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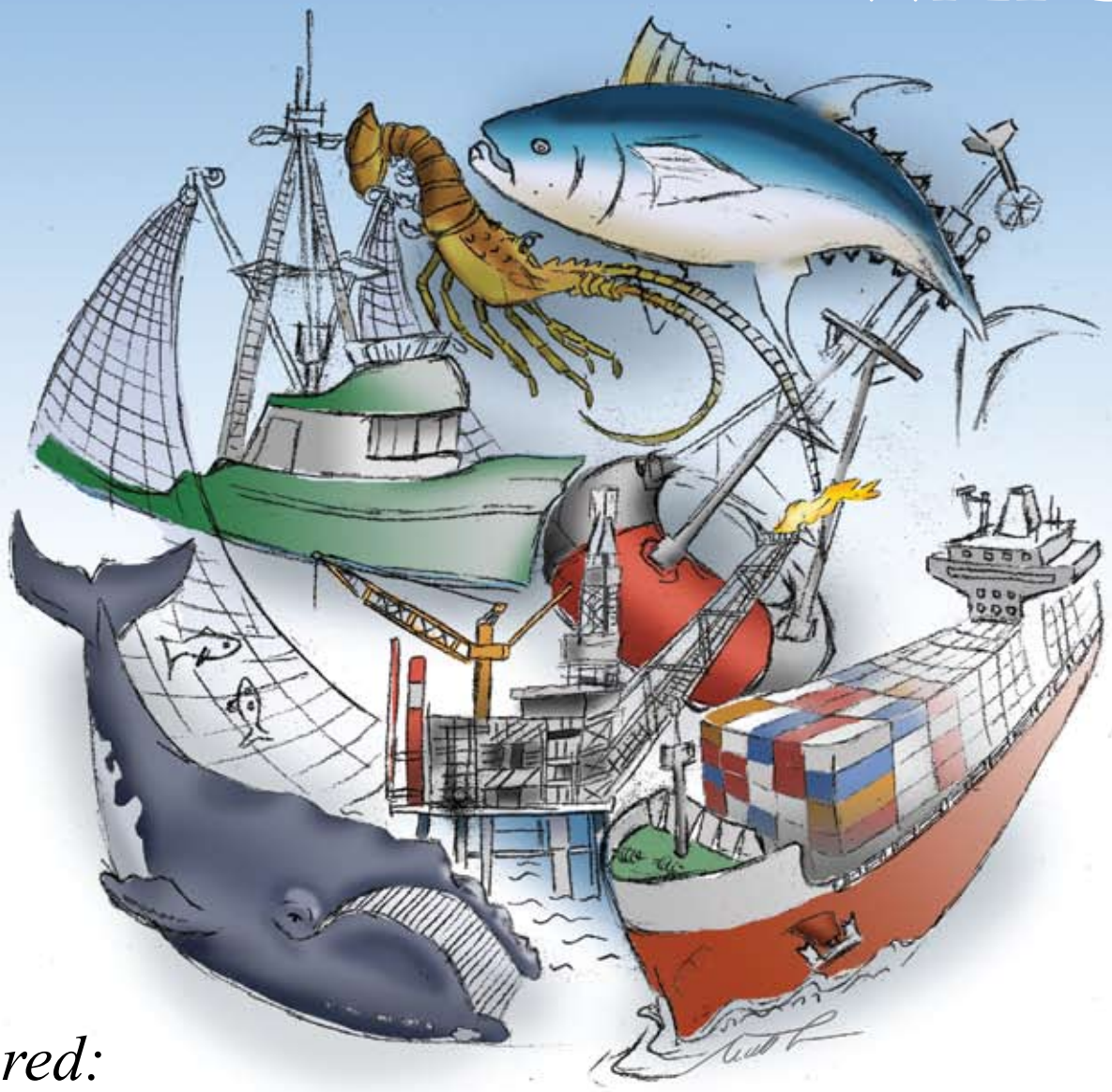
SANCTUARY WATCH



Featured:

COASTAL & MARINE SPATIAL PLANNING

In This Issue

Sanctuaries and Marine Spatial Planning

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DIRECTOR'S LETTER

How do we manage and protect the ocean to make informed and coordinated decisions about its use? That's the underlying question behind President Barack Obama's creation of the Ocean Policy Task Force, which is charged with providing him recommendations on ocean policy, including coastal and marine spatial planning. As our nation works to develop a comprehensive national ocean strategy, your national marine sanctuaries are well-poised to contribute relevant expertise and experience to this important effort.

Marine spatial planning and management are powerful tools we use to protect our coastal and ocean waters and ensure a variety of goods and services, including seafood, marine transportation, energy and recreation, are delivered. Marine spatial planning is a forward-looking, analytical process to manage those uses so they don't conflict with one another and don't adversely affect our marine environment.

A particularly important point about coastal and marine spatial planning is that it involves a public process, where people like you help decide the proper mix of uses and activities in marine areas. The sanctuary system is a leader in involving the public in the management of our coasts and ocean, from the Florida Keys to the Hawaiian Islands, and from the Great Lakes to American Samoa.

In November, the Office of National Marine Sanctuaries hosted a science symposium on coastal and marine spatial planning that drew nearly 300 people from NOAA, other federal agencies, and numerous non-governmental organizations. For more than 30 years, sanctuary system managers have used aspects of marine spatial planning and ecosystem-based management to protect and restore some of our nation's special marine areas for current and future generations.

This edition of Sanctuary Watch highlights marine spatial planning within the National Marine Sanctuary System, including efforts that have increased the protection of whales in New England and proven the effectiveness of stakeholder engagement with marine reserves in the Florida Keys. With its extensive experience in spatial planning and management and a firm commitment to ensuring the responsible use of our coastal and ocean waters, your sanctuary system will help efforts around the nation as we work toward a comprehensive national ocean strategy in the future.

