

# EARTH IS BLUE™

Volume 1, June 2016



WHICH  
**SANCTUARY**  
PERSONALITY ARE YOU?

**STORIES**  
FROM THE BLUE

LEARNING FROM THE  
**PAST** TO PROTECT  
THE **FUTURE**

MAGAZINE OF THE

# NATIONAL MARINE SANCTUARIES



NATIONAL  
MARINE  
SANCTUARY  
FOUNDATION



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**COVER PHOTO:** Maria Brown, Greater Farallones National Marine Sanctuary Superintendent, captures the beauty of the expanded sanctuary. Photo: Matt McIntosh/NOAA



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**NATIONAL MARINE SANCTUARY FOUNDATION**





## FROM THE DIRECTOR



We are all interconnected through our one ocean, so it is essential that we support both a healthy ocean and strong local communities. Marine protected areas help us make progress toward thriving marine ecosystems and sustainable economies, one place at a time. In marine conservation, what we do and how we do it are both crucial — but where we focus our attention also matters immensely. Marine protected areas help us focus our efforts so that we can make a difference.

NOAA's Office of National Marine Sanctuaries serves as the trustee for a network of underwater parks, including thirteen national marine sanctuaries and Papahānaumokuākea and Rose Atoll marine national monuments. This network protects more than 170,000 square miles of our marine and Great Lakes waters — from Washington state to the Florida Keys, and from Lake Huron to American Samoa.

The women and men who work and volunteer for NOAA's Office of National Marine Sanctuaries are dedicated to helping ocean and Great Lakes ecosystems flourish. We rely heavily on partnerships with entities within and outside of government so we can study, monitor and conserve the wildlife and cultural treasures within these special places. Through the National Marine Protected Areas Center, which establishes partnerships with marine protected areas across the country and the globe, NOAA's Office of National Marine Sanctuaries helps ensure that ocean and Great Lakes resources are protected for years to come.

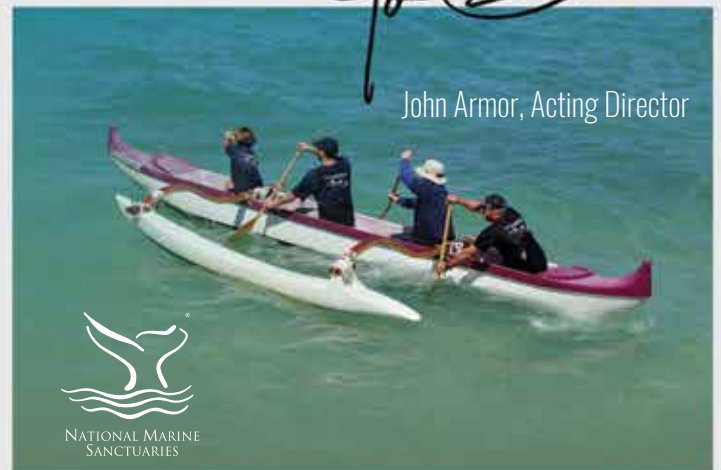
Whether you're part of the 53 percent of Americans who live near the coast or you live in a landlocked state, the ocean is a part of your life. From providing

the food we eat to determining our weather, the ocean matters to all of us — and national marine sanctuaries protect this vital resource.

With that in mind, over a year ago we launched Earth Is Blue, a social media awareness campaign that brings the National Marine Sanctuary System directly to the smartphones and computers of people all over the country — and all over the world. Through vivid images and engaging videos, #EarthIsBlue brings sanctuaries directly to the American public, so that you can experience the wonder of our ocean and Great Lakes even if you don't live nearby.

This magazine, too, is a part of Earth Is Blue. Created in partnership with the National Marine Sanctuary Foundation, it is our attempt at focusing our cameras and your attention on these special protected areas. I hope this is a tangible reminder that no matter where you are, the ocean and Great Lakes are in your hands. I hope it inspires you to help care for our ocean and to spread the word that Earth isn't green — it's blue.

John Armor, Acting Director



John Armor participates in *Get Into Your Sanctuary Day* with Hawaiian Island Humpback Whale National Marine Sanctuary staff.

Photo: Andy Collins/NOAA

# OUR BLUE HE

**N**ational marine sanctuaries are dynamic reefs and lively kelp forests; they are historic shipwrecks and sunken relics. These underwater parks enable us to preserve and understand our history as a seafaring nation and the many ways our cultures have lived with the ocean and Great Lakes for centuries and even millennia. Most of all, they help us understand our communities.

Humans and the sea are inextricably interconnected. From the shipwrecks spanning centuries of the Great Lakes shipping industry in Thunder Bay National Marine Sanctuary to the indigenous seafaring traditions of National Marine Sanctuary of American Samoa, national marine sanctuaries help us understand the diverse cultures that call sanctuaries home. As we look across the broader maritime landscape, we can understand how the environment affects us as a society and how we impact the environment in turn.

Through the study, protection and promotion of our diverse ocean legacy, sanctuaries help Americans learn more about ourselves as a nation.



# RITAGE

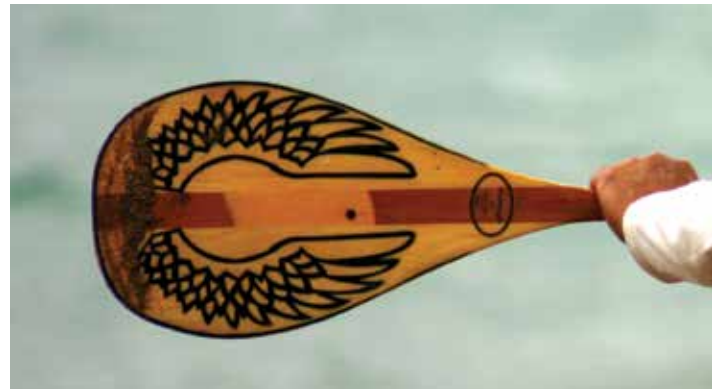


The old Presque Isle lighthouse in  
Thunder Bay National Marine Sanctuary.

Photo: David J. Ruck/NOAA

Below: (top) *Fa'a Samoa*, the Samoan way of life, has tied the people of National Marine Sanctuary of American Samoa to their natural world for centuries. (bottom) In Greater Farallones National Marine Sanctuary, the Manchester Point Arena Band of Pomo Indians joined in celebrating the sanctuary's expansion in 2015.

Photos (below), top: NPS; bottom: Matt McIntosh/NOAA



# INDIGENOUS CULTURES

The lands surrounding many national marine sanctuaries have been inhabited for millennia by seafaring indigenous peoples. Preserving and collaborating with indigenous cultures is a critical part of the mission of national marine sanctuaries: celebrating the great variety of human connections to the sea can help us all become better stewards of our ocean resources.



Members of the Chumash community paddle a traditional redwood plank canoe, called a *tomol*. The Channel Islands are a sacred place in Chumash culture and each year members of the community cross from the California mainland to the islands.

Robert Schwemmer/NOAA

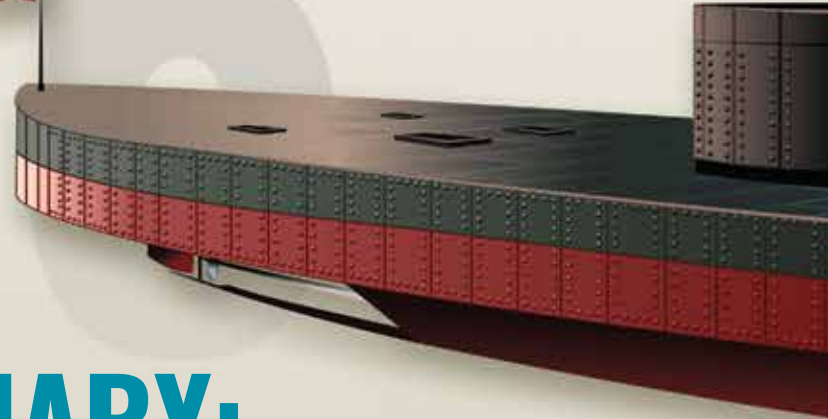
Left: Olympic Coast National Marine Sanctuary works closely with the Quinault Indian Nation, the Hoh Tribe, the Quileute Tribe and the Makah Tribe (top) in areas of mutual interest. In Hawaiian Islands Humpback Whale National Marine Sanctuary, native Hawaiian cultural traditions (middle and bottom) are recognized as crucial to the long-term health of Hawaii's ocean and humpback whales.

Photos (left): Kate Thompson/NOAA

# 1975



## OUR FIRST SANCTUARY: **USS *MONITOR***



The USS *Monitor* changed the course of naval history in the United States — and its resting place is our nation's first national marine sanctuary.

Constructed in the midst of the Civil War at the behest of President Abraham Lincoln, the USS *Monitor* was the United States'

first ironclad warship. The ship was designed to go head-to-head with the CSS *Virginia*, the Confederate ironclad that was wreaking havoc on the Union fleet.

When *Monitor* and *Virginia* finally met at the Battle of Hampton Roads in March 1862, the battle was ultimately a draw,

but one outcome was distinctly clear: the worldwide strategies of naval warfare and shipbuilding were changed forever.

After nearly a year in service, *Monitor's* career came to an untimely end. In the early morning hours of December 31, 1862, the ship was under tow off Cape Hatteras, North



Library of Congress

Officers sit for a portrait before *Monitor's* rotating gun turret.



NOAA Monitor Collection

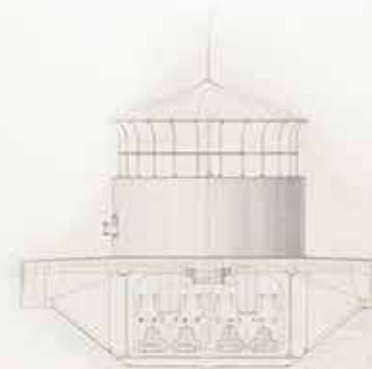
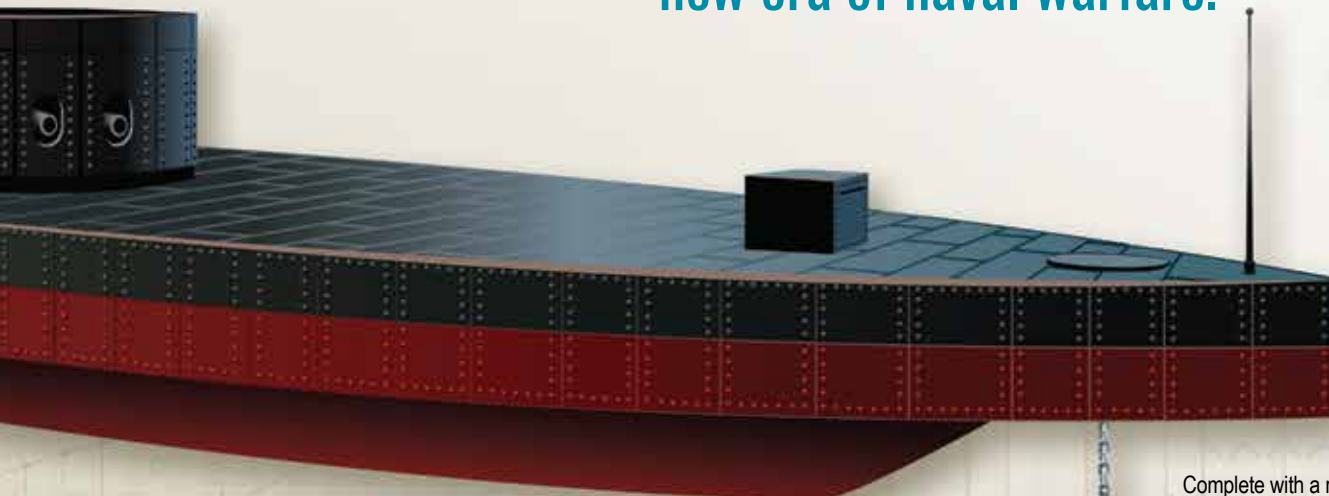
Clanking in at 120 tons and pulled from the depths of Monitor National Marine Sanctuary in 2002, *Monitor's* turret is the largest metal marine artifact ever recovered from the ocean.



