

MARINE PROTECTED AREAS OF THE UNITED STATES



*Conserving Our*

Updated January 2017

# OCEANS

One Place at a Time



## TABLE OF CONTENTS

- 4 Into the Deep: Exploring the Pacific Monuments
- 6 Bridging the Gulf: Connecting MPAs for a Healthier Gulf of Mexico
- 7 California's MPA Monitoring Program: How's the Network Doing?
- 8 Where are the Whales? Tracking Whales at Stellwagen Bank
- 10 Listening Posts: Documenting Noise in Marine Protected Areas
- 11 Growing Awareness and Salt Marshes in ACE Basin
- 12 Hawaii & Rapa Nui Exploring Cultural Connections



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Cover Image:..... Lauren Wenzel/NOAA



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## Marine Protected Areas:

# CONSERVING OUR OCEANS

## *One Place at a time*

**M**arine protected areas (MPAs) are proven tools for conserving habitats, biodiversity and ecosystems. And effective protection has never been so greatly needed. Marine life is threatened by habitat loss, water quality, fishing impacts, climate change and other human impacts. In the U.S., MPAs have been part of the conservation landscape for decades, including marine and coastal national parks, national marine sanctuaries, national wildlife refuges, and similar areas managed by states and tribes.

Well designed and managed MPA networks multiply conservation benefits by linking individual areas ecologically, connecting diverse habitats, and providing protection to species that use different habitats at different stages of their lives. Following California's example of an integrated MPA network of ecologically linked sites, many other MPA programs are increasingly recognizing the value of designed MPA networks, including reaching beyond our national borders to establish sister parks with international partners.

This document summarizes information on MPAs in U.S. waters, focusing on sites established specifically to protect biodiversity, ecosystems and cultural heritage. Reflecting the IUCN definition of MPAs that is used by most countries, this focus allows meaningful comparisons at national and regional scales.

While places conserved for fisheries management are not included here, they are an essential component of ocean management. In 2016, the U.S. celebrated the 40th anniversary of the Magnuson-Stevens

Fisheries Management Act, the law that has dramatically increased the sustainability of U.S. fisheries. This law is also being used to protect places that provide essential fish habitat from fishing impacts.

Through the Convention on Biological Diversity and other international commitments, many countries have committed to a goal to protect 10 percent of coastal and marine areas in well managed MPA networks by 2020. As 2020 draws near, many scientists are urging more ambitious conservation targets and a more explicit emphasis on improved management effectiveness to fully deliver on conservation promises.

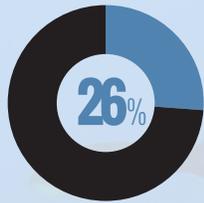
This document summarizes key facts about U.S. MPAs, including snapshots of how managers, scientists and others are working together for the future of our ocean – managing ocean noise, exploring the deep ocean, teaching educators and students through hands-on experiences, connecting the cultural heritage of Pacific Island MPAs, taking a network approach to MPAs in the Gulf of Mexico, and establishing new partnerships to monitor MPA networks. ■



Photo: Kelly Teich

# MARINE PROTECTED AREAS in U.S. WATERS

Marine protected areas (MPA's) are vital tools for conserving the ocean's most valuable places. They come in all shapes and sizes in order to address specific conservation needs. The following figures are for MPAs focused on conserving ecosystems, biodiversity and cultural heritage.



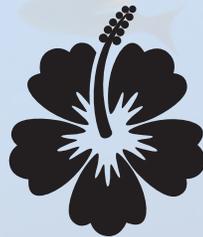
## U.S. WATERS

The U.S. has more than 1,200 MPAs covering more than **3.2 million** square kilometers or 26% of U.S. waters. Most of this MPA area (23% of US waters) prohibits commercial fishing.



## NO TAKE

About **3%** of all U.S. waters are in no take MPAs that prohibit all extractive uses (fishing, mining, etc) to provide the highest level of protection to marine life.



## PACIFIC ISLANDS

**96%** of US MPA area is in the Pacific Islands



## AGENCIES

Federal agencies manage larger MPAs that make up almost all U.S. MPA area (99%), but state agencies manage many smaller coastal sites (<1000).

