

OUR NATIONAL MARINE SANCTUARIES



NATIONAL MARINE
SANCTUARIES™

1972 X 2002

30th Anniversary

S T A T E O F T H E S A N C T U A R Y R E P O R T

 **NOAA** ocean **SERVICE**



NATIONAL MARINE
SANCTUARIES TM



The National Marine Sanctuary System

Our national marine sanctuaries embrace part of our collective riches as a nation. Within their protected waters, giant humpback whales breed and calve their young, coral colonies flourish, and shipwrecks tell stories of our maritime history. Sanctuary habitats include beautiful rocky reefs, lush kelp forests, whale migration corridors, spectacular deep-sea canyons, and underwater archaeological sites. Our nation's sanctuaries can provide a safe habitat for species close to extinction or protect historically significant shipwrecks. Ranging in size from less than one square mile to over 5,300 square miles, each sanctuary is a unique place needing special protections. Natural classrooms, cherished recreational spots, and valuable commercial industries—marine sanctuaries represent many things to many people.

The National Marine Sanctuary Program serves as the trustee for a system of thirteen underwater parks, encompassing 18,000 square miles of marine and Great Lakes waters from Washington State to the Florida Keys, and from Lake Huron to American Samoa. The National Oceanic and Atmospheric Administration's (NOAA) Ocean Service has managed National Marine Sanctuaries since passage of the Marine Protection, Research, and Sanctuaries Act in 1972. Protecting sanctuary resources requires a great deal of planning, management, and cooperation between federal, state, and local officials. The National Marine Sanctuary Program works cooperatively with its partners and the public to balance enjoyment and use with long-term conservation. Increasing public awareness of our marine heritage, scientific research, monitoring, exploration, educational programs, and outreach are just a few of the ways the National Marine Sanctuary Program fulfills its mission to the American people. The Program's staff is ever mindful of their responsibility to protect America's ocean treasures for this and future generations.



National Oceanic and Atmospheric Administration

US Secretary of Commerce
Donald L. Evans

Under Secretary of Commerce for Oceans and Atmosphere and Administrator, National Oceanic and Atmospheric Administration
Vice Admiral Conrad C. Lautenbacher, USN (Ret.)

Assistant Administrator for Ocean Services and Coastal Zone Management, National Ocean Service
Margaret A. Davidson, acting

National Marine Sanctuary Program

Director
Daniel J. Basta

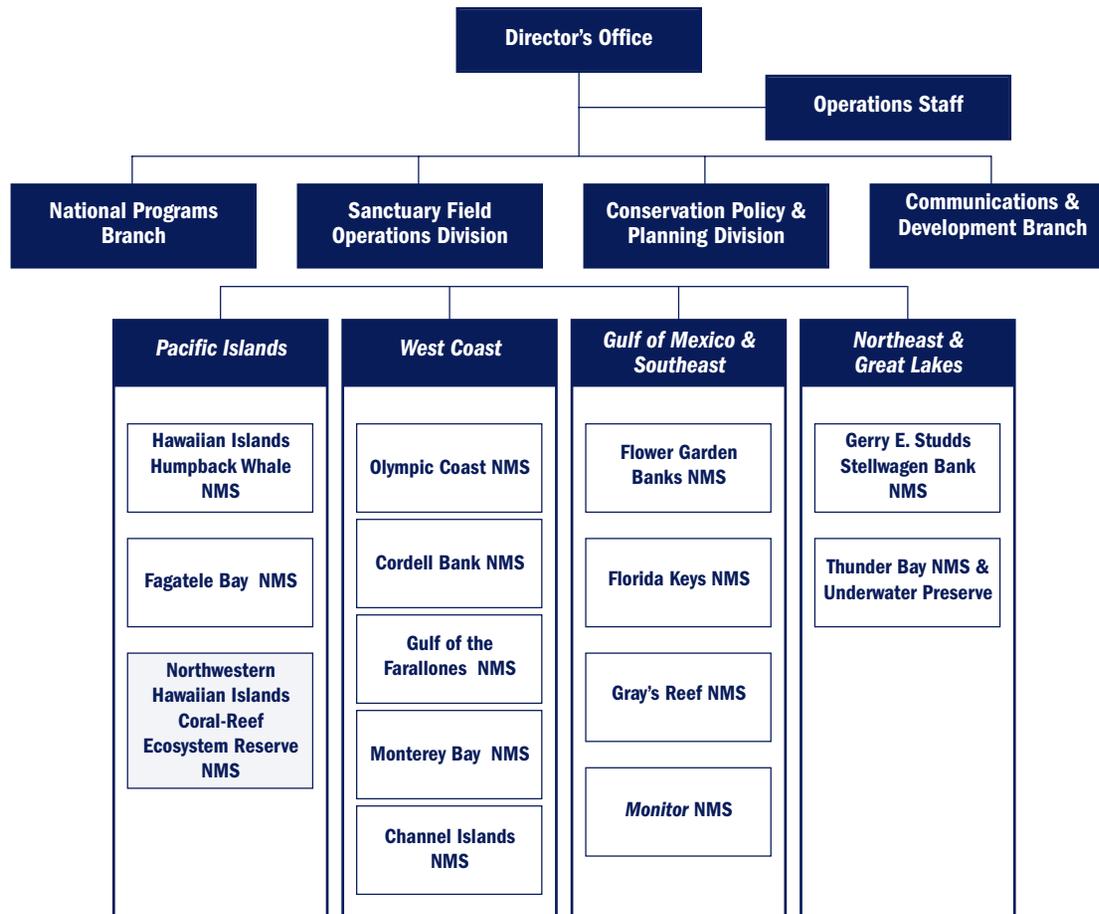
Deputy Director
Michael Weiss

Branch Chiefs—
Charles Alexander
National Programs

Helen Golde
Conservation Policy and Planning

Matt Stout
Communications and Development

The National Marine Sanctuary Program's (NMSP) guiding vision is to inspire people through education, research, public outreach, ocean exploration, and marine management to value marine sanctuaries as treasured places today and for generations ahead. Its mission is to serve as trustee of our nation's underwater parks in conserving, protecting and enhancing their biodiversity, ecological integrity, and cultural legacy. Three branches—National Programs, Communications and Development, and Conservation Policy and Planning—support the system's 13 sites. Currently, NMSP has begun the process for designating our country's fourteenth national marine sanctuary in the Northwestern Hawaiian Islands. This area contains over 24 species of coral, more than 7,000 marine species and includes nearly the entire world population of endangered Hawaiian monk seals.



The Northwestern Hawaiian Islands were named a Coral-Reef Ecosystem Reserve under Executive Orders 13178 and 13196. It is currently beginning a process to determine if it will be designated a national marine sanctuary.



Message from the Director...

In his address to the nation after September 11, President George W. Bush described our country as "the brightest beacon for freedom and opportunity in the world...no one will keep that light from shining." The events of last year have taught many lessons to our nation and the world about the American spirit and the importance of preserving and enhancing the values that embody that spirit: freedom to explore, to discover, to pursue education, to honor communities, and most importantly to prevail in our commitment to protect, preserve, and pass on to future generations the national resources we ourselves inherited. This year, we in the National Marine Sanctuary Program renew again our commitment to preserve our nation's system of underwater parks from Washington State to the Florida Keys, from Massachusetts to California and far offshore to American Samoa.

Americans have held a deep appreciation for our nation's great natural resources, our national parks, and more recently, our coasts and oceans. Over the last century advances in science and technology have confirmed the oceans' importance to our very existence.

For many years, our marine sanctuaries were as unfamiliar and mysterious to the public as the ocean habitats the Program protects today. Ten years ago funding for the system of sanctuaries that Congress had created in 1972 to protect our country's special ocean places was a mere \$5 million. As knowledge of the oceans' importance increased, so did support for this important marine program. In 2002, the year of its 30th anniversary, the National Marine Sanctuary Program will operate with a total budget of \$48.9 million. Currently, the Program protects 18,618 square miles of ocean and freshwater natural resources on both coasts and in American Samoa.

The National Marine Sanctuary Program today is developing new marine conservation partnerships and utilizing innovative management structures that bring direct public participation to a new level. We're working together with others throughout the NOAA family—the National Weather Service, the Office of Ocean Exploration, the National Marine Fisheries Service, and the National Undersea Research Program, as well as with a wide mix of state and other Federal agencies. In addition, new partners in our marine outreach and education efforts include the National Geographic Society and the Association of Zoos and Aquariums.

In 2001 the non-profit National Marine Sanctuary Foundation was created to expand the reach of our program's education and outreach nationwide. Within a short time, the Foundation and Board members, which include marine explorer Jean-Michel Cousteau, Director of the Institute for Exploration Dr. Robert Ballard, and ocean explorer Dr. Sylvia Earle, began promoting the vision

and mission of our national marine sanctuaries. In its first year, the Foundation was the organizing sponsor of the first Ocean Day on Capital Hill, engaging members and staff from both the House and the Senate to learn more about the work of our national marine sanctuaries.

Also in 2001, we broke new ground through the Management Plan Review process which continues today. This review process ensures each sanctuary can reevaluate its mission and goals with help from its constituents. In 2001, the Program for the first time is using an integrated ecosystem framework in jointly reviewing the management plans of three California sanctuaries: Cordell Bank, Gulf of the Farallones, and Monterey Bay.

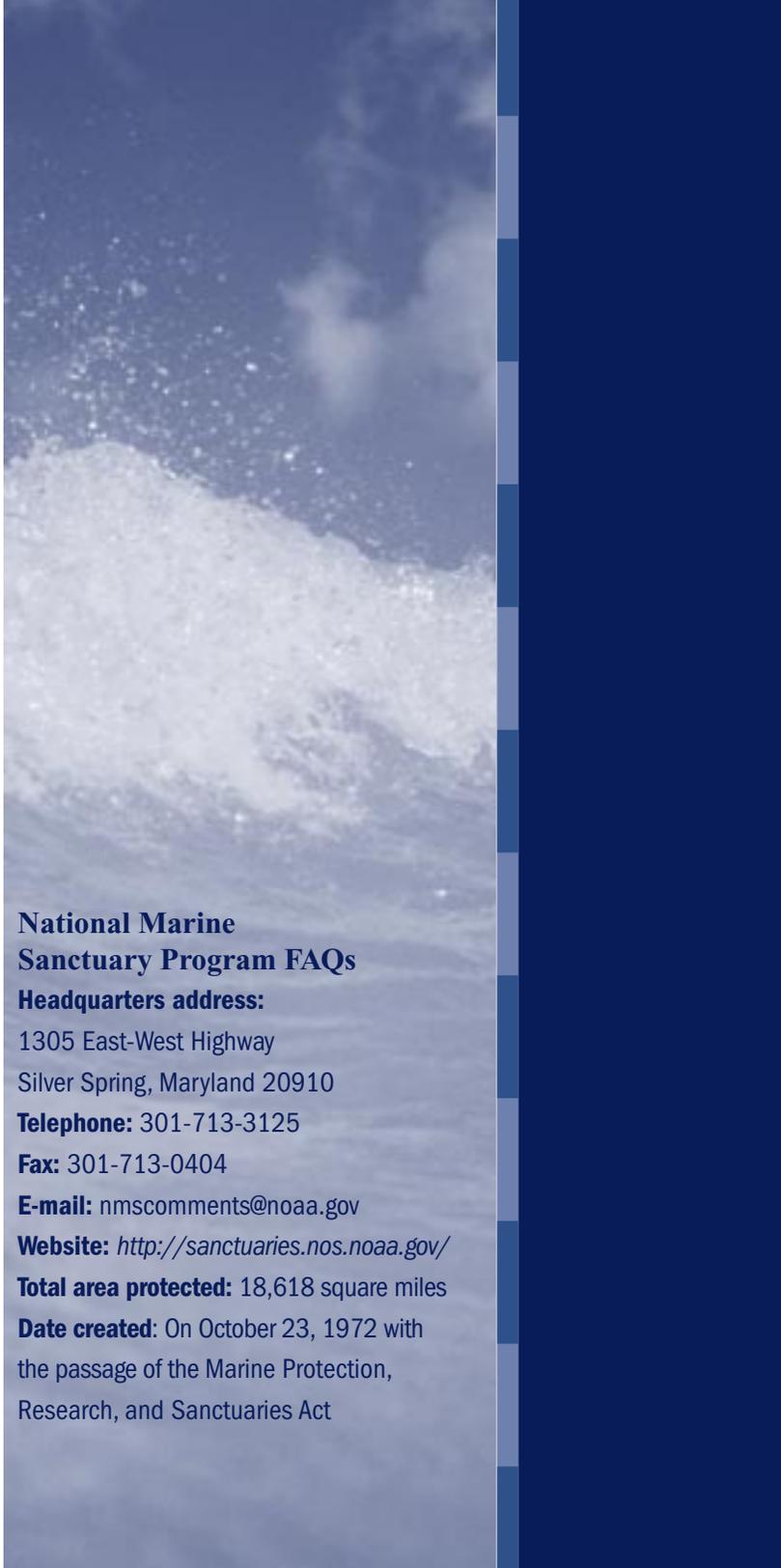
This year, for the first time in its history, the National Marine Sanctuary Program will have Sanctuary Advisory Councils (SAC) at all of its 13 sites. Currently more than 200 citizens along our coasts participate on these councils as members or act as alternates. SACs bring together leaders from business, recreation, diving, conservation, boating and fishing communities who share in a common goal—to protect our oceans and Great Lakes.

With the increased funds, we are making major investments in the Sanctuary Program infrastructure and building a physical presence never before seen at our sites, in visitor centers, in sea-going vessels, and in the equipment necessary for scientific research. These investments will pay ten-fold dividends in bringing the vision of marine conservation and national stewardship to all Americans.

For example, the Dr. Nancy Foster Center, to be constructed in Key West, will house Florida Keys Sanctuary operations and laboratory space, provide waterfront for research vessels and scientific collaborators, and state and federal agency activities. The Center will also offer a place to educate visitors about the marine environment and conservation. The recent transfer of a US Coast Guard three-story building and boathouse in Scituate, Massachusetts to NOAA also furthers Program conservation efforts. This space now provides office space for the Stellwagen Bank Marine Sanctuary operations.

We're especially excited about the Program's increased use of pioneering innovative technology that will bring a vast array of ocean treasures directly to the American public and change the way we experience marine environments. Most Americans have never seen a marine sanctuary and most of those who have, only see the surface. We plan to bring real-time virtual experiences of the underwater world to classrooms and venues across the country.

The National Marine Sanctuary Program is partnering with Bob Ballard's Institute for Exploration and



National Marine Sanctuary Program FAQs

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Total area protected: 18,618 square miles

Date created: On October 23, 1972 with
the passage of the Marine Protection,
Research, and Sanctuaries Act



Sea Research Foundation to build and test a model in ocean education with telepresence technologies. Now after exploring the floor of the Monterey Bay with remote camera systems, students become part of a computer-generated experience of the Monterey environment and learn about the different marine species and plants of the region. This project is the first step in linking all 13 national marine sanctuaries together into a networked web of live interactive cameras and introducing advanced education programs that bring visitors under the waves and into the sanctuaries to explore, examine, and experience.

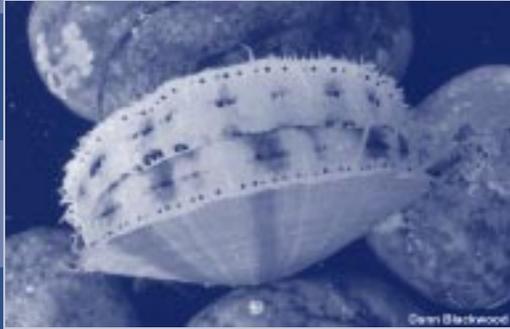
Our submerged cultural marine resources will also be highlighted. With increased funding, the Program's early focus on marine inhabitants and ecosystems can now include a stronger emphasis on creating a nationally recognized submerged cultural resources program. The Monitor NMS office and The Mariners' Museum are joining together to create the USS *Monitor* Center and NOAA Submerged Cultural Resources Center. The creation of this center will demonstrate the beginning of our Program's new emphasis on submerged cultural resources.