NOAA Monitor Collection

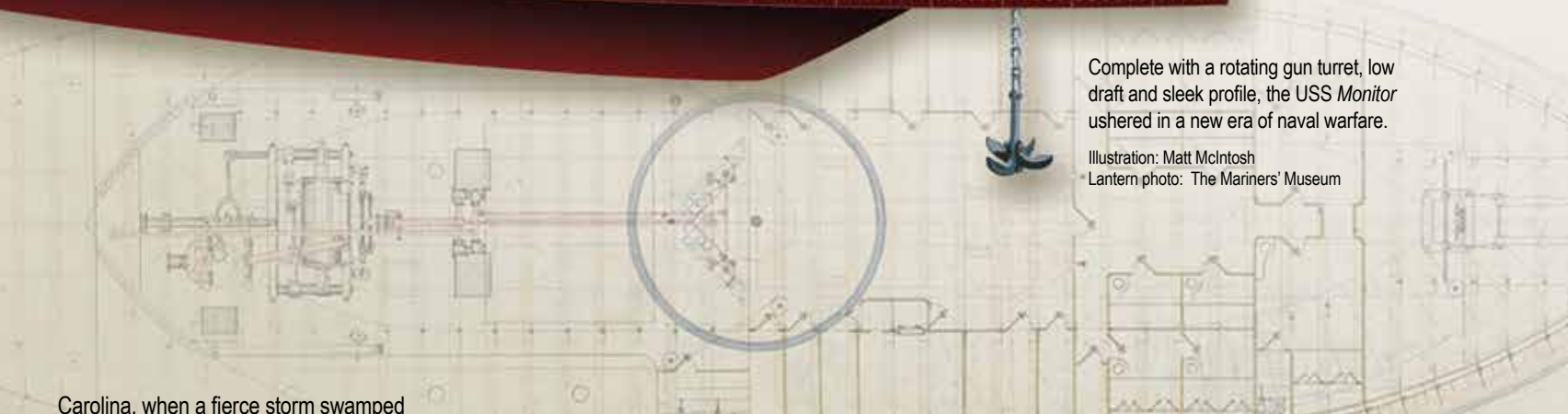


“The USS *Monitor* ushered in a new era of naval warfare.”



Complete with a rotating gun turret, low draft and sleek profile, the USS *Monitor* ushered in a new era of naval warfare.

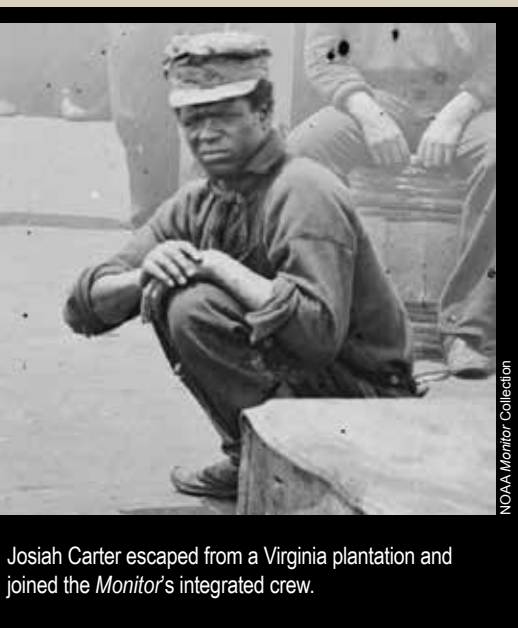
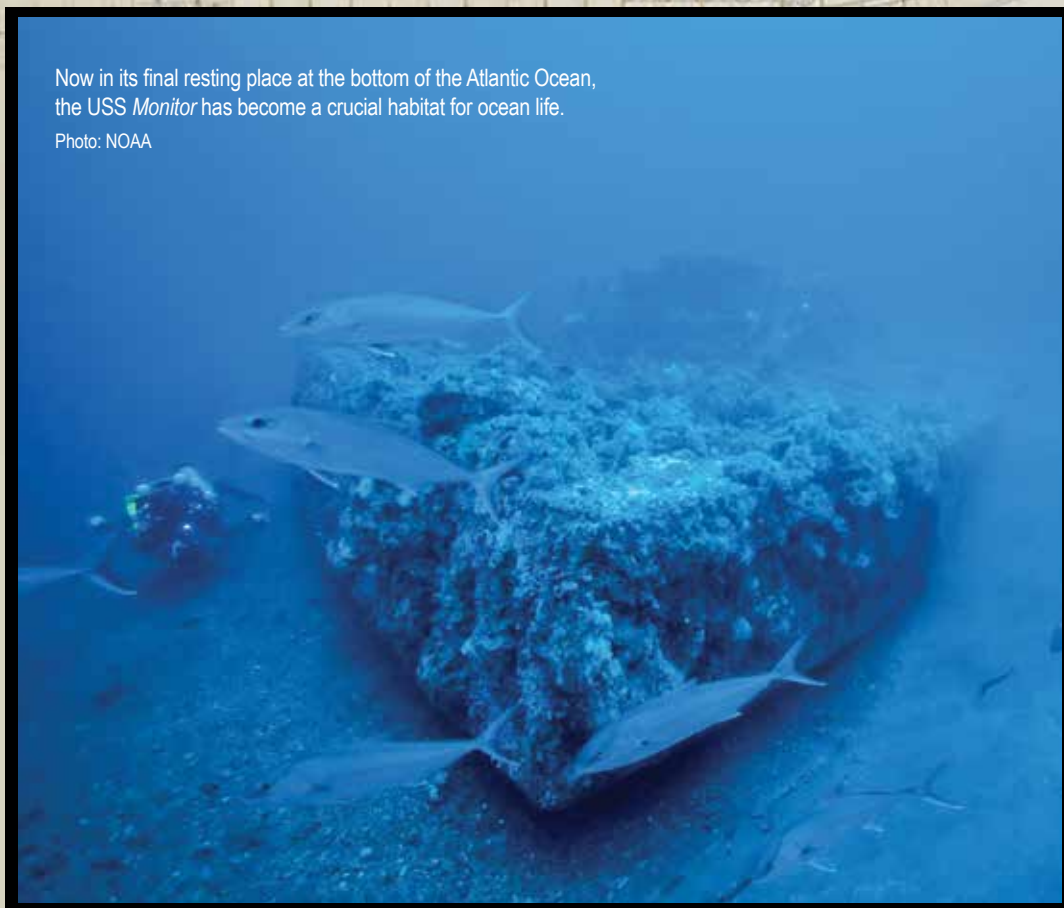
Illustration: Matt McIntosh  
Lantern photo: The Mariners' Museum



Carolina, when a fierce storm swamped the low-riding ship, sending it and 16 brave crew members into the deep. The wreck's location was unknown for more than a century until its discovery in 1973. In 1975, the resting place of the USS *Monitor* became our nation's first national marine sanctuary, Monitor National Marine Sanctuary.

Now in its final resting place at the bottom of the Atlantic Ocean, the USS *Monitor* has become a crucial habitat for ocean life.

Photo: NOAA



NOAA Monitor Collection

Josiah Carter escaped from a Virginia plantation and joined the *Monitor's* integrated crew.

# OUR NEWEST SANCTUARY: THUNDER BAY

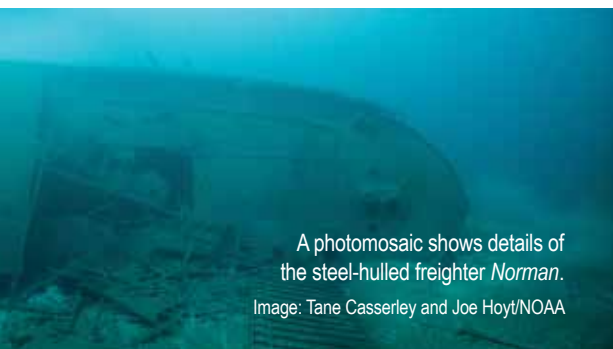
Designated in 2000, Thunder Bay is our newest national marine sanctuary. Located in the cold waters of Lake Huron along the shores of Northern Michigan, the sanctuary is adjacent to one of the most treacherous stretches of water within the Great Lakes system. Fire, ice, collisions and storms have claimed over 200 vessels in and around Thunder Bay. In 2014, the sanctuary expanded to 10 times its original size, from 448 square miles to 4,300 square miles. As the Great Lakes only national marine sanctuary, Thunder Bay protects one of the United States' best-preserved and nationally-significant collections of shipwrecks.



A snorkeler swims above the wreck of the steamer *Albany*, which lies in only five feet of water.

Photo: David J. Ruck/NOAA

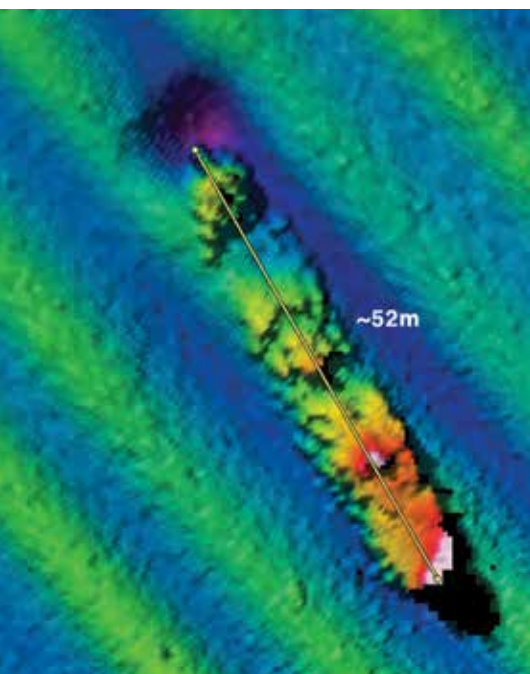




A photomosaic shows details of the steel-hulled freighter *Norman*.  
Image: Tane Casserley and Joe Hoyt/NOAA

