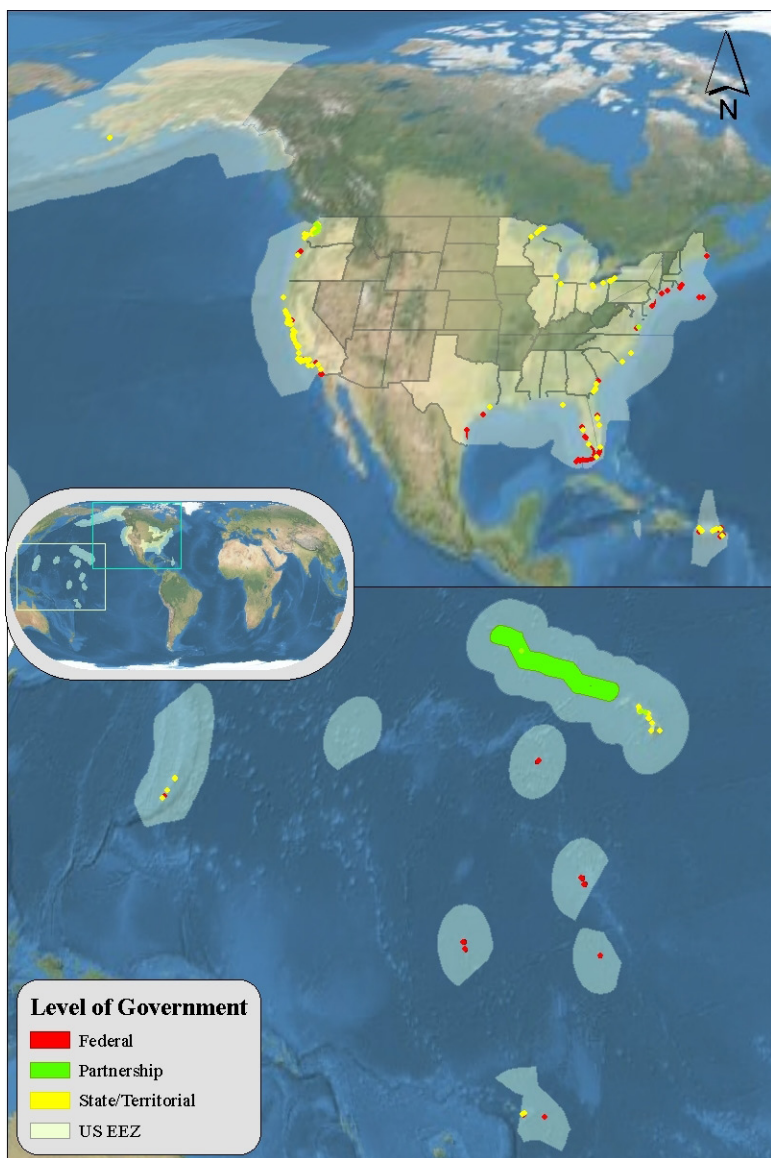


Marine Reserves in the United States

www.mpa.gov



Marine reserves of the U.S. and its territories. Marine reserves cover 3.1% of U.S. waters.

What are marine reserves?

Marine reserves, commonly called “no take” areas, are a type of marine protected area (MPA) that provide a high level of protection to marine resources. While MPAs refer to any area of the marine environment that has been protected for long-term resource conservation, marine reserves are a subset of MPAs that restrict extractive uses in order to protect sensitive habitats or threatened species, or to sustain fisheries. Typically, marine reserves do not allow hunting, fishing, or collecting. Certain marine reserves do not allow other activities (such as anchoring a boat) that can harm sensitive, protected resources.

Marine reserves have been established worldwide, from the tropics to temperate waters. While the ocean area covered by marine reserves is quite small, their contribution to marine conservation is important. There are over 1,600 MPAs in U.S. waters, of which 223 are marine reserves. Marine reserves make up 3.1% of U.S. waters, including marine, estuarine and Great Lakes waters. Approximately 8% of the MPA area in the U.S. is in marine reserves, with the other 92% designated for multiple uses, including fishing. Marine reserves vary greatly in size. Over 95 percent of marine reserve area in the U.S. is located in the 363,680 km² Papahānaumokuākea Marine National Monument in Hawaii. The remaining 5 percent is located in small reserves such as the 17m² North Pond State Nature Preserve on Kelley’s Island in Lake Erie, the nation’s smallest. Marine reserves are established through the existing authorities of federal agencies, states or territories. Fifty-four are federally managed as part of National Parks, National Wildlife Refuges, or National Marine Sanctuaries systems. Others are managed at the State (141) and territorial level (19), or through partnerships (9).