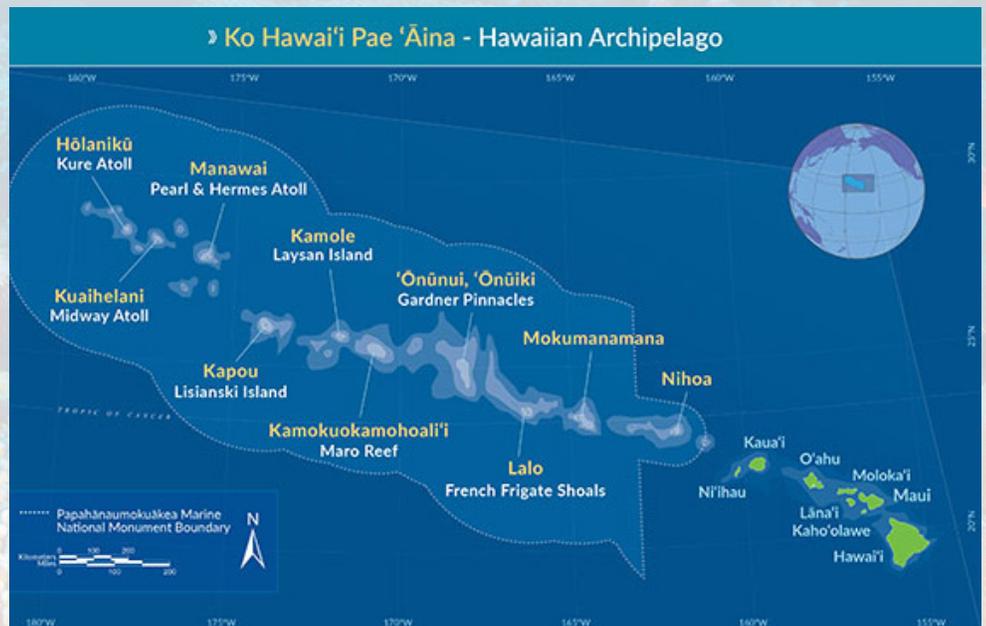
# 20x

## ECOSYSTEMS CONSERVED

The area of U.S. MPAs conserved for ecosystems, biodiversity and cultural heritage increased over **20 times** between 2005 and 2016.

## THINKING BIG

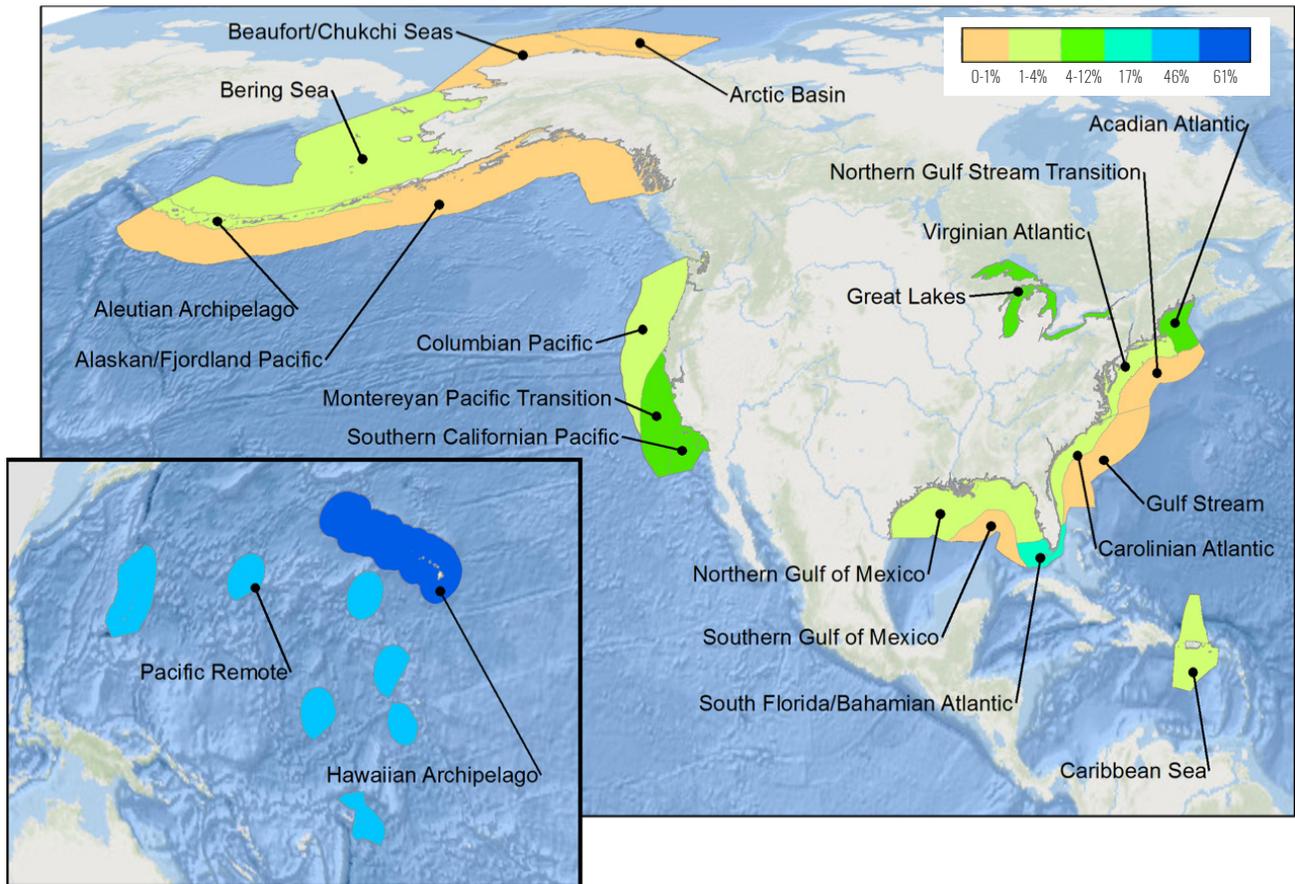
In August 2016, President Obama announced the expansion of Papahānaumokuākea Marine National Monument, now 1.5 million sq km of protected area in the Pacific. This is now one of the largest protected areas – on land or sea – in the world.