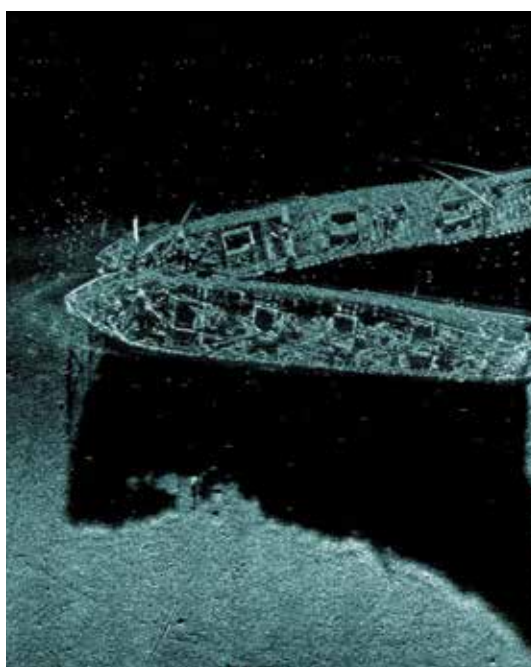


The German freighter, *Nordmeer*, ran aground and sank in 1966 and now lies in 5 - 40 feet of water.  
Photo: Tane Casserley/NOAA



Left to right, from top: SB2C-1C Curtiss Helldiver, Hawaiian Islands Humpback Whale NMS; *City of Washington*, Florida Keys NMS; multibeam sonar survey of the USS *Conestoga*, Greater Farallones NMS; *Paul Palmer*, Stellwagen Bank NMS; Curtiss F9C-2 Sparrowhawks near the USS *Macon*, Monterey Bay NMS; sidescan sonar survey of *Frank A. Palmer* and *Louise B. Crary*, Stellwagen Bank NMS; *Avenger*, Channel Islands NMS

Hans Van Tilburg/NOAA; NOAA; NOAA/Fugro; Matthew Lawrence/NOAA; MBARI-NOAA/Monterey Bay NMS-Ken Israel Integral Consulting Inc.; NOAA; Robert Schwemmer/NOAA



# OUR UNDERWATER HERITAGE

National marine sanctuaries are some of the greatest museums of our seafaring nation. Prehistoric sites, shipwrecks and naval battlefields are all found within these protected areas.



NOAA diver Dr. Kelly Keogh examines artifacts from the wreck of *Two Brothers*, a whale ship found in Papahānaumokuākea Marine National Monument.

Photo: Greg McFall/NOAA

## NATIONAL MARINE SANCTUARIES:

# A SIGNIFICANT IMPACT FOR SPECIAL PLACES



— By TOM MLADA

As mayor of the City of Port Washington, I have been privileged to join my fellow community leaders over the past two years in crafting our Wisconsin-Lake Michigan National Marine Sanctuary nomination. Our four central lakeshore cities — Port Washington, Sheboygan, Manitowoc, and Two Rivers — formed a collaborative regional partnership with a common

mission: to prepare a robust nomination focused on protecting and interpreting a nationally-significant collection of shipwrecks, fostering partnerships with education and research partners, and increasing opportunities for tourism and economic development.

We began with a core premise: we can advance economic growth while also preserving our cultural traditions, protecting our historic resources and ensuring public access to our most spectacular natural places.

The Great Lakes are integral to Wisconsin's quality of life. From commerce, recreation and tourism to our shared culture and maritime history, Lake Michigan and Lake Superior are interwoven into our daily lives. As such, a Wisconsin-Lake Michigan sanctuary will have significant, lasting impact in our four communities and the entire state of Wisconsin. It will provide educational, recreational and research opportunities for the next generation and has the potential to be a significant economic and tourism boon. In enhancing the recognition of the Great Lakes' significance to Wisconsin's history and the sense of place our citizens value so deeply, a sanctuary will bring even more visitors to our lakeshore communities.

“Working together, we can truly showcase our blue Earth.”



Left to right: Manitowoc Breakwater Lighthouse; shipwreck of *Walter B. Allen*, in the proposed Wisconsin-Lake Michigan National Marine Sanctuary; Port Washington Breakwater Lighthouse; shipwreck in the proposed Mallows Bay-Potomac River National Marine Sanctuary

Photos: Cheryl Oliver/NOAA; Tamara Thomsen/Wisconsin Historical Society; goodfreephotos.com; Daryl Byrd

Most importantly, a sanctuary will enrich the discovery, protection and preservation of the enormous wealth of historical, cultural and archaeological treasures found in the special place that is Lake Michigan — and will enable us to connect people with these treasures.

The proposed sanctuary presents our communities with a unique opportunity to inspire collective advocacy for resource stewardship and to be part of a network highlighting the interconnectedness of all water, from lakes to the ocean. Ultimately, this sense of interconnectedness will help drive our understanding that sustainability and stewardship of our most vital natural resources must be part of the community ethos.

All communities, no matter the size, can make differences in ways large and small. As our National Marine Sanctuary System demonstrates, engagement and investment among community stakeholders is critical to ensure proper care and celebration of our greatest assets, whether in our Great Lakes or in the ocean.

Working together, we can truly showcase our blue Earth. 💙

## FUTURE SANCTUARIES

For the first time in twenty years, NOAA has invited communities across the nation to nominate their most treasured places for consideration as national marine sanctuaries. For more information about nominations, visit [www.nominate.noaa.gov](http://www.nominate.noaa.gov).

Two sites have successfully met the nomination criteria and have moved on to the designation process. One is a section of the Potomac River in Mallows Bay, Maryland, and the other is an 875-square-mile area of Lake Michigan that extends from Port Washington to Two Rivers, Wisconsin. Nominated with broad community support, these locations are home to historic shipwrecks and other maritime heritage resources.

# GET INTO THE



**W**hether you're seeking adventure or a cozy place to bask in the sun, national marine sanctuaries have something for everyone. So what are you waiting for? Dive in!

Surf, sail, kayak and paddleboard while taking in some of the most amazing scenery in the country. Strap on your scuba gear and descend to live-bottom reefs, coral gardens, kelp forests and historic shipwrecks. Catch a glimpse of whales breaching and feeding, rare birds landing at an island rookery after a long migration, or elephant seals gathering for breeding season. Cast your line into the sportfishing opportunities that abound in these protected environments. Or stop by your sanctuary visitor center for interactive exhibits that will help you learn about the ecosystems, artifacts and coastal communities that make each sanctuary unique.

In national marine sanctuaries, you can play, explore, relax, and create lasting memories above and below the waves — all while helping to protect America's most treasured underwater places.



# BLUE



A stand-up paddleboarder heads out into the waves of Hawaiian Islands Humpback Whale National Marine Sanctuary.

Photo: Matt McIntosh/NOAA

# TAKE ONLY MEMORIES, LEAVE ONLY

## *A Guide for Ocean Etiquette*

— By CHIARA ZUCCARINO-CROWE  
& ELIZABETH WEINBERG



A visitor explores the beaches of Hawaiian Islands Humpback Whale National Marine Sanctuary.

Photo: Kate Thompson/NOAA

**B**ecause we love our sanctuary resources and want you to appreciate them, the National Marine Sanctuary System sees every visitor as a potential steward of the ocean and Great Lakes. The system protects America's most iconic natural and cultural marine resources. When you visit sanctuaries, help us preserve these resources for future generations — and have a whale of a time!

Learn more about ocean etiquette and how you can help protect national marine sanctuaries at:

[sanctuaries.noaa.gov/mag/etiquette](https://sanctuaries.noaa.gov/mag/etiquette)

### HERE ARE FIVE TIPS TO BE AN EFFECTIVE SANCTUARY STEWARD:



#### 1. TAKE ONLY PICTURES

While it may seem harmless to pick up that shell and put it in your pocket, think of how barren sanctuaries would become if everyone else took a souvenir, too. On the flip side, make sure you don't leave anything behind. Fishing line can entangle animals, and that plastic bag you brought your lunch in does a pretty good impersonation of a jellyfish snack for a sea turtle.



#### 2. KEEP YOUR DISTANCE

For your safety and that of the animals in our protected areas, make sure you're keeping your distance — regulations and guidelines suggest staying 150 to 1,000 feet back, depending on the location and type of wildlife. If an animal appears stressed, you are too close and need to back away cautiously. Plus, keeping your hands to yourself helps keep sanctuaries healthy.

# Y FOOTPRINTS

Planning a trip to one of your national marine sanctuaries this year?

When watching orcas and other whales in national marine sanctuaries, always give them plenty of space.

Photo: Karlyn Langjahr/NOAA



### 3. DON'T MIX PETS & WILDLIFE

That cute seal may look cuddly, but it could turn out to have a nasty bite. We understand that you may want to share your experience in these special places with your pets, but make sure to keep them leashed and under control. Wild animals recognize dogs as predators and may flee or try to fight back, and may also spread diseases to your pets if they get too close.



### 4. KNOW BEFORE YOU GO

Read about the wildlife, viewing sites and local regulations to get the most from your wildlife viewing experience. Sanctuary websites and visitor's centers are perfect ways to get acquainted with the sanctuary before you visit. With a little advanced planning, you can have an amazing time visiting your national marine sanctuaries while caring for all of their inhabitants.



### 5. BE CONSIDERATE!

Did you know 42 million people visit the sanctuaries each year? These places may seem quiet, but you're not the only one there! Be considerate of other visitors. If you notice other visitors behaving in a way that disturbs the wildlife or other viewers, speak up. Be friendly and respectful, and help encourage everyone at the sanctuary to do their part as ocean stewards.

Sanctuaries provide an idyllic setting for a variety of recreational activities. From wreck diving to surfing, satisfy your taste for adventure while building a connection to these special areas.

Photo: Danielle Schwarzmann/NOAA



## RECREATION IN SANCTUARIES

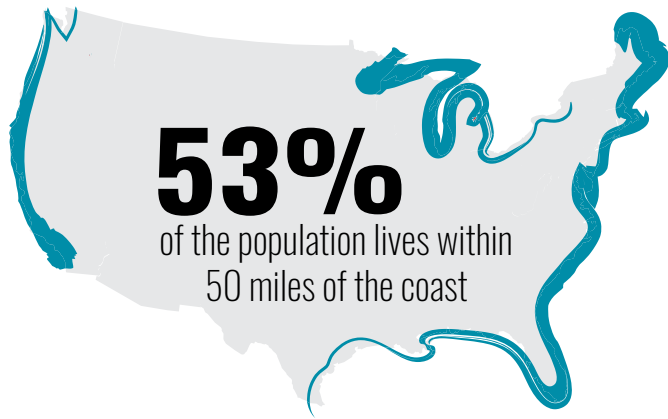


Left to right, from top: Channel Islands NMS; Hawaiian Islands Humpback Whale NMS; Monterey Bay NMS; Gray's Reef NMS; Monterey Bay NMS; Thunder Bay NMS; Olympic Coast NMS; Channel Islands NMS; NMS of American Samoa; Hawaiian Islands Humpback Whale NMS; Channel Islands NMS; Florida Keys NMS; Cordell Bank NMS; Channel Islands NMS; Hawaiian Islands Humpback Whale NMS; Flower Garden Banks NMS; Olympic Coast NMS; Gray's Reef NMS; Monterey Bay NMS; Greater Farallones NMS

Photos: Rocío Lozano/MERITO Foundation; Matt McIntosh/NOAA; Robert Schwemmer/NOAA; Greg McFall/NOAA; Kate Thompson/NOAA; David J. Ruck/NOAA; Kate Thompson/NOAA; Claire Fackler/NOAA; Wendy Cover/NOAA; Kate Thompson/NOAA; Robert Schwemmer/NOAA; David J. Ruck/NOAA; Joe Hoyt/NOAA; Kate Thompson/NOAA; Matt McIntosh/NOAA; Emma Hickerson/NOAA; Karlyn Langjahr/NOAA; Greg McFall/NOAA; Kate Thompson/NOAA; Matt McIntosh/NOAA

# AMERICA &

# OCEAN RECREATION



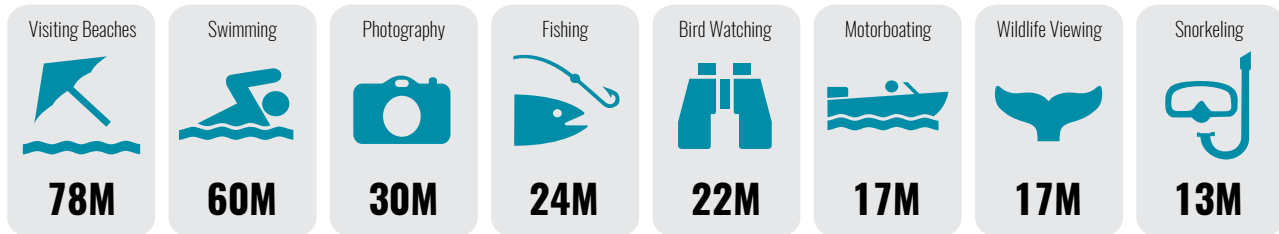
Time the average beachgoer spends at the shore per year



Americans participate in some form of ocean recreation

## TOP 8 OCEAN ACTIVITIES

NUMBER OF ANNUAL PARTICIPANTS:



Visitors compete in the cardboard boat regatta at the annual Thunder Bay Maritime Festival.