In 2002, the Monitor National Marine Sanctuary concludes the Program's most significant cultural resource project as NOAA and the US Navy attempt to raise the turret of the famed Civil War shipwreck off Cape Hatteras, North Carolina. In the future, underwater cameras will let students and teachers tag along when marine archeologists visit the sunken remains of historic shipwrecks in the Thunder Bay National Marine Sanctuary and Underwater Preserve in Lake Huron.

Exciting sea adventures have challenged the American public to learn more about our mysterious ocean worlds. As a maturing program we've taken up the challenge and have begun periodic expeditions of exploration that promote marine conservation, research, and education. In recent years, we've joined the National Geographic Society, NOAA's Office of Ocean Exploration, and the Woods Hole Oceanographic Institution in ocean explorations such as the Sustainable Seas Expeditions, Islands in the Stream and participated in the underwater lab, Aquarius. This year, the National Marine Sanctuary Program embarks on the "Investigations of Marine Sanctuaries 2002" (IMS2002), a project to identify linked ecosystems along the Pacific coastline, mapping wrecks in Thunder Bay, Michigan, and joining with the National Geographic Society's Sustainable Seas Expeditions in the Gulf of Mexico.

As we move forward with our new programs we are looking over a changed national landscape. All of the staff, including state and local partners of the National Marine Sanctuary Program, its supporters, and volunteers are even more dedicated to preserving our nation's marine sanctuaries. The changed national landscape has made us think we will never be the same again. And we won't; we will be better.

Daniel J. Basta
National Marine Sanctuary Program



The sea scallop (*Placopecten magellanicus*) has over 100 blue eyes along the edge of its mantle with which it senses light intensity. This mollusk scoots away from potential danger by flapping the two parts of its shell, like a swimming castanet.



Atlantic herring (*Clupea harengus*) is one of the marine fish species not considered overexploited. Large schools of these small fish fall prey to a wide variety of predators including whales, sharks, and tuna.

Gerry E. Studds

Stellwagen Bank National Marine Sanctuary

The Sanctuary...

The slow retreat of massive Ice Age glaciers formed what is today Stellwagen Bank, a sand and gravel plateau at the mouth of Massachusetts Bay. There, ocean currents sweep water in and out of the bay, with the bank partially blocking the opening and funneling the flow into relatively narrow passageways. Nutrient-rich waters make this an area of high marine productivity and a multilayered food web with species ranging from single-celled phytoplankton to great whales.

The presence of feeding whales in the sanctuary draws an estimated one million whalewatchers a year, intent on witnessing the acrobatics of the gregarious but endangered humpback whale.

Sanctuary FAQs

Date Designated: November 4, 1992

Protected area: 842-square miles; 25 miles east of Boston, 3 miles southeast of Cape Ann, and 3 miles north of Provincetown

Key species: Humpback whale, northern right whale, white-sided dolphin, storm petrel, northern gannet, bluefin tuna, Atlantic cod, winter flounder, sea scallop, northern lobster

Key habitats: Sand and gravel bank, muddy basins, boulder fields, rocky ledges, open water

Sanctuary Superintendent: Dr. Craig MacDonald

Headquarters address: 175 Edward Foster Road, Scituate, Massachusetts 02066

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Website: <http://stellwagen.nos.noaa.gov/>

Accomplishments 2000 -2001

Whalewatch Guidelines—The sanctuary and the National Marine Fisheries Service (NMFS) Office of Protected Resources jointly issued revised guidelines for whalewatching in the northeast region. The guidelines provide approach and departure speeds and minimal distance recommendations for commercial and recreational humpback whalewatching boats. Regulations

for approach distances when sighting northern right whales are also incorporated into all materials. The National Marine Fisheries Service, in consultation with the sanctuary, issued an Advance Notice of Proposed Rulemaking (ANPR) for whalewatching in the Northeast.

Humpback Whale Research Funded—Stellwagen Bank’s importance as a major feeding ground for marine mammals was one of the primary reasons for the sanctuary’s designation. The information archive on the whales of Stellwagen Bank is extensive. Many peer-reviewed research publications have been generated based on that archive. The sanctuary has committed funding to several whale research institutions to continue the maintenance and update of this database. In addition, the sanctuary has supported monthly cruises to document and identify cetaceans and to study whale feeding behaviors and sand lance populations.

Partnership with New England Aquarium—The New England Aquarium agreed to serve as the Boston area Sanctuary Visitor Center. Outdoor exhibit panels focusing on sanctuary resources and conservation issues were created for the Aquarium’s outdoor mall and whalewatch boats. The Aquarium’s Immersive Theater currently offers a 15-minute interactive, multi-screen video called “Storm Over Stellwagen.” The national sanctuary system contracted for an addition of a brief film trailer to more fully describe the entire system of sanctuaries.

Seafloor Habitat Recovery Monitoring—This program is a collaborative effort between scientists at the Stellwagen Bank Sanctuary, the National Undersea Research Center at the University of Connecticut (NURC-UConn), the University of Maine and Brown University. The program began in 2001 and is planned to continue for 10 years. The specific objectives are to compare the relative impacts of human-caused and natural changes to the seafloor with respect to fish and benthic animal communities and seafloor structure. The project uses remotely-operated vehicles and the Sanctuary’s Integrated Seafloor Imaging System (ISIS) along with box cores, side scan sonar, and current profilers.

Water Monitoring Linked to MWRA Program—Although modeling by the Massachusetts Water Resources Authority (MWRA) suggests there should be no impact on Sanctuary water quality through normal operation of the outfall pipe, there has been a significant expression of public concern over potential impacts from anomalous events. To assess this possibility, the sanctuary established a multi-year water quality monitoring program in 2001. The sanctuary program works with the Harbor Outfall Monitoring Program, supported by MWRA, to increase sampling coverage to multiple sites within the sanctuary.

Submerged Cultural Resources—The sanctuary began its first systematic investigation of cultural



Dan Blackwood, USGS

A sheet of water streams off the rounded tail of a humpback whale (*Megaptera novaeangliae*). Humpbacks usually lift their flukes out of the water when they dive; the underside, not seen here, is different for every whale, giving researchers a way to identify individual whales by their fluke prints.



Gerry E. Studds Stellwagen Bank



Former Congressman Gary E. Studds and Congressman Bill Delahunt cut the ribbon at the grand opening for the sanctuary's high tech exhibit in Provincetown, Massachusetts.



Large numbers of boats travel into the sanctuary to watch whales. Scientists are interested in knowing whether sound levels are loud enough to hurt whales' hearing or if noises are causing whales to change their behaviors.

Caption (right):

A field of live sand dollars (*Echinarachnius parma*) sits on a sandy plain along with one test (the white inner structural form from a dead sand dollar)

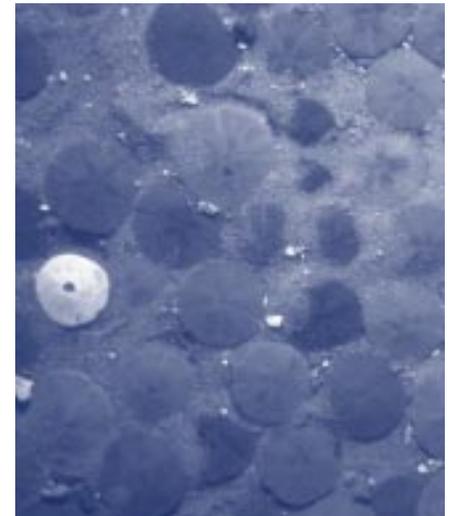
Photo: Dann Blackwood and Page Valentine, USGS

resources within its boundaries. Sanctuary scientists collaborated with scientists from the US Geological Survey in Woods Hole, Massachusetts, and NOS Coast Survey to visit three shipwreck sites in the southern sanctuary. The ISIS camera system was used to collect video and still photographs of each wreck. Those data are being analyzed to further identification of the wrecks.

Provincetown Visitor Exhibit— In 2001, the Stellwagen Bank National Marine Sanctuary created hi-tech portals that now provide the public with virtual visitation to this site three miles off the coast of Massachusetts. The new exhibit received enthusiastic reviews from visitors who expressed amazement in discovering the resources protected in the sanctuary.

“See A Spout - Watch Out”—An important part of the sanctuary's mandate is protecting vulnerable marine life from human threats. In 2001, the sanctuary joined with the International Wildlife Coalition to help prevent whale strikes by recreational boaters in the Stellwagen Bank Sanctuary through a variety of educational efforts. Almost 5,000 boaters were trained, some 30,000 rack cards, and 25,000 decals were distributed, and 125 metal dockside signs were installed as a result of this new collaboration.

Stellwagen Bank Sanctuary Enforcement Program—Another noteworthy accomplishment achieved in 2001 was the development of a Joint Enforcement Plan with the National Marine Fisheries Service's Office for Law Enforcement and the Massachusetts Environmental Police. During the months of May-October, enforcement officers conducted two patrols a week and reported that boaters responded well to on-water interception. Their report also highlighted the high demand for greater enforcement efforts.



Monitor National Marine Sanctuary

The Sanctuary...

The *Monitor* National Marine Sanctuary, designated in 1975, enjoys the distinction of being the nation's first national marine sanctuary.

The *Monitor* is recognized worldwide for its significance as the vessel that revolutionized nineteenth-century naval technology and warfare. In 1862, the turreted ironclad engaged the Confederate warship CSS *Virginia* in battle. Less than a year later the *Monitor* sank off Cape Hatteras, North Carolina, during a storm.

Since 1995, the National Marine Sanctuary Program and its partners have worked to stabilize the *Monitor's* hull and recover major components of the ship, including the propeller, propeller shaft, and skeg. The *Monitor's* steam engine was recovered in July 2001 and recovery of her famous gun turret and guns is planned for 2002. All recovered artifacts are transported to The Mariners' Museum, Newport News, Virginia, for conservation and eventual public exhibition.

Resting at a depth of 235 feet, the wreck provides habitat for corals, sponges, anemones, and other plants and attracts a variety of deepwater fish.

Sanctuary FAQs

Date Designated: January 30, 1975

Protected area: 1-square mile

Key species: Amberjack, black sea bass, red barbier, scad, dolphin, sand tiger shark, corals, sea anemone, sea urchin

Key habitats: Pelagic, open ocean; artificial reef

Sanctuary Manager: Dr. John Broadwater

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James River, VA. Close-up view of officers on the Deck of the USS *Monitor* near the turret. Taken July 9, 1862



The battle between the USS *Monitor* and the Confederate Ironclad *Virginia* was the subject for a United States postage stamp in 1995. The *Monitor* is the vessel near the lower portion of the stamp.

Accomplishments 2000 -2001

Silver Anniversary—On January 30, 2000, the *Monitor* National Marine Sanctuary celebrated its 25th year of preservation, research, education, and outreach. The Mariners' Museum, Newport News, Virginia, hosted a ceremony honoring the sanctuary's anniversary and NOAA's 30th anniversary.

Monitor Expeditions—The 2000 field season ran April through mid-August with only a three-week break between the two major expedition phases. Both NOAA and the US Navy fielded dive teams in an effort to survey the site, install cement bags to stabilize the *Monitor's* hull and deploy a 90-ton engine recovery structure to be used for rigging and raising the vessel's engine. An important milestone was reached in July 2001 when The *Monitor's* 35-ton steam engine, that had rested for 139 years under the Atlantic Ocean, was recovered. The *Monitor* 2001 Expedition was the longest, most complex yet, consisting of six separate expeditions to the sanctuary, including a large-scale U.S. Navy dive expedition with coordination and advice from the *Monitor* staff. The Navy again expanded its capabilities, utilizing for the first time ever a commercial saturation diving system that greatly increased the amount of time the Navy divers could work on the engine. NOAA supported the Navy by conducting a spring expedition that mapped and photographed the engine, providing details on configuration and access needed for the final recovery plan.

Increasing Sanctuary Awareness and Support—As the result of its recovery missions, the *Monitor* Sanctuary received major media coverage during 2000 including nearly four and one-half hours of prime time national television coverage. Many of the documentaries were repeated several times in the months that followed. The Discovery Channel on May 14 aired a one-hour documentary titled, *Wreck Finder*, which featured four significant salvage projects conducted by the USS *Grasp*. The *Grasp's* 1999 diving expedition to the *Monitor* was one of the four projects. On October 24, the award-winning PBS science series NOVA aired a one-hour special on the *Monitor* titled, *Lincoln's Secret Weapon*. This program documented the recovery of the *Monitor's* two-ton propeller by NOAA, the U.S. Navy and other participants. The NOVA documentary was previewed at a special ceremony at the National Press Club, Washington, D.C., on September 26. The event featured several key speakers including Senator John Warner (R-VA), senior Department of Commerce representatives, and other dignitaries. The History Channel aired *Raise the Monitor*, a full two-hour documentary on the USS *Monitor* and *Monitor* National Marine Sanctuary on December 11. This program, which has broadcast numerous times, tells the *Monitor's* story from its construction up to the deployment of the engine lifting structure by NOAA and the U.S. Navy during July 2000. On October 22, CBS Sunday

An illustration of the *Monitor* as seen from above its current position. The Civil War ironclad rests on its turret in the deep waters off Cape Hatteras, North Carolina.

Caption (right): Image compiled from a series of video stills by Jeff Johnston of the *Monitor* National Marine Sanctuary. Although there is a distinct amount of distortion from the camera, this image shows some of the significant collapse that has occurred over the years.



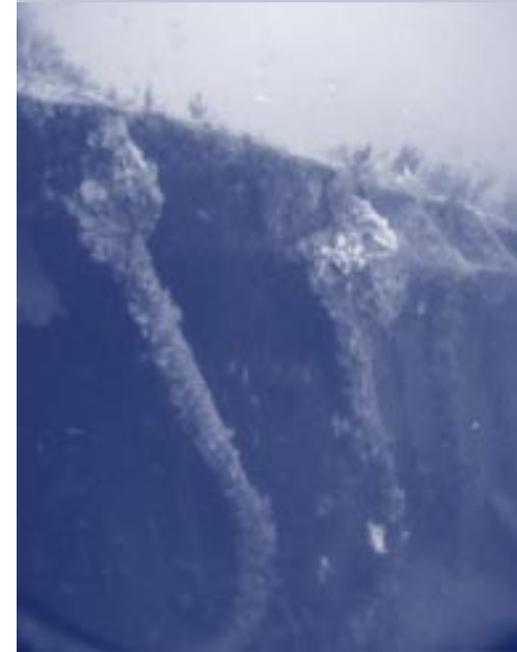
Morning ran a feature story on the *Monitor* with host Charles Osgood reporting on NOAA's current efforts to work with the U.S. Navy and others to preserve the *Monitor* for future generations. In addition to these new programs, the Arts and Entertainment Channel broadcast a program on the *Monitor* on its *Civil War Chronicles* series. During the 2001 engine recovery expedition, a production team was aboard to film the event for a documentary to be developed for the Discovery Channel.

International and National Outreach—Sanctuary Manager John Broadwater presented conference papers and public lectures in numerous U.S. cities and in Canada, Turkey, and Australia. He also served as NOAA Observer on a deep-sea expedition in the Black Sea sponsored by the Institute for Exploration, with support from NOAA. A National Geographic Society article on the Black Sea expedition noted NOAA's participation.

Expanded Navy Partnerships—During 2001, the sanctuary expanded its partnership with the U.S. Navy and developed a cooperative program of research and training with the Naval Sea Systems Command. The training program has proved to be so successful that plans are already underway to continue the program even after the *Monitor's* turret recovery mission scheduled for 2002.

Expanded Dive Partnerships—Also in 2001, the sanctuary expanded its dive program partnerships with the National Undersea Research Center at the University of North Carolina at Wilmington and East Carolina University. The multi-agency dive team has the capability to conduct scientific diving expeditions to water depths down to 300 feet.