THE AREA COVERED BY US WATERS IS 1.4 TIMES OUR LAND AREA



PERCENT MPA COVERAGE BY MARINE ECOREGION



All but 4 U.S. Marine Ecoregions have some MPA area, ranging from marginal (<1% coverage) in the Arctic to 61% in the Hawaiian Archipelago.

# INTO THE DEEP

## Exploring the Pacific Monuments

In recent years, the protection of US waters has increased dramatically, primarily due to the establishment and expansion of large marine national monuments in the Pacific Ocean. Marine Protected Areas (MPAs) encompass over large expanses of coral reef, ocean and island habitat in the region. Papahānaumokuākea Marine National Monument was established in 2006, and Marianas Trench, Pacific Remote Islands, and Rose Atoll Marine National Monuments in 2009, with a major expansion of the Pacific Remote Islands in 2014 and of Papahānaumokuākea in September 2016. With such a vast area now under protection, we need to better understand its resources and ecological value. The region is known

for its vibrant coral reefs, birds and other wildlife, but there is also growing commercial interest in deep sea mining. NOAA's CAPSTONE—Campaign to Address the Pacific monument Science, Technology and Ocean Needs—is a 2-year exploration mission shedding new light on deepwater habitats. This new knowledge will help agencies develop MPA management plans, as well as managing future commercial activities in similar areas outside MPAs.

The deep ocean areas of these Monuments are still largely unknown. A single deep-water expedition to Papahānaumokuākea National Marine Monument in 2003 discovered more than 20 new species of corals and sponges. More recently, a 2015 expedition discovered six previously unknown communities of

high-density coral gardens. CAPSTONE science priorities include: 1) identifying and characterizing vulnerable marine habitats, especially deep sea coral and sponge communities; 2) characterizing seamounts within the Prime Crust Zone—the area of the Pacific with the highest concentrations of commercially valuable manganese nodule deposits; 3) investigating the geologic history of Pacific seamount chains, including their relevance to plate tectonics, subduction zone biology and geology; and 4) increasing understanding of deep-sea biogeographic patterns across the Central and Western Pacific.

Researchers are tapping into new technologies to explore these remote areas and share them with global audiences. NOAA ship Okeanos Explorer is equipped with

This sponge, about the size of a minivan, was discovered at a depth of 7,000 feet in Papahānaumokuākea Marine National Monument in 2015. Below Left: New species of deep-water algae *Ulva ohiohilulu* collected by a submersible of the Hawaii Undersea Research Laboratory at 304 feet from west Maui.