Why establish marine reserves?

Coastal and marine areas in the U.S. serve as routes of transportation, provide us with food and materials, and are places we go for recreation and enjoyment. Increased use

NOAA’s National Marine Protected Areas (MPA) Center’s mission is to facilitate the effective use of science, technology, training, and information in the planning, management, and evaluation of the nation’s system of marine protected areas. The MPA Center works in partnership with federal, state, tribal, and local governments and stakeholders to develop a science-based, comprehensive national system of MPAs. These collaborative efforts will lead to a more efficient, effective use of MPAs now and in the future to conserve and sustain the nation’s vital marine resources.



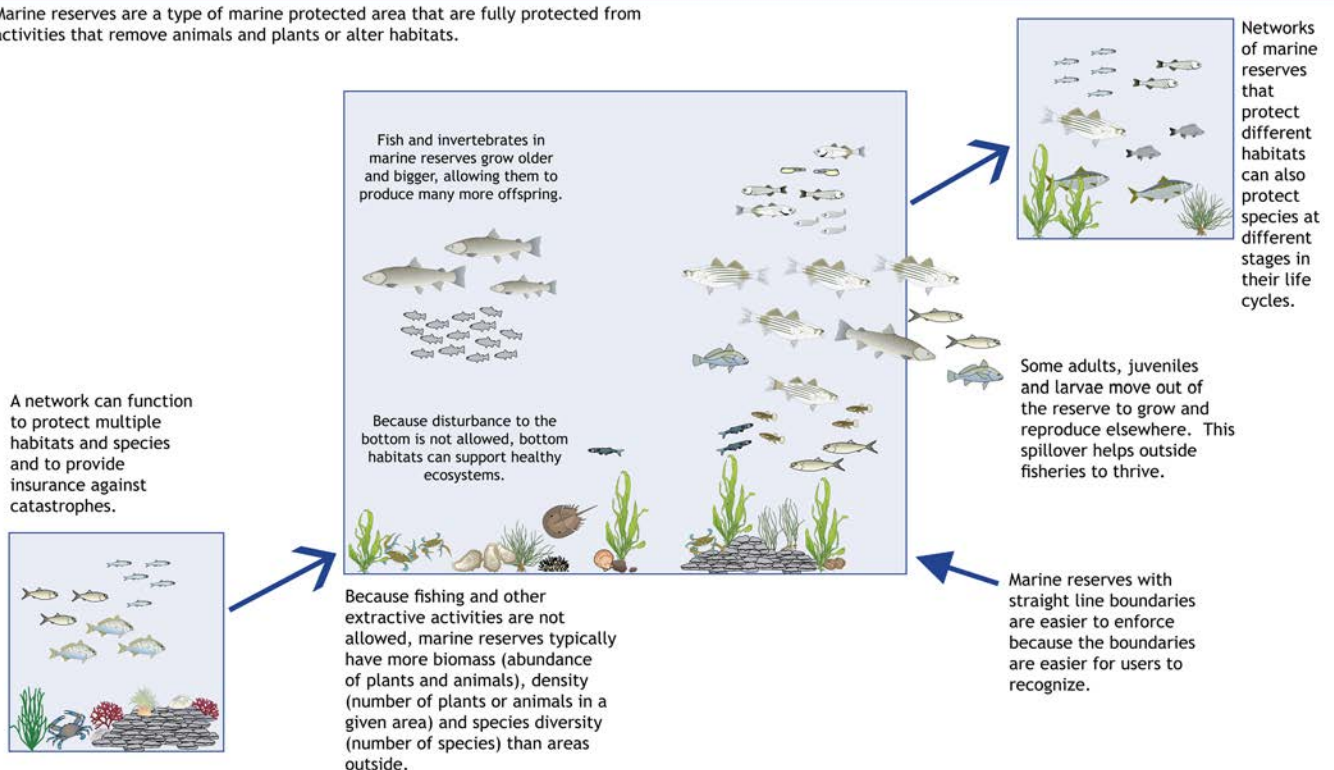
of these areas, however, has degraded coastal and marine habitats and caused many species to decline. While past resource management techniques were primarily aimed at restoring or protecting a single species or type of habitat, management agencies have increasingly turned toward an ecosystem-based approach to management in order to take a holistic approach to protecting and restoring ecosystem health. Marine reserves are an important tool because they reduce human pressures and allow the natural connections within an ecosystem to recover from many environmental stressors. Establishing a marine reserve not only protects and helps to restore the habitats and populations of organisms within the reserve, it can also enhance habitats and populations throughout a region. This in turn supports human communities by protecting special places and resources and the economic, social and cultural values they provide.