Sincerely,

Daniel J. Basta, Director
Office of National Marine Sanctuaries

IN EVERY ISSUE

WORLD'S LARGEST MARINE PROTECTED AREAS SIGN PARTNERSHIP AGREEMENT

Two of the world's largest marine protected areas announced a historic alliance to enhance the management and protection of almost 300,000 square miles of marine habitat in the Pacific Ocean.

The agreement establishes a ground-breaking "sister site" relationship between the Papahānaumokuākea Marine National Monument, located in the Northwestern Hawaiian Islands, and the Phoenix Islands Protected Area near the equator in the Republic of Kiribati.

Photo: NOAA

Managers of both sites met in November in French Polynesia to formalize the agreement. Combined, the two sites encompass 25 percent of all marine protected areas on Earth.

SANCTUARY WHITE SHARKS GET INCREASED PROTECTION

Photo: Scot Anderson

New regulations to protect one of the most important white shark populations in the world are now in effect in Gulf of the Farallones National Marine Sanctuary, a marine protected area off San Francisco. The new rules strengthen the ban on hunting and fishing for white sharks by allowing them to feed undisturbed and without distraction from intrusive human activities. The regulations, enacted by NOAA's Office of National Marine Sanctuaries in March 2009, prohibit attracting white sharks anywhere in Gulf of the Farallones National Marine Sanctuary, as well as in Monterey Bay National Marine Sanctuary.

CHANNEL ISLANDS ADVISORY GROUP NAMED PARTNER OF THE YEAR

The Channel Islands National Marine Sanctuary Advisory Council's Conservation Working Group was named Partner of the Year by NOAA's Office of National Marine Sanctuaries for its outstanding dedication and community service. The working group was recognized for a report it prepared explaining ocean acidification and recommendations to focus research, monitoring and education. The group's recommendations also were adopted at the 2009 Sanctuary Advisory Council Summit meeting.

STEWARDSHIP EFFORT LAUNCHED WITH DIVE COMMUNITY

Florida Keys National Marine Sanctuary welcomed the first scuba dive operator into a new program that recognizes businesses that practice responsible diving and snorkeling. The Blue Star program acknowledges companies that work to protect the coral reef ecosystem of the Florida Keys by educating the public about the impact human actions can have on the marine environment. Unlike some of the major causes of reef decline such as climate change, damage to reefs from diving and snorkeling is considered preventable.

NOAA LOCATES U.S NAVY SHIP SUNK IN WORLD WAR II BATTLE

A NOAA-led research mission has located and identified the final resting place of the YP-389, a U.S. Navy patrol boat sunk by a German submarine during World War II off the North Carolina coast, officials announced in September. Six sailors died in the attack on June 19, 1942. There were 18 survivors. The wreck is located in about 300 feet of water in a region off North Carolina known as the "Graveyard of the Atlantic," home to U.S. and British naval vessels, merchant ships, and German U-boats sunk during the Battle of the Atlantic. NOAA and its expedition partners mapped and shot video of the wreck using high-resolution camera equipment, multibeam sonar and an advanced remotely operated vehicle.

Photo: NOAA

DEEP CORAL REEF EXPLORATION REVEALS MORE OCEAN WONDERS

Researchers returned from a month-long expedition to the Papahānaumokuākea Marine National Monument in the Northwestern Hawaiian Islands with new photos of rarely explored deep-sea environments, including a dozen records of deep-reef fishes never before seen near the islands of Nihoa, Mokumanamana, Laysan, Pearl and Hermes Atoll, Midway Atoll and Kure Atoll.

Photo: NOAA

Aboard the NOAA ship *Hi`ialakai*, scientists from the National Oceanic and Atmospheric Administration, the Hawaii Institute of Marine Biology and Bishop Museum demonstrated the safety of deep dive mixed gas technology as well as the tremendous potential for biological discoveries associated with exploration of deep coral reefs. The mission last summer took the scientists as far as Kure Atoll, nearly 1,400 miles from Honolulu and the most northerly reef of the Hawaiian Archipelago.

In the Zone

Photo: NOAA

Marine reserves in the Florida Keys help protect coral reefs like this one, which support ecologically and economically important species.

Management Areas Help Sanctuary Balance Diverse Uses in the Florida Keys

For all the relaxed, sunny charm of the Florida Keys, the ocean waters surrounding the idyllic archipelago are a bustling, crowded place.

The Keys boast a thriving tourism industry and a local community that is passionately connected to the sea. Diving, snorkeling, boating, commercial and recreational fishing, and conservation interests have shared these warm, clear waters for decades, and that combination of intense, often conflicting activities can present a challenge for marine resource managers working to keep the region's ecosystems healthy and productive. Florida Keys National Marine Sanctuary has managed this complex area through an evolving system of marine reserves, zones and regulations since it was created in 1990, making it one of the best examples of coastal and marine spatial planning in the nation.

Billy Causey, director of the National Marine Sanctuary System's Southeast Region, said marine spatial planning plays a big part in the sanctuary's efforts to protect ocean life, habitats and resources while still allowing people to use and enjoy the marine environment.

"In a place like the Florida Keys, which gets 3 million visitors a year, there are many uses and pressures on the environment," Causey said. "One of the main goals of marine spatial planning in the sanctuaries is conservation, and marine zones are a good way to achieve that goal."

The sanctuary contains a variety of zone types: three different forms of no-take reserves — where removal of marine life is not allowed — and two other kinds of management areas, each with regulations developed using community input and tailored to the areas they protect.

Sanctuary preservation areas (SPA), one of the three reserve types, protect 18 of the most popular diving and snorkeling sites in the sanctuaries. All activities that remove resources from the water are prohibited in SPAs, which Causey said has helped solve prob-

"The key in any marine spatial planning effort is to engage stakeholders early and often"

lems like divers and fishermen interfering with each other's use of the ocean.

"These are small areas, but they play a huge role in conservation and protection," he explained. "It's a tremendous example of how marine spatial planning can be used to resolve conflicts between different user groups."

