Marine Protected Areas of the United States

Conserving Our OCEANS

One Place at a Time

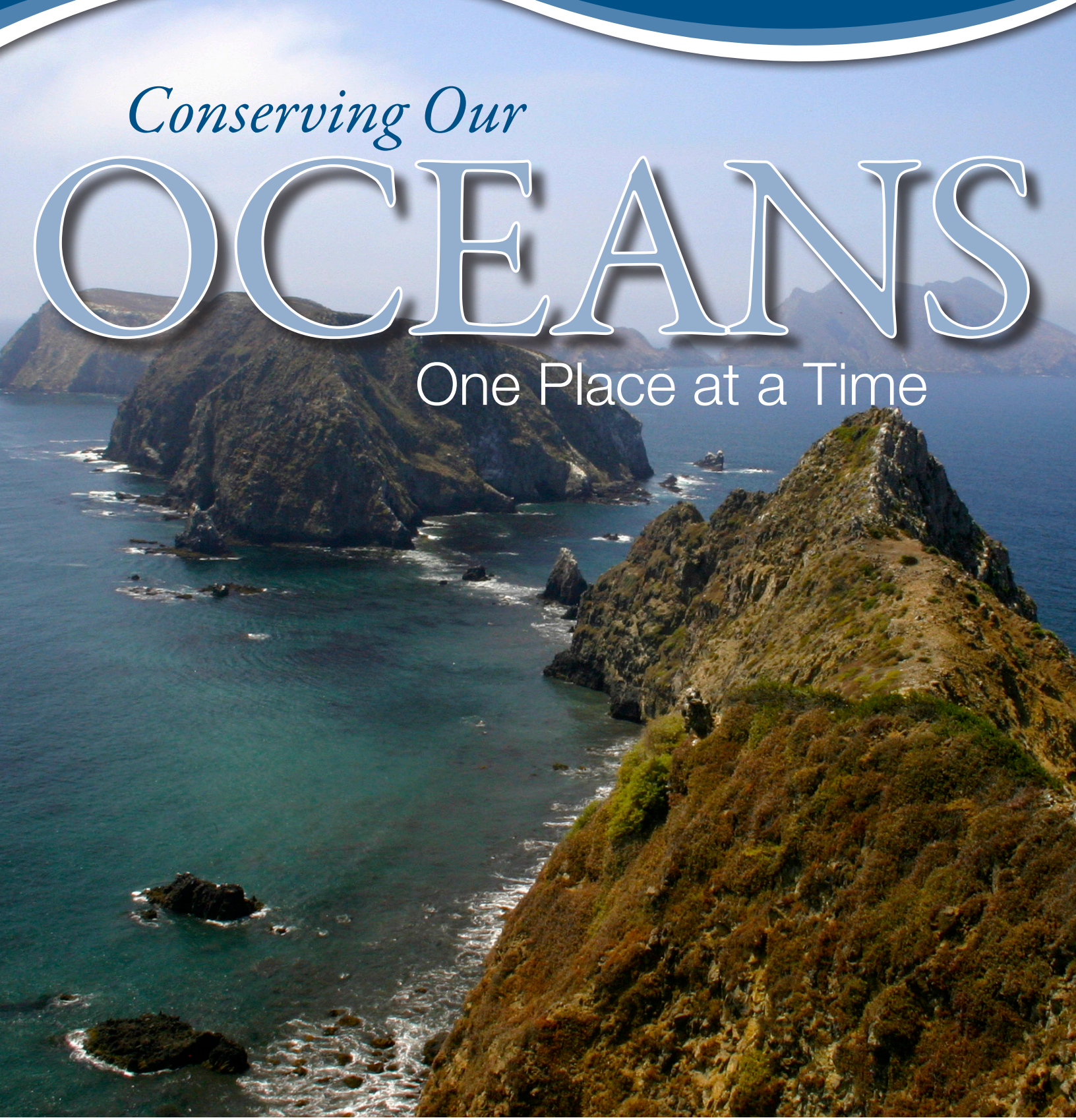

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TABLE OF CONTENTS

1 **U.S. MPAs at a Glance**

3 Protecting Blue Carbon Habitats at Waquoit Bay National Estuarine Research Reserve

4 **Connecting the Dots: MPA Networks and Systems**

4 California's Ecological Networks of MPAs

8 **Focus on Natural and Cultural Heritage**

11 Thunder Bay National Marine Sanctuary: Building Community Support

12 **MPA Management Trends**

13 Thinking Big – Large Remote MPAs are Havens for Marine Life

14 Managing for Resilience: Kahekili Herbivore Fishery Management Area

15 Planning for Visitors – and Sea Level Rise – at Gateway National Recreation Area

16 **Looking Forward**

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Marine Protected Areas: CONSERVING OUR OCEANS *One Place at a time*

Marine protected areas not only protect the marine life and cultural resources within their boundaries, but are a valuable tool for protecting marine ecosystems and the coastal communities they sustain. By engaging local communities in places they care about, MPAs demonstate how we can truly conserve our oceans... one place at a time.

What is a Marine Protected Area?

Marine protected areas (MPAs) are special places like coastal or underwater parks that protect habitats, fish and wildlife, and cultural resources. While some people assume that marine protected areas are closed to fishing and other uses, MPA is actually a broad term that includes places with a wide range of purposes, legal authorities and levels of protection. What they have in common is a focus on the long-term conservation of coastal and ocean ecosystems and the resources and services they support.

The formal definition of an MPA in the United States is "any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein." Key terms within the definition – area, marine, reserved, lasting, and protection – are defined in the *Framework for the National System of Marine Protected Areas of the United States of America*. The United States categorizes MPAs by three primary conservation purposes:

- Natural Heritage – biological communities, habitats, ecosystems and processes
- Cultural Heritage – cultural resources that reflect the nation's maritime history and traditional cultural connections to the sea
- Sustainable Production – harvested living resources and their habitats

Why We Need MPAs

The world's oceans and coasts are increasingly threatened by development, pollution, overfishing, climate change and natural events, which strain

Timeline

MPAs have been used as a conservation tool for more than a century – starting with a focus on key resources like fur seals or water birds, and expanding to focus increasingly on protecting entire ecosystems.

Take a trip through time to learn about the many ways in which communities, states and federal agencies have established MPAs to protect our nation's ocean treasures.

1868

Photo: Flickr/Bob Jagendorf

THE BIG PICTURE

U.S. MPAs at a Glance

The coastal and ocean waters around the United States are home to a wide array of MPAs of all sizes, shapes, and purposes. A quick overview of all types of MPAs in U.S. waters, including those established for natural heritage, cultural heritage and sustainable production, reveals that:

- The United States currently has more than 1,700 MPAs
- About 41 percent of all U.S. waters out to 200nm are in some form of MPA (includes sustainable production [fishery] MPAs which often have specific gear restrictions over large ocean areas)
- About 8 percent of all U.S. waters are protected by MPAs focused on natural heritage or cultural heritage (excluding sustainable production MPAs)
- Nearly all (85 percent) U.S. MPAs are multiple use, allowing some form of extractive activities
- No take MPAs occupy only about 3 percent of all U.S. waters
- About 7 percent of the area in MPAs in the U.S. is no take
- State and territorial governments manage approximately 76 percent of the nation's MPAs
- Federal agencies manage 60% of U.S. MPA area

1903

President Grant deploys military and customs agents to the Pribilof Islands, part of the recently purchased territory of Alaska, to protect valuable fur seals from overexploitation by foreign hunters.