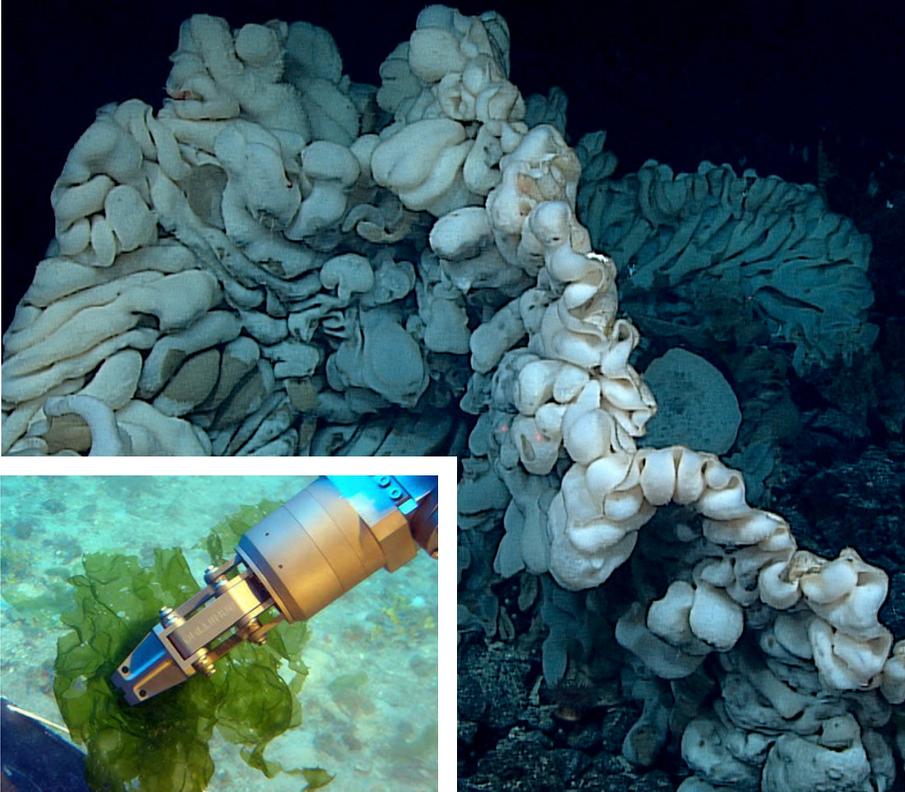


Photo: NOAA

a remotely operated vehicle (ROV) Deep Discoverer, with a specialized robot arm with high definition cameras that can gather samples and document formerly inaccessible areas of the ocean. These discoveries are being shared with audiences across the world through telepresence.

Other ships and technology are critical as well. In June 2016, researchers conducting an expedition to deep coral reefs of Papahānaumokuākea Marine National Monument aboard the NOAA Ship Hi'ialakai used advanced dive technology to survey reefs at depths far greater than conventional scuba gear allows (below 300 feet), identified two new species of fish, collected specimens of deep-water fishes never before seen by divers, and documented significant coral mortality.



Photo: NOAA

**NOAA Ship Hi'ialakai's main missions include coral reef ecosystem mapping, coral reef health and fish stock studies, and maritime heritage surveys.**

In summer 2016, scientists and managers investigated areas in and around the Marianas Trench Marine National Monument, discovering new hydrothermal vents, a new mud volcano, several areas of high density deep sea corals and sponges, dozens of new species and a WWII B29 Bomber. In late 2016 and 2017, Okeanos Explorer will return to the central Pacific to investigate areas

of the Pacific Remote Islands and Rose Atoll Monuments and the National Marine Sanctuary of American Samoa. The international team of scientists and managers may also conduct work within the Republic of Kiribati's Phoenix Islands Protected Area (PIPA), which partners with both Papahānaumokuākea and the Pacific Remote Islands Marine National Monument. ■



Daniel Wagner, a scientist with the Papahānaumokuākea Marine National Monument, gingerly removes a deep coral from the collection basket on the ROV Deep Discoverer.

Image courtesy of Art Howard/NOAA Office of Ocean Exploration and Research, 2015. Hohonu Moana.