Research-only areas are another "flavor" of no-take reserve in the Keys. Only scientists and educators with permits are allowed to enter these four reserves, providing a comparison for research purposes between undisturbed areas and those subject to diving use.

The third marine reserve category consists of two large no-take areas called the Western Sambo Ecological Reserve and the Tortugas Ecological Reserve, which were created to protect and restore swaths of important Keys habitat. Both the Western Sambo and Tortugas reserves — established in 1997 and 2001, respectively — have experienced dramatic increases in the number and size of commercially valuable species such as spiny lobster and black grouper over a short span of time.

Jim Bohnsack, a supervisory research fishery biologist for the NOAA Fisheries Service who has studied the Florida Keys marine reserves extensively, said several independent studies have confirmed the positive benefits of the no-take areas.

"We've seen that the reserves do what they're supposed to do in increasing the abundance and average size of marine species, which is encouraging," Bohnsack said.

The Tortugas reserve, which covers 150 square nautical miles of the sanctuary, is the result of a public process that brought in numerous community members to help design the reserve from the ground up. Brian Keller, Southeast Region science coordinator, called the process the "gold standard" of public involvement in marine spatial planning.

"The Tortugas reserve creation process was a product of lessons learned throughout the history of the sanctuary," Keller said. "The key in any marine spatial planning effort is to engage stakeholders early and often. Put them behind the wheel."

No-take reserves aren't the only tool in the sanctuary's marine spatial planning arsenal. Partnerships with other agencies are crucial to the management of the sanctuary, like the 27 wildlife management areas that incorporate both U.S. Fish and Wildlife Service and Florida Keys sanctuary regulations. Causey said these areas have been very successful in protecting roosting birds and sea turtle nesting sites, as well as dealing with conflicts between fishermen and jet ski users.

The sanctuary also encompasses several so-called "existing management areas" — a collection of four national wildlife refuges, seven state parks, three state aquatic preserves and two former marine sanctuaries — that were in place before the sanctuary was designated. Causey said all of the original regulations for these areas are still in place, in addition to sanctuary rules.

"To have that existing layer of protection is a huge benefit for the sanctuary," Causey said. "It requires close cooperation with all of those different agencies, which is really essential to effective marine spatial planning in the Florida Keys."

Background Photo: NASA

"Tower Rock," the large tupua, or rock formation, at Fatamafuti, represents a giant frozen in stone. Photo: NOAA

Cultural Connections

On Tutuila Island in American Samoa, a rock formation in Fagasa Bay is the source of a legend handed down over generations. Sina and Li'ava'a's rock are said to commemorate the location where a girl was mistakenly left behind by her father. The girl, Sina, eventually married a Samoan chief, Togamana.

Upon her marriage, Sina's father, Li'ava'a, said dolphins would be her dowry and would visit her every year. To this day, dolphins appear each year in Fagasa Bay.

The story of Fagasa Bay's Sina and Li'ava's rocks is among 20 coastal legend sites included in a 2007 inventory of American Samoa's maritime heritage. Study author Hans Van Tilburg, maritime heritage coordinator for the Office of National Marine Sanctuaries, said there are many narratives based in history that reflect cultural significance for particular natural features within the coastal and marine environment.

Although national marine sanctuaries are best known for protecting natural resources, Van Tilburg said some marine management decisions, including coastal and marine spatial planning, can be informed by a better understanding of history, culture and traditions, and the connection some communities have to special places. Resource managers should consider and respect the contribution and significance of indigenous cultural knowledge, he added.

"In American Samoa, natural features that are closely associated with cultural heritage, legends and history all tell a story," Van Tilburg said. "The sites are important because they hold the memory of those legends."

From a biological standpoint, Van Tilburg said awareness of the Sina dolphin story, for example, contributes useful information to scientists studying trends in animal behavior.

"The contribution that historical and cultural knowledge can make to understanding marine species population data and animal behavior has been demonstrated a number of times," he said.

Elsewhere, cultural awareness and engagement is ingrained in the management of Olympic Coast National Marine Sanctuary in Washington. The sanctuary is encompassed by the traditional harvest areas of the Hoh, Makah and Quileute tribes and the Quinault Indian Nation. As sovereign nations, the tribes have treaty fishing rights and co-management responsibilities with the state of Washington for fishery resources and fishing activities within the sanctuary.

Before public review of the Olympic Coast sanctuary's management plan began, sanctuary managers met with tribal representatives to work out a process and forum for how they wanted to participate. George Galasso, assistant superintendent of the sanctuary, said the discussions resulted in the formation of the Olympic Coast Intergovernmental Policy Council, composed of representatives from the three tribes, the Quinault Indian Nation, the state of Washington and the Office of National Marine Sanctuaries.

The council has focused on identifying research priorities, including development of a five-year Ocean Ecosystem Monitoring and Research Initiative, and preparing for the transition to ecosystem-based management.

"We had to understand where they were coming from and make the extra effort to get the council set up prior to being in a position where we could successfully go through a management review process," Galasso said.

Through many years of successful partnerships, the National Marine Sanctuary System has learned the importance of cultural legacy in marine resource management decisions. While human activities such as shipping, fishing and energy dominate marine spatial planning discussions, the sanctuaries recognize the importance of considering cultural values and heritage in this process.

Mapping the CITIES BENEATH THE SEA

Photos: NOAA

Divers from NOAA's National Centers for Coastal Ocean Science collect data during a biogeographic assessment of coral and reef species in Flower Garden Banks National Marine Sanctuary. The scientists use various tools to assess reef conditions including quadrants, line transects and fish surveys.

"It's important to know exactly what areas to protect"

For the researchers who conduct science for coastal and marine spatial planning at NOAA's National Centers for Coastal Ocean Science (NCCOS), a marine ecosystem looks a lot like a busy metropolis. Just like real cities, marine ecosystems have heavily-trafficked "streets," prime real estate, and popular places to eat.