Walter B. Jones Awards—On October 3, 2001 at the Walter B. Jones Awards and NOAA Excellence Awards Ceremony, *Monitor* Sanctuary Manager John Broadwater received a NOAA Award for Excellence in Sanctuary Management. The NOAA award recognized Dr. Broadwater's efforts to coordinate the recovery, preservation and exhibition of significant portions of the USS *Monitor*.



Bent and bowed deck support stanchions and the angled ends of "floor beams" along the port boiler.



James River, VA. U.S.S. *Monitor* Onondaga. Soldiers in rowboat in foreground.



The orange ridged sea star (*Echinaster spinulosus*) has orange yellow spines. It has five legs with small tube feet in the under side which are used in locomotion. If sea stars are cut in half, they are able to regenerate and become two individual sea stars.



Sea slugs are uncoiled snails (*mollusks*) that have no shell and have external gills (*cerata*). The regal sea goddess (*Hyselodoris edenticulata*) specializes in feeding upon sponges, thus are quite common in Gray's Reef.

Gray's Reef National Marine Sanctuary

The Sanctuary...

Gray's Reef is 17 miles off the coast of Georgia, in waters 50-70 feet deep. One of the largest nearshore sandstone reefs in the southeastern United States, its sandy, flat-bottom troughs and sandstone outcroppings and ledges are optimal for the colonization of marine invertebrates, including sponges and corals that in turn attract a rich diversity of reef and pelagic fish, sea turtles and marine mammals. The sanctuary lies near the only known calving grounds for the northern right whale, the most endangered large whale in the world.

In 1986, the United Nations listed Gray's Reef as an International Biosphere Reserve. In recent years, the South Atlantic Fishery Management Council designated Gray's Reef as a "Habitat Area of Particular Concern" citing its important biological and ecological values. The Council also noted its scientific importance as a marine habitat, and its great interest to sport fishers and divers.

Sanctuary FAQs

Date Designated: January 16, 1981

Protected area: 23-square miles, 17 miles east of Sapelo Island, Georgia

Key species: Loggerhead sea turtle, spotted and bottlenose dolphins, gag grouper, black sea bass, angelfish, barrel sponge, ivory bush coral, and sea whips

Key habitats: Calcareous sandstone reefs, sand bottom communities, moderate relief ledges, patch reefs, tropical/temperate reef

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Website: <http://www.graysreef.nos.noaa.gov/>

Accomplishments 2000 - 2001

Habitat Assessment - Gray's Reef initiated a comprehensive study of the sanctuary habitat through NOAA's National Centers for Coastal Ocean Science (NCCOS). The habitat assessment study analyzed reef fish monitoring data, the importance of the non-reef habitats for juvenile fish, possible

contaminant levels in sediments and shellfish, the species of fish that spawn at Gray's Reef and the movements of larval fish to and from Gray's Reef.

Sanctuary Cruises—The sanctuary also accomplished several research projects during cruises aboard the NOAA Ship *Ferrel*. The projects resulted in hundreds of biological and sediment samples, bongo tows and beam trawls, 90 SCUBA dives, more than a dozen ROV dives of up to four hours each and the release of drifter buoys, and sidescan sonar operations useful in the management plan review process. Gray's Reef also sponsored a detailed mapping of the sanctuary on the NOAA ship *Whiting*. The results of this hi-tech bottom mapping will be used to characterize the habitat of the sanctuary.

Student Ocean Council—The sanctuary created the Student Ocean Council program to enable upper level high school students from local public and private schools to explore ocean science related careers and subjects. The Student Ocean Council is comprised of 50 students from several coastal Georgia counties. In 2000, the programs included field trips to Gray's Reef and to several of Georgia's barrier islands. Students have worked with sanctuary staff, coastal area scientists (oceanographers, marine biologists and archaeologists), marine educators, marine operations professionals, search and rescue personnel, fisheries technicians, and NOAA personnel.

Distance Learning Programs—Through Georgia's distance learning network Gray's Reef staff are able to teach "live" with as many as seven classes across the State or across the country. The sanctuary can bring the reef to life through slides and video footage. Students in downtown Atlanta and in the mountain community of Helen or on the plains of Texas go beneath the ocean via sanctuary cameras and explore Gray's Reef without ever getting wet.

Exploration—In summer 2001, the sanctuary sponsored a research exploration cruise to an area known as the Savannah Scarp during the NOAA sponsored Islands in the Stream expedition. Using a three person submersible from the Harbor Branch Oceanographic Institutions research vessel *Seward Johnson II*, Gray's Reef scientists joined researchers and educators from South Carolina and Georgia to explore this productive reef fish habitat and document its value for conservation.

Management Plan Review—Gray's Reef Marine Sanctuary significantly broadened its scope of public involvement and awareness in 2001 through management plan revision that drew responses from 100 individuals, organizations and academic institutions. The sanctuary held workshops and produced proceedings for research, education and conservation.

Increased Partnerships—Gray's Reef Marine Sanctuary joined forces with National Marine



Over the years, researchers have learned much about the loggerhead's nesting behavior (i.e. seasonality, number of eggs, sites), but little is known about its behavior when underwater, away from the beach—especially for the relatively small Georgia/South Carolina nesting population. With use of satellite tracking, researchers hope to learn more about the swimming and resting behaviors, habitat utilization, and genetics of the post-nesting loggerhead sea turtle.

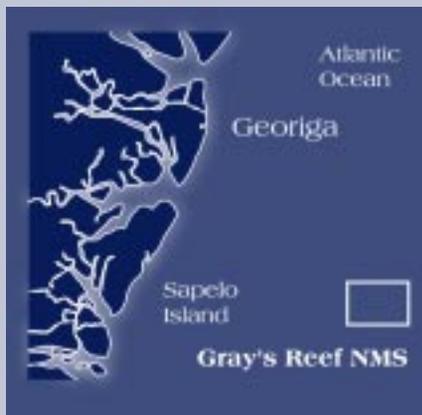


The R/V *Jane Yarn* is a 65 foot converted Navy vessel renovated for marine science and education at Gray's Reef National Marine Sanctuary. The vessel is named after the late Mrs. Jane Yarn, a prominent advocate for protection of Georgia's barrier islands, who worked tirelessly to advance the designation of Gray's Reef National Marine Sanctuary. Jane Yarn served on President Carter's Council on Environmental Quality.



Dean DeFilippo - Passage Productions

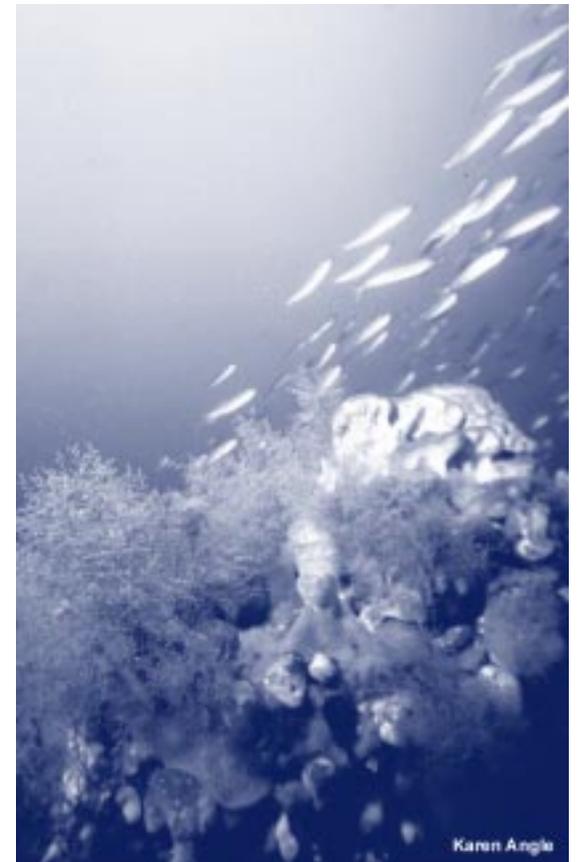
Colonial Tunicate (*Symplegma rubra*): These orange, yellow, and red colonies make bright colored patches on the sandstone outcroppings of Gray's Reef.



Caption (right):

Horizontal reef tops provide habitat for sessile (attached) benthic (bottom dwelling) invertebrates, which rely upon ocean currents for food, gas exchange, waste removal, and egg dispersal. Examples include hard corals, soft corals, sponges, and hydroids.

Fisheries Service (NMFS) and the South Atlantic Fisheries Management Council (SAFMC) to collaborate on the development of a marine protected areas program for the southeast. Sanctuary staff have been appointed to SAFMC advisory panels on Habitat and Marine Protected Areas. The sanctuary also developed the criteria for Marine Protected Area classification adopted by the Council and developed with NMFS and the SAFMC a memorandum of understanding to formalize the cooperation among the three organizations.



Karen Angila

Florida Keys National Marine Sanctuary

The Sanctuary...

The Florida Keys National Marine Sanctuary contains one of the most diverse underwater communities of plants and animals in North America. Its dazzling coral reefs support rich marine populations that depend on the reefs for shelter, food, and habitat. The reefs also hold the final resting places of shipwrecks that span pre-colonial and modern maritime history.

This complex marine ecosystem, which also includes fringing mangroves, seagrass meadows, hardbottom communities, and bank reefs offers many opportunities to commercial fishing and tourism-based businesses that are crucial to Florida's economy. Today, the Florida Keys Sanctuary serves as a model for international marine conservation efforts to save vulnerable oceans.

Sanctuary FAQs

Date Designated (by Congress): November 16, 1990

Protected area: 3,674-square miles of water surrounding the archipelago formed by the Florida Keys

Key species: Hard corals: elkhorn, staghorn, pillar, brain and star corals; soft corals: sea fans, sea rods, and sea whips; sponges; turtle grass; angelfish; spiny lobster; stone crab; grouper; tarpon

Key habitats: Coral reefs, patch and bank reefs, mangrove-fringed shorelines and islands, sand flats, seagrass meadows, hardbottom communities

Sanctuary Superintendent: Billy Causey

Headquarters address: P.O. Box 500368, Marathon, Florida 33050. Regional operations offices located in Key West and Key Largo.

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Accomplishments 2000 - 2001

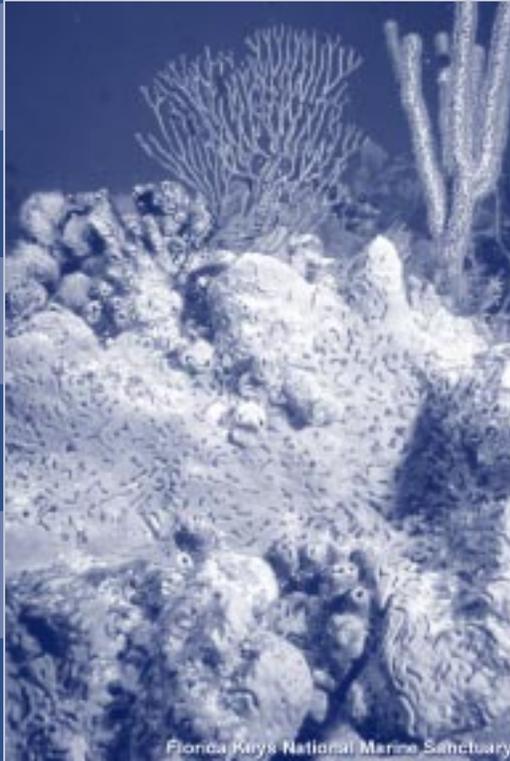
Research and Monitoring—The Sanctuary Research and Monitoring Program's primary goal is to provide the knowledge necessary to make informed decisions about protecting the sanctuary's



Elkhorn coral (*Acropora palmata*) is a branching coral. Branching corals grow in the shallow areas of the reef crest and serve to break up the wave action as it comes onto the reef. The branches of elkhorn coral resemble an elk's rack of antlers, thus its name.



Mangrove islands serve as rookeries for many threatened and endangered species such as the great white heron (*Ardea herodias occidentalis*). Many of the islands in the Florida Keys are zoned for protection of the nesting birds by both the National Park Service and the National Wildlife Refuges.



Soft corals, often mistaken for plants, include the deep water sea fan (*Iciligorgia schrammi*) and the giant slit-pore sea rod (*Plexaurella nutans*). These corals attach themselves to a hard substrate and slowly move with the natural wave action. Sponges like this orange elephant ear sponge (*Agelas clathrodes*) are water filters for the reef. They filter up to 30,000 times their body volume every day.

biological diversity and natural ecosystem and its resources. More than 200 research permits have been issued since implementation of the Sanctuary's management plan in 1997. A wide range of topics is being investigated, including coral physiology and ecology, water quality, fisheries biology, algal and seagrass ecology, and reef geology (www.fknms.nos.noaa.gov/research_monitoring/bycategory.html). Monitoring focuses on the sanctuary-wide status and trends of water quality, coral reef and hardbottom communities, and seagrass beds. It also compares no-take zones and reference sites to determine the efficacy of no-take zones in protecting biodiversity and enhancing human values related to the Sanctuary (www.fknms.nos.noaa.gov/research_monitoring/).

Submerged Cultural Resources—The sanctuary's Submerged Resources Inventory team continued with its valuable underwater and archival research in 2000. The team documented over 660 sites, most of which are historical. Led by Mr. Chuck Hayes, the team developed a three-volume set entitled "Underwater Resources of the Florida Keys National Marine Sanctuary Northeast Region."

Shipwreck Trail—To allow the public to view the sanctuary's historic shipwrecks *in situ*, a sanctuary Shipwreck Trail opened in August 1999, after three years of work by sanctuary staff, contractors, and volunteers. Today dive shops and the general public receive Shipwreck Trail brochures and underwater site guides. Sanctuary education staff frequently give presentations on the Shipwreck Trail to the SCUBA diving community, the marine archaeology community, and the public at large.

South Florida Ecosystem Restoration Task Force—The Florida Keys Sanctuary works with the South Florida Ecosystem Restoration Task Force and Working Group interagency teams that coordinate the nation's largest ecosystem restoration project, to restore water quality, quantity, timing, and distribution to the Everglades' natural systems while balancing the ever-growing demand for fresh water from South Florida. In 2000, the Task Force achieved approval of the Comprehensive Everglades Restoration Plan (CERP), Congressional funding for the restoration project, and reauthorization of the project's legislation part of the Water Resources Development Act. Superintendent Billy Causey serves as the NOAA/NOS/FKNMS representative to the Working Group, ensuring that restoration decisions fully consider the ultimate downstream recipient of restoration, the Florida Keys' coral reefs.

Personal Watercraft Working Group—The sanctuary's personal watercraft working group met regularly in 2000 to develop strategies for managing the impact of personal watercraft on the marine environment and on other user groups. The group includes concerned local citizens, conservation representatives, flats guides, charter boat captains, personal watercraft rental operators and industry representatives, resource management agency personnel and enforcement

officials. The group developed strategies to address concerns associated with personal watercraft and presented these at community meetings.

Sustainable Seas Expeditions/Outreach and Education—In 2000, the Florida Keys Sanctuary Education and Outreach program taught visitors, residents, teachers and students about the sanctuary, its resources, and stewardship skills to care for these resources. The 2000 Sustainable Seas Expeditions provided unique educational opportunities for students from the Midwest and northeast United States, and South Florida through fish counts, Coral Reef Classroom, tours of the NOAA Ship Gunter and DeepWorker submersibles, student-at-sea days, and Internet uplinks. By leading the multi-agency Florida Keys Seagrass Outreach Partnership, the sanctuary raises statewide awareness of the importance of seagrass, the seriousness of boating impacts on seagrass, and ways boaters can participate in a solution. The sanctuary education and outreach staff continued to reach residents and visitors through Team OCEAN program brochures and on-the-water interpretation by volunteers.