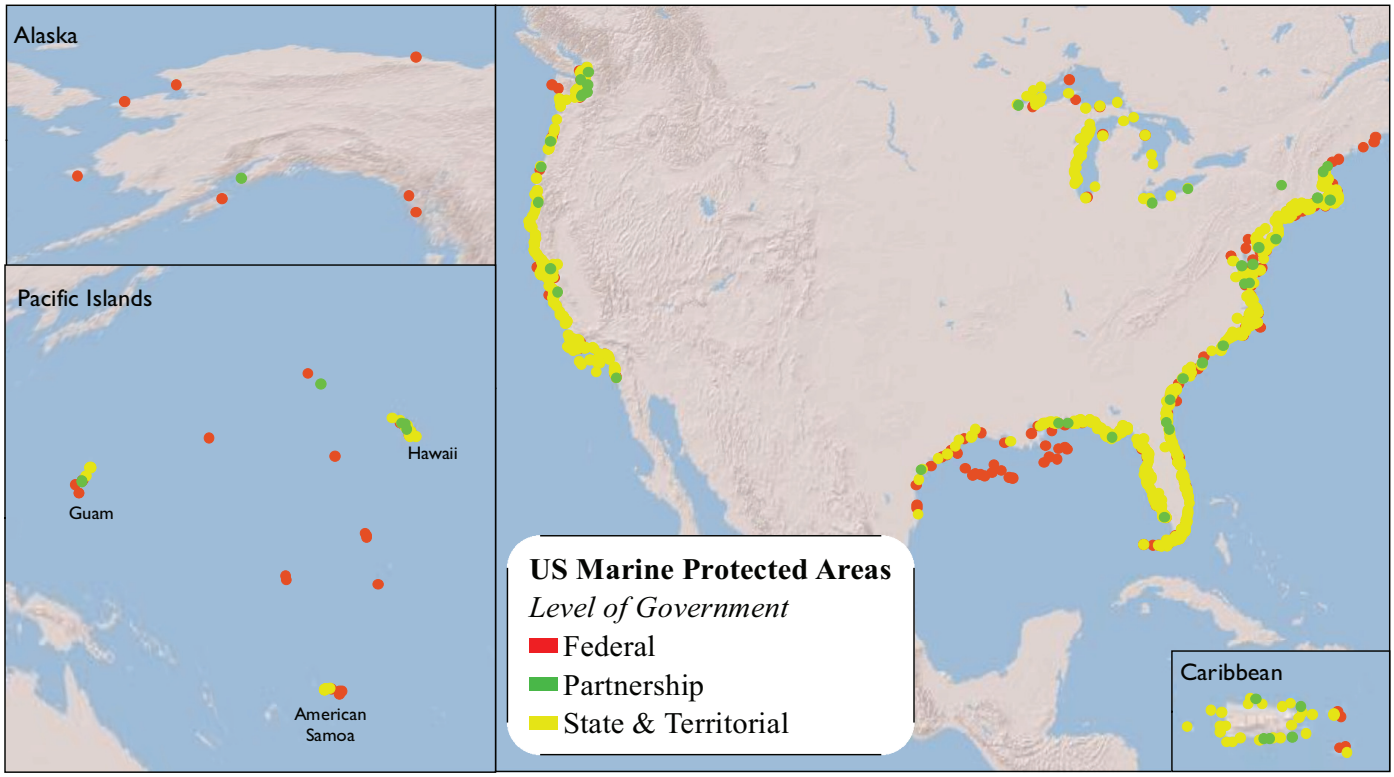
1913

President Theodore Roosevelt establishes the first MPA and the first National Wildlife Refuge in the United States -- Pelican Island National Wildlife Refuge –to protect pelicans and other migratory birds that were being killed for their feathers for hats and other fashions.

First MPA in National Park System is created at Cabrillo National Monument, California.

1967

Hanauma Bay Marine Life Conservation District is designated as the first no-take MPA in Hawaii, and today is one of the most visited MPAs in the world.



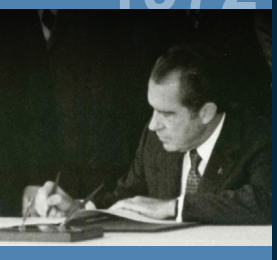
Map of U.S. Natural Heritage and Cultural Heritage MPAs

Resources Present in U.S. Natural Heritage and Cultural Heritage Marine Protected Areas

RESOURCE	PERCENT OF MPAs WITH RESOURCE PRESENT
Coastal wetlands	47
Mangroves	16
Barrier Islands	15
Rocky Intertidal Areas	11
Corals (tropical)	14
Corals (deepwater)	3
Seagrasses & Kelp	40
Marine Mammal Haulouts	10
Bird Nesting Areas	60
Migratory Birds	48
Fish Spawning Areas	22
Fish Nursery Areas	19
Anadromous Fish	14
Turtle Nesting Areas	14
Fissipeds (sea otters & polar bears)	5
Cetaceans (whales, dolphins, porpoises)	31
Pinnipeds	16

the health of our marine ecosystems. MPAs are a tool to help reduce those stresses and restore marine ecosystems. They can also serve as an "insurance policy" by conserving biological diversity, protecting spawning and nursery areas, and protecting habitats like barrier islands, coral reefs and wetlands that shield communities from coastal storms and flooding. These benefits, along with other economic benefits from recreation, tourism and fishing, help sustain local coastal communities.

1972



National Marine Sanctuary Act is passed, outlining the purpose and process to create Sanctuaries.

Coastal Zone Management Act is passed, establishing the National Estuarine Research Reserve System, a network of MPAs for research, education and stewardship.

1974

The wreck of the USS Monitor is nominated for National Marine Sanctuary status, becoming the first National Marine Sanctuary in 1975.

Making Sense of U.S. MPAs: the MPA Inventory

With more than 1,700 marine protected areas managed by dozens of federal, state and territorial government agencies, the MPA picture in the United States is a complicated mosaic of jurisdictions and approaches. The U.S. MPA Inventory, managed by the National Marine Protected Areas Center, is a comprehensive database of all MPAs in U.S. waters and is updated annually. This unique database includes geospatial information on the sites, as well as a host of other data on the purpose, governance, regulations and resources of MPAs in U.S. waters. An accompanying MPA Mapping Tool allows users to view boundaries and access data for most of these sites. (See www.marineprotectedareas.noaa.gov.)

This overview summarizes information about all U.S. MPAs, with particular emphasis on MPAs established to protect the nation's natural or cultural heritage such as biological diversity, functioning ecosystems and intact habitats. As such, this analysis excludes sustainable production MPAs created specifically to manage fisheries. Additionally, figures for the natural heritage and cultural heritage MPAs in this document exclude some very large and spatially- or temporally-dynamic areas managed by NOAA Fisheries to protect right whales and other threatened species from fishing impacts. The Inventory also provides information on the wealth and diversity of resources protected by U.S. MPAs. The table at left shows the percent of U.S. MPAs focused on natural and cultural heritage that contain certain habitats and resource groups.

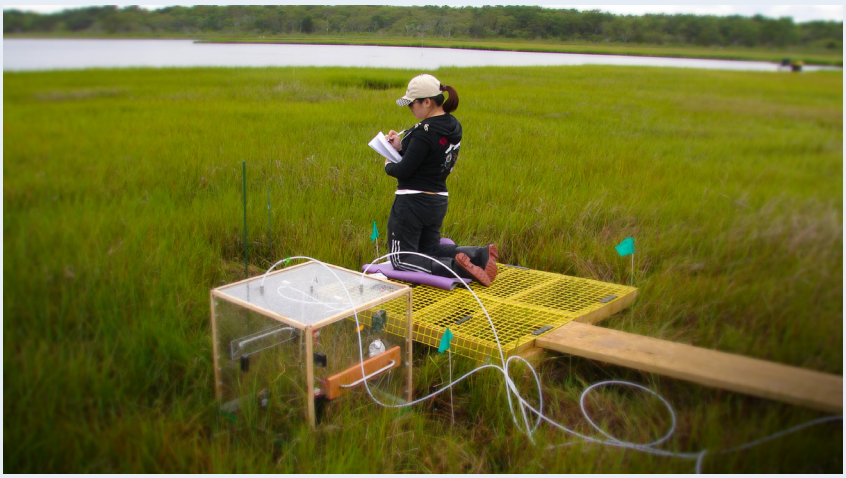


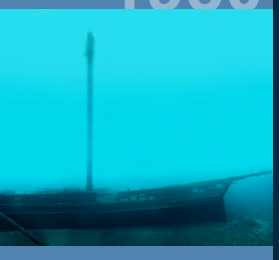
Photo: Waquoit Bay National Estuarine Research Reserve

PROTECTING "BLUE CARBON" HABITATS AT WAQUOIT BAY NATIONAL ESTUARINE RESEARCH RESERVE

Tidal wetlands are increasingly recognized as one of the key coastal habitats that absorb large quantities of carbon dioxide from the atmosphere and store it as "blue carbon," thus decreasing the effects of global warming. Globally, coastal habitats like salt marshes, seagrasses and mangroves are more effective than forests in sequestering carbon. To better understand how these processes work, Waquoit Bay National Estuarine Research Reserve (NERR) is conducting research into the relationships between climate change, sea level rise, salt marshes and nitrogen pollution in order to develop and apply new techniques to quantify greenhouse gas emissions and carbon sequestration in wetlands.