For decades, NCCOS scientists have been tracking and mapping the features of these underwater realms. These maps are helping reveal in ever greater detail the complexity of these landscapes and are giving us new insight into how we can make use of our natural resources without overburdening them.

Spatial studies can help determine which areas of a sanctuary are most vital to marine species and thus deserve special protection. For example, NCCOS researcher Matt Kendall and his colleagues have provided Gray's Reef National Marine Sanctuary with data on how commercially valuable fish like snapper and grouper are "using" the space within the sanctuary.

"It's important to know exactly what areas to protect," Kendall said. "Certain fish gravitate to certain bottom types. If you want to protect red snapper, for example, you have to know where they live."

In other cases, researchers are helping sanctuaries use science rather than politics to figure out where to draw their boundaries. In the last several years, information provided by NCCOS was instrumental in helping establish the Rose Atoll, Marianas Trench, and Pacific Remote Islands marine national monuments, and to determine the best of six proposed expansion alternatives for Channel Islands National Marine Sanctuary.

Ultimately, the goal of this research is to help balance ecological security with human needs. Nowhere is this more evident than in the Massachusetts Ocean Management Plan of 2009, the first such state-based plan in the nation. Following a successful research collaboration between NCCOS and Stellwagen Bank National Marine Sanctuary, the International Maritime Organization decided to relocate shipping lanes in Boston Harbor to reduce whale-ship collisions. Well-informed planning such as this can help protect both economic and ecological vitality.

As our use of the ocean intensifies and our coasts become even more crowded, balancing use of our marine resources will be more important than ever. And NCCOS researchers will continue to bring to light the fascinating world beneath the sea.

Setting a New Course

Shipping Lane Shift Helps Mariners Steer Clear of Whales

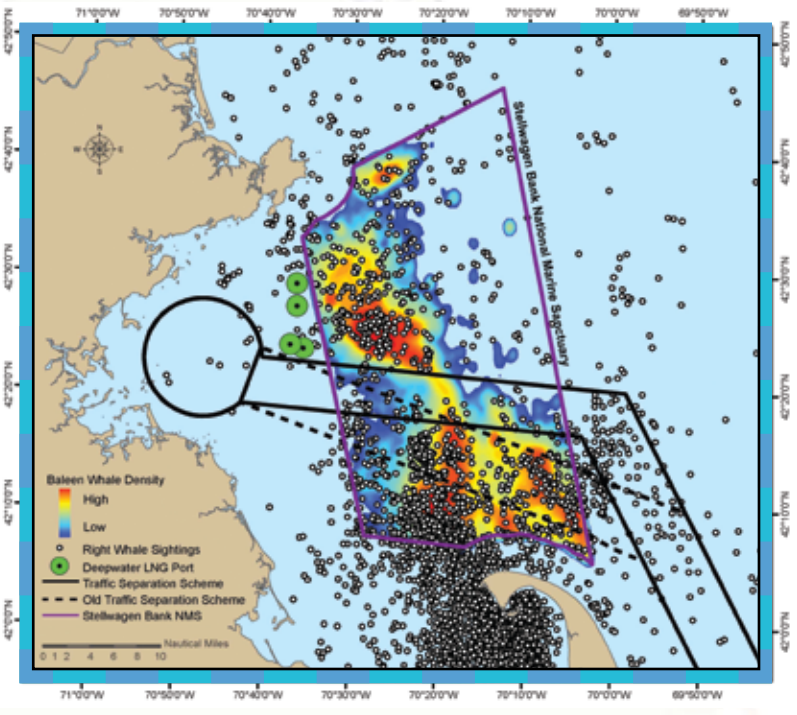
A small change to Boston shipping traffic is expected to play a big role in protecting endangered whales off the coast of Massachusetts, thanks to an innovative coastal and marine spatial planning effort by Stellwagen Bank National Marine Sanctuary staff and partners.

Cargo and passenger vessels from all over the world funnel through the shipping lanes in and out of Boston Harbor thousands of times every year. The route takes them through waters where high concentrations of humpback, right and other whales are found, putting both the whales and ships at risk of dangerous collisions. To reduce the potential for such accidents, the United Nations International Maritime Organization shifted the shipping lanes in 2007 based on the sanctuary's recommendation, redirecting vessel traffic 12 degrees to the north to an area with fewer whales.

"This effort really was a triumph of marine spatial planning," said Stellwagen Bank sanctuary Superintendent Craig MacDonald. "The vessel traffic shift not only helps save the lives of endangered whales, it provides a safer environment for ships traveling through this vital waterway."

The project began in 2003 when Stellwagen Bank sanctuary researchers studied data on whale sightings collected over a 25-year period. They noticed that the Boston shipping lanes ran through a section of the sanctuary with high numbers of sightings, right next to an area where relatively few whales had been spotted. The scientists worked with academic and nonprofit organizations to confirm their findings, studying whale feeding behavior and maps of the seafloor to get a more complete picture of where the whales spend their time in the region.

Armed with these data, the sanctuary science team, NOAA Fisheries staff and NOAA General Counsel collaborated with the U.S. Coast Guard to propose a way to move the shipping lanes that would help protect whales without disrupting vessel traffic. The resulting plan increased travel time for ships by just 10–22 minutes, but



A map created by sanctuary staff shows whale distribution and the proposed shipping lane shift in the Gulf of Maine.

Map: NOAA

Photo: K. Sardi, Whale Center of New England

A large vessel traveling through the Boston shipping lanes passes whales in Stellwagen Bank National Marine Sanctuary. Vessel traffic in the area was redirected by the International Maritime Organization in 2007 to reduce ship collisions with endangered whales.

> *"This effort really was a triumph of marine spatial planning"*

cut down the risk of collisions with critically endangered right whales by an estimated 58 percent and all other baleen whales by 81 percent.