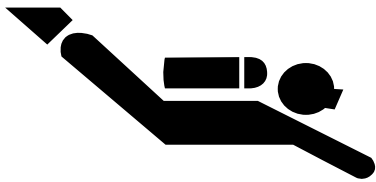
The California coastline offers stunning views of Greater Farallones National Marine Sanctuary.

# SANCTUARIES: A DESTINATION FOR RECREATION

# \$8,000,000,000



Annual revenue generated by ocean recreation, tourism, education, science and commercial fishing across the National Marine Sanctuary System

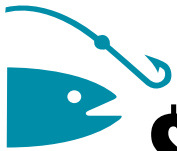



## \$5.15 billion

spent on recreation

## \$2.1 billion

in income supporting  
**63,000 jobs**



From 2010 to 2012

## \$156 MILLION

spent annually on recreational fishing in the four CA sanctuaries



## \$101.6 MILLION

 spent on recreation in Olympic Coast NMS in 2014

Matthew Lawrence/NOAA



Jenny Stock/NOAA

Divers in Stellwagen Bank National Marine Sanctuary may encounter wildlife like the *Mola mola*, or ocean sunfish.

National marine sanctuaries provide fantastic wildlife viewing opportunities.

# VISITING SANCTUARIES

Visit sanctuary discovery centers and exhibits at partner venues to learn more about the natural and cultural treasures these special places protect.



Left to right, from top: Mokuapāpapa Discovery Center, Hilo, Hawaii; Florida Keys Eco-Discovery Center, Key West, Florida; Olympic Coast Discovery Center, Port Angeles, Washington; Great Lakes Maritime Heritage Center, Alpena, Michigan; Sanctuary Exploration Center, Santa Cruz, California

Photos: Andy Collins/NOAA; NOAA; Kate Thompson/NOAA; NOAA; NOAA



Stellwagen Bank National Marine Sanctuary offers some of the world's premiere whale watching.

Photo: NOAA/NOAA Fisheries permit #605-1904



# STORIES FROM THE BLUE



Nathaniel Linville prepares a fly to catch the next fish.  
Photo: C1 Films



The Angling Company owner Nathaniel Linville fly fishes in Florida Keys National Marine Sanctuary.

Photo: C1 Films



## A Fly Fisherman's Voice — Nathaniel Linville

— By KATE THOMPSON

A few blocks off of the main strip in Key West is a fly fishing shop called The Angling Company.

Much like many of the people who migrate to the warm climate and crystal blue waters of the Florida Keys, the owner, Nathaniel Linville, is

originally from New York. What brought him here, however, was not the lively Duval Street or the delicious Cuban food. It was the lure of the big catch — and that's what the Keys are known for.

As Nathaniel puts it: "The Keys are a very special place, and are different from other des-

tinations in multiple ways. First are the fish: you have the large tarpon, the bonefish, the cobia, the barracuda, as well as the offshore tuna and sailfish. Why this is unique is that it will provide you with a different experience each time you go out. Second are the guides. They are better here than anywhere else in the world."

He adds, "Fly fishing in the Keys is a two person game. You have a guide and you have an angler. The whole way that you fish is different. The boat is pushed with a pole



Above: The Angling Company is a fly shop in Key West that sells fly equipment, clothing and outdoor apparel, books, tackle, and anything else a sanctuary visitor could need for fly fishing and outdoor boating.

Photos: Kate Thompson/NOAA



Left: Nathaniel Linville and guide show off their barracuda catch.

Photo: C1 Films

and positioned by the guide, and then the fish is cast to by the angler. It gives you an opportunity to contribute the most as an individual to the transaction of actually catching a fish.

"I want to be as involved as I can be in that process. That is something that is really important to me. I mean there are parts of the world where you can't fish this way anymore because there are too many people doing too many different things. That is the last thing that makes the Keys special: the sanctuary protecting its waters to keep the balance.

"I think that we have a really great thing with the sanctuary. You don't have tours or airboat rides running around the backcountry, but there is still a lot of commercial activity out there. If it wasn't for the regulation and thus the preservation provided by the sanctuary, this place would be finished." ♥

“ If you let people for whom the health of the resource is imperative ... actually interact with it, those people will take care of it.”

# CONNECTIONS I

**W**hether you live in the mountains, on the plains, or on the shore, in the United States or abroad, we are all connected by the ocean. This enormous body of water contains 97 percent of Earth's water, and all life, including our own, depends on it for survival.

The National Marine Sanctuary System protects some of the most important areas of the ocean and Great Lakes. This system of marine protected areas encompasses more than 170,000 square miles within United States waters — an area almost twice the size of the Great Lakes. National marine sanctuaries and marine national monuments help build a stronger, more resilient future for communities and ecosystems alike.

But we can't do it alone: the global ocean and waterways are all connected, and many ocean inhabitants, like humpback whales, travel across the world. By working with marine protected areas around the globe, the National Marine Sanctuary System helps maintain a healthy ocean for everyone.



# N THE BLUE



The sun sets over the ocean off the shores of Cuba.

Photo: Gonzalo Cid/NOAA

# MARINE PROTECTED AREAS: WORKING TOGETHER



Many migratory marine species, like humpback whales, don't remain within sanctuary boundaries while traveling the world. Sister sanctuary relationships seek to protect these species by fostering cooperation among marine protected areas. Stellwagen Bank National Marine Sanctuary, for example, has sister sanctuary agreements with the Dominican Republic, the French Antilles and Bermuda, which help protect and manage whale populations while also enabling these marine protected areas to coordinate research and education.

Photo: Jodi Frediani



The U.S. has hundreds of marine and coastal protected areas, including national marine sanctuaries, national parks, national wildlife refuges and national estuarine research reserves. Together, these marine protected areas conserve biodiversity, ecosystems, cultural heritage and fisheries and are part of a worldwide network. Our waters and marine resources across the globe are connected, and managing our most important places requires close collaboration. The National Marine Protected Areas Center connects and strengthens marine protected areas across the country and around the world.

Photo (Shipwreck off the coast of Sleeping Bear Dunes National Lakeshore): Mark Lindsey/NPS



Downtown Havana, Cuba

Photo: Gonzalo Cifra/NOAA

# ¿QUÉ BOLÁ CUBA?

## A Historic Ocean Conservation Partnership

— By ELIZABETH WEINBERG



**L**ess than a hundred miles south of the coral reefs and mangrove forests of Florida Keys National Marine Sanctuary lies the equally diverse marine environment of Cuba.

Though managed by different nations, these special places are part of the same ecosystem, bound together by ocean currents and animal migrations, and threatened by some of the same environmental stressors. And in 2015, NOAA, the National Park Service, and Cuba's National Center for Protected Areas signed an agreement recognizing these connections.

This new agreement established sister-sanctuary relationships between Guanahacabibes and Banco de San Antonio in Cuba, and Florida Keys and Flower Garden Banks national marine sanctuaries in the United States, recognizing that these places are all inextricably linked through the flow of the ocean and geographic proximity.

Researchers in both countries have long studied the connectivity between our marine environments. In the case of fisheries, the juveniles of important species such as tuna and lobster likely originate in Cuban waters. For corals, the

marine currents of the Caribbean Sea and Gulf of Mexico are crucial, serving as the crossroads of multiple species of coral to spread their larvae during the spawning events. The transportation of these larvae helps increase population diversity by bringing new coral colonies to the reef, and gives coral reefs under human pressure a better chance to thrive.

In Flower Garden Banks National Marine Sanctuary, for example, elkhorn corals (*Acropora palmata*) had been absent for centuries but more recently have reappeared; these larvae likely originated on the reefs of Cuba or Mexico.






And it's not just invertebrates and fish that travel back and forth between U.S. and Cuban waters; a number of large species like whale sharks, sea turtles, and sperm and humpback whales travel among Cuba, the United States and Mexico. To conserve these species, collaboration among sites is crucial: "Our success," explains Gonzalo Cid, International Activities Coordinator with NOAA's National Marine Protected Areas Center, "depends in large part on other people's success."