Do marine reserves work? Studies conducted in many different habitats and ecosystems have shown their effectiveness. When a reserve is established, species that were previously exploited usually begin to recover. Overall, biomass (the total mass of plants and animals) increases in the reserve, as does the size and density of organisms and the number of species. Reserves also help restore the balance between species including important predator-prey relationships. For example, sea urchins graze on kelp in rocky habitats, and overgrazing by urchins can lead to declines in kelp forest ecosystems. In parts of California, overgrazing occurred when populations of sea urchins exploded due to the reduction in the number of their natural predators such as sea otters, lobsters and California Sheephead (*Semicossyphus pulcher*). However, the protection provided by marine reserves, along with broader protection of sea otters, has helped restore predator control of sea urchins and promoted recovery of kelp forests. The amount of time required for ecosystem restoration can vary, and depends on the growth and reproductive rates of the local organisms. In colder waters where animals grow more slowly or in areas with organisms that reproduce at larger sizes, the recovery time is longer.

The mobility of organisms is a key factor in how reserves affect adjacent areas. Many species of fish, such as coral reef fish or rockfish, spend much of their lives in the same area. For these species, the benefits of establishing a reserve are mostly observed within its boundaries. Other species, such as the fish and crustaceans present in seagrass beds, are highly mobile, moving in and out of different habitat types over the period of a tidal cycle, day, or season. Larvae and juveniles of mobile species produced within a reserve or network of reserves can enhance the diversity and abundance of organisms across a region as they migrate and support food webs by becoming prey for other species. Similarly, highly mobile adult animals can be caught when they move outside the reserve, improving commercial and recreational fishing. In areas with an active sport fishing community, it's common for areas just outside reserve boundaries to become popular fishing sites.

How Marine Reserves and Networks Protect Ocean Resources

Marine reserves are a type of marine protected area that are fully protected from activities that remove animals and plants or alter habitats.



Source: Partnership for Interdisciplinary Studies of Coastal Oceans. 2007. Science of Marine Reserves. www.piscoweb.org. 22 pages. Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/), University of Maryland Center for Environmental Science.

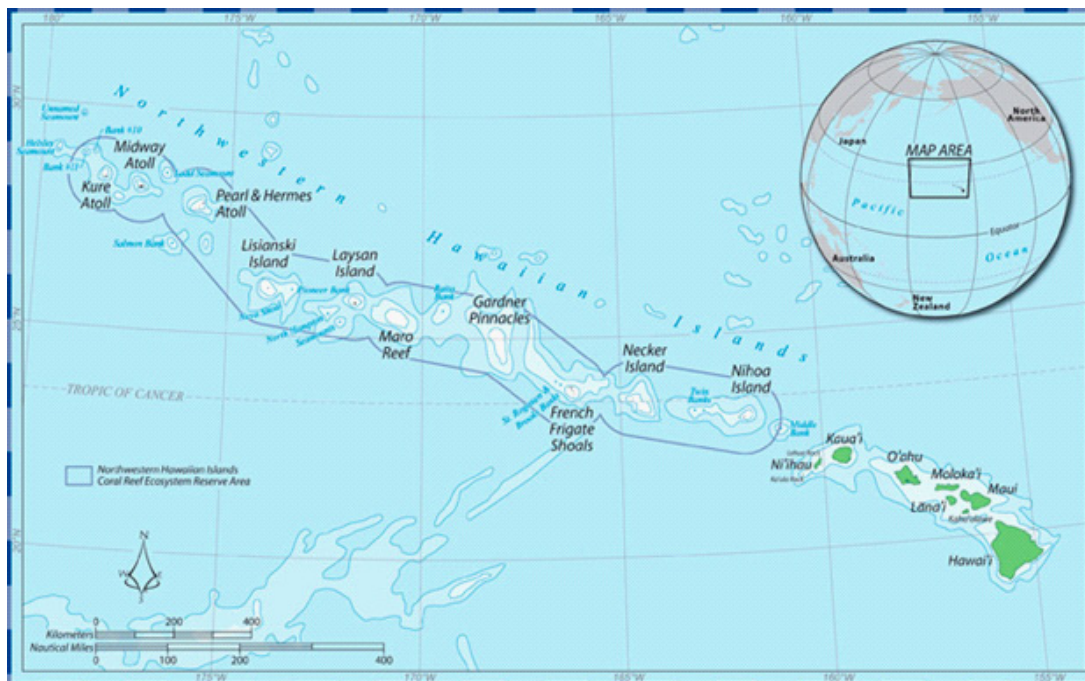
Where should marine reserves be established?