# BRIDGING THE GULF

## Connecting MPAs for a Healthier Gulf of Mexico



Photo: NOAA

The Gulf of Mexico is a study in contrasts, with areas intensively developed for oil and gas, some of the most popular recreational fishing in the country, and diverse coastal and marine habitats. These habitats are connected by ocean currents, which transport larvae of corals, fishes and other marine life across the region. The Gulf's biological riches are on full display at Flower Garden Banks National Marine Sanctuary, 100 miles southeast of Galveston, Texas. These seafloor features are home to some of the healthiest coral reefs in the Western Hemisphere, with abundant and diverse invertebrate and fish life. To ensure these reefs stay healthy, sanctuary managers are looking beyond their borders to ensure the ecological connections in the region also stay healthy.

Many of the seafloor features that surround the sanctuary have shallow coral reef communities with coral and fish species in common with those found at Flower Garden Banks. Mesophotic corals – light dependent corals that typically grow between 30-40 meters – occupy deep hardground habitats that physically

link the banks to one another. These connections mean that the sanctuary does not function in ecological isolation.

To strengthen these ecological connections to Flower Garden Banks and protect the broader marine ecosystem of which it is a part, NOAA is now considering bringing sanctuary protections to some of the other reefs and banks in the NW Gulf. To do this, the sanctuary is relying on emerging science about ecological connectivity in the Gulf, as well as extensive stakeholder engagement. The goal is to ensure that management decisions balance ocean uses protecting ecological functions.

The sanctuary has also taken a wider approach to strengthening the region's ecological connections by reaching out to marine protected area (MPA) management agencies in Mexico and Cuba to create a network of "sister sanctuaries." This alliance will focus research and management strategies on shared conservation challenges at key sites around the Gulf.

In June 2015, U.S. and Mexico protected area managers met together in Merida, Mexico to formulate a plan for cooperation, linking the Flower Garden Banks and Florida Keys national marine sanctuaries

with seven protected areas in Mexico. This successful meeting established areas of mutual interest and need, and a personal working relationship between managers from some of the most ecologically significant places within the Gulf of Mexico.

This vision for cooperation took a huge step forward when the U.S. Government opened the door to improving relations with Cuba in 2014. In November 2015, NOAA, the U.S. National Park Service, and Cuba's Ministry of Science Technology and Environment came together in Havana, to sign a Memorandum of Understanding on MPA cooperation, which includes "sister sanctuary" relationships between Guana-hacabibes National Park and Florida Keys National Marine Sanctuary, and between Banco de San Antonio and Flower Garden Banks National Marine Sanctuary.

From Flower Garden Banks to the entire Gulf, we can better protect marine resources – and the communities and jobs they sustain – by connecting MPAs, working on shared solutions, and protecting the linkages that connect us. In doing so, we will build stronger ties between the key places and players that sustain the Gulf of Mexico and its abundant resources. ■



Photo: Rani Gaddam

California Statewide MPA Monitoring Program sampling in the intertidal zone to inform adaptive management.

# CALIFORNIA'S MPA MONITORING PROGRAM

## How's the Network Doing?

In 2012, California completed planning for the largest ecologically connected network of MPAs in the nation, with about 9% of state waters (0-3 nautical miles), including waters around offshore islands, in no-take reserves. Since then, the state has focused on creating an innovative MPA Management Program for these areas. A key component of this management program is the research and monitoring needed to answer the fundamental question – how is our network doing? The answer to this question can help inform management decisions and communicate important information about network performance to decision-makers and the public.

California's MPA network monitoring program is organized into three core components: science, communication and evaluation. Each component plays a critical role in tracking, communicating and adapting to changes in ocean conditions.