Still, for all researchers currently understand about connectivity between Cuba and the

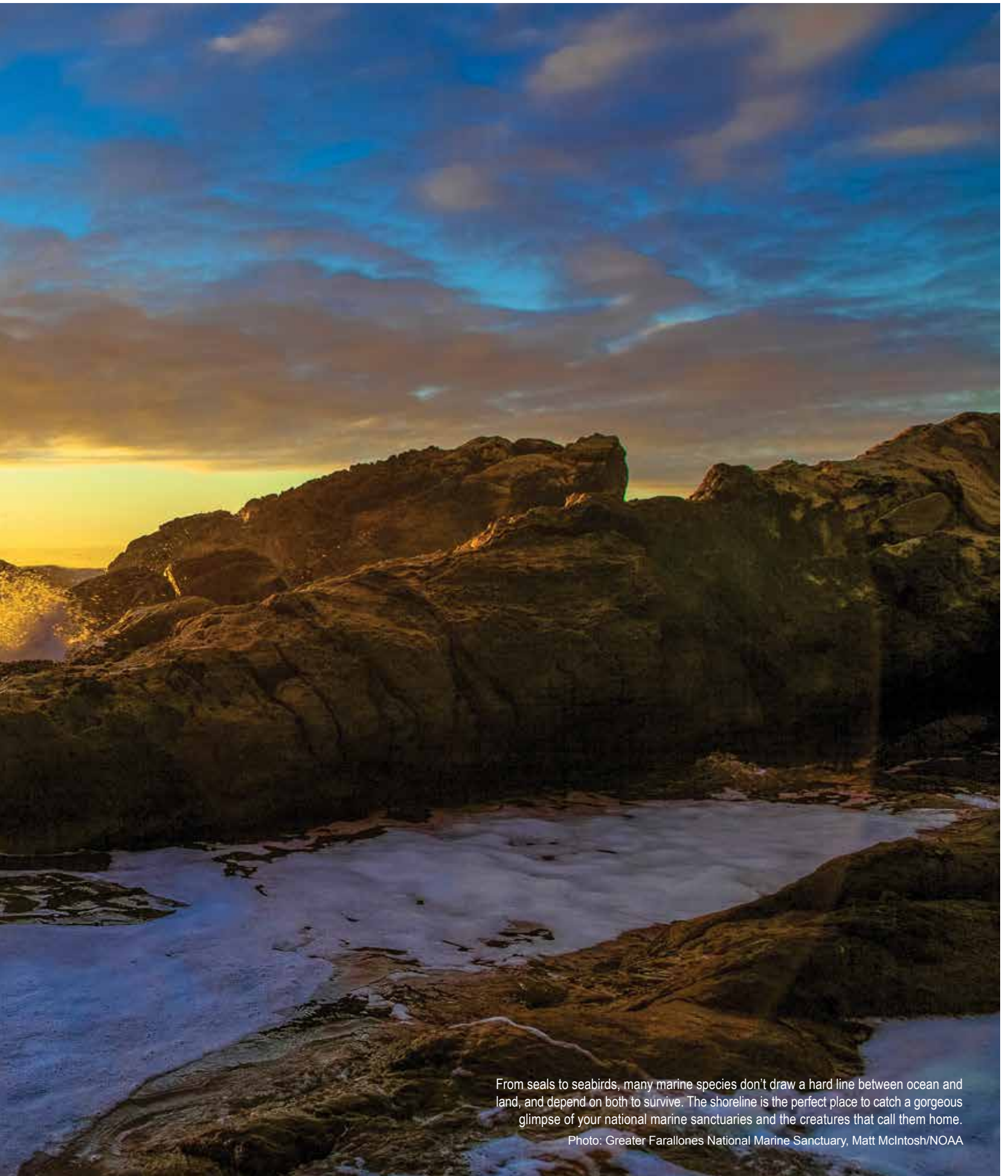
United States, there is plenty left to learn. This new partnership opens up the gates for scientists and resource managers to better understand life cycles, larvae distribution, migratory patterns, potential climate change impacts and other issues. Further, U.S./Cuba collaboration will enable more comprehensive and effective management of resources in this shared ecosystem.

By exchanging information and experience managing marine protected areas, this cooperation could bring important benefits to marine protected areas and their inhabit-

ants. "Our national marine sanctuaries and Cuba's marine protected areas are like the bookends for the ecological encyclopedia of the Gulf of Mexico," explains William Kiene, a policy analyst for national marine sanctuaries' Southeast Atlantic, Gulf of Mexico and Caribbean region. "Working together to preserve these spectacular concentrations of marine life in key areas of the Gulf will not only help us to strengthen the connections between them, but also help us strengthen the connections between our societies, which both rely on the ocean we share." 

# SANCTUARY SHORELINES





From seals to seabirds, many marine species don't draw a hard line between ocean and land, and depend on both to survive. The shoreline is the perfect place to catch a gorgeous glimpse of your national marine sanctuaries and the creatures that call them home.

Photo: Greater Farallones National Marine Sanctuary, Matt McIntosh/NOAA



# MARINE NATIONAL MONUMENTS

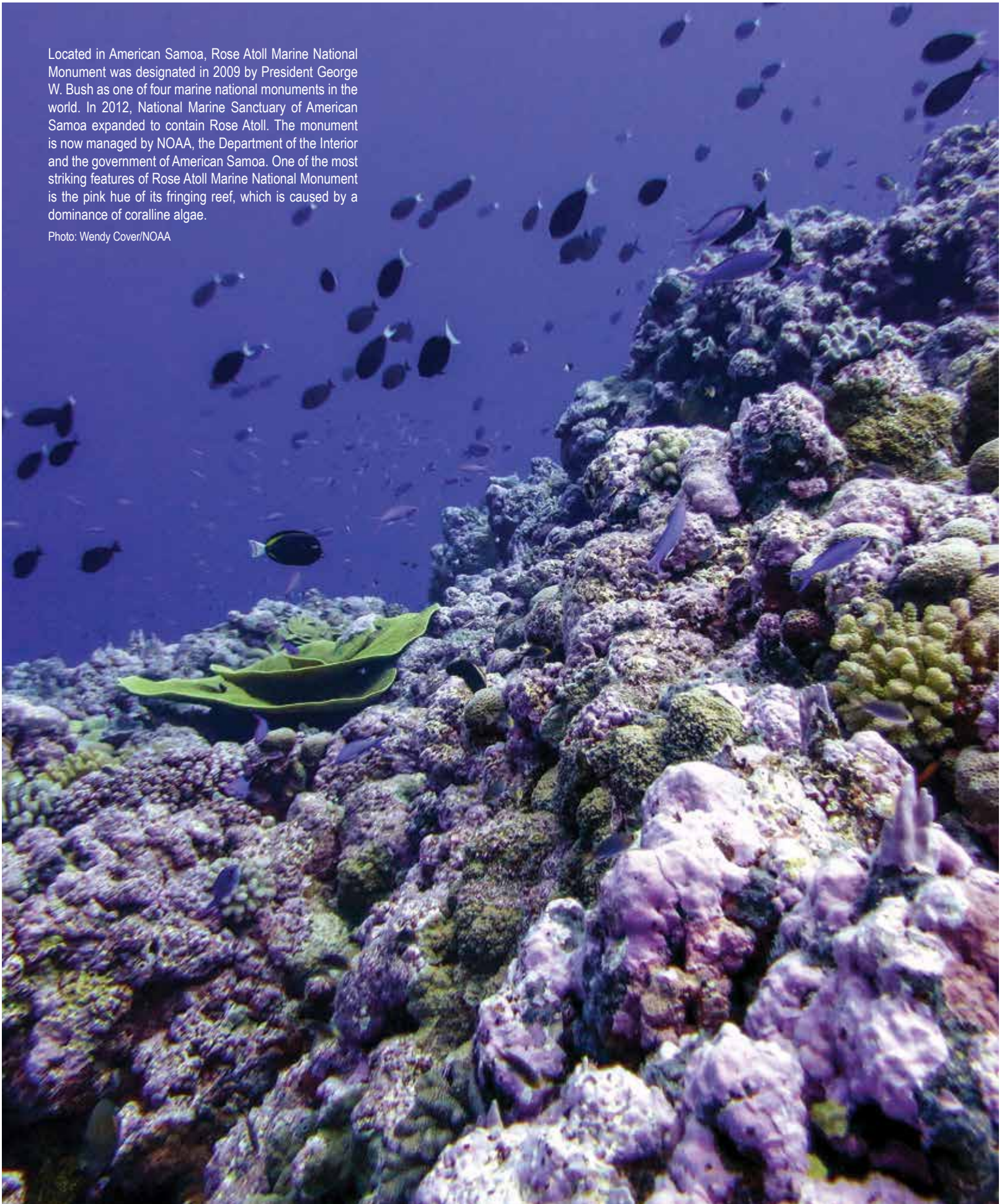
The name Papahānaumokuākea commemorates the union of two Hawaiian ancestors, Papahānaumoku and Wākea, who gave rise to the Hawaiian archipelago, the taro plant, and the Hawaiian people. Many of the islands and shallow water environments within the monument serve as important habitats for rare species like the threatened green sea turtle and the endangered Hawaiian monk seal, as well as for the 14 million seabirds that breed and nest there.

In 2000, the Northwestern Hawaiian Islands were designated as an ecosystem reserve by President Bill Clinton. In 2006, the area was renamed Papahānaumokuākea and was designated as the nation's first marine national monument by President George W. Bush. It is managed by the state of Hawai'i, NOAA and the Department of the Interior. On July 30, 2010, it was inscribed as a mixed (natural and cultural) World Heritage Site by delegates to the United Nations.

Photo: Greg McFall/NOAA

Located in American Samoa, Rose Atoll Marine National Monument was designated in 2009 by President George W. Bush as one of four marine national monuments in the world. In 2012, National Marine Sanctuary of American Samoa expanded to contain Rose Atoll. The monument is now managed by NOAA, the Department of the Interior and the government of American Samoa. One of the most striking features of Rose Atoll Marine National Monument is the pink hue of its fringing reef, which is caused by a dominance of coralline algae.