The coastline of the U.S. is 150,590 km long (93,572 miles). This distance includes a wide range of habitat types, from the Arctic to the Great Lakes to the tropics. Each habitat type within a region may support a distinct mix of species, including endangered species and organisms of commercial, recreational, or cultural importance. As a result, what is considered ecologically important and valued often varies from place to place.

MPAs are established to achieve specific conservation goals, usually a result of a dialogue among resource managers, scientists, local communities and other stakeholders. Once these goals have been established, the management measures needed to achieve these goals must be evaluated. Because marine reserves are the most highly protected type of MPA, they necessarily involve tradeoffs with socio-economic uses of an area. As a result, they are generally established only when this management tool is determined to be the most appropriate one available to achieve the management objectives. Given the diversity of habitats and communities in coastal and marine areas, management tools must be science-based, and must address local and regional uses of the area.

The following three examples illustrate the ways in which marine reserves are playing a key role in conserving our ocean resources.

In Focus: Papahānaumokuākea Marine National Monument



Created in 2006, the Papahānaumokuākea Marine National Monument includes 363,680 km² of ocean waters in the Northwestern Hawaiian Islands U.S. It is home to over 7,000 species, a quarter of which are found only in the Hawaiian archipelago. Islands and shallows in the northern areas are dominated by more temperate and subtropical species, while the more southerly areas have predominantly tropical species.

Human use of the Northwest Hawaiian Islands has been generally limited because of the isolation of many of the islands, the limited space suitable for habitation in the chain, and cultural protection from the area's status

as a sacred ancestral homeland to Native people. Papahānaumokuākea is of great cultural importance to Native Hawaiians, with significant cultural sites found on the islands of Niihau and Mokumanamana. Native Hawaiian people seasonally hunted and fished and in later years, Americans, Europeans, and Japanese hunted whales and seals, mined guano, and fished the waters, but never to the extent seen in main Hawaiian Islands. The area first came under protection in the 1700s, when the Kingdom of Hawaii required Japanese ships to obtain permission to collect seabird feathers and eggs. In response to the illegal activity of bird hunters, President Theodore Roosevelt signed an Executive Order in 1909 protecting many of the islands as a Federal Bird Reservation, establishing what would later become the Hawaiian Islands National Wildlife Refuge.

Despite locally significant impacts from past use as military bases and commercial overfishing of a number of species such as lobster and grouper, much of the island chain is still relatively pristine. The Northwest Hawaiian Islands have three times the biomass of shallow-water reef fish than the Main Hawaiian Islands, in large part because the most of the apex predators in the waters around the Main islands have been fished to near extinction. The atolls of the Northwest Hawaiian Islands also provide abundant nursery habitat sheltered from waves for many juvenile fish. This island chain is one of the few predator dominated coral reef ecosystems remaining.



Kure Atoll (Image courtesy of the Image Science & Analysis Laboratory, NASA Johnson Space Center, ISS008E14407, <http://eol.jsc.nasa.gov>)

Designating Papahānaumokuākea as a marine reserve helps to protect the rich and unique biodiversity of the area. As part of the establishment of the Monument, all commercial fishing will be phased out by 2012. Current uses are restricted to traditional uses by Native Hawaiians, limited tourism, and scientific research. Populations of previously fished species such as lobster and bottomfish are being monitored for signs of recovery. It's too early for definitive results of the effects of reduction and removal of fishing pressure. From historical anecdotal evidence and scientific research, ecosystem recovery has been documented numerous times in the waters surrounding the islands when the human activity responsible for the decline has been removed for long periods of time.