The monitoring program began with baseline monitoring (Phase 1, 2007-2018) to

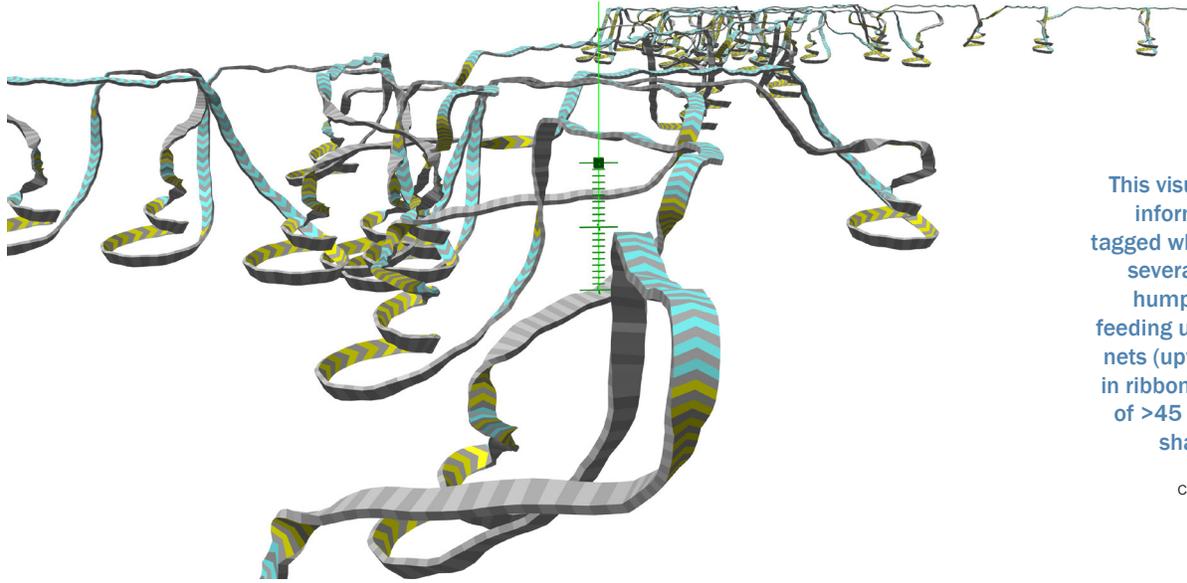
create a comprehensive statewide inventory of ecological and socioeconomic conditions at the time the MPAs were implemented. The state invested \$16 million in baseline monitoring and partnered with academic, agency, tribal and citizen science groups to create an unprecedented set of information. This information allows the state to track changes, both inside MPAs and at associated reference areas outside MPAs.

Baseline monitoring is nearly complete, and the focus will now turn to designing and implementing long-term monitoring (Phase 2). Phase 2 will reflect updated priorities and management needs, while building on the knowledge, capacity and unique considerations for each region. The state has committed an annual budget of \$2.5 million for Phase 2, beginning in 2016.

The first year of funding will:

- Upgrade equipment necessary for ongoing data collection;
- Expand science-management collaborations through post-doctoral positions, co-mentored by University of California Davis and California Department of Fish and Wildlife.
- Support the Ocean Science Trust to help the state develop monitoring that serves across agencies and mandates.

A Statewide MPA Monitoring Action Plan to define a priority sites and metrics for Phase 2 is being developed now by the California Department of Fish and Wildlife, California Ocean Protection Council, and California Ocean Science Trust (planned for release in 2018). Once approved, the Action Plan will guide future monitoring spending by the state. To learn more about the California Statewide MPA Monitoring Program, including all data collected to date, visit: [www.OceanSpaces.org/monitoring](http://www.OceanSpaces.org/monitoring). ■



This visualization of information from tagged whales shows several hours of a humpback whale feeding using bubble nets (upward spirals in ribbon). Body rolls of >45 degrees are shaded yellow.

Credit: NOAA/SBNMS

# Where are the WHALES?

## Tracking Whales at Stellwagen Bank

**S**tellwagen Bank National Marine Sanctuary, located off Cape Cod, Massachusetts, is a prime feeding ground for many types of whales, including the endangered North Atlantic right whale. Each year, whales migrate to this highly productive area from their breeding grounds in the Caribbean. This whale hub is also a place for science and technology to better understand and protect them.

Despite their size, whales are not always easy to see from the deck of a ship, putting them at risk of collisions from busy shipping traffic. This is a major threat, especially to the endangered right whale. To help avoid collisions, the sanctuary has partnered to create a phone application called “Whale Alert” with a real-time GPS map that notifies ships of areas with high whale concentrations. It also draws on help from recreational boaters, who can report whale sightings. These are then communicated on the map to other mariners so that they can avoid collisions. The app also allows people to report injured whales, so they can get immediate help.

Scientists also need to understand the movement of whales on a smaller scale - not just where they go, but also how

they swim while doing specific activities like feeding. By tagging whales with small tracking devices, scientists can create amazing 3D images that show the movement of the whale as it moves up and down, side to side, and even spins – an image that helps us understand whale behavior underwater.