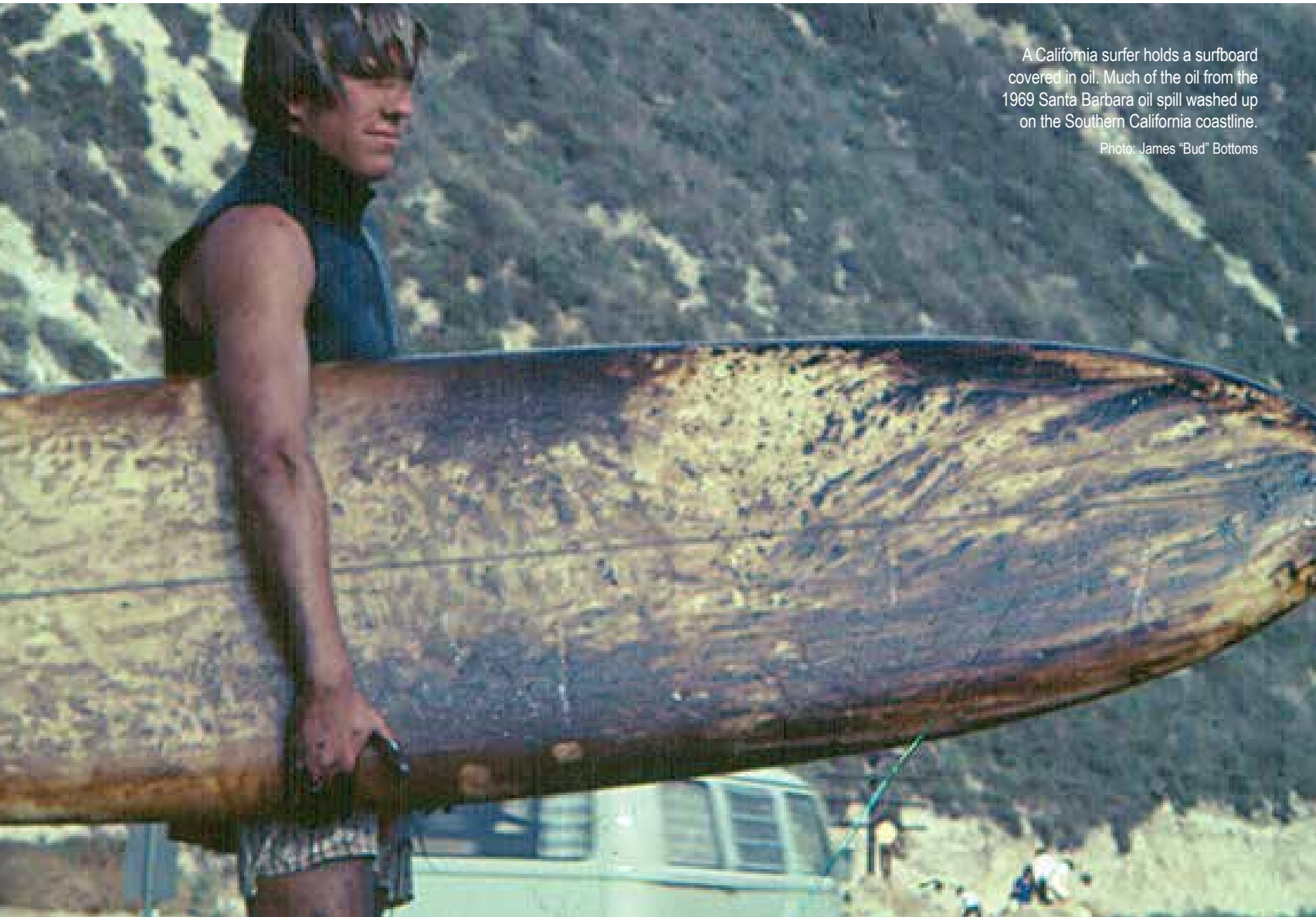
Photo: Wendy Cover/NOAA



# LEARNING FROM THE PAST TO PROTECT THE FUTURE

Ensuring the continued safekeeping  
of our **Earth's special places**

— By ELIZABETH WEINBERG

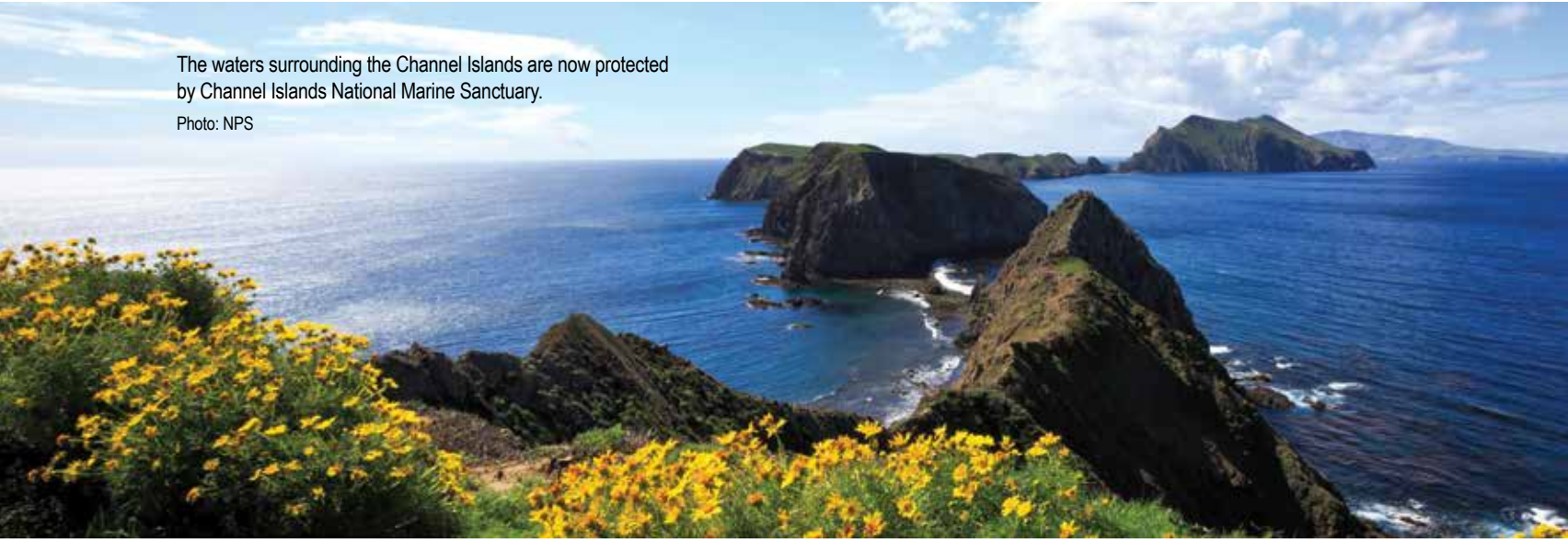


A California surfer holds a surfboard covered in oil. Much of the oil from the 1969 Santa Barbara oil spill washed up on the Southern California coastline.

Photo: James "Bud" Bottoms

The waters surrounding the Channel Islands are now protected by Channel Islands National Marine Sanctuary.

Photo: NPS



## IT STARTED WITH AN OIL SPILL

**T**ake a moment and picture your most treasured ocean place. A salty tang wafts in on the sea breeze, carrying with it the cacophony of seabirds and the sound of rolling waves. Sun-warmed sand or cool, damp rocks buoy your feet while small waves drift against your bare toes. Perhaps in the distance, a whale breaches or a shearwater swoops and dives into the waves.

Now imagine oil creeping in between your toes, or trash piling up along the shore next to you. Would it still be your most treasured ocean place? What would you do to protect it?

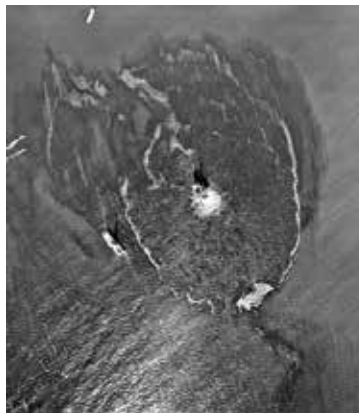
National marine sanctuaries were set aside to keep this future from becoming a reality.

Just like our national parks, sanctuaries work to ensure that our most special ocean and Great Lakes waters will remain healthy and vibrant for future generations. But it hasn't always been this way: a long history of conservation brought us to where national marine sanctuaries are today.

The conservation movement in the United States began in the early 19th century, as westward expansion and the industrial revolution brought forth contradicting images to the American public. On the one hand, photographs and paintings of places like El Capitan, Old Faithful and the Grand Canyon invoked a new appreciation for nature, while on the other hand, documentation of the impacts of widespread

industrialization showed the public the dark future that could befall these special places.

In 1872, a century before the passage of the National Marine Sanctuaries Act President Ulysses S. Grant designated the first nationally protected land area, Yellowstone National Park — an action that “signaled a new way the world would view its land and, eventually, its seas,” the National Parks Advisory Board noted in 2001. Throughout the early 20th century the United States signaled again and again its commitment to protecting the nation’s special terrestrial areas. Through legislation like the Antiquities Act and the National Park Service Organic Act, authority was given to both the



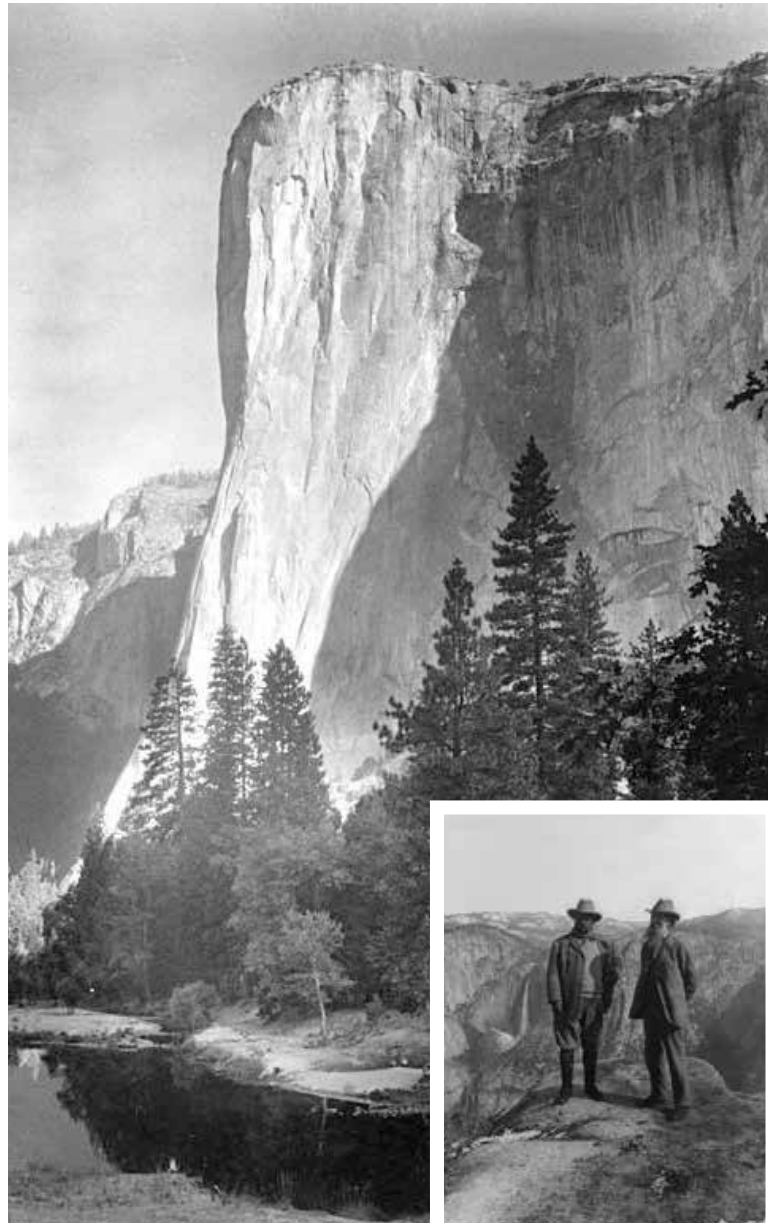
Right: Aerial photos show Union Oil's Platform "A" surrounded by oil on February 14, 1969.

Left photo: University of California Santa Barbara Map and Image Library; right photo: USGS



National parks like Yellowstone and Yosemite and conservationists like President Theodore Roosevelt and John Muir paved the way for environmental protection in the United States.

Images: NPS



President and Congress to set aside national monuments and parks to ensure the future of the most magnificent places across the U.S.

Still, it wasn't until the middle of the last century that the ocean itself began to be seen as uniquely in need of protection. In 1960, Florida designated John Pennekamp Coral Reef State Park, the first marine protected area in the United States declared independent of a land-based component. Some of the waters protected by this park are now protected by Florida Keys National Marine Sanctuary. Then, in 1966, President Lyndon B. Johnson's Science Advisory Committee called for a system of marine preserves, prompting the first marine sanctuary bills to be introduced in the House of Representatives — but these early bills stalled out. It would take more than that to create change for the ocean.

But then on January 28, 1969, Union Oil's drilling rig Platform "A" experienced a well blowout, sending bubbles of black oil and gas into the ocean off the coast of Santa Barbara, California. It was, at the time, the worst oil spill in United States history: an estimated 3 million gallons of oil spilled into the ocean, killing thousands of birds, fish and marine mammals, and provoking an enormous public outcry.

The spill — and similar incidents throughout the 1960s — prompted citizens to band together and look for ways to protect the coastline. Many people now "consider it to be the birth of the modern environmental movement," explains Chris Mobley, superintendent of Channel Islands National Marine Sanctuary, which now protects waters not far from where the spill occurred. For many, the spill marked a new

era: one in which Americans were beginning to recognize the damage our actions have done to the ocean and the urgent need to protect these special places.