Waquoit Bay NERR is part of the National Estuarine Research Reserve System, a network of 28 MPAs focused on estuarine areas protected for research, education and stewardship. Waquiot Bay NERR's research also aims to predict carbon fluxes across a range of environmental conditions such as precipitation, water level, and salinity and under conditions of future climate change. Through this work, scientists at Waquoit Bay NERR are generating information and tools that coastal decision makers can use to manage nitrogen pollution and design effective wetlands protection and restoration projects. They are also contributing to policy frameworks and economic incentives that may someday soon bring coastal wetlands into international carbon markets, thereby providing a financial incentive for investment in tidal wetland restoration and preservation.

1980



The Michigan underwater preserve system is created to preserve and protect Michigan's historic shipwrecks for later generations.

1987

Florida begins to develop a statewide system of underwater parks featuring shipwrecks and other historic sites, popular attractions for skin and scuba diving visitors to witness a part of Florida's history first-hand.

1998

International "Year of the Ocean." A National Oceans Conference is held in Monterey, California. President William J. Clinton and Vice President Albert Gore attend, calling for a comprehensive program for national action for the oceans.

Connnecting the Dots: MPA NETWORKS AND

MPA Networks: Linking Sites Ecologically to Maximize Conservation Impacts

MPAs span a range of habitats including the open ocean, coastal areas, intertidal zones, estuaries, and the Great Lakes. Networks of MPAs can connect these diverse habitats, providing protection to species that use different habitats at different stages of their lives. Scientists and policy makers have called for the establishment of MPA networks to connect important habitats and populations ecologically, replenish and sustain marine life, maintain ecosystem processes, and improve resilience by spreading risk in case of localized disasters. MPA networks can also enhance the effectiveness of small MPAs when establishing larger MPAs is not economically, logistically or socially feasible. Most U.S. MPAs were established before the recent focus on MPA networks, and are therefore not designed to be ecologically connected. However, research on the movements of adults, juveniles and larvae is helping to inform management decisions to create MPA networks. The most systematic approach to developing MPA networks in the United States has been California's Marine Life Protection Act (see below).

MPA Systems: Partnerships across MPA Programs

Creating systems of MPAs focuses on strengthening the institutional con-

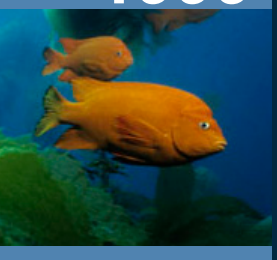
CALIFORNIA'S ECOLOGICAL NETWORK OF MPAS

Photo: L. Wenzel

California is the national leader in developing ecological networks of MPAs. The state's 1999 Marine Life Protection Act (MLPA) requires the California Department of Fish and Wildlife (formerly the California Department of Fish and Game) to redesign California's system of MPAs to increase its cohesion and effectiveness at protecting the state's marine life, habitats and ecosystems. The goals of the MLPA focus on protecting the state's marine life populations, habitats and ecosystems, as well as the recreational, educational and study opportunities they provide. Moreover, the law clearly states that the state's MPAs should function as a network to the extent possible. An MPA planning process was completed in 2011 for the four coastal regions of the state, resulting in 124 MPAs covering about 16 percent of state waters. Of this MPA area, approximately 58 percent (9 percent of state waters) is in "no-take" MPAs.

Much has been learned from California's process creating its MPA network, including the importance of stakeholder engagement, clear science guidelines, financial investment, building broad-based support and ensuring a transparent decision-making process. After two failed attempts to design a statewide MPA network, California launched a public-private partnership to conduct regional planning processes. Regional stakeholder groups developed alternative MPA proposals that were evaluated by a science advisory team and the California Department of Fish and Wildlife for the ability to meet MLPA goals. Potential socioeconomic impacts and other factors were also considered during multiple rounds of review that included government agencies, tribes, industry and the public. A blue ribbon task force, established to oversee the MPA planning process, made recommendations

1999



California's Marine Life Protection Act passed to protect marine life populations, habitats and ecosystems.

2000

President William J. Clinton issues Executive Order 13158, calling for the establishment of a National System of Marine Protected Areas, and establishing the National Marine Protected Areas Center.

2001

Virgin Islands Coral Reef National Monument in St. John is established and Buck Island Reef National Monument in St. Croix, USVI is expanded.

SYSTEMS

nections among MPA programs. The United States has dozens of federal, state, territorial and tribal MPA programs that manage their component MPAs according to their own authorities and mandates. Familiar examples include national parks, national marine sanctuaries, national wildlife refuges and the state counterparts to these programs. In 2000, Executive Order 13158 called for the establishment of a comprehensive National System to strengthen and expand the nation's portfolio of MPAs. This system was established in 2009 as a voluntary partnership among the nation's MPA programs to more effectively conserve the nation's marine resources. The national system brings together federal, state and territorial MPAs managed by diverse agencies that are working toward shared national conservation objectives, providing them with a means to address issues that occur in multiple sites across their boundaries, such as adaptation to climate change.

The focus of the national system is on enhancing protection of marine resources and representing the nation's diverse ecosystems. The national system does not bring state, territorial or local sites under federal authority, nor does it restrict or change the management of any MPA. There are currently 437 members of the national system, representing four federal programs and programs in 12 coastal states. To be eligible for the national system, a site must meet criteria in the *Framework for the National System of MPAs of the United States*.

Since its inception, the National System of MPAs, coordinated by the National Marine Protected Areas Center, has undertaken several activities to help strengthen and connect the nation's MPA programs. These have included:

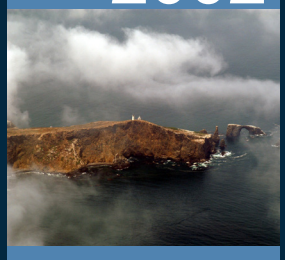
- Annual meetings to identify program priorities and establish priorities for the national system
- Regular updates of the U.S. Inventory of MPAs
- Spatial data and tools for MPA managers to better understand and address expanding human uses of the oceans and the conflicts they sometimes entail
- Updates on MPA science and management news through the MPA Center website, marineprotectedareas.noaa.gov, and social media
- A small grant program to support collaborative projects, including regional MPA networks
- Training (MPA network development, climate change adaptation), and,
- Collaboration on outreach and communication.

to the California Fish and Game Commission, which made final regional decisions after conducting its own environmental review and regulatory processes.

Scientific design guidelines and other key design criteria established a framework for developing the regional MPAs. The science guidelines were developed by the science advisory team and recommended habitats to be represented in MPAs, replication of habitats within MPAs, and size and spacing of MPAs, to promote ecological connectivity. The resulting statewide network includes more and larger MPAs, as well as MPAs that capture a broader range of habitats. The MPA Monitoring Enterprise, an independent, non-profit organization, is working with the California Department of Fish and Wildlife and other state, federal, tribal and nongovernmental partners to establish a monitoring benchmark for measuring future MPA performance and develop a strategy for long-term monitoring.

Tortugas Ecological Reserve in Florida Keys National Marine Sanctuary is established, the largest fully-protected marine reserve in U.S. federal waters to-date.