Researchers at Stellwagen Bank National Marine Sanctuary are also working with partners to track and understand whale movements and patterns by listening to them. Acoustic buoys have been placed at various locations in the sanctuary to record whale noises and when they are heard. Scientists can then compare the

information from several buoys to map and analyze whale movements.

Growing citizen science tools let the public contribute to marine science and conservation efforts. The sanctuary is partnering with conservation organizations in the Caribbean and Atlantic to encourage boaters in the Caribbean to take and upload photos of individual whale tails. A whale’s tail is equivalent to a human’s fingerprint – it is unique to that whale and is used to identify it. With the help of the Carib Tails Program, and the people who participate in it, scientists can track specific whales and learn more about their movements, health and habits. ■



Scientists at Stellwagen Bank National Marine Sanctuary use multi-sensor tags placed on endangered whales to learn about their underwater behavior.



Photo: NOAA

Close-up photograph of multi-sensor tag attached to a humpback whale via suction cups.



Photo: Christin Khan/NOAA

Humpback whales "bubble feeding" to herd fish into a small area so they can be more easily eaten.

Researchers at Stellwagen Bank National Marine Sanctuary get a view of an airborne humpback.



NOAA Fisheries Permit #14245

# LISTENING POSTS

## Documenting Noise in Marine Protected Areas



National Park Service diver installs the ocean noise monitoring station at National Park of American Samoa.

Photo: NPS

**M**any marine animals depend on sound for basic life functions. Dolphins use sound to locate food, whales use sound to communicate with mates across great distances, crabs use sound to find suitable habitat, groupers use sound in elaborate mating displays and many reef fish use noise cues to hide from predators. Human activities in the ocean produce noise that can interfere with these vital functions and undermine the integrity of marine ecosystems. Ocean noise is ubiquitous in the global ocean and can travel thousands of kilometers from its source. Scientific research suggests that increased anthropogenic noise levels hinder communication and induce stress for marine mammals. Noise can also affect fish and invertebrate species' health and abundance as well as their habitats.

Marine protected areas (MPAs) protect marine habitats, including soundscapes and other physical aspects and processes important to ecological integrity. As a result, MPAs can provide focal points for research where ocean noise can be monitored, evaluated and possibly mitigated. In June 2015, the National Park Service

(NPS) deployed an ocean noise monitoring station in the National Park of American Samoa off the island of Tutuila. This site is providing critical baseline information on the park soundscape, the nearby national marine sanctuary and this remote region of the South Pacific. The passive acoustic monitoring system in Glacier Bay National Park, Alaska has been in place for over fifteen years. It provides data on the status and trends of underwater noise from motorized vessels and the presence and seasonality of humpback whales, orcas, and harbor seals, as well as baseline data for the inland coastal waters of Alaska. A new site at Buck Island Reef National Monument on St. Croix, U.S. Virgin Islands will track conditions and trends in the Caribbean to detect the occurrence and seasonality of whales and dolphins and measure local noise levels from motorized boat traffic.

Acoustic monitoring stations at these three NPS sites are part of a larger ocean noise monitoring network, the Ocean Noise Reference Station Network. Led by the National Oceanic and Atmospheric Administration (NOAA) and launched in 2014, this network organizes existing acoustic sites and incorporates new ones to provide spatial coverage regionally and

nationally. It represents the first large-scale effort to monitor long-term changes and trends in underwater sound spanning vast swaths of U.S. waters. NOAA's Office of National Marine Sanctuaries also participates in this effort and has deployed noise reference stations in or near four national marine sanctuaries (Channel Islands, Olympic Coast, Stellwagen Bank and, Cordell Bank). The acoustic monitoring network enables the U.S. and international partners to research sounds produced and used by marine life and to evaluate anthropogenic noise sources that contribute to overall ocean noise, with the goal of managing noise and reducing impacts on MPAs and the wider marine environment.