Out of that public outcry came environmental legislation like the National Marine Sanctuaries Act, which in 1972 created the basis for the 13 national marine sanctuaries and two marine national monuments that now make up your National Marine Sanctuary System. Today, this system protects more than 170,000 square miles of marine and Great Lakes waters from Washington state to the Florida Keys, and from Lake Huron to American Samoa.

Protecting our marine environment, however, requires collaboration: the health of the marine environment cannot exist independently of the





Everglades National Park shares a border with Florida Keys National Marine Sanctuary.

Photo: © Nagel Photography

health of terrestrial ecosystems. This year, the National Park Service celebrates its centennial, marking a hundred years of devotion to environmental conservation — and it is more important than ever that agencies like NOAA and the National Park Service devote themselves to working together to make sure that our marine environments remain healthy for future generations.

### FROM THE TOP OF THE WATERSHED TO THE BOTTOM OF THE OCEAN

Five national marine sanctuaries — Olympic Coast, Greater Farallones, Channel Islands, Florida Keys and American Samoa — have boundaries adjacent to or overlapping national park boundaries, and these protected places work closely together. And other sanctuaries, like Cordell Bank and Stellwagen Bank, collaborate with nearby national seashores and other protected lands and waters. National Park Service Director Jonathan B. Jarvis points out that “coastal parks have more than 11,000 miles of shoreline and 2.5 million acres of ocean and Great Lakes,” creating a multitude of opportunities for parks and sanctuaries to work together. Collaborations between parks and national marine sanctuaries, he adds, “play a major role in connecting the public to



Dry Tortugas National Park is surrounded by Florida Keys National Marine Sanctuary.

Photo: National Archives

these special places and expanding our understanding of our ocean heritage.”

Bill Douros, West Coast Regional Director for NOAA's Office of National Marine Sanctuaries, points out that partnerships between national marine sanctuaries and national parks help protect entire environments “from the top of the watershed down through the national park and into the national marine sanctuary.”

“Because our boundaries are adjacent or overlapping, many of the species that we share an interest in, or habitats that we share an interest in, don't recognize boundaries,” adds Sarah Allen, Ocean and Coastal Resources Program Coordinator for the National Park Service's Pacific West Region. “So [national parks] have a greater network of protection by collaborating with other land or water management agencies. By having this network, we're much more powerful in protecting those resources.”

Through science and monitoring initiatives alike, our national marine sanctuaries and national parks collaborate in order to protect natural and cultural marine resources. Florida Keys National Marine Sanctuary partners with Everglades National Park, with which it shares a boundary, to monitor seagrass beds and water quality. The sanctuary also shares a boundary with Biscayne National Park, with which it monitors water quality, the spread of invasive lionfish, and impacts on the coral reef. By working together, the sanctuary and Dry Tortugas National Park — which the sanctuary surrounds — protect the largest no-take area in the continental United States, the Tortugas Ecological Reserve, which is home to more than 400 species of reef fish. And other sanctuaries have similar monitoring and resource protection partnerships: Channel Islands National Marine Sanctuary and National Park work together on the park's 30-year-long kelp forest monitoring program, while National Marine Sanctuary of American Samoa and National Park of American Samoa collaborate on crown-of-thorns starfish removal and research efforts at Swains Island and Rose Atoll.

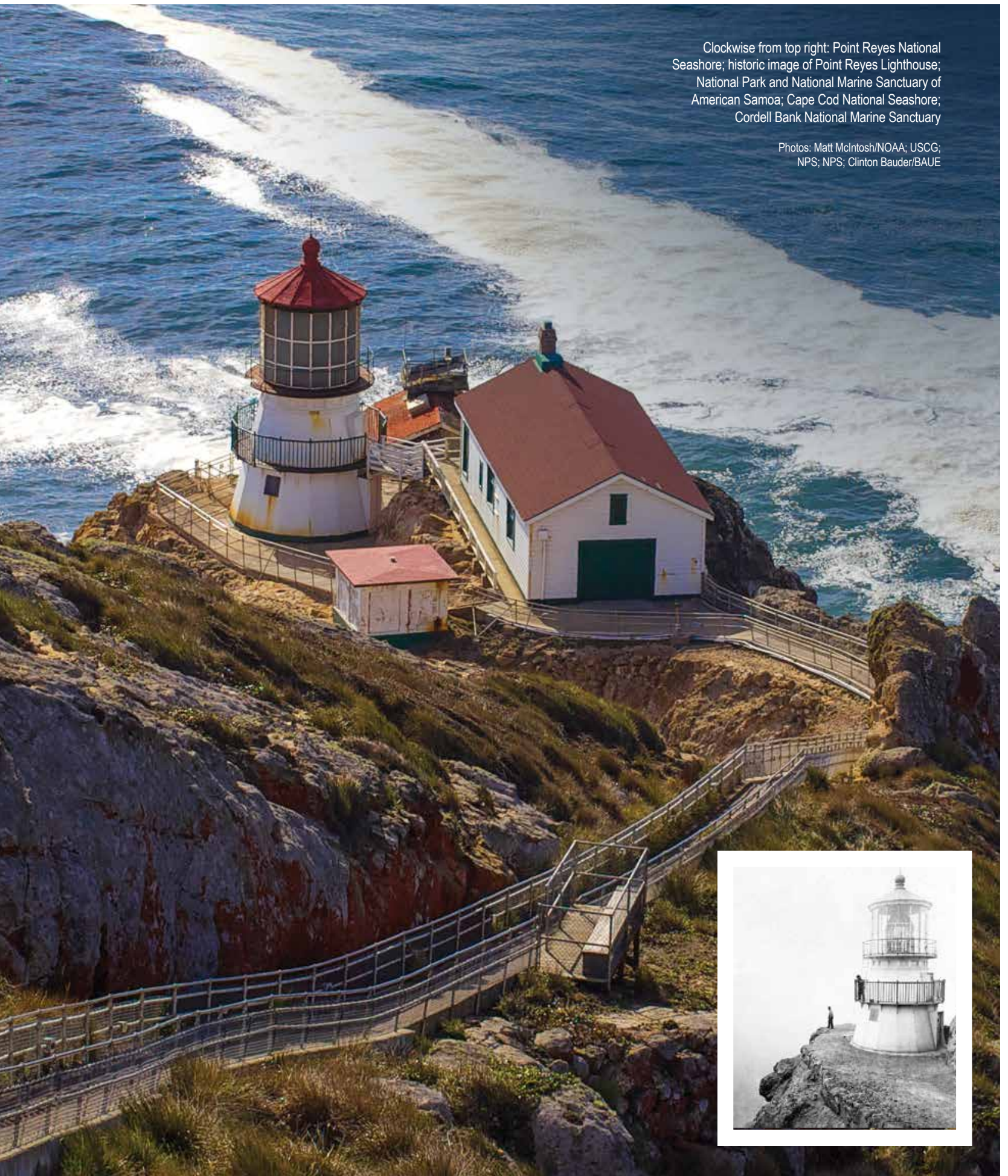
Even when parks and sanctuaries aren't working directly together in the field, their initiatives are frequently mutually beneficial, explains Allen. Two citizen science monitoring programs within Greater Farallones National Marine Sanctuary, ACCESS and Beach Watch, “have been tremendous benefits to the parks in real tangible ways.” Both of these programs collect crucial species data along the beaches of the Point Reyes National Seashore, enabling the sanctuary and seashore to establish a baseline for oil spill damage assessments. Channel Islands National Marine Sanctuary and National Park also collaborate on their volunteer Naturalist Corps, which trains volunteers to interpret park and sanctuary resources at visitor centers and on vessels that transit to and from the park over sanctuary waters. In 2011, the White House named this program the Take Pride in America Outstanding Federal Volunteer Program.

**CONTINUED ON PAGE 46**



Clockwise from top right: Point Reyes National Seashore; historic image of Point Reyes Lighthouse; National Park and National Marine Sanctuary of American Samoa; Cape Cod National Seashore; Cordell Bank National Marine Sanctuary

Photos: Matt McIntosh/NOAA; USCG; NPS; NPS; Clinton Bauder/BAUE



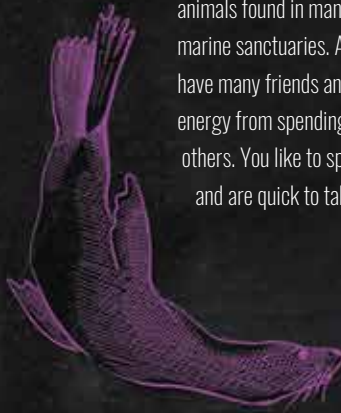
# WHICH SANCTUARY

*follow the steps*

1

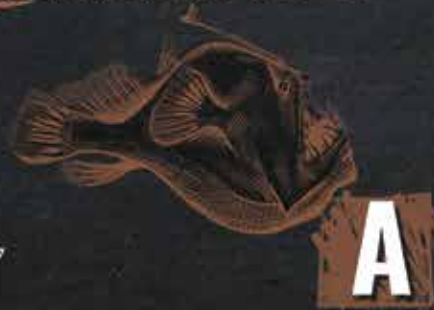
Are you a **SEA LION** or an **ANGLERFISH**?

Sea lions are incredibly social, gregarious animals found in many West Coast national marine sanctuaries. As a sea lion, you have many friends and interests, and get your energy from spending time with others. You like to spark conversations and are quick to take action.



**S**

*pick one*



**A**

Anglerfish are found in deep-sea habitats of national marine sanctuaries like Monterey Bay National Marine Sanctuary. As an anglerfish, you prefer to spend time alone and have a few deep friendships. Generally quiet, you like to focus on your inner world.

2

Are you a **CORAL** or a **HUMPBACK WHALE**?

From Flower Garden Banks to American Samoa, corals form the base of many national marine sanctuary ecosystems. As a coral, you are detail-oriented, think in concrete terms and focus on the present.



**C**

*pick one*



**H**

Whales like the humpback whale travel all over the world each year to their feeding and breeding grounds. As a humpback whale, you are creative and imaginative. You like to see the big picture and focus on the future.

Open here to find your answer

5

# PERSONALITY

*Are You?*

*below to find out*

3

Are you an **OCTOPUS** or a **WHALE SHARK?**

Found throughout national marine sanctuaries, octopuses have neurons distributed throughout their arms that help them gather information. As an octopus, you make decisions based on logic and are interested in ideas and facts.



*pick one*



Whale sharks travel throughout tropical waters and are often spotted in Flower Garden Banks National Marine Sanctuary. As a whale shark, you prefer to make decisions based on how you feel and are interested in people and emotions.

4

Are you a **TURTLE** or a **GARIBALDI?**

Found throughout national marine sanctuaries, sea turtles spend much of their time in the open ocean. As a sea turtle, you prefer to "go with the flow" — you change your plans and adapt quickly, and like to simply let life happen.



*pick one*



Strongly territorial fish found in the kelp forests and rocky reefs of Channel Islands National Marine Sanctuary, garibaldis like to be in control. As a garibaldi, you are strongly organized and like to make your plans in advance.

# 6

# USE YOUR LETTERS

## To Determine Your Sanctuary Personality Type

The National Marine Sanctuary System is made up of special places around the country that have unique and distinctive personalities all their own. Follow the letters to determine which sanctuary's personality you share.