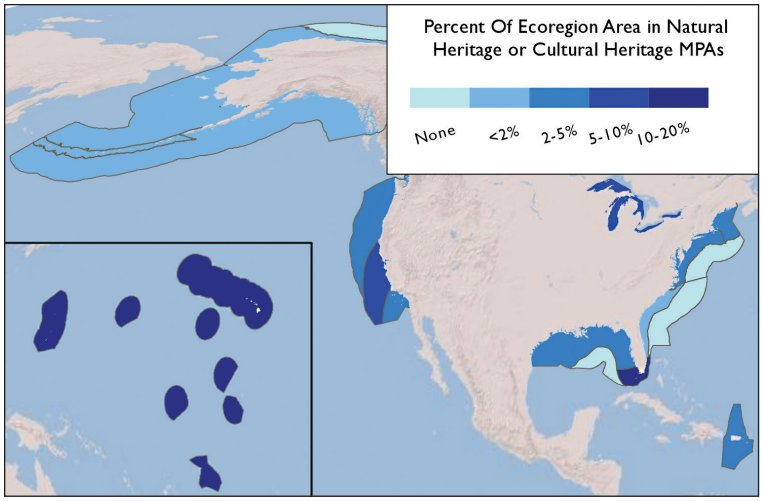
2002



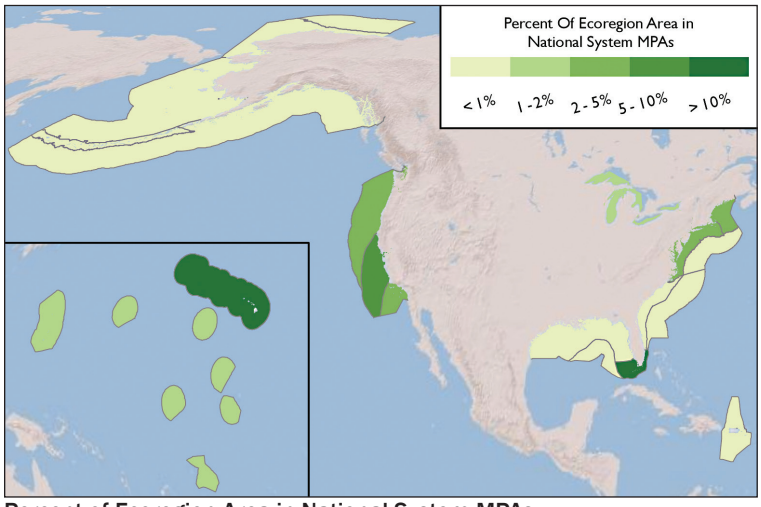
California establishes ten marine reserves and two marine conservation areas within Channel Islands National Park and National Marine Sanctuary, creating one of the largest marine reserve networks in U.S. waters.

2006

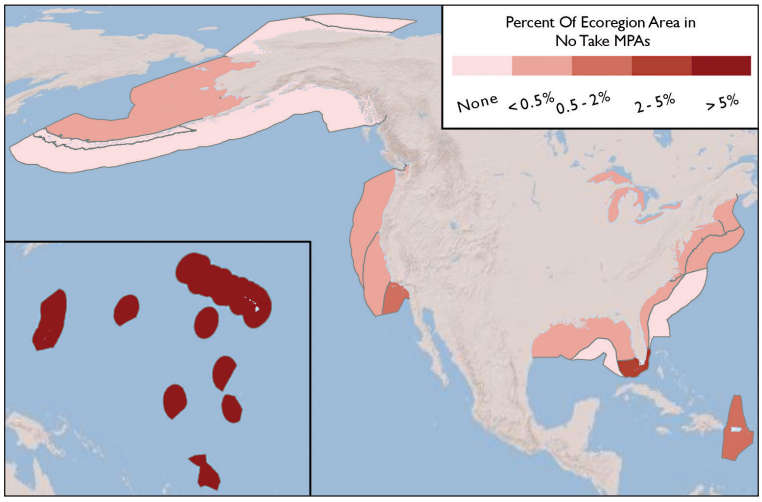
Papahānaumokuākea Marine National Monument in Hawai'i is established by President George W. Bush, the largest MPA in the United States and one of the largest in the world.



Percent of Ecoregion Area in Natural Heritage and Cultural Heritage MPAs



Percent of Ecoregion Area in National System MPAs



Percent of Ecoregion Area in No Take Reserves

Toward a Representative System of MPAs

Executive Order 13158, which called for the establishment of the National System of MPAs, noted that its purpose was to "develop a scientifically based, comprehensive national system of marine protected areas representing diverse U.S. marine ecosystems." The initial analysis of representativeness shown here is based on the extent to which each of the 14 ecoregions in U.S. waters are covered by MPAs. Marine ecoregions are geographic areas established based on distinct oceanographic features and species groups. These ecoregions were created by the trilateral (Canada, Mexico and US) Commission for Environmental Cooperation, and are similar to the Marine Ecoregions of the World created by the World Wildlife Fund and The Nature Conservancy.

For natural heritage and cultural heritage MPAs, the best represented ecoregions include the Hawaiian Islands, Remote Pacific Islands, the Great Lakes and South Florida, which all have more than 10 percent of their area in these types of MPAs. The least represented ecoregions include the Beaufort and Chuckchi Seas in Alaska, the Southern Gulf of Mexico (offshore), and the Gulf Stream and Northern Gulf Stream transition ecoregions off the East Coast, none of which have any natural heritage or cultural heritage MPAs.

Ecoregions that have the most area in the National System of MPAs include South Florida and Hawaii, both of which have more than 10 percent of their area in national system MPAs. Ecoregions least represented within the national system include all of those in Alaska, the Gulf of Mexico, and most of ecoregions along the East Coast.

For no-take natural heritage and cultural heritage MPAs, the best represented ecoregions are Hawaii and the Remote Pacific Islands, followed by South Florida and then by the Southern Californian Pacific and the Caribbean. The remaining regions have very small no-take MPA area, with the Beaufort and Chuckchi Seas, the Southern Gulf of Mexico and the offshore ecoregions along the East Coast (Northern Gulf Stream Transition and Gulf Stream) having none of these highly protective MPAs.

2007

National Park Service sets aside Research Natural Area at Dry Tortugas National Park as no-take zone and establishes joint science plan with State of Florida.

2009

Marianas Trench, Pacific Remote Islands, and Rose Atoll Marine National Monuments established by President George W. Bush.

National System of Marine Protected Areas formally established, with 225 federal and state MPAs as charter members.

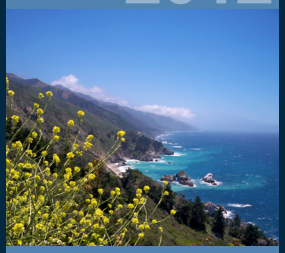
Photo: NOAA

2010

President Obama establishes a National Ocean Policy to protect and provide for the sustainable use of ocean resources.

Papahānaumokuākea Marine National Monument becomes the first World Heritage Site in the U.S. recognized for both natural and cultural heritage. Papahānaumokuākea's globally significant natural attributes incorporate its living, indigenous, cultural connections to the sea.

2012



California completes the coastal component of the statewide Marine Life Protection Act network with 124 MPAs, including 58 no-take MPAs.

Aichi Target 11: A GOAL FOR NATURAL HERITAGE AND CULTURAL HERITAGE MPAS

The Convention on Biological Diversity (CBD) plays an important role as an international framework for conservation action. In 2010, parties to the CBD in Nagoya, Japan, established new conservation targets, including Aichi Target 11, on marine protected areas. Specifically, the target states that "by 2020…10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes." This target builds on earlier conservation targets calling for the establishment of MPA networks as a tool for ocean management. While the United States is not a party to the CBD, Aichi Target 11 is a useful international benchmark for assessing progress toward widely shared marine conservation goals. Because the international definition of MPAs established by the International Union for the Conservation of Nature does not include areas established for fisheries management, U.S. sustainable production MPAs have been excluded from much of the analysis provided here. This focus on natural heritage and cultural heritage MPAs provides greater comparability with MPA management efforts in other countries.

Focus on NATURAL & CULTURAL HERITAGE

Natural and Cultural Heritage MPAs at a Glance:

- Account for 1,303 of the nation's 1,700 MPAs
- Cover about 8 percent of all U.S. waters
- About 18 percent of these MPAs are no-take
- Of these MPAs, 88 percent are primarily focused on natural heritage protection, with 12 percent focused primarily on the protection of cultural heritage. (Many MPAs have more than one conservation focus.)