The highly endangered Hawaiian monk seal (*Monachus schauinslandi*) is found almost exclusively within the Monument, including the only known colony to actually have shown an

increase in seal numbers in recent years. Hawaiian monk seals are shy animals and there is a strong correlation between declines in their numbers and their amount of human interaction. The impacts of invasive species have thus far been low in Papahānaumokuākea, concentrated mostly in harbors and where man-made objects are found.

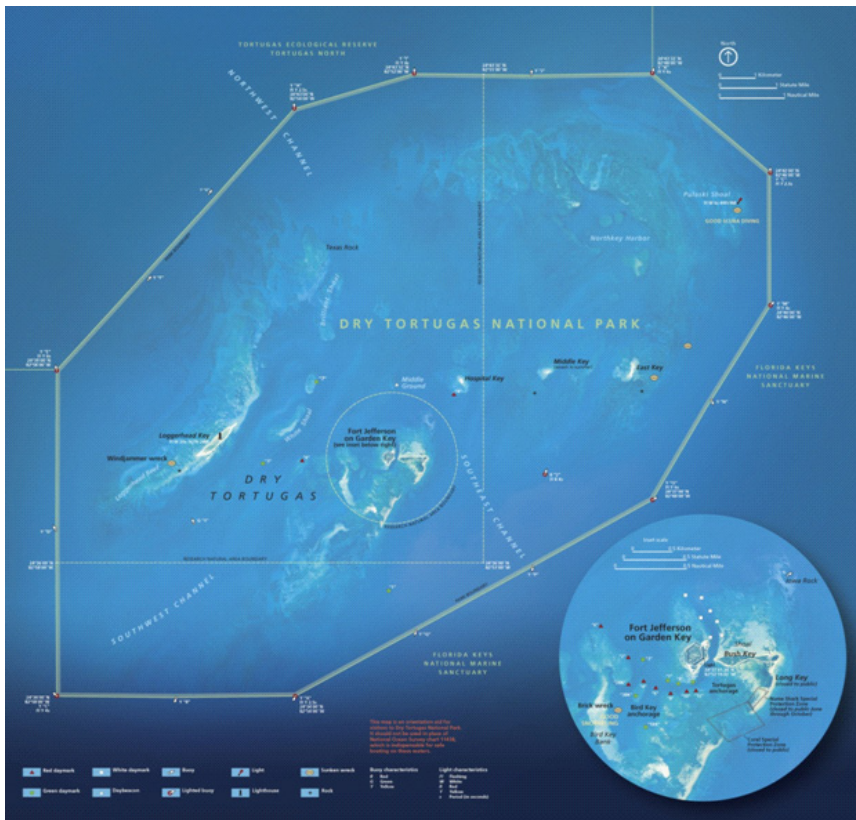
The value of Papahānaumokuākea is that it contains a large number of unique species, protects a large pristine coral reef ecosystem which has been degraded elsewhere by overuse, and protects large predators that have been overfished in the main Hawaiian Islands. The goal of the Monument is to protect, preserve, and restore the natural biological communities while allowing for Native Hawaiian traditional activities consistent with conservation efforts. It also represents an important opportunity to study a relatively undisturbed coral reef ecosystem.

In the years since the Monument was established, efforts have expanded to map and monitor its resources and determine their diversity and abundance. Due to the Monument's immense size and location, only about 50% of the shallow water habitats within have been mapped. This information will be essential for assessing the effectiveness of Papahānaumokuākea's protection.