Partnerships—The year 2000 saw many positive results from the sanctuary's partnerships with the State of Florida and Florida Keys local governments. Federal, state and local agencies have worked together on water quality issues, restoration of the South Florida ecosystem, and management of fisheries, wildlife and other natural resources of the Florida Keys. Foremost among the successes have been the development of new sanitary wastewater treatment systems, creation of vessel no-discharge zones around Key West and progress toward a no-discharge zone for state waters, and the cleanup of spiny lobster and stone crab gear destroyed by hurricanes. Other partnerships include the National Park Service, the US Environmental Protection Agency, and Sanctuary Friends of the Florida Keys.

Florida Keys Sanctuary, the National Park Service and the US Environmental Protection Agency continued their six-year partnership to produce *Waterways*, a half-hour television show that profiles the South Florida environment and sanctuary research and management efforts.

Establishment of the Tortugas Ecological Reserve—In the 1996 final Management Plan for the Florida Keys National Marine Sanctuary, working closely with the State of Florida, NOAA made a commitment to establish an ecological reserve in the Tortugas. During fiscal year 2001, the sanctuary established the Tortugas Ecological Reserve based on a proposal developed by the Tortugas 2000 working group and adopted by the Sanctuary Advisory Council. The 25-member working group included commercial and recreational fishermen, divers, scientists, conservationists, citizens-at-large and resource managers. The process to develop the reserve has drawn accolades from around the country and is touted as a model for collaborative reserve design. (The Tortugas Ecological Reserve consists of two sections: Tortugas



Laurel Canty-Ehrlich

The Florida Keys National Marine Sanctuary is visited by several marine mammal species, including the endangered West Indian manatee (*Trichechus manatus*). Manatees are winter visitors while species like the spotted dolphins and bottlenose dolphins can be seen throughout the year.





William Harrigan

Boulder and massive corals, like this boulder star coral (*Montastrea annularis*), are the “builders” of the reef. A coral head is a colony of small animals called polyps. Polyps the size of a pencil eraser build an external skeleton of calcium carbonate around their bodies. The walls of these skeletons form a rock-like structure. Over time, as new polyps build their skeletons on top of each other, a large coral head is formed. The boulder and massive coral skeletons develop the main reef structure. Coralline algae and encrusting corals glue everything together.

Caption (right): Corals are large colonies of small animals called polyps. These polyps reside within a cup-like calcium carbonate skeleton.

North and Tortugas South, protecting 151-square nautical miles of significant coral reef areas known as Sherwood Forest and Riley’s Hump.)

Dr. Nancy Foster Florida Keys Environmental Center—On April 26, 2000, the Florida Keys Sanctuary dedicated the Dr. Nancy Foster Environmental Center at Truman Annex in Key West. An ex-Navy 2.94 acre site, transferred to NOAA at no cost, will house Lower Region operations and an interagency visitor center, a partnership among NOAA, the National Park Service and the US Fish and Wildlife Service.

Throughout FY2001, the sanctuary worked closely with the US Fish and Wildlife Service and the National Park Service to design an interagency visitor center to be located at the Dr. Nancy Foster Florida Keys Environmental Center in Key West. The purpose of this world-class center is to increase the three agencies’ ability to protect the Florida Keys resources by providing coordinated orientation and education for visitors and residents in one location.

Enhanced Protection of Sanctuary Regulations—In fiscal year 2001, the Florida Keys Sanctuary provided funds to the State of Florida for the purpose of hiring additional law enforcement officers for the sanctuary. Due to hiring constraints within the State, only two new officers were hired, and the funds were used to pay overtime expenses for existing officers. Additionally, funds were reallocated for the purchase of new vessels. The sanctuary was able to obtain two 82’ and two 41’ enforcement vessels from the US Coast Guard which will be used for both enforcement and to support research in the newly created Tortugas Ecological Reserve.



Florida Keys Marine Mammal Sanctuary

Flower Garden Banks National Marine Sanctuary

The Sanctuary...

One hundred miles off the coasts of Texas and Louisiana, a trio of underwater gardens emerge from the depths of the Gulf of Mexico. These fertile coral reefs serve as a regional reservoir of shallow water Caribbean reef fishes and invertebrates. Like oases in the desert, these salt domes provide homes for coral reefs, sponges, and fish of such beauty that the Flower Garden Banks have become a premier diving destination in the United States. Each winter schools of hammerhead sharks visit the sanctuary, and in summer, an annual coral spawning attracts scientists and recreational divers from around the world.

Sanctuary FAQs

Date Designated: January 17, 1992

Protected area: 56-square miles

Key species: Star coral, brain coral, manta ray, hammerhead shark, and loggerhead turtle

Key habitats: Coral reefs, algal-sponge communities, brine seep, sand flats, artificial reef and pelagic, open ocean

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Accomplishments 2000 - 2001

Investigating Fish Habitat—The sanctuary worked with government and university researchers to learn more about fish habitat within the sanctuary. The sanctuary received information from acoustic studies carried out by Louisiana State University that indicated that deep water areas of the sanctuary are being utilized by grouper and snapper as aggregation and possible spawning areas. Further studies are planned to investigate and document this data.

Radar Buoys—Anchor points were made for the installation of radar reflecting buoys at the East



An example of the reefscape at the Flower Gardens - brain coral (*Diploria strigosa*), exposed reef rock, branching tube sponge (*Pseudoceratina crassa*), algae, parrotfish, bluehead wrasse juveniles, and brown chromis. As seen in the background, there is great competition for space. Monitoring efforts over the past 20 years have shown over 50% coral coverage - an indication of a very healthy reef.



The spotted drum (*Equetus punctatus*) is an elusive fish but it can be found at all three banks of the sanctuary. Juveniles are seen swimming in circular motions.

Flower Garden Banks



The Coast Guard Air Station in Corpus Christi, Texas, has been working closely with the Flower Gardens Banks office to conduct flyovers of the sanctuary on a regular basis. Sanctuary personnel have been fortunate enough to participate in these fly-overs in order to learn the capabilities of the jets and pilots and to educate the Coast Guard personnel about the sanctuary regulations.



Orange cup coral (*Tubastraea coccinea*) is not found on any of the sanctuary banks, but it's made a home on oil platforms in the area.

and West Flower Garden and Stetson Banks. These buoys will assist in warning large ships of the sensitive coral reef communities located here, preventing potential damage caused by anchors and slack towing cables.

GIS/Atlas & mapping—The sanctuary, in 2000, began the development of a sanctuary Geographic Information System. The computer-based mapping and data management system will compile information and enhance analysis and presentation. Sanctuary staff initiated this effort by compiling sanctuary-related data into one system.

“Naturalist on Board” — The Flower Garden Banks Sanctuary initiated a new education and outreach program that will place sanctuary-trained volunteers on commercial dive charter vessels to provide information about the sanctuary and its resources. This is part of the overall National Marine Sanctuary Program “Team OCEAN” program.

Speakers Bureau—To increase education and outreach capacity, the sanctuary successfully piloted a Speakers Bureau in San Antonio, Texas. Volunteers are trained and provided with audiovisual tools to use in Flower Garden Banks Sanctuary presentations given to students, civic organizations, dive clubs and other groups.

“Down Under, Out Yonder”—This project is a continuation of the very successful teacher workshops that bring diving educators to the Flower Garden Banks Sanctuary to learn about the sanctuary system and to incorporate that knowledge in their individual educational curricula.

Sanctuary Partnerships—In 2000, the Flower Garden Banks continued ongoing partnerships and initiated new ones to fulfill its mission to conserve the vulnerable coral reefs in the Gulf of Mexico. Working with the Minerals Management Service (MMS), an ongoing partnership, the sanctuary continued a long-term monitoring project of coral reef areas. The sanctuary also worked with MMS to expand the scope of the monitoring program to include additional parameters and areas within the sanctuary. Other important sanctuary partnerships included the U.S. Geological Survey, U.S. Coast Guard, National Marine Fisheries Service, and the Gulf of Mexico Foundation.

Flower Garden Banks Receives IMO No-Anchor Area Designation— A NOAA proposal to the International Maritime Organization (IMO) to create a no-anchor zone at the Flower Garden Banks National Marine Sanctuary culminated in December 2000 with the establishment of the first internationally-designated no-anchor zone for the purpose of coral reef protection. The

designation took effect in June 2001. The IMO designation named the Flower Garden Banks Sanctuary as the world's first No-Anchor Zone for the purpose of protection of sensitive coral reef resources.

Underwater Research—In 2001, the sanctuary continued a number of research studies that used underwater remotely operated vehicles (ROVs) to explore sites within the sanctuary that may be important aggregation and possible spawning areas for several species of grouper and snapper. Sanctuary scientists also documented a rare double coral spawning event, which occurred this year after both the full moons of August and September.

Sanctuary Vessel Acquisition—Acquiring a new sanctuary vessel, a decommissioned U.S. Coast Guard 82' patrol boat named the *Point Glass*, was an important achievement for the sanctuary in 2001. The new vessel will be used to support research and monitoring programs, conduct environmental education projects, provide surveillance for enforcement of sanctuary regulations, and maintain a physical presence in sanctuary waters.

Water Quality Monitoring—The ability to monitor water quality conditions within the sanctuary was enhanced by the installation of a “real-time” oceanographic data buoy, which provided, via satellite, information on currents, temperature, and salinity that can be accessed over the Internet. Also multiparameter water quality data instruments were installed on each of the three banks within the sanctuary which will continuously monitor temperature, salinity, pH, dissolved oxygen, light intensity, and turbidity at the sea floor.

Partnership with the Audubon Aquarium of the Americas—The sanctuary initiated a partnership with the Audubon Aquarium of the Americas in New Orleans, Louisiana, to develop a Flower Garden Banks National Marine Sanctuary exhibit within the aquarium. The exhibit's opening is anticipated in 2002. In addition, a program to utilize aquarium volunteer divers to conduct reef fish population surveys in the sanctuary is under development.

Ocean Discovery Day—A day of fun and marine exploration was held in Galveston, Texas, on June 1, 2001, to celebrate the visit of the Sustainable Seas Expedition, a NOAA/National Geographic Society undersea project, to the Flower Garden Banks Sanctuary. An open house aboard the NOAA Ship *McArthur*, booths, exhibits, and a variety of activities for all ages were held throughout the day.



Brenden Holland

An annual, predictable event of coral spawning occurs at the Flower Gardens Banks eight to ten nights after the full moon in August or September. Here, a male star coral, (*Montastraea cavernosa*) releases sperm into the water column.





The Garibaldi (*Hypsypops rubicundus*) is lucky enough to be protected not only within the boundaries of the marine sanctuaries, but by California state law as well. They are intensely curious about divers and are known for being very aggressive when defending either territory or eggs. During the spring these feisty fish will vigorously defend their nests from unwelcome guests- no matter how large they may be.



As well as providing a wonderful setting for research and recreation, the Channel Islands National Marine Sanctuary is a wonderful classroom. Los Marineros is a marine education program for children founded by the CINMS in 1987 and administered by the Santa Barbara Natural History Museum. Activities provided by the Los Marineros program include lectures, presentations, and student field trips to the local marine sites.

Channel Islands National Marine Sanctuary

The Sanctuary...

A fertile combination of warm and cool currents swirling around five islands makes up the Channel Islands National Marine Sanctuary attracting a great variety of plants and animals—large nearshore forests of giant kelp, flourishing populations of fish, invertebrates, and cetaceans, and diverse colonies of pinnipeds and marine birds. Historic shipwrecks and Chumash Indian artifacts are lodged in this marine protected area.

Sanctuary FAQs

Date Designated: September 22, 1980

Protected area: 1,658-square miles

Key species: California sea lion, elephant seal, harbor seal, blue and gray whale, dolphin, blue shark, brown pelican, western gull, abalone, garibaldi, and rockfish

Key habitats: Kelp forests, rocky shores, sandy beaches, seagrass meadows, deep rocky reefs, and pelagic, open ocean

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E-mail: channelislands@noaa.gov

Website: <http://www.cinms.nos.noaa.gov/>

Accomplishments 2000 - 2001

Submerged Cultural Resources—The Channel Islands Sanctuary's submerged cultural resources educational programs targeted both local community and national audiences. Sanctuary staff carried the sanctuary message to the public through schools, adult education programs, online chats hosted by RAIN Network (Regional Alliance for Information Networking), a local community Internet and education provider, and a lecture program at the Santa Barbara Maritime Museum. Staff also presented papers on the sanctuary's submerged cultural resources programs to the academic community at the Society for Historical Archaeology in Quebec City, Canada. In addition,

the sanctuary partnered with BRIDGE, an Ocean Science Teacher Resources Center, to create an online curriculum featuring shipwrecks of the five West Coast sanctuaries.

Annual monitoring and recording of the cultural resources was completed through a component of the Shipwreck Reconnaissance Program, a collaborative effort with partners including the Coastal Maritime Archaeology Resources Group and Channel Islands National Park. Shipwreck exhibits to be featured at the Santa Barbara Maritime Museum Visitors Center were also planned.

The Collaborative Marine Research Program—The Channel Islands Sanctuary initiated a program to involve commercial fishers in assessing sanctuary resources. The program joined together local marine researchers, commercial fishers, and the regional resource management agencies (National Marine Fisheries Service and California Department of Fish and Game) to work on sanctuary issues.

In the future, commercial fishers will aid the sanctuary in project selection and act as paid research assistants. The program will also collect significant information, build upon current relations between marine stakeholders, and contribute to resource protection.

Sanctuary Partnerships—The sanctuary opened a southern regional office in Channel Islands Harbor, Oxnard, California, to develop partnerships and programming opportunities within the Ventura County and greater Los Angeles County communities.

Over 53% of the population in the tri-county region of the sanctuary is located within the Ventura region. Two harbors with over 5,000 boat slips are located within Ventura County. The sanctuary works in partnership with Ventura County Harbor Department officials to develop the new Youth and Group Boater Education facility in Channel Islands Harbor.

Sanctuary Naturalist Corp Volunteer Program (SNC)—Whalewatching operators within Santa Barbara, Ventura, and Channel Islands Harbor signaled support for the new Sanctuary Naturalist Corps volunteer program, which numbers 100 volunteers, and their efforts to enhance whale watching interpretation aboard their boats.

Sanctuary Advisory Council—The Sanctuary Advisory Council (SAC) provided key advice and assistance in 2000 on the management plan revision. The SAC was instrumental in helping the sanctuary attract interested members of the local community, helped raise community awareness about the plan process and the concept of boundary expansion, and hosted two Public Information Forums on the project. In August, the SAC provided the sanctuary with a recommendation that two boundary configurations be considered as possible preferred alternatives in the Draft Environmental Impact Statement.



This urchin, the red urchin (*Stroglyocentrotus franciscanus*) is the largest species of urchin, growing up to 7 inches in diameter and can survive for up to 20 years. Red urchins are grazers whose appetite for kelp play a significant role in the overall ecology of kelp forest and reef communities.

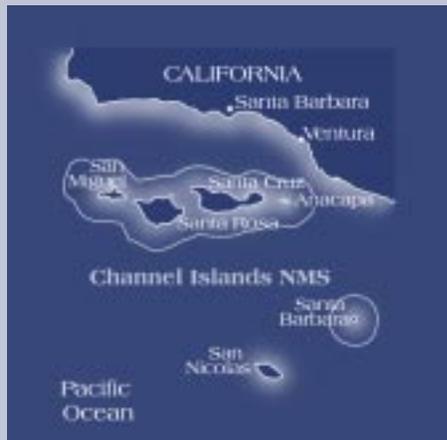


San Miguel, the westernmost island surrounded by Channel Islands National Marine Sanctuary, is strongly influenced by wind and weather. The colder waters here support a distinct group of fish and invertebrates that are not found on the southern islands.



Kip Evans

In addition to being a food source for abalone, fish and invertebrates, kelp forests (*Macrocystis pyrifera*) provide shelter for many marine organisms. Factors such as these make kelp an extremely important part of the Channel Islands ecosystem.