Regional MPA Coverage

There are 1,303 natural heritage and cultural heritage MPAs in place in the United States. These areas vary widely in purpose, legal authorities, managing agencies, management approaches, level of protection, and restrictions on human uses. About eight percent of U.S. waters are within this type of MPA. These MPAs are fairly evenly divided among the Southeast (24 percent of the total number), Great Lakes (23 percent) West Coast (22 percent) and Gulf of Mexico (17 percent), with much fewer in the Caribbean, Northeast, Pacific Islands and Alaska. By area, nearly 90 percent of natural heritage and cultural heritage MPA area is in the Pacific Islands region.

MPAs by Coastal vs. Offshore Location

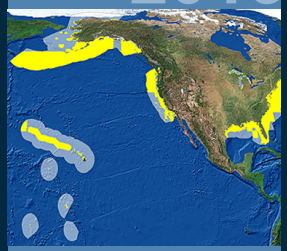
MPAs provide important ecological, social and economic benefits, which vary widely depending on the resources they protect and their location in relationship to human communities. Because terrestrial protected areas have a longer history than MPAs, it's not surprising that nearly half of all MPAs are part of a larger terrestrial protected area. Of the remainder, 45 percent are coastal (sites are primarily marine, but may include a terrestrial component; all areas are within one mile of shore) and 8 percent are offshore (at least one mile from shore). In terms of area, nearly all the area of natural heritage and cultural heritage MPAs is coastal, which includes large oceanic areas that encompass islands.

2012

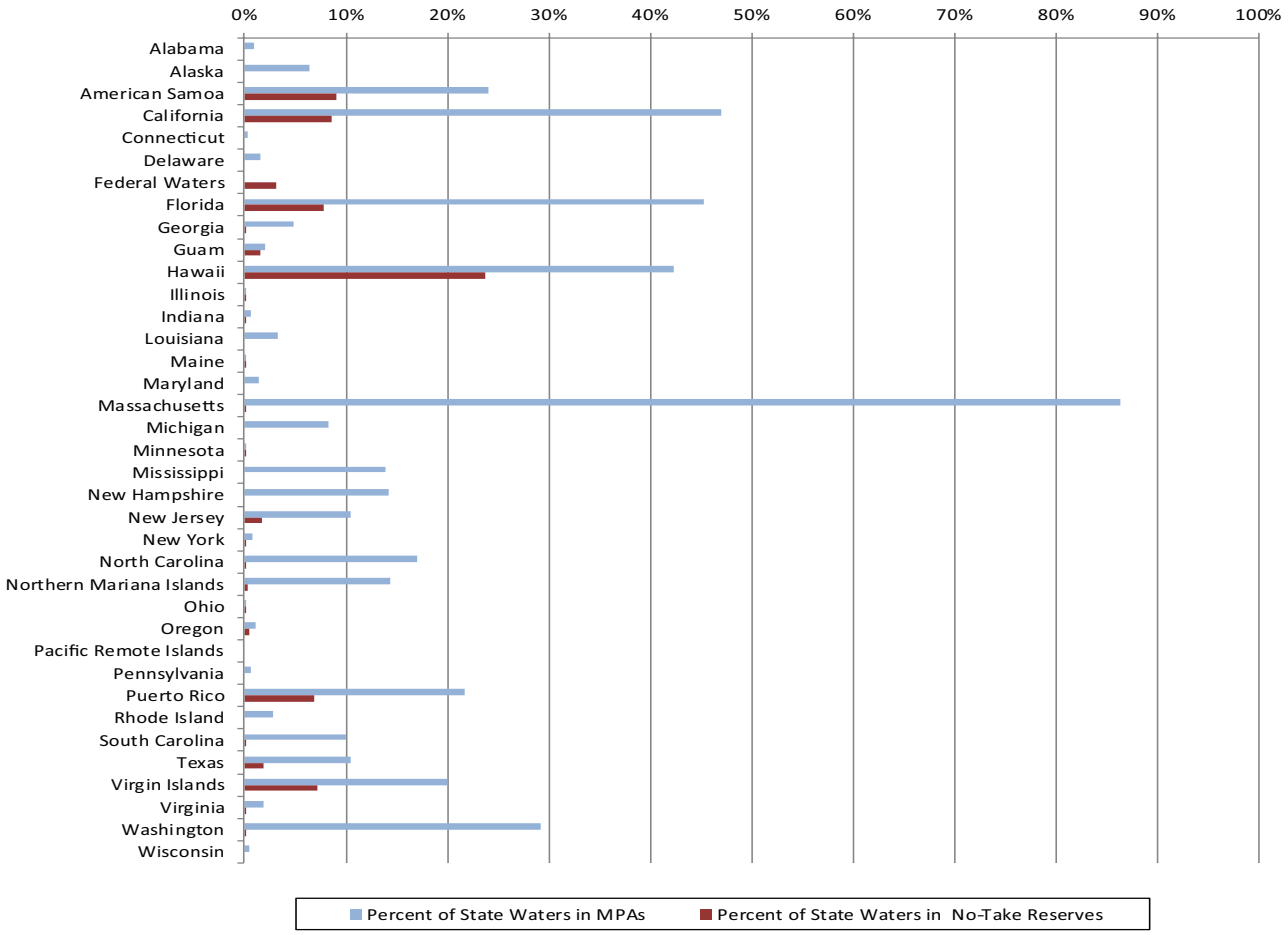
Oregon establishes three new no-take marine reserves to aid in the research and management of marine habitats and resources.

Hurricane Sandy hits the New York/New Jersey area. Numerous MPAs are inundated and suffer major damage to shoreline resources. Communities protected by natural barriers like sand dunes are shielded from the worst impacts.

2013



As of 2013, there are over 1,700 MPAs in American waters.



Percent of State Waters in Natural Heritage and Cultural Heritage MPAs and No-Take Reserves

MPAs by Level of Government

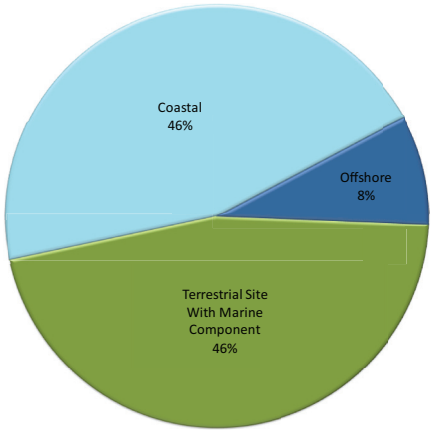
Approximately 81 percent of the nation's natural heritage and cultural heritage MPAs are managed by coastal states and territories, while 15 percent are under federal jurisdiction and four percent are managed by MPA partnerships. Fewer than one percent of these MPAs are managed by local governments. Although most of these MPAs are managed by states and territories, they are typically quite small. In contrast, federally-managed areas such as national marine sanctuaries and national monuments are often very large. For this reason, approximately 60 percent of the total MPA area is managed by federal agencies, and 40 percent is managed by intergovernmental partnerships (dominated by the Papahānaumokuākea Marine National Monument in Hawaii, managed jointly by NOAA's Office of National Marine Sanctuaries, the U.S. Fish and Wildlife Service and the State of Hawai'i).