Making the plan a reality, however, required the endorsement of the International Maritime Organization. In December 2007, a combination of solid scientific evidence, effective coordination between NOAA and Coast Guard personnel, and support from the shipping industry led the organization to take the unusual step of altering the shipping lanes to protect an endangered species.

"Collaboration with partners was crucial through every step of this process," Wiley said. "With so many overlapping uses of the marine environment to take into account, this would not have been possible without a high level of involvement from all sides."

Made possible by extensive research with contributions from a wide range of partners, cooperation among government, private industry, non-profit and international organizations, and continuous public input from community stakeholders, this effort will provide a prime example for marine spatial planning efforts to come, both inside and outside the national marine sanctuaries.

STEVE GAINES

Dean, Donald Bren School of Environmental Science & Management

Sanctuary Voices is a guest column featuring views and opinions from the national marine sanctuary community.

The need for new approaches in coastal and marine spatial planning is growing rapidly due to increasing ocean user conflicts and emerging uses such as wave energy farms and offshore aquaculture. Although new approaches may be needed to meet these challenges, we can also learn from programs that have dealt with marine spatial planning for a long time. The National Marine Sanctuary System was established with a focus on specific places in the marine environment, making it a good model to study for insight.

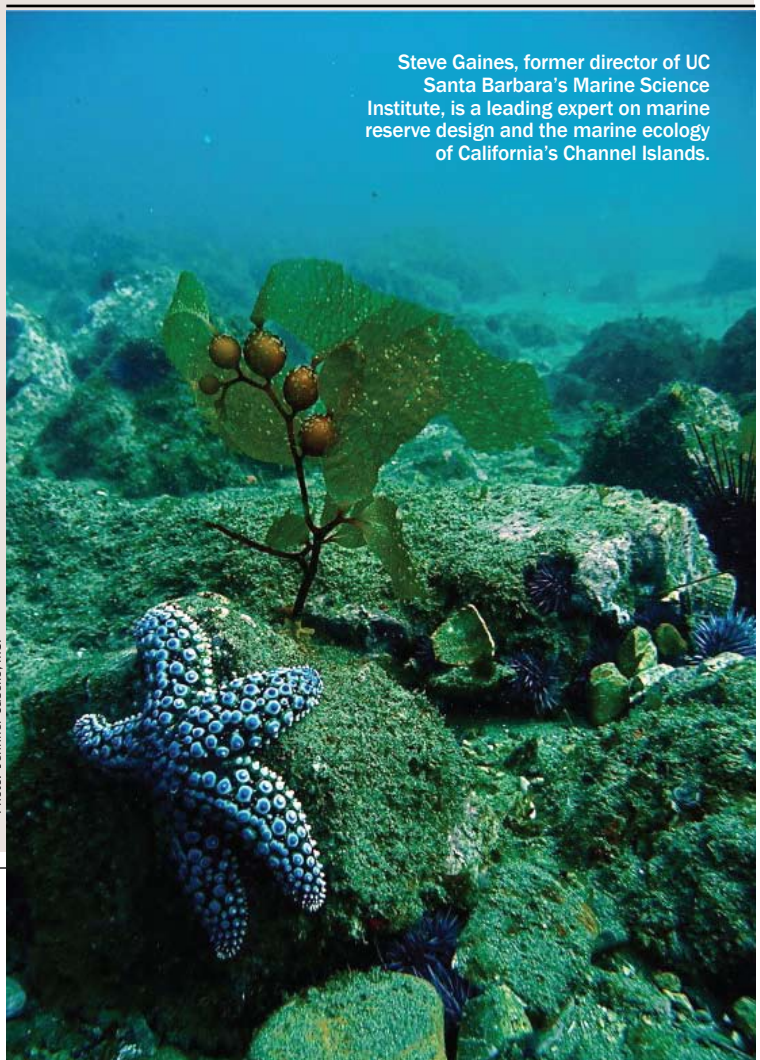
As an ecologist, I want to highlight an example of effective marine spatial planning that started over a decade ago in the Channel Islands National Marine Sanctuary. The Office of National Marine Sanctuaries, working closely with the state of California, established a process to create marine protected areas (MPA) that involved stakeholders and emphasized the role of science in the planning effort. The timing of the effort was ideal, coming at the same time as the publication of a report combining data from over 100 studies on MPA effectiveness from around the world. What emerged from the effort was one of the world's first networks of MPAs, with 11 no-take marine reserves and two partial-protection MPAs. Three broad lessons from this process provide insight for future marine spatial planning efforts:

Marine spatial planning must bridge artificial boundaries. The Channel Islands sanctuary includes both state and federally managed waters. Since the fish and other marine life targeted for protection are not limited by any such borders underwater, effective MPAs need to span these jurisdictional boundaries. The sanctuary played a key coordinating role to establish MPAs that fit ecological — rather than political — boundaries.

Marine spatial planning must have the right scale. The Channel Islands MPA network set aside roughly one-quarter of the area in no-fishing zones. At the time, this was the largest closure, percentage-wise, of any region in the world. Yet when one considers the vast ranges many ocean species inhabit, for example, the sanctuary MPA network represents just a small piece of the management puzzle. These protected areas are only an incremental step, and we need to be able to apply this kind of marine spatial planning to a wider spatial scale to match the resources we are trying to protect.

Marine spatial planning must deal with multiple uses. Most agencies regulate single activities (fishing, shipping, drilling, etc.). When these activities overlap with other uses in a given area, conflicts can arise in the absence of effective coordination and planning. Although the Channel Islands MPA process regulated only fishing, it has subsequently formed the basis for much broader multi-use spatial planning in the sanctuary. The place-based mandate of the sanctuary drives this critical focus on the broader spectrum of ocean uses.