Hawaiian Monk Seal, *Monachus schauinslandi* (image courtesy Papahānaumokuākea National Marine Monument <http://www.papahānaumokuākea.gov/imagery/photos.html>)

In Focus: Dry Tortugas Research Natural Area and Ecological Reserve

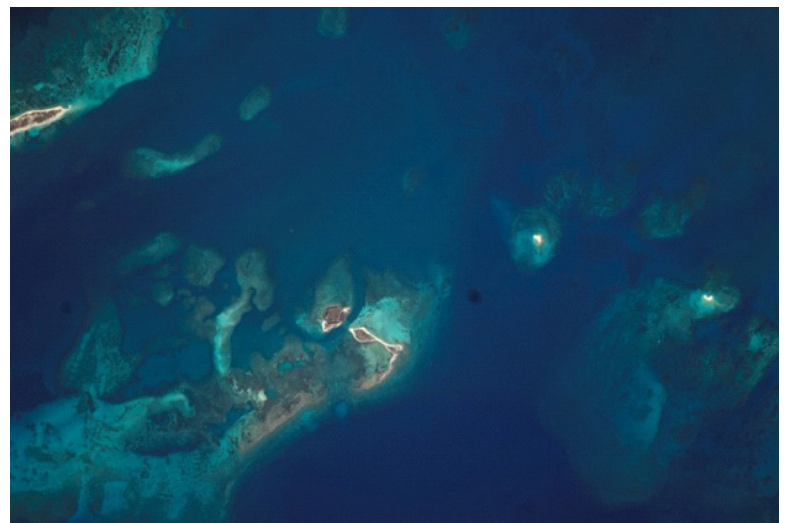


The seven islands comprising Dry Tortugas National Park are located approximately 112 km west of Key West, Florida. Towns were never built on the seven islands (Garden, Loggerhead, Bush, Long, East, Hospital, and Middle Keys), although they have long been used by people. Fort Jefferson was established in 1847 on Garden Key to protect shipping in the straits between the Gulf of Mexico and the Atlantic. The Fort was never completed, but served as a military prison during and after the Civil War until it was finally abandoned in 1874. Franklin D. Roosevelt declared it a National Monument in 1935 and it is now managed by the National Park Service. Lighthouses have been located at Garden Key and Loggerhead Key to aid in navigation and reduce the number of shipwrecks occurring in the area. The Carnegie Institute operated the Laboratory for Marine Biology on Loggerhead Key from 1905 to 1939, making significant scientific contributions to coral reef research and mapping and pioneering the first underwater photographs.

In 2001, the Tortugas Ecological Reserve was established within the Florida Keys National Marine Sanctuary. The Ecological Reserve is a 391 km² area made up of two sections: Tortugas North,

containing some of the most pristine coral reefs in the Florida Keys, and Tortugas South, which includes Riley's Hump, a 30m tall seamount that has been identified as a critical spawning site for many fish including five commercially important snapper species. In 2007, Dry Tortugas National Park established a 119 km² Research Natural Area, where fishing and anchoring are prohibited. Together, the Research Natural Area and the Ecological Reserve make up the second largest no-take marine reserve in the continental U.S.

The coastal and marine areas of South Florida are heavily impacted by development and other human uses. Commercial and recreational fishing are major industries in the area, but fish populations have declined due to fishing pressure and habitat loss. Similarly, corals throughout the Keys have declined precipitously in the last several decades, in part linked to land-based sources of pollutants, including bacteria found in human and animal waste. Seagrass beds have been shrinking, both from a change in the flow of freshwater into the region and through direct damage by boat propellers. Because of their isolation well apart from the main Florida Keys chain, the Dry Tortugas have experienced fewer of these impacts. Commercial fishing was prohibited in the area well before the establishment of the reserve areas. While recreational fishing has been limited due to the area's relative isolation, game fish including snapper, grouper, and grunts had been declining in both size and abundance before the establishment of the reserve areas.



Garden, Hospital, and Bush Keys (Image courtesy of the Image Science & Analysis Laboratory, NASA Johnson Space Center, ISS017E008188, <http://eol.jsc.nasa.gov>).