MPAs by State

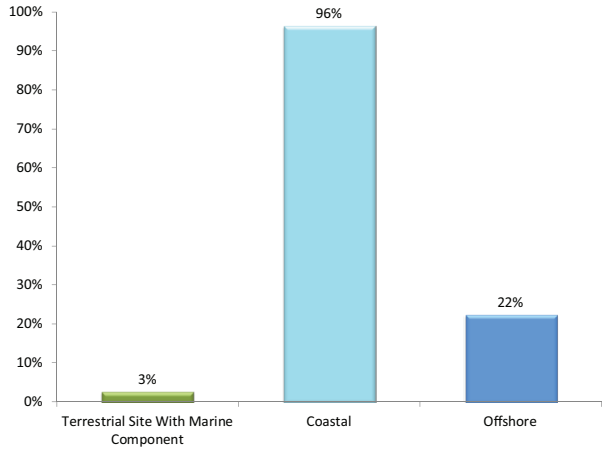
The graph above shows the coverage of state waters by all federal and state natural heritage and cultural heritage MPAs by State, and by no-take reserves. State waters extend from shoreline out to three nautical miles, except for Texas and Florida's Gulf coast, where state waters extend out to nine nautical miles. (The federal government has jurisdiction over the area beyond state waters out to the 200 nautical mile limit of the Exclusive Economic Zone.) The state with the highest amount of MPA coverage is Massachusetts, with over 86 percent of the state waters in MPAs, followed by California (47 percent), Florida (45 percent) and Hawaii (42 percent). States with the highest coverage of highly protected no-take reserves include Hawaii (24 percent), American Samoa and California (9 percent), Florida (8 percent), Puerto Rico and the Virgin Islands (7 percent). Twelve states have no no-take reserves at all, and other 14 have less than one percent of their waters in no-take reserves.

MPAs by Scope of Protection

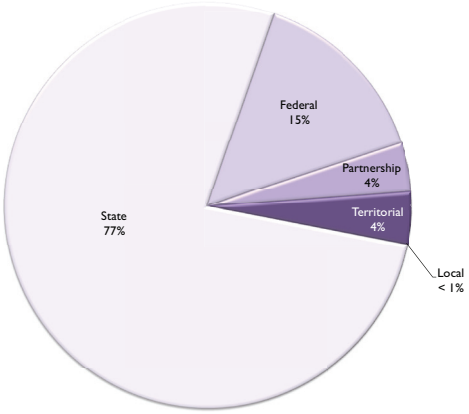
Scope of protection distinguishes between MPAs that have the broad authority and management strategies to sustain ecosystem integrity and health, versus those that were established to protect a specific resource, such as a threatened or endangered species or a cultural resource. Interestingly, most natural heritage and cultural heritage MPAs (78 percent) have an ecosystem focus, with only 22 percent established with a narrower focus on a resource or resource group. In terms of



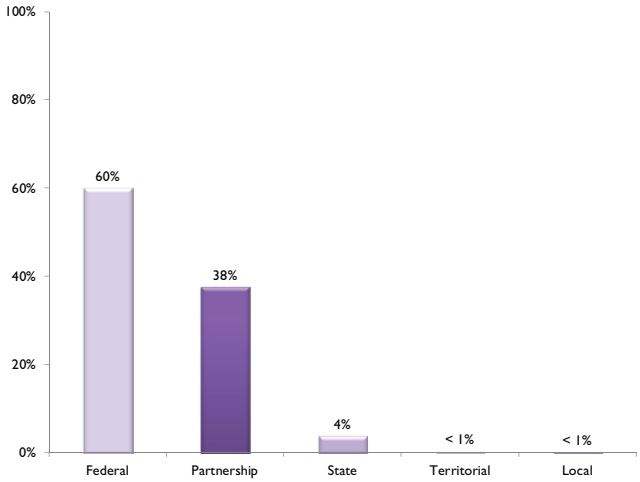
Number of Natural Heritage and Cultural Heritage MPAs by Coastal vs. Offshore



Area of Natural Heritage and Cultural Heritage MPAs by Coastal vs. Offshore



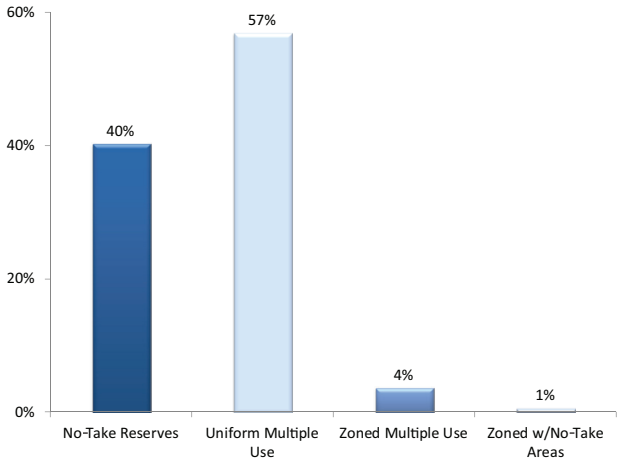
Number of Natural Heritage and Cultural Heritage MPAs by Level of Government



Area of Natural Heritage and Cultural Heritage MPAs by Level of Government

WHY DON'T THE "PERCENT OF AREA" BAR GRAPHS ADD UP TO 100 PERCENT?

Some ocean areas contain multiple MPAs managed by different governmental entities that overlap each other spatially. As a result, the total area of MPAs in U.S. waters exceeds the absolute area of ocean covered by one or more MPAs.



Area of Natural Heritage and Cultural Heritage MPAs by Level of Protection

THUNDER BAY NATIONAL MARINE SANCTUARY: BUILDING COMMUNITY SUPPORT

Photo: Thunder Bay NMS

When Thunder Bay National Marine Sanctuary was proposed for designation in 1997, 70% of voters in a non-binding ballot initiative opposed the sanctuary. Fifteen years later, some of its most outspoken opponents are now supporting an eight-fold expansion of the sanctuary, which protects over 200 historic shipwrecks in the cold waters of Lake Huron. What happened to lead to such a dramatic change in attitudes?

Thunder Bay National Marine Sanctuary is located on the Northeast coast of Michigan, near Alpena, a town of approximately 1,200. Formerly dependent on timbering, the town has been working to diversify its economy, particularly as a destination for recreation and tourism. While local residents were skeptical of the federal government establishing a marine protected area in state waters, they were given an early and important voice in its management through the creation of a Sanctuary Advisory Council (SAC). Made up of individuals representing diverse interests from the community, the SAC was a key mechanism for providing community input into sanctuary decision-making.

The sanctuary also served as a focal point for public and private investment in the community. In fall 2005, it opened a new Great Lakes Maritime Heritage Center in the site of a former paper mill. The building includes exhibit space; a theater; a high-tech classroom dedicated to distance learning via the Internet; and an archeological conservation laboratory. Visitors can explore Sanctuary shipwrecks in real time via live video feeds from shipwrecks in the bay. The energy efficient building is LEED certified, and now hosts thousands of visitors each year, serving as a hub for visitors, students and divers across the region and beyond. Sanctuary staff also led an effort to develop a Great Lakes Maritime Heritage Trail, funded by the Department of Transportation and other partners, including a boardwalk and interpretive material explaining the vibrant history of the region.

Today, Alpena continues its efforts to foster economic development, using the sanctuary as a key selling point. The town has even begun marketing efforts to brand itself as the "Sanctuary of the Great Lakes," blending the identity of town and protected area. This partnership demonstrates the potential for MPAs to both conserve valuable marine resources and foster vibrant communities.

area protected, nearly 99 percent of the MPA coverage for natural heritage and cultural heritage sites is focused on protecting ecosystems. Some sites with a focus on ecosystem protection may not yet be fully implementing this approach, but it is the purpose for their establishment. As ecosystem-based management has become a basic principle for resource managers, some sites originally established to protect a focal resource are expanding their scope to encompass a broader ecosystem-scale approach. The Hawai'ian Humpback Whale National Marine Sanctuary, for example, established principally to protect the breeding grounds for humpbacks, is now updating its management plan to focus on ecosystem protection to benefit a wider range of species, features and ecosystem services.

MPAs by Level of Protection

Most (82 percent) of our natural heritage and cultural heritage MPAs are multiple-use sites that allow a variety of human activities, including fishing and other extractive uses. In contrast, only 15 percent of these MPAs are no-take reserves that prohibit the extraction or significant destruction of natural or cultural resources. Within this MPA category of no-take reserves, eight percent are no-take areas; six percent prohibit take and access without a permit; and, one percent prohibit take, access and impacts from human activities. In terms of area covered, no-take reserves comprise about 40 percent of the overall natural heritage and cultural heritage MPA area, with no take protecting 39%; no access protecting one percent and no impact protecting less than one percent. Nearly all of the no-take reserve area is in just one MPA -- the Papahānaumokuākea Marine National Monument in Hawai'i. In most states and regions, no-take reserves are uncommon and cover only a small fraction of the MPA area.