Channel Islands Marine Reserves Process—The Marine Reserves Working Group (MRWG), a subgroup of the Sanctuary Advisory Council (SAC), provided the SAC and resource management agencies with a series of consensus agreements that provide the State and NOAA guidance on the establishment of sanctuary no-take marine reserves. The 17-member MRWG group, reflecting fishing interests, conservation community representatives, government agencies, and the public reached consensus agreements on a problem statement, goals, and objectives in a suite of reserve implementation recommendations. The MRWG received advice from the SAC-appointed Marine Reserve Science Panel who recommended that a minimum of 30-50% of the representative habitats should be set aside in the sanctuary in order to meet MRWG's goals for protecting biodiversity and sustaining fisheries. Similarly, the Socio-Economic Panel provided the MRWG with economic data on the commercial and recreational industries operating within the sanctuary. This information, along with ecological data, was placed in a GIS support tool that MRWG members used in mapping exercises to study the potential benefits and impacts of various reserve placement scenarios. In 2001, the SAC directed the sanctuary and Department of Fish and Game (DFG) to develop a reserve network recommendation that incorporates the MRWG process and consensus agreements. After nearly three years of unprecedented agency partnership, community involvement, science and economic analysis, CINMS and DFG delivered a recommendation to protect 25% of CINMS waters by prohibiting all extractive uses in a network of marine reserves. If adopted, this network of marine reserves would be the largest in North America. The regulatory process is expected to take 6 to 12 months

Management Plan Review—As one of the oldest of the 13 National Marine Sanctuaries, Channel Islands was one of three sanctuaries chosen to begin the five-year management plan review process. Five other sanctuaries have also begun management plan review. This process provides the sanctuary with the opportunity to take a closer look at how the marine environment has changed over the last 20 years, understand the cause and effect relationship of human activity and natural perturbations on the marine resources, and engage the public in the management plan decision-making process.

New Research Vessel—The Channel Islands Sanctuary began construction design of a 62' Teknicraft catamaran. This research vessel will cruise at 20 knots, sleep 10, and carry up to 24 passengers during research. The new vessel is designed to support a wide variety of projects, includes wet and dry labs, a-frame, winch, crane, dive compressor and a variety of electronic equipment.

Monterey Bay National Marine Sanctuary

The Sanctuary...

The Monterey Bay National Marine Sanctuary, the largest of the nation's 13 marine sanctuaries, encompasses more than 5,300 square miles of water. The sanctuary contains many diverse biological communities: rocky shores, lush kelp forests, one of the deepest underwater canyons in North America, and the largest habitat on earth—the open ocean. An abundance of life, from tiny plankton to huge blue whales, thrives in these waters. This diversity of habitats and marine life has made the sanctuary a national focus for marine research and educational programs.

Sanctuary FAQs

Date Designated: September 18, 1992

Protected area: 5,328-square miles along nearly 300 miles of the central California coast from the Marin County headlands south to Cambria.

Key species: Sea otter, blue whale, market squid, brown pelican, rockfishes, giant kelp, krill, and leatherback sea turtle

Key habitats: Sandy beaches, rocky shores, kelp forests, subtidal rocky reefs, soft-bottom benthic submarine canyons, cold seeps, wetlands and pelagic, open ocean

Cultural resources: Submerged shipwrecks and Indian midden sites

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Accomplishments 2000 - 2001

Sanctuary Vessel Traffic Strategies—The International Maritime Organization gave final approval in May 2000 for a Sanctuary vessel traffic scheme that moves recommended tracks for ships of 300 gross tons and above, as well as ships carrying hazardous materials and barges, farther offshore. The sanctuary began educating mariners about the new vessel tracks, which became effective



Common dolphins are just one of the many species of dolphins that frequent the waters within California's Monterey Bay National Marine Sanctuary.



Animals that live in the intertidal zone have to be specially adapted to life with heat, wind, rain, and large crashing waves. Some animals like starfish, hold on tight with suction cup tube feet. Others, like mussels, attach to the reef with tough fibrous threads.



There are many world renowned surfing areas in the Monterey Bay National Marine Sanctuary, including “mavericks” at Pillar Point in Half Moon Bay and Santa Cruz.



Harbor seals haul-out on the intertidal rock to rest. At dozens of locations along the shores of the Monterey Bay National Marine Sanctuary hundreds of harbor seals haul-out during the day where they can be viewed by the general public.

December 1, 2000, by distributing flyers to shipping agents and captains, placing the new tracks on nautical charts, and including the strategy in NOAA's *U.S. Coast Pilot*, a series of nautical books that cover a variety of information important to navigators of coastal and intracoastal waters.

Sustainable Seas Student Summit—Ecosystem monitoring was the theme for the sanctuary's annual SSE Student Summit event. To inspire high school student teams to undertake field projects, a workshop on rocky intertidal monitoring techniques was organized with support from regional scientific experts. At the summit, 40 students from six high schools presented their results to an audience of peers and local scientists. Other education activities related to the SSE included two on-the-water excursions for students and a live satellite uplink that allowed the public to interact with divers in the sanctuary.

Environmental Emergencies—In 2000, Monterey Bay Sanctuary responded to 20 environmental emergencies. These included sewage spills, a plane crash, boat groundings, and sinkings. In addition, the sanctuary sent a team to help the Channel Islands National Marine Sanctuary respond to the Alaska Airlines crash.

Citizen Watershed Monitoring Network—The sanctuary's Citizen Watershed Monitoring Network organized more than 100 volunteers for a one-day, sanctuary-wide monitoring event. The event, “Snapshot Day 2000,” held on Earth Day, was the largest simultaneous water quality monitoring event in California. Data from the first event indicated relatively good water quality in most coastal streams, but high nitrogen levels in and near the Salinas River and high coliform in some San Mateo County creeks.

Furthering Education In Southern Boundaries—The sanctuary sponsored three Cambria teachers to participate in the sanctuary's annual teacher workshop, worked with San Luis Obispo County to install a new “Sanctuary southern monument” exhibit, began planning a new outdoor exhibit at the Hearst Castle Visitor Center, and partnered with California State Parks and National Geographic Theatre in San Simeon to host a special event launching the 2000 Sustainable Seas Expeditions. A new sanctuary education specialist was hired to work in a satellite office provided by California State Parks, San Simeon District at Hearst Castle.

Interpretive Enforcement to Further Resource Protection—In 2000 Monterey Bay became one of two national marine sanctuaries selected to pilot an enforcement program. A special agent from NOAA's Office for Law Enforcement was assigned to concentrate on sanctuary enforcement issues. As a result, both response and investigative capabilities were improved and a strategic enforcement (monitoring and surveillance) plan is underway. The sanctuary piloted a new interpretive enforcement program for the growing community of sea kayakers off Monterey and in Elkhorn Slough. The new Team OCEAN program sent a team of sanctuary staff on the water to

educate fellow kayakers about the sanctuary, its wildlife, and how to protect marine mammals from disturbance.

Model Urban Runoff Program—Educational activities to reduce urban runoff continued in several California communities. Partnerships with the cities of Watsonville and Monterey and the California Coastal Commission led to a number of multimedia projects: bilingual brochures (Spanish-English); a bilingual training video, “Make The Connection,” which provides storm drain pollution prevention tips for restaurant employees; the award-winning “Dirty Words” radio campaign; and a bilingual TV Public Service Announcement on urban runoff pollution. In addition, the sanctuary’s Urban Watch monitoring program expanded to Capitola, California.

Research Cruises—The sanctuary research team participated in research cruises aboard MBARI’s *Western Flyer*, Moss Landing Marine Labs’ *John Martin*, and the NOAA Ship *McArthur*. The sanctuary also took advantage of a NOAA Shrike Commander aircraft. These efforts included exploring the Davidson Seamount, tagging leatherback turtles, and assessing krill, bird, and mammal populations. Using the *Deep Worker* submersible, divers took photographs of the seafloor associated with no-fishing reserves and proposed communication cable routes.

Kelp Management Report—The sanctuary research team produced a kelp management report that summarized existing information on kelp systems and commercial harvesting and made policy recommendations for improving kelp harvesting throughout the sanctuary. The California Department of Fish and Game is using it in developing its updated five-year kelp management plan.

SIMoN: Ecosystem Monitoring Program—SIMoN, Sanctuary Integrated Monitoring Network, was developed after extensive input from resource managers and scientists to include coordinated historical data, State of the Sanctuary publications, web access for education and resource management purposes, and new funds for monitoring. In 2001, the sanctuary staff completed the design of SIMoN and received funding from NOAA to hire necessary staff. In September 2001, the sanctuary received funding (\$2 million) from the David and Lucile Packard Foundation to initiate critical monitoring activities.

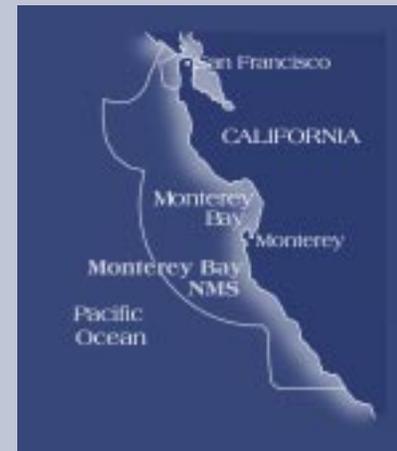
Joint Management Plan Review —The Monterey Bay joined with Cordell Bank and Gulf of the Farallones Sanctuaries in a five-year management plan review process. Monterey Bay staff hired two contractors to help in the process and completed six months of initial evaluation of existing management plan review in advance of the public process that began in November 2001.

Initiated Collaborations with Fishing Industry - The sanctuary hosted several public forums which focused on commercial fishing and research related to fishing issues. It also commenced, at the initiation of leaders in the fishing industry, a collaborative process to discuss fishing issues related the Monterey Bay National Marine Sanctuary.



Kip Evans

Exposed rocky areas are often used as resting sites for many fish eating birds such as these cormorants seen here at sunset.





Stellar sea lions are one of several endangered species making a comeback in the Gulf of the Farallones. The animal's loud roar and the male's thick mane helped the marine mammals get their name.



Sunrise at Stinson Beach in Marin County is a sight to behold in the early glow of morning. Twenty minutes from San Francisco, the beach, adjacent to sanctuary waters, is a popular weekend destination. In 2001 over 1.6 million visitors came to enjoy its beauty.

Gulf of the Farallones National Marine Sanctuary

The Sanctuary...

The Gulf of the Farallones Sanctuary is rich in marine resources: spawning grounds and nurseries for commercially valuable species, at least 36 species of marine mammals, and 13 species of breeding seabirds. One-fifth of California's harbor seals breed within the sanctuary while the Farallon Islands are home to the largest concentration of breeding seabirds in the contiguous United States. In addition to the Farallon Islands, the sanctuary boundaries include the coastline up to mean high tide, and protect a number of accessible lagoons, estuaries, bays, and beaches for the public.

Sanctuary FAQs

Date Designated: January 16, 1981

Protected area: 1,255-square miles, along the coast of California north and west of San Francisco

Key species: Steller sea lion, gray, blue and humpback whales, Dungeness crab, Common Murre and Ashy Storm-Petrel

Key habitats: Coastal beaches; rocky shores; salt marsh; estuaries; mud and tidal flats; pelagic, open ocean; deep benthos; continental slope and shelf

Cultural resources: Shipwrecks and fossil beds

Sanctuary Manager: Ed Ueber

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Website: <http://www.gfnms.nos.noaa.gov/>

Accomplishments 2000 - 2001

Restoring Bolinas Lagoon—Bolinas Lagoon, a haven for wildlife with its rich wetlands and quiet waters, has also attracted development and recreation seekers to this scenic area of the Gulf of the Farallones National Marine Sanctuary. Filled in along its edges, the tidal prism of this

dynamic lagoon has also changed due to an accumulation of silt from logging, housing development, and other land use. Used extensively by wintering waterfowl and shorebirds, Bolinas Lagoon is also home to breeding harbor seals, herons and egrets and is the only Ramsar site (the Convention on Wetlands of International Importance) in California, Oregon, and Washington. The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

To restore Bolinas Lagoon, sanctuary staff is working with the State of California, Marin County, the Army Corp of Engineers, and other organizations on a long-term management plan. The Gulf of the Farallones Sanctuary, in collaboration with the Farallones Marine Sanctuary Association, continued its SEALS program to protect the harbor seals in Bolinas Lagoon. SEALS volunteers educate visitors about harbor seals and monitor human and seal interactions that may cause resting seals to flee from their haul-out areas.

Tracking Gray Whale Mortalities—Working in cooperation with The Marine Mammal Stranding Network, which includes The Marine Mammal Center, California Academy of Sciences, University of California-Berkeley, National Marine Fisheries Service, the sanctuary developed a system to keep track of gray whale mortalities. To accurately assess the number of dead whales, the members of the Marine Mammal Stranding Network developed a method to mark and track dead whales to ensure accurate counts.

Farallones Marine Sanctuary Association—In 2000, the Farallones Marine Sanctuary Association, a local group of sanctuary supporters, developed several new education programs in cooperation with the sanctuary that reached out to the San Francisco Bay Area public about the marine environment. School programs for kindergarten through 12th grade students were offered at the Sanctuary Visitor Center in San Francisco. This program reached 432 students with the assistance of AmeriCorps' Watershed Stewards.

At Duxbury Reef, students are monitoring the reef and developing stewardship projects for this heavily visited area. The pilot high school intertidal monitoring program teaches students how to identify marine invertebrates and algae. They later use these skills to monitor key species and human patterns to study the effects of trampling.

Sanctuary Visitor Center—The Sanctuary Visitor Center in San Francisco saw a dramatic increase in



Colorful sea stars decorate the algae-covered rocks of a tidepool along the central California Coast.



Gulf of the Farallones National Marine Sanctuary

Blue rockfish (*Sebastes mystinus*) hover nearshore amidst long stipes of bull whip kelp. The school moves with the gentle ebb and flow of the water as the mop-like fronds of kelp wave above.

Caption (right): Branches of algae, or seaweed, that cast ashore in the tideline often resemble the branches of terrestrial plants or trees. Because of the insects and other organisms that cling to it, this beach wrack is an important foraging area for shorebirds.



visitors since it was established. The number of visitors increased from 4,500 in 1998 to 40,000 in 2001. The National Park Service and Golden Gate National Park Association restoration of Crissy Field, where the visitor center is located, now features a tidal marsh, restored dunes, and a historic airfield.

20th Anniversary Celebration—Throughout 2001, the Gulf of the Farallones Sanctuary celebrated its 20th anniversary by sponsoring events that included a lecture series, kayaking, whale watching, birding, and tidepool trips. For the main anniversary event, the sanctuary and Association sponsored a Sanctuary Festival that attracted 3,000 visitors to the Sanctuary Visitor Center. Many marine-related environmental organizations participated in the event and helped educate the public on shared missions.

Ban on Motorized Personal Watercraft—After a 6-year process, initiated by a petition from the Environmental Action Committee of Marin County, a new regulation was put in place on October 10, 2001 that banned personal watercraft from all sanctuary waters.

Management Plan Review—In coordination with Monterey Bay and Cordell Bank Sanctuaries, the Gulf of the Farallones Sanctuary initiated the joint management plan review. All three sanctuaries produced State of the Sanctuary reports and sponsored scoping meetings to receive input from the public to revise the current management plans.

New Sanctuary Advisory Council—Starting in 2002, the newly appointed SAC members will assist with the Management Plan review by prioritizing comments received from the public during scoping meetings.

NOAA Recognizes Sanctuary Supporters—A NOAA Environmental Hero award was given to sanctuary volunteer and San Mateo County Naturalist Bob Breen.

Executive Director of the Farallones Marine Sanctuary Association Maria Brown was chosen as NOAA's Coastal Steward of the Year for her work in recruiting a dedicated and involved volunteer base for the sanctuary.



Joe Heath

Cordell Bank National Marine Sanctuary

The Sanctuary...