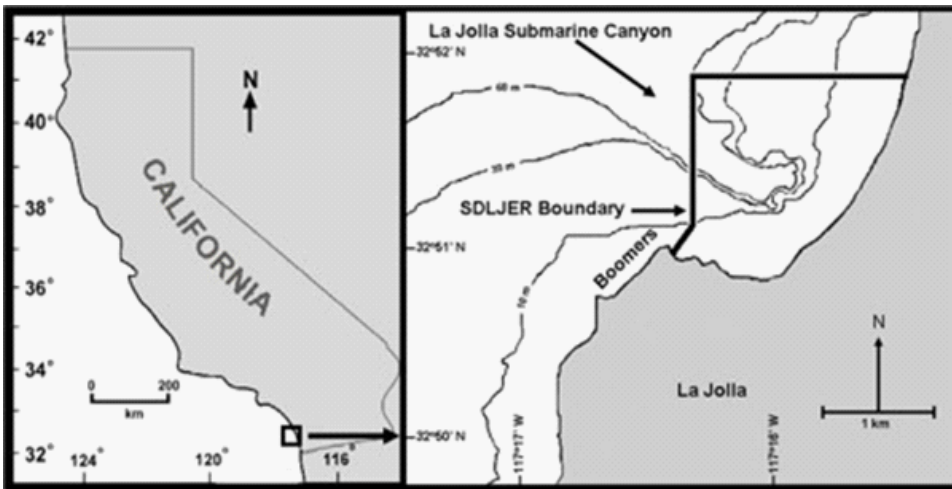
Establishing marine reserves around the Dry Tortugas accomplishes two major goals. First, it protects some of the least disturbed marine areas in South Florida, providing a refuge for large, healthy coral colonies and fish species that are overfished elsewhere.



Coral and fish community, Dry Tortugas National Park (Image courtesy of NPS <http://www.nps.gov/drto/photosmultimedia/Flora-and-Fauna-of-Dry-Tortugas.htm>)

Since the establishment of the reserves, the number and size of several fish species (e.g. red grouper) within its boundaries have increased. Bottom habitat previously disturbed by shrimping gear on a regular basis now has increased biomass and diversity of organisms. Secondly, the waters around the Dry Tortugas are an important regional source of larval and juvenile fish and coral organisms, influencing and influenced by populations and ecosystems in the Gulf of Mexico, the Atlantic, and the Caribbean. Some of the same species may benefit from the linkages between the protection of deep water habitat protection provided by the adjacent Florida Keys National Marine Sanctuary and the shallow water habitat protection provided by the reserve at Dry Tortugas National Park, spawning in the deep coral areas and settling out as juveniles in the shallow seagrass beds. Protecting this geographic crossroads supports the diversity and abundance of fish in a broad area and augments the basis for both commercial and recreational fishing.

In Focus: La Jolla State Marine Conservation Area



La Jolla State Marine Conservation Area (previously called the San Diego-La Jolla Ecological Reserve, or SDLJER) (Image courtesy of California SeaGrant, <http://www-csgc.ucsd.edu/>)

In 1971, the City of San Diego and the California Department of Fish and Game established a 533 acre (1.92 km²) no-take reserve in La Jolla Bay called the San Diego – La Jolla Ecological Reserve, now referred to as the La Jolla State Marine Conservation Area (La Jolla SMCA). While small, including only 1.6 miles of shoreline, the La Jolla SMCA includes a range of habitats, from kelp forests to boulder reefs to a submerged canyon at depths from the intertidal to 400 feet (120 m). While the reserve was initially established as a no-take area, the regulations have been amended to allow some commercial squid fishing by hand held scoop nets. The area is a popular recreation site particularly for snorkeling and diving due to its easy accessibility, clear

water, and relatively low wave action during summer months. The La Jolla SMCA is one of the oldest reserves in the U.S. The reserve's location immediately adjacent to this highly urbanized area has meant, however, that land uses in the watershed have changed significantly in the forty years since it was established.

Beginning in the 1940s, researchers at the nearby Scripps Institute observed declines in the abundance of marine animals in the area, particularly giant sea bass (*Stereolepis gigas*), broomtail grouper (*Mycteroperca xenarcha*) and red, black and green abalone. Squid trawlers working in the area were also thought to be damaging the habitats along the rim of the submarine canyon. Researchers and community members lobbied for decades until the City of San Diego and the California Department of Fish and Game established the reserve. The reserve's goal is to protect threatened or endangered native plants, wildlife, or aquatic organisms or habitats. In particular, the reserve aims to protect the canyon wall habitat and populations of green abalone.