MPA MANAGEMENT TRENDS

Photo: Flickr/USFWS Southeast

MPA Establishment Over Time

Natural heritage and cultural heritage MPAs have been established in U.S. waters to protect marine resources for more than a century. The first U.S. MPA was Pelican Island National Wildlife Refuge, established in 1903 to protect pelicans and other water birds from the plumage trade driven by demand for feathers for ladies' hats. Since then, most MPAs have been established since 1960, with numbers steadily increasing over time. Superimposed on the general trend of increasing numbers of MPAs over time, the area of coastal and ocean waters they protect has jumped dramatically in recent years, more than doubling in 2006 with the establishment of Papahānaumokuākea Marine National Monument in 2006, and doubling again in 2009 with the establishment of three additional marine monuments in the remote Pacific Ocean.

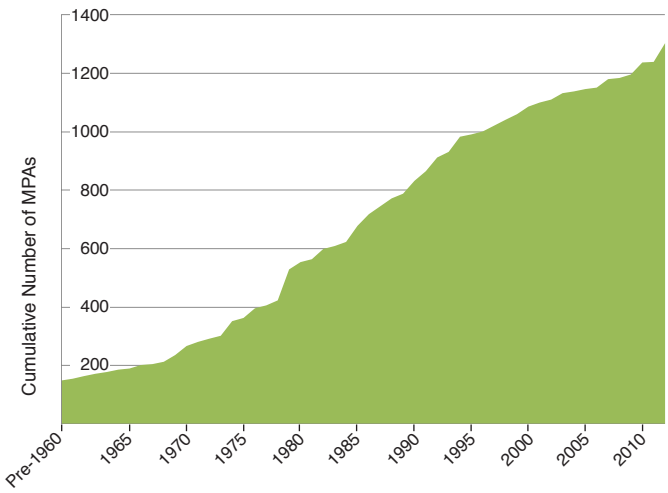
Natural and Cultural Heritage within the Broader Seascape

The Aichi Target 11 calls for MPAs to be "integrated into the wider landscapes and seascapes."

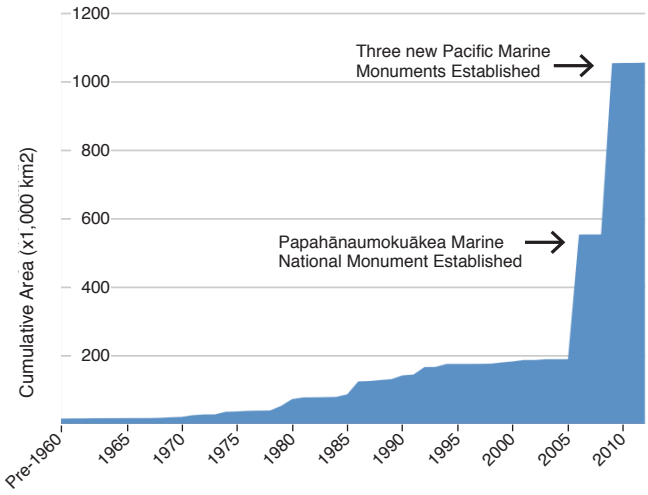
In the United States, the framework for this effort is the 2010 National Ocean Policy, which calls for the formation of regional planning bodies to develop comprehensive regional ocean plans reflecting diverse sectors of ocean users. This process is underway in the Northeast and emerging in the Mid-Atlantic and West Coast, with other regions expected to follow. The National Marine Protected Areas Center is helping to produce information and tools for ocean planning, including support for participatory mapping of ocean uses, and the development of analytical tools to better understand the patterns and implications of ocean use requirements, impacts and conflicts.

Improving the Effectiveness of Natural Heritage and Cultural Heritage MPAs

U.S. MPAs are managed by dozens of federal, state and territorial agencies, each with their own approach to measuring and improving management effectiveness. The MPA Center has iden-



Growth in numbers of MPAs, 1960-2012



Growth in area of MPAs, 1960-2012

THINKING BIG – LARGE REMOTE MPAS ARE HAVENS FOR MARINE LIFE

Four of the largest MPAs in U.S. waters have been established in the last decade through the 1906 Antiquities Act. The first, the Papahānaumokuākea Marine National Monument, was established in 2006 to protect the pristine coral reefs of the Northwest Hawaiian Islands and the more than 7,000 species they contain. Stretching more than 1,200 miles, the Monument's distinct geology, biology, and cultural history make it one of the world's greatest treasures. The archipelago is home to more than 7,000 marine species, a quarter of which are found nowhere else on Earth, and is the primary habitat for endangered Hawaiian monk seals, land and sea birds, and plant species. Following this success, three additional Monuments were established in 2009 to protect unique and valuable habitats in the remote Pacific Ocean – the Marianas Trench Monument, the Pacific Remote Marine National Monument, and Rose Atoll Marine National Monument in American Samoa. Together, these four MPAs cover over 335,350 square miles – an area greater than California, Oregon and Washington combined. These MPAs are part of a broader global effort to establish large MPAs that can encompass entire ecosystems.

These MPAs are remote, and little visited by people, but are home to a wealth of species, habitats and geologic features. The Marianas Trench monument primarily protects the ocean floor, including the deepest place on earth – Challenger Deep -- 6.8 miles below the ocean's surface. The monument also protects 21 undersea mud volcanoes and thermal vents along the Mariana Arc, as well as waters and submerged lands surrounding the three northernmost Mariana Islands. It includes some of the most biologically diverse coral reef ecosystems in the Western Pacific, the greatest diversity of seamount and hydrothermal vent life yet discovered and unique ecosystems striving in environments once thought too severe to support life. Exploration in these areas may inform our knowledge about how life evolved on earth and how it might exist elsewhere in the universe. Commercial fishing is banned in some of these waters and restricted in others to ensure that these delicate ecosystems will remain intact for research and exploration.

The Pacific Remote Island Marine National Monument extends 50 nautical miles from the mean low water lines of Howland, Baker, and Jarvis Islands; Johnston, Wake, and Palmyra Atolls; and Kingman Reef. This monument comprises the most widespread collection of coral reef, seabird, and shorebird protected areas on the planet under a single nation's jurisdiction. Rose Atoll Marine National Monument in the territory of American Samoa was created to extend the protections in the waters surrounding the tiny Rose Atoll National Wildlife Refuge out to 50 nautical miles where all commercial fishing is prohibited. Despite its small size, Rose supports the largest populations of giant clams, nesting sea turtles, nesting seabirds, and rare species of reef fish in American Samoa.

Together, these four monuments represent critical refuges for fish and wildlife species rapidly vanishing elsewhere, including sea turtles, dolphins, whales, pearl oysters, giant clams, coconut crabs, large groupers, sharks, humphead wrasses, and bumphead parrotfishes.