Northwest of California's Golden Gate Bridge, at the edge of the continental shelf, Cordell Bank rises from the seafloor. For the most part, the water is about 400 feet deep; however, along a few of its ridges and pinnacles, this submerged island rises to within 120 feet of the ocean surface. Here, upwellings of nutrient rich ocean waters and the bank's topography create one of the most biologically productive areas on the West Coast--a lush feeding ground for many marine mammals and seabirds. Its depth, currents, and distance from the mainland have kept this special part of the California seafloor a mystery to the public. Cordell Bank is at the focal point of the only transboundary current in the North America.

Sanctuary FAQs

Date Designated: May 24, 1989

Protected area: 526-square miles, 60 miles northwest of San Francisco, California

Key species: Krill, Pacific salmon, rockfish, humpback whale, blue whale, Dall's porpoise, albatross, and shearwater

Key habitats: Rocky subtidal areas, open ocean, soft sediment continental slope and shelf

Sanctuary Manager: Ed Ueber

Headquarters address: Fort Mason, Building 201, San Francisco, CA 94123

Telephone: 415-464-5247

Fax: 415-868-1202

E-mail: cordellbank@noaa.gov

Website: <http://www.sanctuaries.nos.noaa.gov/oms/omscordell/omscordell.html>

Accomplishments 2000 - 2001

ROV Surveys and Research Efforts—Sanctuary staff initiated remotely-operated vehicle (ROV) surveys on Cordell Bank that provide data for several different studies. The primary effort of the surveys was to characterize critical habitat on Cordell Bank and initiate site characterization studies to provide data for the Sanctuary's Management Plan Review. Nine locations totaling 15 hours diving were over the Bank. This was the first time systematic surveys were conducted on the Bank since



Two giant blue whales, each near 100 feet in length, appear at the surface above Cordell Bank before they resume diving. The thick tail stalk and the two raised blowholes are characteristic of blue whales, as is their mottled blue-gray color.



For many years, the productivity around Cordell Bank has attracted the attention of commercial and recreational fishermen. It also attracts bird and whale watchers.



Cordell Bank Expeditions

Tiny strawberry anemones stretch their starry crowns of tentacles to catch prey from the food-rich currents.



Cordell Expeditions completed SCUBA surveys in the mid 1980's. Using the ROV provided by the Sustainable Seas Expedition, the collaborative deep ocean explorations conducted by NOAA and the National Geographic Society, allowed the sanctuary to collect data far below the diver depths of the earlier study.

The divers discovered that most of the dive locations supported large aggregations of juvenile rockfishes (*Sebastes spp.*). This bodes well for the Bank's rockfish resources, as recruitment throughout the 1990's was generally poor. Data from this cruise may also provide information which can be used to describe essential fish habitat for juvenile and adult rockfishes. Images provided data that can be used to assess gear impacts and the distribution and abundance of benthic invertebrates and algae on Cordell Bank.

Management Plan Review—In coordination with Monterey Bay and the Gulf of the Farallones Sanctuaries, Cordell Bank initiated the joint management plan review. All three sanctuaries produced State of the Sanctuary reports and sponsored scoping meetings to receive input from the public to revise the current management plans.

Boundaries Clarified—Staff from the Cordell Bank Sanctuary, National Marine Sanctuary Program headquarters and NOAA's Coastal Services Center reviewed the boundary description for Cordell Bank and identified inconsistencies in boundary definitions for the mutual boundary between Cordell Bank and the Gulf of the Farallones. These inconsistencies were clarified and the boundaries digitized. Digitizing the boundary coordinates will be used in an analysis that may be necessary during the Management Plan Review.

New Personnel & Office Space—In 2000, with increased funding for the program, the Cordell Bank National Marine Sanctuary hired two permanent employees, an education specialist and biological technician. With this increase in staff and resources, the sanctuary was better able to address on-site and national program priorities. The new office space, a result of a cooperative agreement with the National Park Service and the Cordell Bank Sanctuary, is located adjacent to the Point Reyes National Seashore headquarters.

Research Vessel Purchased—The Cordell Bank and Gulf of the Farallones Sanctuaries added a new research vessel, the *C. Magister*. The new vessel will greatly enhance the research capabilities of the two sites.

Research Cruises—Using ROV and Delta submersible, the sanctuary conducted two research cruises to classify Cordell Bank habitats.

Fagatele Bay National Marine Sanctuary

The Sanctuary...

NOAA's most remote sanctuary nestles in an eroded volcanic crater on the island of Tutuila, American Samoa. An ancient Polynesian culture has served as steward of this fringing coral reef ecosystem that contains crown-of-thorn starfish, giant clams, and blacktip reef sharks. In the late 1970s, nearly 200 species of coral were devastated by a crown-of-thorn starfish attack. Over 90% of the corals were destroyed. This attack was followed by two hurricanes, tropical storms and coral bleaching. Despite these damaging natural events, the coral has proved resilient, and today is protected by Fagatele Bay National Marine Sanctuary.

Sanctuary FAQs

Date Designated: April 29, 1986

Protected area: 0.25-square miles, 14 degrees south of the equator, on the southwest shore of Tutuila Island, American Samoa

Key species: Crown-of-thorn starfish, blacktip reef sharks, surgeon fish, hawksbill turtle, parrotfish, giant clam

Key habitats: Tropical coral reef

Sanctuary Manager: Nancy Daschbach

Headquarters address: P.O. Box 4318, Pago Pago, American Samoa 96799

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Fax: 684-633-7355

E-mail: fagatelebay@noaa.gov

Website: <http://www.fbnms.nos.noaa.gov/>

Accomplishments 2000 - 2001

Longliner Removal from Pago Pago Harbor--Nine abandoned longliners, grounded on the coral reef in Pago Pago Harbor in 1991, were removed under a joint NOAA, American Samoa Government, Department of the Interior, and US Coast Guard effort. Sanctuary Manager Nancy Daschbach organized the removal and participated in many of the necessary activities during the removal and in the aftermath. Daschbach and eight other NOAA employees were awarded the NOAA Silver Medal for their efforts to restore and protect American Samoan corals.



The genus *Pocillopora* is one of the most common types of coral found in American Samoa, and has some of the most widely distributed species throughout the Pacific. The species pictured here, consists of compact clumps composed of uniform, thick, primarily upright branches with flattened ends.



The coral formations in Fagatele Bay are found very close to shore. The beach (upper left) is only about 20 feet wide and 200 long at high tide, and is composed mainly of calcareous sand.

Fagatele Bay



Fagatele Bay's extensive coral reef ecosystem includes over 600 species of corals, macroinvertebrates, fish, and microalgae have been recorded in the bay's waters.

EnviroDiscoveries Camp—Entertaining-while-educating future coral reef stewards was an important facet of Fagatele Bay Sanctuary's EnviroDiscoveries Camps. Twice in 2000, three-day camps provided children of the island with environmental activities. EnviroDiscoveries Camps were held on land within the National Park of American Samoa on Tutuila and Ofu Islands. The sanctuary co-sponsored the camp. Sixty-five schoolchildren attended the camps.

World Environment Day—On the first World Environment Day celebration in American Samoa on June 5, 2000, the sanctuary coordinated activities, exhibits, and interactive educational computer games to teach children about hazards that impact the ocean such as oil spills. The sanctuary also presented Environmental Hero Awards. The celebration was spearheaded by *Le Tausagi*, the interagency environmental educators group.

Project Wet—The Sanctuary education coordinator co-facilitated two teachers' Project Wet workshops. Twenty-eight teachers and administrators attended workshops on the islands of Manu'a and Tutuila. Drawing upon instructions and activities from the Project Wet Curriculum and Activity guide, the workshops informed the participants about water resources and water conservation. In addition, three schools were visited by *Le Tausagi* members. *Le Tausagi*, using the Project Wet activity guide, reached 67 students.

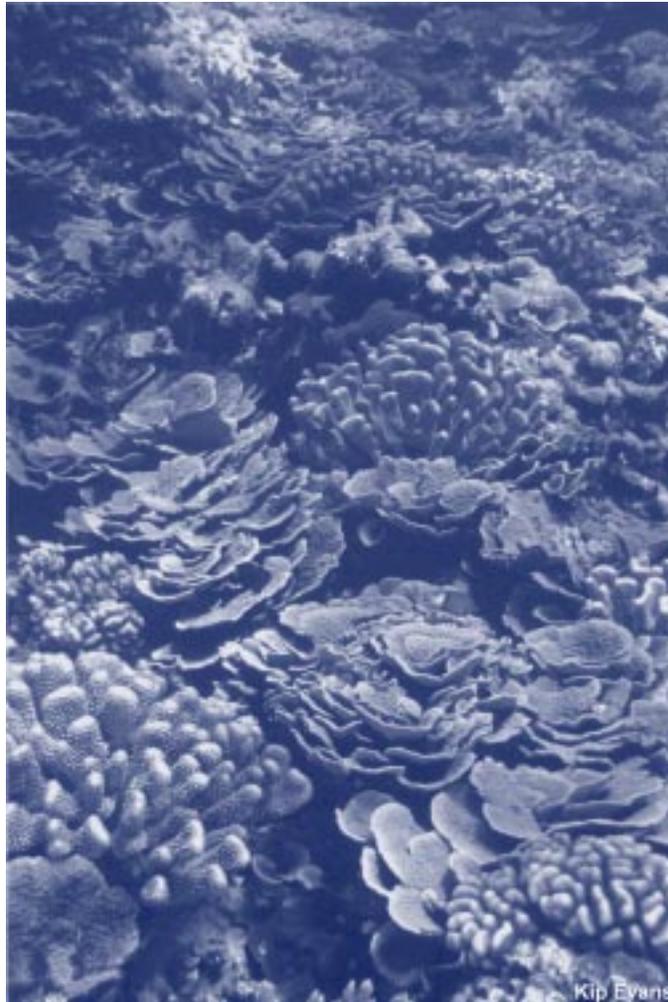
Fagatele Bay National Marine Sanctuary Signs—Educational signs are an important way of getting the sanctuary's message out. In 2000, turtle information signs and general information about the sanctuary were produced in cooperation with the National Marine Fisheries Service. The informative signs are part of a cooperative project with the National Marine Fisheries Service, Department of Marine and Wildlife Resources, and the AmeriCorps volunteers.

AmeriCorps Volunteers—The Sanctuary education coordinator trained and supervised two AmeriCorps volunteers. In all respects, the volunteers have been successful in promoting the sanctuary program and assisting in 2000 projects and activities.

Coral Reef Resource Survey—The Fagatele Bay Sanctuary has sponsored periodic coral reef resource surveys at the site since 1985. In 2001, the sanctuary conducted its fifth survey. The sanctuary and the principal investigator, Dr. Charles Birkeland, announced that the coral reef had recovered from the insults of the past twenty year, these include a crown-of-thorns starfish invasion in the late 1970s that destroyed 90% of the corals in Fagatele Bay, two hurricanes, and a major coral bleaching in the mid-1990s.

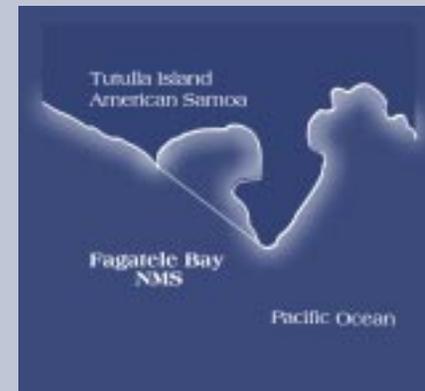
Mapping and GIS—A multi-beam mapping mission of Fagatele Bay was completed, and a GIS

database utilizing these data and past information was compiled in 2001. The maps generated from the mission identified new benthic regions that were not known before, including a “hole” that was deeper than the 100m limit of the multibeam system. The GIS database is a developing project that will provide map linked information on resources in Fagatele Bay. This information will allow for more refined planning and evaluation of resource protection. Most of the database maps can be found at <http://dusk.geo.orst.edu/djl/samoa/>. The site also provides general information about American Samoa.



This large sea star is known locally as a lima. It is found on reef flats and is a striking bright blue. Not common in Fagatele Bay, the sea star is common on other reef flats of American Samoa. As a member of the phylum *Echinodermata*, the sea star's body plan is radially symmetrical, that is, equal units arranged in a circle around a central disc.

Caption (left): Climatic change and rise and fall of sea level are significant influences on coral reefs. Over geologic time, the southwest Pacific has enjoyed the most continuous occupation of coral reefs worldwide.





Female humpback whales and their calves are sometimes accompanied by a single adult male humpback whale, otherwise known as an “escort” whale. This escort protects the female and her calf from other whales and may sometimes attempt to mate with her.



A young calf performing a back flip in Maalaea Bay, Maui. Spectacular behaviors such as these (known as breaching) can easily be seen from the shores of all the main Hawaiian Islands. Whale watching regulations make it unlawful to approach a whale closer than 100 yards.

Hawaiian Islands Humpback Whale National Marine Sanctuary

The Sanctuary...

One of the world's most important humpback whale habitats is within the warm and shallow protected waters of the Hawaiian Islands Humpback Whale National Marine Sanctuary. Scientists estimate that two-thirds of the entire North Pacific humpback whale (*Megaptera novaeangliae*) population migrate to Hawaiian waters to breed, calve, and nurse their newborns. The sanctuary is also home to a fascinating array of marine animals, corals, and plants, some of which are found nowhere else on Earth. Its cultural heritage includes native Hawaiian traditions of living in harmony with the sea.

Sanctuary FAQs

Date Designated: November 4, 1992

Protected area: 1,370-square miles

Key species: Humpback whale, pilot whale, Hawaiian monk seal, spinner dolphin, green sea turtle, coral reefs, limu (seaweed)

Key habitats: Humpback whale breeding, calving, nursing grounds; coral reefs; sandy beaches

Acting Sanctuary Manager: Naomi McIntosh

Headquarters address: Maui Office: 726 South Kihei Road, Kihei, Hawaii 96753. Sanctuary offices are also based in Oahu and Kauai islands.

Telephone: 808-879-2818

Fax: 808-874-3815

E-mail: hihumpbackwhale@noaa.gov

Website: <http://www.hihwnms.nos.noaa.gov/>

Accomplishments 2000 - 2001

Humpback Whale Research—The sanctuary increased funding support in 2000 for scientific research, awarding over \$60,000 in grants to six projects. The projects yielded important findings useful to sanctuary management and other agencies that share the responsibility for protecting endangered humpback whales by increasing baseline information on habitat requirements,

population dynamics, social behavior, and vital rates of North Pacific humpbacks. The new technologies and methods include tracking, aerial survey, and videogrammetry. To ensure study results would be useful to other agencies and the general public, the sanctuary took several steps to integrate research with sanctuary outreach and education. The sanctuary website offers an annotated list of all sanctuary-supported research projects and studies dating back to 1993. Sanctuary research grant recipients also participate as presenters in the Sanctuary Lecture Series on the islands of Maui, Kauai, and the Big Island.

Sanctuary Education Center—A mini marine science museum and library, where some displays and artifacts are the hand-built creations of volunteers, remains a main attraction at the site in Kihei, Maui. The sanctuary improved training and education for volunteers, enabling a corps of interested individuals to assist the center and to provide visitors with information on the sanctuary program and humpback whales. The center also proved an extremely popular venue for the Sanctuary Lecture Series. Monthly lectures by cultural and marine science experts—including researchers with projects supported by sanctuary funding—have attracted capacity crowds and provided the sanctuary with opportunities for positive publicity. During the 2001 humpback whale season over 1000 people visited the site during the month of March. In addition, the Sanctuary Education Center hosted close to 25 school group visitations that included students from Hawaii, other states and countries. In June, the Sanctuary hosted a teacher workshop.

Media and Outreach—A sanctuary press kit successfully solicited positive media coverage of the education center and, as a related development, the sanctuary experienced a significant increase in the number of visitors stopping-in at the headquarters site on Maui. In response to the increased visits by school and community groups, the sanctuary developed a program of on-site interpretation of sanctuary resources, including the archeologically significant Native Hawaiian aquaculture pond fringing the shorefront.