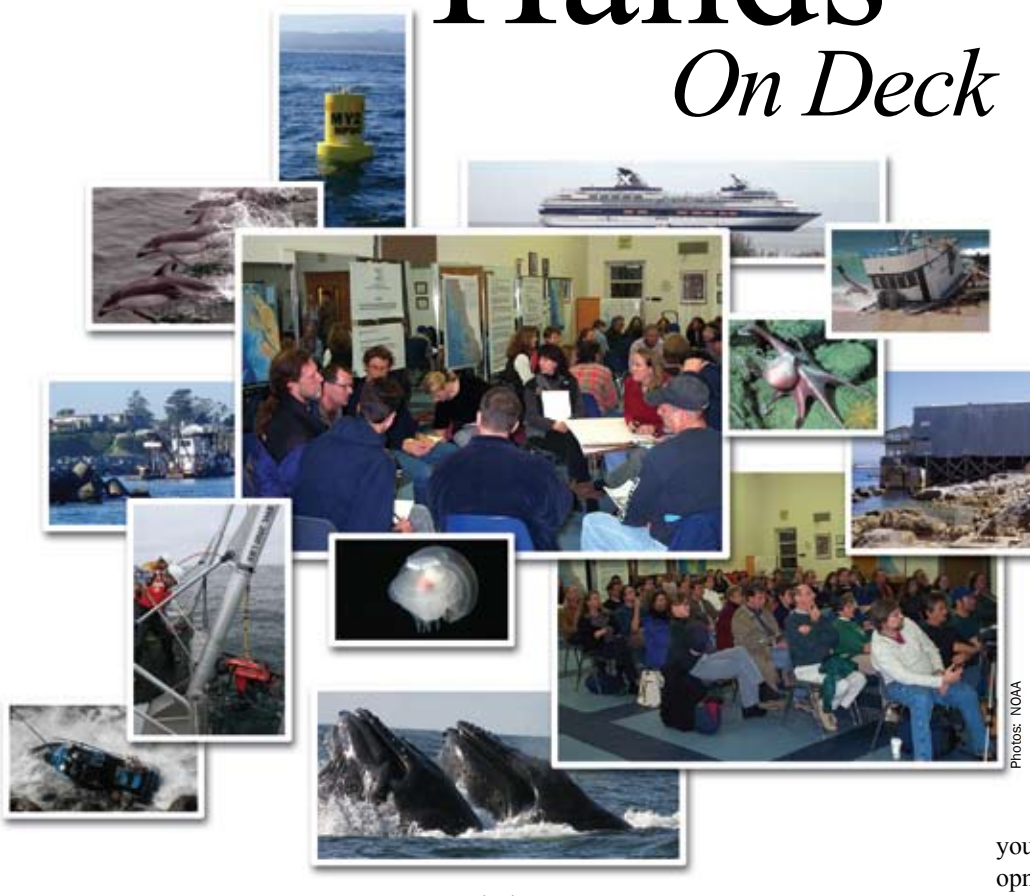
Meeting the sanctuaries' needs to conduct marine spatial planning effectively will require new scientific tools and new collaborations between disciplines that have not worked together in the past to deal with tradeoffs between the rich array of uses we derive from the sea. The National Marine Sanctuary System provides a strong model for how marine spatial planning can be integrated effectively and sustainably into future ocean management.



Steve Gaines, former director of UC Santa Barbara's Marine Science Institute, is a leading expert on marine reserve design and the marine ecology of California's Channel Islands.

Photo: Jennifer Caselle, MSI

All Hands *On Deck*



Photos: NOAA

Sanctuary Management Takes Oceans of Input

Creating a comprehensive management plan for one marine protected area is no easy task. Doing so for three at once takes incredible amounts of planning, time, patience and public participation — just ask staff at the trio of national marine sanctuaries off California's central coast.

Every site in the National Marine Sanctuary System is required to update its management plan periodically. These documents help guide sanctuary policy, research and education and try to anticipate future management challenges. In 2001, when Monterey Bay, Cordell Bank and Gulf of the Farallones national marine sanctuaries prepared to revise their original management plans, sanctuary leadership decided to take a bold step — to roll all three plans into a single, joint review process. Public involvement is one of the key elements of coastal and marine spatial planning, and the sanctuaries incorporated extensive community input into the revised plans, which were released in 2008.

Karen Grimmer, deputy superintendent of Monterey Bay National Marine Sanctuary, helped oversee the latter stages of the management plan review for the Monterey Bay sanctuary. Grimmer says a joint process made the most sense for the three adjacent sanctuaries, which together cover nearly 8,000 square miles of coastal and ocean waters along northern and central California.

"The sanctuaries share similar ecosystems and user groups, so we wanted to review the management plans together to be more efficient in our use of resources and also make things as clear as possible for the public," Grimmer said.

Combining the review of the three plans was no simple matter. Each sanctuary faced its own unique challenges, and 35 community working groups led by sanctuary staff met to ensure sanctuary advisory council members, local fishermen, scientists, educators, business owners and other stakeholders were represented throughout the planning process. Over a number of months, the working groups met regularly to develop strategies for addressing key issues including ecosystem protection, wildlife disturbance, vessel discharge, water quality, non-native species and coastal development.

Staff also held dozens of public meetings and collected more than 17,000 comments from members of the public during the course of the joint plan review. Maria Brown, superintendent of Gulf of the Farallones National Marine Sanctuary, said this process is essential to creating marine spatial plans that reflect the diverse communities that use the ocean.

"It's critical to have lots of public input when you develop management plans," Brown said. "When you involve that many people in the development of a plan, they are more invested in implementing it."

Some of the issues tackled in the revised plans included expanding the Monterey Bay sanctuary to include an underwater mountain called Davidson Seamount, new regulations protecting white sharks off the Farallon Islands, and a ban on harmful waste dumping from cruise ships in all three sanctuaries.

In addition to listening to and integrating public feedback, sanctuary staff worked closely with state, local and other federal agencies. This collaboration among the different levels of government — an important part of any marine spatial planning effort — helped clarify how each agency fits into the management picture and how they can work together more effectively in the future.