Other parks are investigating natural sounds and noise in the marine environment. Everglades National Park is monitoring sound in Florida Bay to help understand ecological conditions and changes that are occurring. NPS also recently deployed an underwater recorder in Sitka National Historical Park, Alaska to collect a month-long record of sounds occurring in the park. If successful, NPS will transfer this system to various sites in other parks to begin a library of underwater sounds in the National Park System. ■

# Growing Awareness and Salt Marshes in ACE Basin

Coastal wetlands are battered by storms, erosion from boat traffic and sea level rise. To help students and teachers understand how estuarine wetlands are affected by hazards and human activities, the ACE Basin National Estuarine Research Reserve (NERR) in South Carolina began the Seeds to Shorelines program. Designed to meet state science standards, the one-day workshop trains teachers in lesson plans about salt marsh ecosystems and how to grow smooth cordgrass, *Spartina alterniflora*.

Back in the classroom, these teachers are able to use what they have learned to teach school children about the estuarine ecosystem, climate change and other threats to marshes. They also grow cordgrass nurseries at their schools. The program ends with a field trip to a local marsh restoration project, where students apply what they have learned and plant the seedlings they have grown, helping to restore the marsh. Since the program began, more 6,000 students have participated in the program. During the 2014-2015 school year, it resulted in 8,484

plants being placed in nearly 300 square meters of restored marsh.

ACE Basin NERR protects over 94,000 acres of coastal habitats, historic resources and public access points. It is part of the National Estuarine Research Reserve System, a network of 28 coastal sites designated to protect and study estuarine systems. With so much success, the Seeds to Shorelines program is now also being offered in three other reserves in the southeast—Sapelo Island NERR in Georgia, North Inlet-Winyah Bay NERR near Georgetown, SC, and the North Carolina NERR. ■



Local teachers from Charleston, SC practice plotting and surveying smooth cordgrass transects during a Seeds to Shorelines training workshop.

Photo: Hansje Gold-Krueck

# HAWAII & RAPA NUI

## Exploring Cultural Connections



Photo: Flickr/Steve Cadman

In December 2012, a group of U.S. coastal and marine managers visited Chile to begin conversations about how the two countries could collaborate on marine and land-based parks. While the managers from both countries saw many connections, those from Hawai'i and Rapa Nui (Easter Island) were particularly struck by the cultural, historical, social, ecological, and geologic similarities between these two Polynesian cultures and eager to explore future collaboration.

There is an undeniable connection among people who look toward the ocean as the path of their history and genealogy. Despite the thousands of kilometers that separate the

islands of Hawai'i and Rapa Nui, the ocean connects their cultures. At the far reaches of the Pacific, these isolated archipelagos were both settled around 300-500 AD and have allowed the ancestral peoples of Hawai'i and Rapa Nui to develop distinct variations of Polynesian culture.

The ecosystems of Hawai'i and Rapa Nui contain some of the highest rates of endemism and have fostered and sustained similarly unique cultural histories. In the Northwestern Hawaiian Islands, a number of stone idols (ki'i) found on Nihoa and Mokumanamana are described in early historical accounts of Hawaiian culture. These ki'i are much smaller than the impressive stone moai of Rapa Nui, statues that embody the sacred spirit of ancestors. However, both the moai and ki'i are thought to have important religious significance and marked the emergence of significant cultural shifts.

When the great migrations throughout Polynesia ended hundreds of years ago, these indigenous peoples adapted to local landscapes and their ancestral relationships with the lands and waters continue today. The people of both Hawai'i and Rapa Nui have demonstrated a resurgence of cultural pride and identity and self-determination. In 1999, the traditional Hawaiian voyaging canoe, Hōkūle'a, sailed to the shores of Rapa Nui – a tangible reminder of how the ocean connects us.

Today, managers and staff at Papahānaumokuākea Marine National Monument and Motu Motiro Hiva Marine Park are exploring these connections and ways to work together to conserve their vibrant marine resources and cultural heritage. ■



Photos (clockwise from top left): Ki'i (carved idols) at Pu'uhonua O Hōnaunau National Historical Park; The people of Rapa Nui perform traditional song and dance; The traditional voyaging canoe, Hōkūle'a, off the island of O'ahu; Ahu Tongariki, the largest ahu (stone platform) in Rapa Nui; The cliffs of Nihoa from the deck of the traditional voyaging canoe, Hikianalia.



Photo: Flickr/travelwayoflife



Photo courtesy Polynesian Voyaging Society



Photo: Gonzalo Cliff/NOAA



Photo: Brad Wong



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[www.marineprotectedareas.noaa.gov](http://www.marineprotectedareas.noaa.gov)

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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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