Solar Electric System Partnership—The sanctuary headquarters site was chosen in 2000 to be the recipient of an innovative solar electric system, developed jointly by the US Department of Energy and the Maui Electric Company. Collaborating with these agencies allowed the sanctuary to publicize the environmental value of the system and promote a public festival that included educational activities and entertainment.

Interagency coordination—The sanctuary continued to work with NOAA Fisheries Office for



Education and research are the main goals of the Hawaiian Islands Humpback Whale National Marine Sanctuary. A majority of the Sanctuary's publications are printed in English and Hawaiian. Recently, the State of Hawaii's Department of Education reprinted several of the Sanctuary's bilingual coloring books for their native Hawaiian language program.



Photo: R. Cartwright - NMFS Permit # 895-1450

The scientific name for the humpbacks, (*Megaptera novaengliae*), means “Great Wings of New England.” The Hawaiian name for the whale is Kohola.



Enforcement. This agency holds the authority to enforce humpback whale protection laws arising from the Marine Mammal Protection Act and the Endangered Species Act. The sanctuary continued to funding support enabling the NOAA Fisheries Office for Enforcement to have a stronger presence on Maui to investigate and prosecute violations of humpback whale protection regulations. Over 70 cases of potential whale harassment or approach law violation were investigated in 2000.

The sanctuary also sponsored Ocean Users Workshops throughout the islands and assisted NMFS with a publication on guidelines to ensure safe wildlife-viewing of marine mammals and sea turtles in Hawaii.

2000 International Marine Debris Conference—The Hawaiian Islands Humpback Whale Sanctuary, in cooperation with its multi-agency partners, tackled the important issue of ocean pollution in the 2000 International Marine Debris Conference in Honolulu. Over a period of one week, 300 resource managers, scientists, environmentalists and policy-makers convened to examine the environmental impacts associated with discarded fishing gear. Working groups focused on special interest areas of education, industry, legal issues, impacts, mitigation, removal, and source identification. At the end of the session, each group issued recommendations aimed at reducing harmful impacts of marine debris on the ocean environment. Throughout the conference, website coverage of the latest development was made accessible. The sanctuary also committed to monitoring the implementation of the recommendations and pledged its support for further marine debris conferences.

Management Plan Review—The Hawaiian Islands Humpback Whale National Marine Sanctuary completed initial efforts to revise its management plan. A draft of the revised management plan was produced and reviewed during December 2001 and January 2002 and will be released for public review in March 2002. The draft revised management plan made a number of improvements including updating the vision, goals, and objectives of the sanctuary, restructuring the document into a series of action plans, adding a new set of outcomes and performance indicators; and removing tasks already completed and planning new tasks for the next five years.

Annual Sanctuary Ocean Count—The annual Sanctuary Ocean Count has been expanded and is being conducted year on the islands of Oahu, Kauai, and the Big Island. The event has continued to be a popular attraction to both residents and visitors alike. The number of participants increased from 400 in 2000 to over a 1000 in 2001 and will be available for public comment in early 2002.

Kauai Ocean Fair and Teacher Workshops—The 4th annual Kauai Family Ocean Fair was held at Kilauea Point National Wildlife Refuge in March. The Ocean Fair has been a signature event of the Hawaiian Islands Humpback Whale Sanctuary and the US Fish and Wildlife Service Kilauea Point National Wild Reserve since 1998. In 2001, approximately 3,000 people attended. A teacher workshop and research lectures were also held in conjunction with the Ocean Fair.

Sanctuary Volunteers—A major social benefit of the Sanctuary involves the continuing success of the Sanctuary Volunteer Program at the Maui office. A sanctuary volunteer coordinator recruits and trains volunteers, apprising them of NOAA policies and sanctuary goals. A core group of approximately 75 volunteers maintains regular weekly hours at the sanctuary, assisting with everything from office chores to the design of educational displays. Last year, approximately 700 volunteers contributed a total of 4,500 hours of pro bono services to the Sanctuary.



Photo: Stan Butler



Photo: Jean Souza

The sanctuary boundary extends from the high-water mark on the shoreline to a 600-foot depth offshore. The area shown here, off the north shore of Kauai, is also frequented by monk seals and spinner dolphins.



Photo: Hawaii Dept. of Land and Natural Resources

The corals of the Hawaiian Islands, such as the Finger coral (*Porites compressa*) pictured here, are rich in diversity and support an abundance of life. Coral habitats are found extensively throughout the sanctuary.

Caption (left): The green sea turtle (*Chelonia mydas*), also known in the Hawaiian language as *honu*, is the most common sea turtle in Hawaiian waters. It feeds on marine plants in shallow coastal waters throughout the islands and can grow to 200 pounds or more. Sea turtles hold an important role in Hawaiian culture and were prominently represented in ancient Hawaiian mythology and petroglyphs.



A spectacular landscape of living coral reef colonies attract an ever changing kaleidoscope of marine creatures. The remote islands' bottomfish and seamount groundfish populations bring both commercial and recreational fishing to the Northwestern Hawaiian Islands. Photo: Donna Turgeon



The remote islands of Northwestern Hawaii contain over 22 species of hard coral and two species of soft coral. They are home to more than 7,000 marine species, of which approximately half are unique to the Hawaiian Island chain. These include nearly the entire world population of endangered Hawaiian monk seals. The region is also an important nesting habitat for the threatened green sea turtle. Photo: Donna Turgeon

Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve

The Reserve...

In December 2000, President Clinton's Executive Order 13178, established the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve in response to the serious decline in coral reefs. Many of the world's reefs have been destroyed by human impacts such as pollution or dynamite fishing or devastated by natural events such as global warming or hurricanes. While the United States has only three percent of the world's coral reefs, approximately 70 percent of them are in the Northwestern Hawaiian Islands. As part of the Reserve's creation, certain conservation measures restricting activities throughout the Reserve and special preservation areas were established. Following a 30-day comment period on these measures, Executive Order 13196, which amended the initial order, was issued. The Executive Orders also directed the Secretary of Commerce to initiate the process necessary in designating the area a National Marine Sanctuary. A Reserve Advisory Council was created to provide NOAA with advice and recommendations on the Reserve's Operation Plan for management and its efforts in the designation process.

Reserve FAQs

Date Established: December 4, 2000

Protected area: 99,500-square nautical miles

Key species: 7,000 marine species including the endangered monk seal, threatened green sea turtle and the endangered leatherback and hawksbill sea turtle, black coral

Key habitats: Coral reefs, seamounts, banks and shoals

Reserve Coordinator: Robert Smith

Headquarters address: 308 Kamehameha Avenue, Suite 203, Hilo, HI 96720

Telephone: 808-933-8180

Fax: 808-933-8186

E-mail: Robert.Smith@noaa.gov

Website: <http://hawaiireef.noaa.gov/>

Accomplishments 2000 - 2001

A New Reserve Headquarters—In 2001, the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve established two new offices on two islands within the Hawaiian islands, created a staff to support its projects, and established relationships with headquarters and other sites necessary to guide this new project over time.

Increasing Community Support—One important achievement for the NWHI Reserve in 2001, was the creation of a Reserve Advisory Council. During the year the Council chose its own leadership and responded to the various charges and requests given the Advisory Council by NOS leadership. In particular, the enthusiasm for the NWHI project by the native Hawaiian community, educators, researchers, and the recreational interests was noteworthy.

Reserve Operations Plan—Having a Reserve in place provides immediate added protection and coordinated management for the NWHI coral reef ecosystem and marine environment. As directed by Executive Order, a Reserve Operations Plan was drafted as a guide to govern the management of the Reserve throughout the sanctuary designation process. The plan addresses priority issues like marine debris, research and monitoring, education, and enforcement. The intended life span of this plan is approximately three years, or until such a time as the designation process for the proposed sanctuary is completed.

Sanctuary Designation Process—Sanctuary designation is an extensive public process that involves identifying issues facing the NWHI and determining what a marine sanctuary can and should do to address those issues. The process begins with a public scoping, including statewide public meetings, in Spring 2002. Scoping is designed to solicit comments from user and interest groups, the public, and agencies on management priorities for a proposed Sanctuary. Next, the NMSP reviews all comments and works with the NWHI Reserve Advisory Council and the public to prioritize issues and ultimately develop the draft management plan. If designated, the management plan serves as the site-specific planning and management document describing objectives, policies, and activities.



These Masked Boobies feed by plunge diving for fish in nearshore waters. They can be found among the wide diversity of seabirds in the Northwestern Hawaiian Islands.
Photo: Donna Turgeon



Butterflyfish in Hawaii show a wide variety of feeding patterns. These schooling Milletseed Butterflyfish focus on plankton while other monogamous pairs of butterflyfish feed only on certain Hawaiian species of coral.
Photo: Donna Turgeon



Most killer whales (*Orcinus orca*) in the sanctuary belong to groups that migrate into the inner waters of Puget Sound and Georgia Strait. Occasionally, oceanic pods visit the region.



Echinoderms - "spiny skin" - represent an important group of invertebrates in sanctuary waters. The purple and red sea urchins (*Stongylocentrotus purpuratus*, *S. franciscanus*, respectively) and the blood and six-rayed sea stars (*Henricia leviuscula* and *Leptasterias hexactis*) all have tube feet. Urchins feed on algae. Sea stars are predators of smaller invertebrates.

Olympic Coast National Marine Sanctuary

The Sanctuary...

Spanning 3,310-square miles of marine waters and rugged undeveloped beaches, Olympic Coast National Marine Sanctuary provides habitat for 29 species of marine mammals and is a critical link along the Pacific flyway for migratory birds. The sanctuary boasts a rich mix of cultures, preserved in the contemporary lives of the Quinault, Hoh, Quileute, and Makah Tribes.

Along this same stretch of coastline, vessel and air traffic, and recreational uses must all be balanced to protect the region's natural resources.

Sanctuary FAQs

Date Designated: July 16, 1994

Protected area: 3,310-square miles, from Neah Bay to the mouth of the Copalis River, on Washington's outer coast

Key species: Tufted puffin, bald eagle, northern sea otter, gray and humpback whales, dolphin, Pacific salmon, rockfish

Key habitats: Rocky and sandy shores, kelp forests, seaweeds and islands, continental shelf, open ocean, deepwater canyons

Sanctuary Superintendent: Carol Bernthal

Headquarters address: 138 W. First Street, Port Angeles, WA 98362

Telephone: 360-457-6622

Fax: 360-457-8496

E-mail: olympiccoast@noaa.gov

Website: <http://www.ocnms.nos.noaa.gov/>

Accomplishments 2000 - 2001

Marine zoning—A Marine Conservation Work Group (MCWG) was appointed by the Olympic Coast National Marine Sanctuary Advisory Committee to evaluate existing zoning strategies within the sanctuary. The group was also asked to develop a specific proposal for the conservation and protection of intertidal habitats. In 2000, the group developed ground rules, hired a contractor to coordinate the evaluation process, met to develop goals and objectives, reviewed available intertidal habitat data, and began evaluating zoning options.

Oil Spill Prevention—A number of important projects addressed marine traffic’s impact on the sanctuary. One project, a five-year report on the effectiveness of the existing Area to Be Avoided (ATBA) program, examined vessel traffic patterns within a defined geographic area of the sanctuary to help prevent catastrophic oil spills. Using the USCG radar tracking information, sanctuary staff monitored compliance with the voluntary measure and found a 95 percent compliance rate since the program began in 1995. The report also identified a significant unaddressed risk of oil spills from large commercial vessels. This report served as a basis for proposing a modification to the current ATBA, which was submitted to and received preliminary approval from the International Maritime Organization in 2001. Sanctuary staff also provided considerable information and recommendations to the U.S. Coast Guard’s Port Access Route Study, which developed recommendations on measures to improve marine safety in the Strait of the Juan de Fuca and northern Puget Sound region.

Submerged Cultural Resource Survey at Destruction Island—The sanctuary provided vessel support, funding, and technical assistance to the national sanctuary system’s archeologist, Bruce Terrell, and the National Programs Branch in carrying out a remote sensing survey for shipwrecks near Destruction Island. A team contracted through East Carolina University located the remains of the 1875 shipwreck, *Emily Farnum*, just off Destruction Island’s southwest corner. The vessel was one of the last Clipper ships to ply the West Coast.

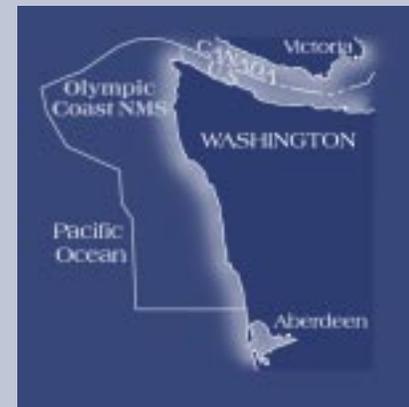
Seafloor Mapping—NOAA’s Office of Coast Survey, with support from the Olympic Coast National Marine Sanctuary, reached an agreement with the US Navy regarding the collection of high-resolution bathymetry within the sanctuary. Previously, the sanctuary had been prohibited from collecting this data because of Navy security concerns. In 2001, the sanctuary was able to field two survey cruises in previously unmapped areas (Quinault Canyon and northern sections of the sanctuary), beginning an ambitious, multi-year project to map the entire sanctuary in partnership with other federal, state, academic, and tribal organizations.

Tribal Educational Initiatives—Olympic Coast National Marine Sanctuary sponsored several new educational initiatives directed at tribal communities. Coast Quest is a unique program representing the coastal region’s diverse rural and Native American communities. A week long immersion in a wilderness setting, Coast Quest blends marine science with outdoor and team-building skills for teenagers. The sanctuary is also an active partner with the Quileute Tribe and University of Washington College of Ocean and Fisheries Science and Tribes Education Partnership (STEP), which brings culturally appropriate field teachings in research, environmental monitoring, and technology to tribal students who later attend



Olympic Coast National Marine Sanctuary

Four coastal tribes—the Makah, Quileute, Hoh and Quinault—work with the sanctuary for protection of marine resources. Under treaties with the United States, the tribes also have a right to harvest fish, shellfish, and other natural resources within the sanctuary.





Nancy Sefton

Rich intertidal areas along the Olympic Coast host a wide diversity of specialized plants and animals. Although pristine by most standards, these habitats are vulnerable to oil spills and other human impacts. The sanctuary, along with other resource stewards, is considering ways that this fragile boundary between terrestrial and ocean ecosystems can be protected.

intensive residence summer programs at the university.

Overflight Education Campaign—Sanctuary staff initiated a new peer-education program to inform and seek voluntary compliance from pilots. The sanctuary currently has a 2,000-foot restriction for flights over its most sensitive areas, but pilots have been generally unaware of this provision. A brochure was mailed directly to 18,000 pilots, with a message from the federal co-managers (Olympic National Park, USFWS) identifying the restricted area and asking for their cooperation. Targeted presentations from an experienced pilot were also made to aviation groups, and a colorful booth at aviation shows promoted the message of a “be a pro, don’t fly low.”

Seattle Aquarium Partnership—The sanctuary was a catalyst in the designation of the Seattle Aquarium as a Coastal America Ecosystem Learning Center. As a designated center, the Seattle Aquarium hosted a student conference for 60 high school students from around the region. The sanctuary also contributed toward the production of a new sea otter exhibit at the Seattle Aquarium.

Ecosystem Monitoring—Multiple research and monitoring projects were accomplished by sanctuary staff. These included a first-time rapid assessment of exotic plant and animal species, aerial surveys of kelp to determine trends in abundance and distribution, population and prey studies for the northern sea otter, and baseline surveys of intertidal plants and fishes. In 2000 the sanctuary launched a 10-year program to monitor the impacts of the placement of submarine fiber optic cables within the sanctuary. Sanctuary scientific staff completed a 14-day cruise using the R/V *Velero* and Delta submersible along the cable route to identify benthic habitat impacts and begin monitoring bottom habit recovery rates.