"I think we formed much closer relationships with our state and local partners, and that collaboration will help improve management of the sanctuary in the future," Grimmer said. "This isn't the end of the process — it's just the beginning."

Researchers attempt to tag a whale at Stellwagen Bank. Mike Thompson is holding the tagging pole, while Dave Wiley drives the inflatable.

NOAA Fisheries Permit #775-1875

DAVE WILEY | Research Coordinator
MIKE THOMPSON | GIS Specialist

Stellwagen Bank's Scientific "Tag Team"

Just call them the Dynamic Duo of the Deep.

As a research team, Stellwagen Bank National Marine Sanctuary Research Coordinator Dave Wiley and GIS Specialist Mike Thompson are a force to be reckoned with. For the past eight years, Wiley and Thompson have been breaking new ground with their research on endangered whales off the coast of Massachusetts, using a combination of innovative thinking and technical know-how to reveal the secrets of some of the sanctuary's largest underwater residents.

The pair has tackled scientific challenges ranging from whale tagging to acoustic monitoring since they first met in 2001, and the results have been impressive. One of their latest projects just earned Wiley a Department of Commerce Gold Medal — the highest honor bestowed by the agency — for his role in convincing the International Maritime Organization to redirect the Boston shipping to reduce the risk of collisions with whales.

"It's a real team effort," Wiley said. "I come up with the vision, and Mike has the technical savvy to make that vision a reality."

Wiley, who grew up outside Albany, New York, says studying marine life was never part of his plans as a young man. "I didn't even see the ocean until I was 22," he admitted. He instead attended UMass-Amherst on a wrestling scholarship, studying wilderness resource management.

It wasn't until 1980 that Wiley, who was teaching at a high school along the coast of Massachusetts at the time, first went whale watching and fell in love with the water. "I got bit by the whale bug, and that was it," he said. The epiphany led him to return to school for a Ph.D. on the nexus of sociology and biology, and eventually into a fruitful career with the national marine sanctuaries.

Thompson, on the other hand, made a connection with the sea at an early age. Born and raised in Scituate, Mass. — home of the Stellwagen Bank sanctuary offices — he worked as a gill net fisherman in high school before attending Bridgewater State College. He pursued his interest in oceanography and mapping through a degree in environmental geography and, later, a job analyzing fishing vessel trip reports and managing the Stellwagen Bank sanctuary's marine spatial databases.

Thompson said he was drawn to maps as a way to illustrate complex information about the environment. "I felt like there was a story to be told," he explained. "People always say a picture is worth a thousand words, and I think a map can do the same thing."

The two researchers first worked together on the Stellwagen Bank sanctuary's large marine mammal database project in 2001. Since then, they have collaborated on a habitat use study; an automated ship tracking system; a whale tagging project that lets scientists follow the animals' movement underwater; an acoustic monitoring network that detects right whale calls and alerts nearby vessels automatically; the award-winning shipping lane analysis effort; and the sanctuary's management plan review process, among other things.

"We've got a lot of stuff going on, that's for sure," Wiley said. "The nice thing is that we get to design our own research projects, so these are things that we are really the leaders on, and they all mesh together from the start."

There's still plenty of work to be done, though, and the Office of National Marine Sanctuaries is grateful to Wiley and Thompson for their continuing hard work and determination in developing new ways to protect the whales of Stellwagen Bank.

"We are always at the forefront of the technology, pushing the envelope," Thompson said. "If it was easy, everyone would be doing it."

North Atlantic Right Whale

It's been a tough battle for the North Atlantic right whale.

After nearly 300 years of being hunted almost to extinction by commercial whaling, this small baleen whale is one of the rarest marine mammals on the planet. So called because they were believed to be the "right" whale to target, the slow-moving animals were prized for their unusually thick blubber, used for lamp oil until the late 1800s. This layer of fat made them not only a profitable catch for whalers but an easy one, since they floated at the surface after being harpooned.

Where right whales were once hunted a century ago, they now draw throngs of tourists. Around 1 million people travel to New England to watch whales every year, bringing in more than $30 million to the regional economy annually.

Right whales are frequent visitors to Stellwagen Bank National Marine Sanctuary off Cape Cod, where they feed and nurse their calves in the spring and summer months. In fall and winter, the whales head south to give birth off the coasts of Georgia and Florida, often passing through Gray's Reef National Marine Sanctuary along the way.

Today, only about 350 right whales remain in the North Atlantic Ocean. Whaling of the species has been banned since 1935, but the endangered animals continue to face serious threats like collisions with ships and entanglement in fishing gear, and populations have struggled to recover.

However, there is still hope for the right whale. They are now one of the most protected whale species on the planet and progress has been made to reduce impacts, including vessel speed limits along the East Coast and partnerships with fishermen to reduce fishing debris. Thanks to the efforts of Stellwagen Bank sanctuary researchers, the International Maritime Organization approved a change to Boston's shipping lanes in 2007 that will help reduce the risk of ship collisions with right whales by 58 percent.

Through the continued efforts of dedicated marine managers, scientists and educators, the national marine sanctuaries are working to ensure that these majestic, ecologically (and economically) important whales are protected for the enjoyment of future generations.

Photo Credit: Florida Fish and Wildlife Conservation Commission/NOAA

COMMON NAME: North Atlantic Right Whale
SCIENTIFIC NAME: *Eubalaena glacialis*
DISTRIBUTION: Winter: Coastal Georgia, Florida
Summer: Gulf of Maine, including Cape Cod
MAX. LENGTH: 60 feet
MAX. WEIGHT: 70 tons
DIET: Zooplankton, especially copepods
STATUS: Endangered

North Atlantic right whales concentrate along the East Coast of the U.S. and Canada, but have been spotted farther east near Iceland and Great Britain.

A NOAA diver investigates the bow of the wooden freighter SS Florida. The wreck lies in about 200 feet of water within Lake Huron.