Analysis of the La Jolla SMCA's effectiveness showed that its strength is in primarily protecting species that are sessile or



The La Jolla State Marine Conservation Area (image courtesy of the CA State Water Resources Control Board http://www.swrcb.ca.gov/water_issues/programs/ocean/docs/asbs/asbs_areas/swqpa29c_lo-jolla_asbs.jpg)

do not travel significantly beyond its boundaries, such as abalone. Green abalone, one of the species of concern in this area for decades, are found in higher abundance in the reserve than in other similar locations in the region, although populations are still low compared to historic levels. The establishment of the reserve was also effective in halting the on-going decline of canyon wall habitat due to squid trawling. However, the La Jolla SMCA does not have a significant effect on the abundance or diversity of larger, more mobile organisms. One reason for this could be because the reserve is too small and doesn't contain a unique location such as a spawning ground or rookery. Over the years, the reserve has become increasingly impacted by land based development in the watershed, as have other coastal areas in this region. Fishing pressure is also high in areas immediately adjacent to the reserve, and poaching is common, as much of the public in the area is unclear on the area's protected status. In a survey conducted in the area, only 21% of the general public and 35% of fishers could correctly identify the Reserve boundaries.

In 2010, the area of the La Jolla SMCA was adopted by the California Fish and Game Commission as part of the Matlahuayl

State Marine Reserve, a part of a new network of MPAs in Southern California established under California's Marine Life Protection Act (MLPA). The legislation addresses concerns that the State's MPAs had been established on a piecemeal basis, sometimes without coordinated planning or a strong scientific basis. The MLPA calls for a redesign of the statewide MPA system to increase the effectiveness of the system overall by making sure critical areas are protected and that reserves and conservation areas are in the right place and of the right size to accomplish their goals. In the case of the La Jolla SMCA, the reserve area was increased in size by the length of two city blocks and is now adjacent to another conservation area with controls on fishing and collecting (San Diego-Scripps Coastal State Marine Conservation Area). The La Jolla SMCA went from being an isolated protected area to being a part of a coordinated network with complementary goals and benefits. While the reserve has had some success, its inclusion in the network is expected to improve its effectiveness in protecting a wider range of species.

Marine Reserves: Helping to Conserve Important Marine Areas

Marine reserves are critical tools for marine conservation, allowing for the protection of important resources such as the Riley's Hump spawning grounds in the Dry Tortugas and unique and threatened places such as the remote islands of the Papahānaumokuākea Marine National Monument. Public engagement is a critical component of the success of a marine reserve, particularly those in developed areas like near the San Diego – La Jolla Ecological Reserve. Long-term monitoring within marine reserves is essential for effective management and enforcement.

Both large and small reserves have been proven effective at increasing the size and abundance of organisms within their boundaries, and new studies are emerging that show how reserves can help support the ecosystems and fisheries in areas adjacent to them. Large reserves tend to support a greater diversity of organisms than small reserves. Perhaps more important than size, a reserve has to include the right habitats. Protection of rookeries or spawning areas helps to assure that larval and juvenile organisms continue to broadcast across a region, supporting both ecosystems and commercial and recreational fishing. Even a small reserve centered on such an area can have widespread positive impacts. In areas highly impacted by people, the preservation of the remaining least disturbed habitat can protect threatened or endangered species and habitats by providing a place of refuge, as well as supporting the diversity of adjacent areas by maintaining a supply of young organisms. However, marine reserves are only one tool for marine conservation, and should be evaluated and used in the context of other resource management tools such as other fishing restrictions and measures to restore coastal and marine water quality.

Increasingly, scientists and managers are advocating that MPAs should be ecologically linked in regional networks to protect representative examples of the different ecosystems, habitats and natural communities in our oceans. MPA networks can connect different habitats, often fulfilling ecological aims more effectively and comprehensively than a single MPA. The development of regional MPA networks in the United States is still in its early stages, but marine reserves play an important role within them.

How do we balance the needs of the communities to use marine areas with the need to assure that the resources that support both a healthy ecosystem and human uses continue at sustainable levels into the future? Managers, scientists and stakeholders should identify the highest priority coastal and marine areas for protection. To do this, information is needed on where organisms are located, their migration routes, how they use habitats, the locations of critical areas, such as spawning or nursery grounds. Decision-makers also need information on the socio-economic costs and benefits of establishing marine reserves to more accurately evaluate trade-offs. Ultimately, a dialogue among all those who care about and depend on the ocean is needed to identify and protect strategic locations to help ensure the health and survival of species and habitats and the many benefits they provide.

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