Sanctuary staff also collaborated with the NMFS Northwest Fisheries Science Center and the Olympic Regional Harmful Algal Bloom (ORHAB) partners on a study of conditions that lead to harmful algal blooms. Nearshore circulation studies were completed by installing remote sensors at key locations along the coast to understand how offshore algal blooms reach shoreline areas. These HAB events have led to the closures of significant razor clams fisheries along the coast because of human health concerns. Blooms have also been linked to marine mammal deaths in California and may present a hazard to recovering sea otter populations along the Washington Coast. Results of the monitoring program were publicized through a website, annual newsletter, and public presentations.

Teacher Workshops—Teachers from the Olympic Peninsula were trained in intertidal monitoring protocols like those used by sanctuary researchers in this field-based marine science program. Teachers were trained in monitoring techniques and the use of Geographic Information Systems (GIS)

to display monitoring results. The sanctuary actively cooperated with Kachemak Bay National Estuarine Research Reserve and three other west coast sanctuaries to begin developing a network of trained teachers who can incorporate monitoring into classroom activities.

Visitor Services—Nearly three million visitors experience the Olympic Peninsula each year, drawn to Olympic National Park and the scenic Olympic Mountains. Over the last two years the sanctuary has worked closely with Olympic National Park, the US Fish and Wildlife Service and the Makah Tribe to enhance visitor facilities along the coast. The sanctuary contributed toward planning and building a new visitor contact stations at Kalaloch and Neah Bay. Interpretive exhibits, including scale relief models of the Olympic Coast seafloor are under development. The sanctuary continued its Cooperative Coastal Interpretation program of funding seasonal interpreters at Olympic National Park. In 2000 and 2001 the interagency team of resource educators was joined by an interpreter from the Makah Tribe, who leads walks and gives educational presentations on Makah culture and sanctuary resources.



Olympic Coast Marine Sanctuary is comprised of 3,310-square miles of ocean. Drifters, like this moon jelly, travel on currents and feed on plankton that is nourished in the mid-waters where nutrient-rich deeper water mixes with the sunlit surface layer.

Caption (left): Offshore rocks provide nesting and roosting habitat for birds. These remote rock islets are part of Quileute Needles National Wildlife Refuge, created in 1908 to protect seabird habitat. Three national wildlife refuges lie within Olympic Coast National Marine Sanctuary.



The nation's newest marine sanctuary, Thunder Bay National Marine Sanctuary and Underwater Preserve, protects the shipwrecks of the nineteenth and twentieth century. Large steel-hulled vessels, such as the *Isaac M. Scott*, and earlier wooden schooners are preserved in the cold freshwater of Lake Huron.

Thunder Bay National Marine Sanctuary and Underwater Preserve

The Sanctuary...

Historic shipwrecks received special protection in the designation of the Thunder Bay National Marine Sanctuary and Underwater Preserve. In 2000, Thunder Bay became the site of the nation's 13th sanctuary in the National Marine Sanctuary System and the first in the Great Lakes.

The known shipwrecks in Thunder Bay rest as close to the surface as 12 feet and as deep as 180 feet. Maritime archeologists believe the region's shipwreck collection includes wooden schooners, barks, brigs, steamers, barges, tugboats, steel-hulled steamers, and freighters—a vast collection of nineteenth and twentieth century maritime history.

Sanctuary FAQs

Date Designated: October 7, 2000

Protected area: 448-square miles in Lake Huron, off the coast of Alpena, Michigan

Cultural resources: Historic shipwrecks include the sidewheeler *New Orleans* (1844-1849) and the steel-hulled propeller *Isaac M. Scott* (1909-1913)

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Accomplishments 2000 - 2001

Sanctuary Designation—After a decade of discussions and negotiations, on June 19, 2000, NOAA and the State of Michigan announced agreement had been reached on the designation of a national marine sanctuary in Thunder Bay. On October 7, 2000 the Thunder Bay National Marine Sanctuary and Underwater Preserve was designated to protect and manage a nationally significant collection of an estimated 116 shipwrecks. NOAA and Michigan are equal partners in protecting and managing this important site.

The new designation was built on the existing state preserve designated in 1981. It becomes only the second sanctuary created solely to protect underwater cultural resources.

The designation joined the community and federal, state, and local officials in celebrating the first Great Lakes Sanctuary. At the formal designation ceremony on October 7, 2000, Michigan Governor John Engler and senior NOAA management presided over a signing ceremony that included a National Guard presentation of colors, music, historic readings, and performances by two community children's choirs. Throughout the weekend, the NOAA research vessel *Shenon* took the media, local divers and members of the community out to the shipwrecks, accessing them via a remotely operated vehicle.

Management, Science and Education Efforts in the New Sanctuary—Designation of the sanctuary/preserve established a partnership between NOAA and the State of Michigan for the cooperative management and protection of Thunder Bay's underwater cultural resources. As equal partners, NOAA and the State of Michigan work with local agencies as well as private and nonprofit organizations to protect the underwater cultural resources, develop educational activities centered around the maritime heritage of the Great Lakes, and conduct research to further identify and interpret the area's shipwrecks. In 1997, a 15-member Sanctuary Advisory Council was established to provide local input to NOAA and the State on the sanctuary designation process. In 2001, a new Sanctuary Advisory Council was appointed.

Shipwreck Mapping Survey— In June 2001, Dr. Robert Ballard's Institute for Exploration conducted a sidescan sonar shipwreck mapping survey of the deepwater shipwrecks within the Sanctuary/Preserve. The exploration team ran 24-hour operations from June 8-22 while living aboard the U.S. Environmental Protection Agency's research vessel *Lake Guardian*. The expedition team used a new sidescan sonar towfish called ECHO, which uses sound to image objects on the lake floor. Beginning on the lakeward side of the sanctuary, the ship made north-south tracklines continually moving toward shore. The survey covered about 342 square miles. Within this area, the team located approximately 70 underwater "targets," anomalies in the sonar data that could be shipwrecks or other features. Of these targets, 11 are known shipwrecks. Several other targets are shipwrecks whose identities are unknown to the expedition team. The data is being processed to determine which of the other targets should be further examined.

The Institute for Exploration returns to Thunder Bay in 2002 with remotely operated vehicles to explore the wreck discovered in 2001 with video imagery. The explorers will also assess their condition for future management and preservation.



An impediment to navigation, a shelter from powerful storms, and a destination for sailors—the Thunder Bay region has accumulated an impressive array of shipwrecks over the past two centuries. Virtually all types of vessels employed on the open lakes regularly passed along this important trade route, and most vessel types are represented in the region's shipwreck collection.



Many exciting opportunities exist, including establishing a maritime heritage center, using live video hookups in school classrooms to view researchers studying the shipwrecks, providing internship opportunities, developing a Thunder Bay "Shipwreck Trail," and utilizing technology in educational activities.



Thunder Bay Tall Ships Festival—In concert with the National Marine Sanctuary Foundation, the Sanctuary/Preserve sponsored and organized the first annual Thunder Bay Tall Ships Festival in August 2001. National Marine Sanctuary Program staff, Michigan Congressman Bart Stupak, community leaders, and officials attended the two-day event that attracted 4,000 people.

The festival showcased two vessels that represented both sides of the War of 1812 the *HMS Tecumseth* and *Pride of Baltimore II*. The Great Lakes-based *H.M.S. Tecumseth* is a replica of the war schooner that served with the Royal Naval Establishment and was used for transport from the Royal Navy base to what is now known as Discovery Harbor. The *Pride of Baltimore II* is a reproduction of a Baltimore Clipper “privateer,” a type of vessel that helped secure America’s freedom during the War of 1812. This was the first in what will be an annual event.

Documentation and Evaluation of Historic Shipwreck *New Orleans*—The *New Orleans* was a wooden-hull side-wheel steamer built at Detroit in 1844 to carry passengers and freight to ports around the lower Great Lakes. It was constructed during the heyday (1830’s-1840’s) of “sidewheeler” construction in the Great Lakes region.

Archaeological documentation and evaluation of the *New Orleans* is being conducted by the Center for Maritime & Underwater Resource Management (CMURM), a private nonprofit corporation located in Michigan.

Fieldwork conducted this summer included baseline still photography, video documentation, and site mapping using technical survey equipment often seen along the roadsides of Michigan. Products of this study will include a site plan (or scaled map of cultural materials remaining on-site). An archaeological site report, and long-lost knowledge to be shared with the residents of northeast Michigan and visitors to the Thunder Bay National Marine Sanctuary and Underwater Preserve.



Selected publications

Cordell Bank NMS

- Cordell Bank National Marine Sanctuary State of the Sanctuary Report, November 2001, author Dan Howard
- Cordell Bank brochure, author Cordell Bank National Marine Sanctuary staff, April 2002
- *The Amazing Seabirds of Cordell Bank National Marine Sanctuary*, author Rich Stallcup, April 2002

Florida Keys NMS

- Strategy for Stewardship - Florida Keys National Marine Sanctuary Final Management Plan: An Overview - July 1, 1997
- Florida Keys National Marine Sanctuary Final Management Plan/Environmental Impact Statement, July 1, 1997
- Draft Revised Florida Keys National Marine Sanctuary Management Plan, March 2002.
- Florida Keys National Marine Sanctuary Site brochure, 1998
- Florida Keys National Marine Sanctuary, Lower Florida Keys Region brochure, December 1998
- Florida Keys National Marine Sanctuary, Upper Florida Keys Region brochure, December 1999
- Keeping Your Bottom Off The Bottom brochure, January 2001
- Florida Keys Safe Boating Tips decal, 1996
- Florida's Coral Reef Ecosystem poster, 1993
- The Fishes of the Florida Keys National Marine Sanctuary poster, Fall 2001
- Boat Groundings - Much More Than An Inconvenience video, 1994
- Protecting Paradise - Florida Keys Safe Boating Tips video, 1996
- Florida Keys Environmental Education Resource Directory, 1997
- Shipwreck Trail- An Adventure To Dive For... brochure, July 1999
- Shipwreck Trail- Site Guides, July 1999

Flower Garden Banks NMS

- Gulf of Mexico Science: Flower Garden Banks National Marine Sanctuary Special Edition, authors William W. Schroeder, FGNMS staff and partners, including Dr. Sylvia Earle, Dec. 1998
- FGBNMS 2001 Research Summary, authors Emma Hickerson, Kevin L. Buch, and Jennifer DeBose, Dec 2001
- 2001 Student Ocean Conference Summary Report, Jan 2002, authors Sarah Bernhardt, Shelley Du Puy, and George Schmahl
- Quarterly Newsletter (Jan, April, July) Editor, Sarah Bernhardt
- 2001 "Down Under, Out Yonder" Workshops Summary Report, authors Sarah Bernhardt and Shelley Du Puy, March 2002

Gray's Reef NMS

- Monsters in the Mud - poster of creatures that live in the sediments of the sanctuary, August 2002
- Gray's Reef in Depth brochure (detailing the organisms that occupy different layers of the water column at the sanctuary), May 2002
- GRNMS draft management plan, June 2002
- Rivers to Reefs educational module, educational curricula and multimedia depiction of the major ecological zones along the watersheds and to the deep ocean that influence life in the sanctuary, July 2002
- Gray's Reef poster, (signature poster identifies Gray's Reef and its ties to the state of Georgia), March 2002



Selected publications

Hawaiian Islands Humpback Whale NMS

- Hawaiian Islands Humpback Whale NMS State of the Sanctuary Report, Feb. 2002
- Hawaiian Islands Humpback Whale NMS, *Honolulu Advertiser* insert, Feb. 2002
- Newspaper in Education, 12 page color insert, Feb. 2002
- Draft Revised Hawaiian Islands Humpback Whale NMS Management Plan, March 2002
- International Marine Debris 2000 Conference Proceedings, March 2002
- Hawaiian Islands Humpback Whale NMS site brochure, May 2002
- Final Hawaiian Islands Humpback Whale NMS Management, July 2002

Monterey Bay NMS

- The Monterey Bay National Marine Sanctuary Summary of Regulations
- Monterey Bay Urban Watch Program brochure
- Clean Bilge Pump-out Stations--A New Service for Central Coast Boaters brochure
- Water Quality Protection Program Action Plans:
 - Action Plan I - Urban Runoff brochure
 - Action Plan II - Regional Monitoring, Data Access, and Interagency Coordination brochure
 - Action Plan III - Marinas and Boating brochure
 - Action Plan IV - Agriculture and Rural Lands brochure
- MBNMS General brochure
- Dredging brochure
- Overflight brochure
- Threatened and Thriving poster series (6 species pairs) released quarterly starting May 02
- Ecosystem Observations 2001
- Compendium of Salmonid Activities (to complement the poster)
- 10th Anniversary Poster, artist Robert Lynn Nelson
- 10th Anniversary celebrations announcement poster, Monterey Bay Aquarium Sponsored
- Quarterly Newsletter
- Kayaking in the MBNMS brochure

- Diving in the MBNMS brochure (New Version!)
- Boating in the MBNMS brochure
- Motorized Personal Watercraft in the MBNMS brochure
- Water Quality Protection Program brochure
- Monterey Bay is Closer Than You Think brochure
- Interactive Monterey Bay is Closer Than You Think brochure
- A Natural History of the MBNMS: a 256 page book produced cooperatively by the Monterey Bay Aquarium
- Sanctuary Explorations: An access guide to the Monterey Bay National Marine Sanctuary
- Monterey Bay National Marine Sanctuary (12 min.)
- MBNMS: A National Treasure video (20 min.)
- Watersheds to Seashores (20 min.)
- Dive into Fish Watching (10 min.)
- MBNMS Salmonid Poster
- MBNMS Bathymetric & Topographic Map
- MBNMS Nautical Chart
- Water Quality poster
- Storm Drains poster
- Good Cleaning Practices poster for Auto Repair Industry
- Good Cleaning Practices poster for Food and Restaurant Industry
- Storm Drain Pollution Fact sheet
- Monterey Submarine Canyon poster
- Ten Ways You Can Help Make Earth Day Every Day (4/22/00)
- Birthday Celebration poster
- Together We Can flyer & coloring page (available in English & Spanish)
- Sanctuary Newsletter Winter 2002 (due in March)
- Sanctuary Newsletter, Fall and Winter 2001
- Sanctuary Newsletter, Fall and Winter 2000
- Sanctuary Newsletter Summer, 1999
- Sanctuary Newsletter Winter, Spring, Fall, 1998
- Sanctuary Newsletter Winter, Spring, Fall, 1997
- Sanctuary Newsletter Winter, Spring and Fall, 1996
- Sanctuary Newsletter Fall, 1995

- Sanctuary Newsletter Summer 1994
- Ecosystem Observations: MBNMS Annual Report 2000
- Ecosystem Observations: MBNMS Annual Report 1999
- Ecosystem Observations: MBNMS Annual Report 1998
- Coastal Links Newsletter, Winter, 1998
- Coastal Links Newsletter, Spring, 1997
- MBNMS Teacher Curriculum: The Land-Sea Connection.
Available in Spanish and English. Publications in process
- MBNMS general brochure
- Dredging brochure
- Overflight brochure
- Threatened and Thriving poster series (6 species pairs)
released quarterly starting May '02
- Ecosystem Observations 2001
- Compendium of Salmonid Acclivities (complement to the poster)
- 10th Annivesary Poster, artist Robert Lynn Nelson
- 10th Annivesary celebrations announcement poster, Monterey Bay Aquarium Sponsored
- Quarterly Newsletter

Olympic Coast National Marine Sanctuary

- OCNMS Overflight Program Review (internal progress report), March 2002
- OCNMS Seafloor Poster, April 2002
- OCNMS Science Plan, June 2002

Thunder Bay National Marine Sanctuary

- *Historic Shipwreck Collection*, authors Thunder Bay National Marine Sanctuary and Underwater Preserve staff, October 2000, 8 pgs.
- Beneath the Waves (newsletter published twice a year)
- Thunder Bay glossy brochure (expected publication June 1, 2002)
- Thunder Bay National Marine Sanctuary and Underwater Preserve
- Advisory Council 2002 National Marine Sanctuary, ("bio" brochure, expected publication March 2002)