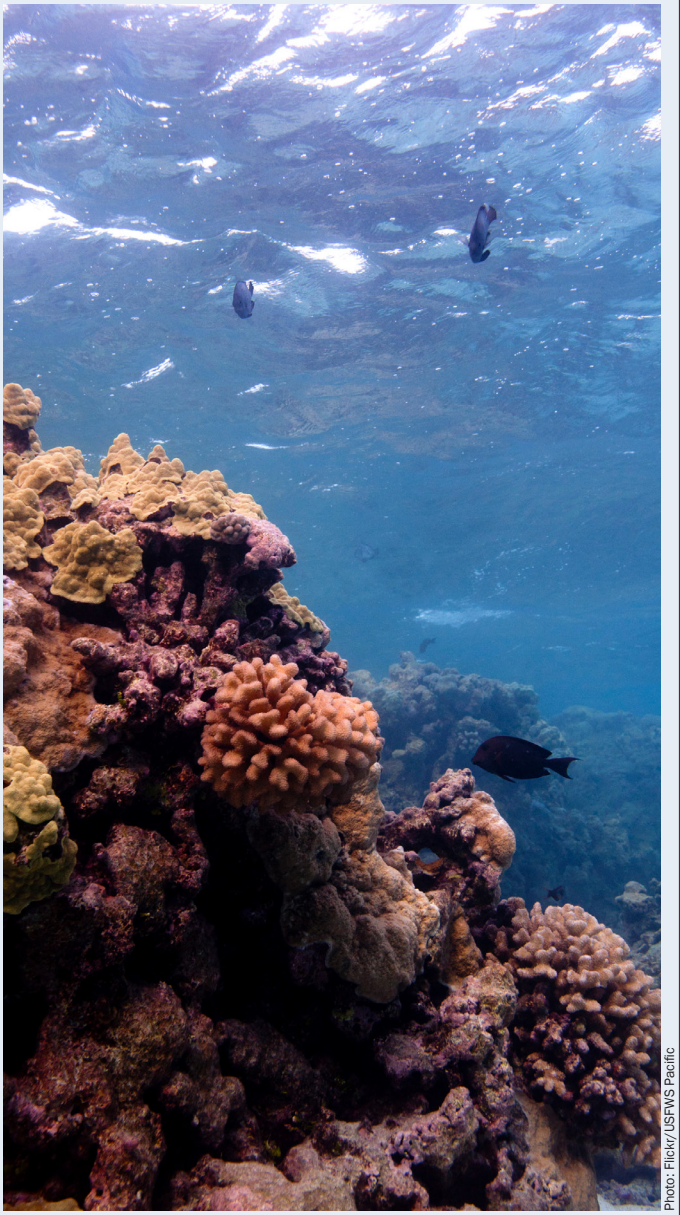


Photo: Flickr/USFWS Pacific

Photo: R. Sparks, Hawaii DLNR

MANAGING FOR RESILIENCE: KAHEKILI HERBIVORE FISHERY MANAGEMENT AREA

As special places with specific conservation objectives and management tools, MPAs provide opportunities to test and adapt management approaches. In response to concerns about the long-term decline of local coral reefs, the state of Hawaii created the Kahekili Herbivore Fishery Management Area (KHFMA) along a two-mile stretch of coastline in Ka'anapali, West Maui. Established in 2009, the KHFMA adopted a form of management unique within Hawaii – protection of coral reef herbivores (i.e., surgeonfishes, parrotfishes, chubs and sea urchins) which may not be killed, injured or harvested. The goal of the KHFMA is to restore natural grazing processes and thereby increase the reef's ability to resist and recover from excessive algal growth that harms corals. The KHFMA does not restrict fishing of other types of finfish or invertebrates.

Beginning in 1999, summertime algal blooms were commonly observed, coinciding with a significant decline in coral cover at Kahekili Beach Park (from approximately 55 percent in 1994, when monitoring began, to 30 percent in 2008). Although the causes of those algal blooms are complex, local scientists and marine managers theorized that protection of reef herbivores could reduce the severity and frequency of algal blooms and help check and potentially reverse declining condition of Kahekili reefs.

To obtain baseline data before the MPA was implemented, the Hawai'i Department of Aquatic Resources, in partnership with the University of Hawai'i, began a comprehensive monitoring program in 2008. This involves one to two co-located surveys per year of fishes, urchins, and benthos (e.g., corals and algae) at 80 to 100 sites. Monitoring is showing a consistent upward trend in the biomass of parrotfishes, which more than doubled between 2009 and 2012. The number of large Bullethead Parrotfish has also steadily increased since the KHFMA was established. Recovery of large parrotfishes may be ecologically significant, as the deep excavating bites made by those large fishes are believed to be especially important in promoting conditions that allow corals to thrive. As the MPA has been in place only three years, its full effects on fishes and corals are not yet known. Surgeonfish, for example, which live longer than parrotfish and are expected to recover more slowly, have shown no increase in biomass. However, survey results show a strong positive link between parrotfish biomass and increased crustose coralline algae – benign algae that are important for successful coral settlement. These promising signs of recovery may point the way to broader adoption of this management tool in other coral reef MPAs.

tified criteria for MPA eligibility to join the National System of MPAs, including contributing to one of the priority conservation objectives of the system and having a management plan (which can either be site specific or part of a broader programmatic management plan). Of the 1,303 natural heritage and cultural heritage MPAs, 32 percent are members of the national system, 26 percent are eligible to be members and 42 percent do not meet the criteria for eligibility. The most common reason why sites are not eligible to join the national system is that they lack a management plan. Management plans are an essential component of effective site management because they set out clear goals and objectives for the site, as well as management strategies for achieving these goals. Typically, they also require public engagement as well as periodic reviews and updates to incorporate new information and changing conditions.

Management effectiveness is the degree to which management actions are achieving the goals and objectives of a protected area. There are many approaches to and components of improving management effectiveness. NOAA's Coral Reef Conservation Program is a partnership between NOAA and state and territorial governments responsible for managing coral reefs. Through an MPA management assessment checklist, the program can identify and fill priority MPA management capacity gaps. The fourteen areas identified on the checklist range from management plans to building ecological networks to climate change adaptation.

As part of the management plan update process, national marine sanctuaries rely heavily on Sanctuary Advisory Councils (SACs) made up of citizens representing diverse interests in the local community. SACs help identify emerging issues, develop and assess management alternatives and build community support for sanctuary management. Monitoring, assessment and public engagement are just some of the tools used to improve management effectiveness.

PLANNING FOR VISITORS – AND SEA LEVEL RISE – AT GATEWAY NATIONAL RECREATION AREA

Meeting the mission of the U.S. National Park Service (NPS) – conserving park resources and values unimpaired for the enjoyment of current and future generations – presents challenges in urban parks where visitor facilities and infrastructure are threatened by storms and sea-level rise. The U.S. National Park System includes 85 parks on the ocean and Great Lakes with more than 17,700 kilometers of coast and one million hectares of marine waters. Some of the most popular marine parks are those near major urban areas where the NPS is expanding opportunities for visitors – especially young people in underserved communities – to experience nature and the outdoors.

For example, Gateway National Recreation Area (NRA) in the New York-New Jersey metropolitan area has a new draft management plan to provide better transportation access to beaches and bays. Under the plan, visitors from the city would reach the water on new roads, foot trails and bike paths, or by ferry. Campsites and improved launching areas for boats and windsports would be built to accommodate both land and water-based recreation. This access offers diverse urban populations with an opportunity to connect with nature, helping create future generations of ocean stewards.

Gateway NRA also must plan for future flooding and inundation of low-lying areas from storms such as Hurricane Sandy, which severely damaged the park in October 2012. NPS will construct and operate new visitor facilities with the highest sustainability standards possible, including mobile or temporary structures that can be removed to avoid damage. The park will transition recreational uses away from impacted areas, and avoid or minimize building of new infrastructure in the most vulnerable flood or storm surge zones. The plan also would protect sensitive habitats and wildlife from disturbance by visitors and restore ecosystems impacted by pollution and shoreline development, which will increase resilience to sea-level rise and storms. Through thoughtful planning, the park can continue to expand recreational opportunities in this urban area with great demand, while protecting the resources that visitors come to experience.

Photo: NPS

LOOKING FORWARD

The United States is fortunate to have a long history of place-based conservation – such as national parks and national wildlife refuges – that in recent decades have expanded increasingly into coastal and marine areas. While there are clearly many MPAs covering large portions of the U.S. Exclusive Economic Zone, these sites vary widely in purpose, scope and level of resource protection they provide. Moreover, U.S. efforts to develop ecologically connected MPA networks are still at an early stage, with the noteworthy exception of California's MPA network. U.S. MPA programs are work-

ing on a wide range of challenges essential to the overall success of our nation's marine conservation efforts and the social and economic values they sustain: assessing and improving MPA effectiveness, identifying gaps in protection for important areas, building MPA networks and planning and managing MPAs in light of increasing demands on the oceans by industrial, recreational, military and other users. By working together through the National System of MPAs, programs can share lessons learned, forge partnerships, and develop a strategic approach to address these challenges.

Photo: Florida Keys NMS

NATIONAL Marine Protected Areas CENTER

www.marineprotectedareas.noaa.gov

The National Marine Protected Areas Center is located within NOAA's Office of National Marine Sanctuaries and works with the Department of the Interior to serve as a resource to all federal, state, territorial and tribal programs responsible for the health of the oceans.

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