Photo: Tane Casserley

Diving Into Our Past

Technology Helps Maritime Heritage Managers Map the Past, Future

At Thunder Bay National Marine Sanctuary, lake bottom mapping data produced by NOAA's Office of the Coast Survey is being used in a couple different ways.

Russ Green, deputy superintendent, said having access to detailed bathymetric data has been helpful in identifying new resources and better characterizing the sanctuary, and could be useful in other planning initiatives involving state, regional and local entities. For example, the data will be made available to the Michigan Department of Natural Resources to help evaluate current fish spawning areas and determine the best place for a potential artificial reef.

In another initiative, the sanctuary is working with the University of Michigan to conduct a socioeconomic study of the proposed three-county sanctuary expansion area. The effort will measure the economic impact of NOAA's Great Lakes Maritime Heritage Center and help create a waterfront plan for the city of Alpena, Mich.

"We've used marine spatial planning to both enhance our ability to manage the resources under our stewardship, and also make forays into other conservation and planning areas," Green said. "All resource management and conservation efforts can benefit from marine spatial planning."

Tane Casserley, a marine archaeologist and national maritime heritage coordinator for the sanctuary system, said the spatial planning process is being used to put Thunder Bay's historic collection of shipwrecks in the larger context of the region's lighthouses, lifesaving stations, historic shipping routes and maritime economic activities.

"With marine spatial planning, you have NOAA offices working together combining satellite, bathymetric and historic data to create a clearer picture of the resources that we're managing," he said.

Elsewhere, NOAA's Special Projects Office is helping Monitor National Marine Sanctuary develop an innovative Google Earth computer map that vividly displays locations of shipwrecks, shipping lanes, military danger zones, fish habitat, historic lifeguard stations and boundary waters.

John Hayes, a mapping analyst working on the project, said the map will help managers identify potential conflicts and balance stakeholders' interests as the sanctuary explores possible expansion.

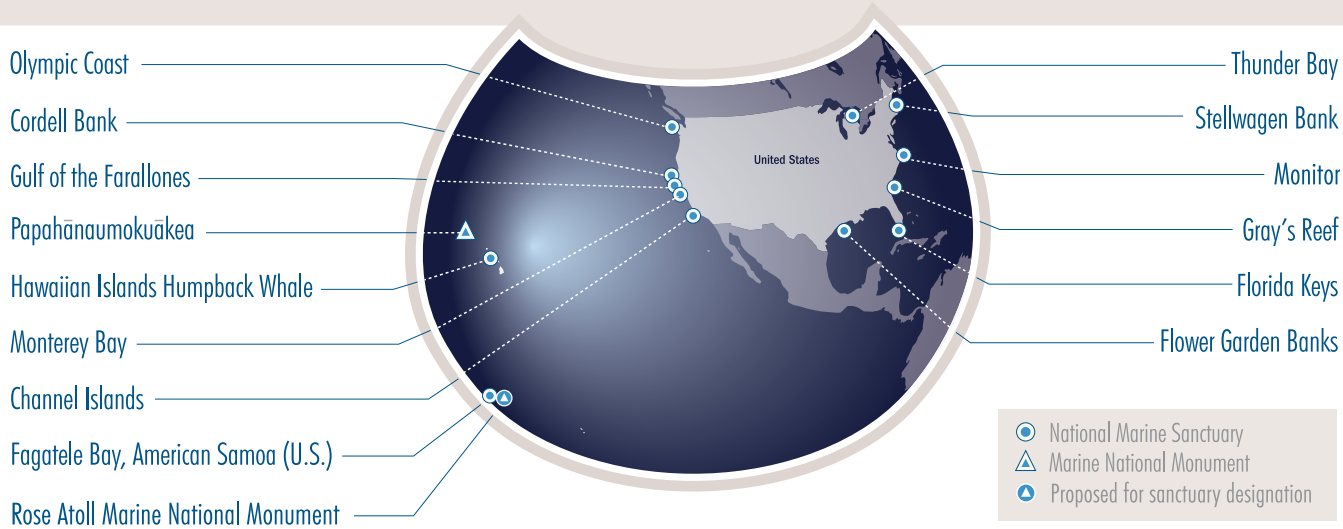
"This tool is built on the idea that a picture is worth a thousand words," Hayes said. "You can pull in all the relevant data and display it so that everybody can see what's out there. Spatially, you can see who's playing in these waters, so to speak, and where there may be competing interests that have to be addressed."

Photo courtesy of GeoEye

SANCTUARY**SNAPSHOT** This striking image of the Florida Keys taken by the IKONOS satellite shows the densely populated island of Key West. With millions of visitors every year and a thriving community of ocean users, the marine ecosystems of the Keys are under heavy pressure from human activities. Florida Keys National Marine Sanctuary, which manages the waters surrounding the Keys, relies on tools like coastal and marine spatial planning to protect marine life and habitats and resolve conflicts between user groups.

SANCTUARY**SYSTEM**

The Office of National Marine Sanctuaries serves as the trustee for a system of 14 marine protected areas, encompassing more than 150,000 square miles of ocean and Great Lakes waters. The system includes 13 national marine sanctuaries and the Papahānaumokuākea Marine National Monument. The sanctuary system is part of the National Oceanic and Atmospheric Administration (NOAA), which manages sanctuaries by working cooperatively with the public to protect sanctuaries while maintaining compatible recreational and commercial activities. Sanctuary staff work to enhance public awareness of our nation's marine resources and maritime heritage through scientific research, monitoring, exploration, educational programs and outreach.



Scale varies in this perspective. Adapted from National Geographic Maps.

NATIONAL MARINE SANCTUARIES

The Office of National Marine Sanctuaries is part of NOAA's National Ocean Service.

VISION – People value marine sanctuaries as treasured places protected for future generations.

MISSION – To serve as the trustee for the nation's system of marine protected areas to conserve, protect and enhance their biodiversity, ecological integrity and cultural legacy.

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