**S H W G** = Olympic Coast

*The Mentor* – *Seek continuity through harmony & collective values.*

Olympic Coast National Marine Sanctuary hosts one of North America's most productive marine ecosystems and spectacular undeveloped coastlines. The sanctuary also has a rich cultural and historical legacy, particularly for the contemporary cultures of the Quinault Nation and Makah, Quileute and Hoh Indian tribes.

**S C W T** = Monterey Bay

*The Performer* – *Live in the moment, experiencing life to the fullest.*

Known as the "Serengeti of the Sea," Monterey Bay National Marine Sanctuary contains vast kelp forests, incredibly diverse habitats, near-shore deep-ocean environments and one of North America's largest underwater canyons.

**S H W T** = Greater Farallones

*The Discoverer* – *Are initiators of change, keenly perceptive of possibilities.*

Encompassing highly productive marine habitats and home to diverse wildlife, Greater Farallones National Marine Sanctuary protects one of the most bountiful marine environments in the world.

**S C O T** = Channel Islands

*The Doer* – *Are hands-on learners who live in the moment.*

Channel Islands National Marine Sanctuary contains a productive ecosystem and protects sensitive species, habitats, and shipwrecks and other maritime heritage artifacts.

**A H W T** = Cordell Bank

*The Idealist* – *Are creative types and often have a gift for language.*

Cordell Bank rises from the soft sediments of the seafloor and provides a rocky habitat that is home to colorful and abundant invertebrates, algae and fishes. Plentiful food in these waters attracts mammals, seabirds and turtles from around the Pacific Ocean.

**S H O T** = Papahānaumokuākea

*The Inventor* – *Adept at directing relationships between means and ends.*

One of the largest fully protected conservation areas in the United States, Papahānaumokuākea Marine National Monument was created to protect an exceptional array of natural and cultural resources. It is also a UNESCO World Heritage Site inscribed for both its outstanding natural and cultural heritage.

**A C W G** = Hawaiian Islands  
Humpback Whale

*The Nurturer* – They are steadfast  
in handling their responsibilities.

Hawaiian Islands Humpback Whale National Marine Sanctuary protects the breeding, calving and nursing grounds used by the majority of humpback whales in the North Pacific.

**S C W G** = American Samoa

*The Caregiver* – Project warmth with a  
genuine interest in other's well-being.

Located in the South Pacific and containing Rose Atoll Marine National Monument, National Marine Sanctuary of American Samoa is the most remote sanctuary and the only true tropical reef in the National Marine Sanctuary System.

**A C W T** = Rose Atoll

*The Artist* – Tend to examine the  
world with all five of their senses.

Located within National Marine Sanctuary of American Samoa, Rose Atoll Marine National Monument protects the remote Rose Atoll and its surrounding waters. It gets its name from the rosy hue of the coral-line algae that dominates its fringing reef.

**A H O G** = Thunder Bay

*The Mastermind* – Require  
independence of thought and desire efficiency.

Nicknamed "Shipwreck Alley," Thunder Bay National Marine Sanctuary protects one of America's best-preserved and nationally-significant collections of shipwrecks.

**A C O T** = Stellwagen Bank

*The Craftsman* – Excel at analyzing  
situations to reach the heart of a problem.

Stellwagen Bank National Marine Sanctuary is one of the world's premiere whale watching destinations, a historically important fishing ground, and the resting place for significant shipwrecks that reveal our maritime past.

**S H O G** = Headquarters

*The CEO* – Focus on the  
most efficient means of performing a task.

Headquarters of the Office of National Marine Sanctuaries supports the system of 13 national marine sanctuaries and Papahānaumokuākea and Rose Atoll marine national monuments.

**S C O G** = Monitor

*The Supervisor* – Take a practical  
approach to life guided by their focus on realism.

Designated as the nation's first national marine sanctuary, Monitor National Marine Sanctuary protects the wreck of the famed Civil War ironclad USS *Monitor*.

**A H W G** = Gray's Reef

*The Counselor* – They seek  
meaning in relationships, ideas, and events.

The natural live-bottom reef at Gray's Reef National Marine Sanctuary teems with marine life. Loggerhead turtles rest at the reef, where scientists have identified more than 200 fish species, and the endangered North Atlantic right whale bears its young near the sanctuary.

**A C O G** = Florida Keys

*The Inspector* – They keep  
their lives and environments well-regulated.

Florida Keys National Marine Sanctuary is home to the world's third-largest barrier coral reef, extensive seagrass beds, mangrove islands, and more than 6,000 species of marine life. Archaeological treasures such as shipwrecks represent the rich maritime history of the Keys.

**A H O T** = Flower Garden Banks

*The Scientist* – They are curious about  
systems and how things work.

Home to manta rays, whale sharks, sea turtles and large coral heads, Flower Garden Banks National Marine Sanctuary includes underwater communities sitting atop submerged mountains called salt domes that rise from the depths of the Gulf of Mexico.



*Olympic Coast*

*Greater Farallones  
Cordell Bank  
Monterey Bay*

*Channel Islands*

*Papahānaumokuākea*

*Hawaiian Islands Humpback Whale*

*American Samoa  
Rose Atoll*







Thunder Bay

Flower Garden Banks

Florida Keys

Gray's Reef

Stellwagen Bank  
Sanctuary Headquarters  
Monitor

**CONTINUED FROM PAGE 41**

National parks and national marine sanctuaries are crossroads of critical scientific monitoring and resource protection — but they are also the places where many members of the public come face-to-face with the beauty and grandeur of America’s natural places. Sanctuary and park outreach initiatives help educate the public about the importance of protecting these amazing ecosystems. Joint initiatives like Every Kid in a Park, which aims to help every fourth grader in the nation experience our public lands and waters, help “educate our future decisionmakers and stewards about how to protect the environment,” says Maria Brown, Superintendent of Greater Farallones National Marine Sanctuary. Collaborative education and outreach efforts, like those conducted by National Marine Sanctuary and National Park of American Samoa in schools and communities, can help communities in and around these special places understand how they are connected to their maritime landscape.

Because parks are primarily land-based, too, they provide sanctuaries with a crucial connection to visitors. “Most people can’t get on the water or don’t have access to the water,” says Allen, so having shared visitors centers can help sanctuaries reach visitors. Cordell Bank National Marine Sanctuary, for example, is entirely offshore, but through exhibits in the Point Reyes National Seashore visitor center, the sanctuary is able to reach a wide, diverse audience. Similarly, Stellwagen Bank reaches onshore visitors to Cape Cod National Seashore through art exhibits at the Salt Pond Visitor Center and interpretive signage located within the seashore’s Province Lands Visitor Center, from which visitors can view sanctuary waters.

**PROTECTING THE FUTURE TOGETHER**

The environments that national marine sanctuaries and national parks protect are constantly changing, and this is especially true in the face of climate change. Carol Bernthal, Superintendent of Olympic Coast National Marine Sanctuary, says that one question for national marine

sanctuaries now is “What does it mean to be a marine protected area in the face of these large changes that are occurring?”


Together, Olympic Coast National Marine Sanctuary and Olympic National Park are facing major shifts as a result of climate change, Bernthal explains. “Glaciers are the heart of the whole Olympic Peninsula, the water pump of the whole system,” but the glaciers within the national park are shrinking. One south-facing glacier, Anderson Glacier, receded 90 percent between 1927 and 2009. And the waters off the coast of the Olympic Peninsula are particularly vulnerable to ocean acidification, such that sanctuary and park researchers “already are seeing changes from the base of the food chain all the way up.” But because the sanctuary and park protect the environment from the deep sea, to the intertidal zone, to the top of the Olympic mountains, they are ideally positioned to serve as “sentinel sites” for understanding and responding to climate change.

Other sanctuaries are also collaborating with national parks on climate issues, like Greater



Farallones, which works with Point Reyes National Seashore and Golden Gate National Recreation Area to assess climate vulnerability and determine focus areas for climate study and mitigation.

Hundreds of millions of people visit national parks and national marine sanctuaries each year, and science conducted in these protected areas also has an enormous impact. That means “sanctuaries and parks can really play a tremendous role together in defining, articulating, describing, and bringing the issue of climate to the minds of the American people,” says Matt Brookhart, Acting Deputy Director of NOAA’s Office of National Marine Sanctuaries.

For more than four decades, sanctuaries and parks have been working together to help the American public better understand and appreciate our most amazing and important cultural and natural resources. We must learn from our past to protect our future: in the next 100 years and beyond, climate change and other ecosystem shifts will continue to impact these special places. Together, sanctuaries and parks are ready to meet those challenges to ensure a better future for us all. 



Citizens like Polly Dyer (leading hikers), working in concert with local indigenous peoples like the Makah Tribe, recognized the importance of protecting marine habitats off the Olympic Peninsula.

Photo: Bob and Ira Spring



Olympic Coast National Marine Sanctuary and Olympic National Park share a boundary along 62 miles of coastline.

Photo: Seattle Aquarium

# LIFE IN THE BLUE

**W**hat do humpback whales, northern elephant seals, spiny lobsters and nudibranchs have in common?

They all live in national marine sanctuaries.

These special places protect the thousands of species — from tiny phytoplankton to enormous blue whales — that call the ocean and Great Lakes home. National marine sanctuaries provide much-needed refuge for endangered species like the southern resident orca and the Hawaiian monk seal. They also provide protection for fragile ecosystems like coral reefs that in turn provide a home for fish, marine mammals and invertebrates.

National marine sanctuaries are uniquely positioned to help these marine species. Whether it's through disentangling whales and other large marine animals that have been caught in fishing nets and marine debris, or researching the effects of ocean acidification on shellfish and other organisms, sanctuary staff and partners devote their time and energy to making sure life in the blue can continue to flourish.



# UE



The rocky habitat of Cordell Bank National Marine Sanctuary provides a home to colorful and abundant invertebrates, algae and fishes.

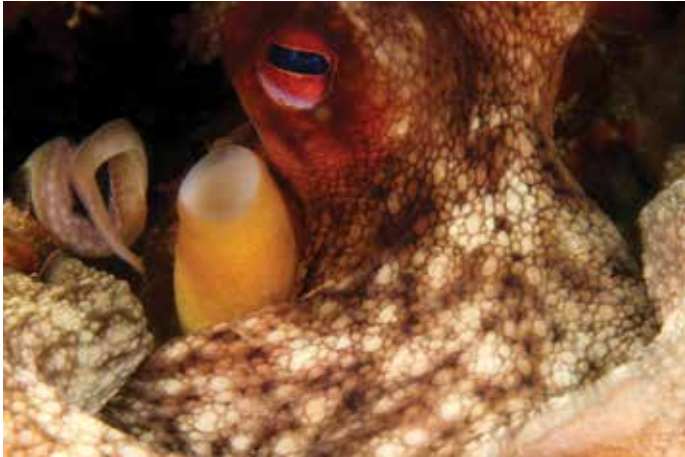
Photo: Clinton Bauder/BAUE

# LIFE IN COLOR



Many humpback whales make their way north to Stellwagen Bank National Marine Sanctuary off the coast of Cape Cod, Massachusetts each year to feed.

Elliott Hazen/NOAA Fisheries permit #14245



Left to right, from top: Crinoid, Cordell Bank NMS; green moray eel, Flower Garden Banks NMS; harbor seal, Stellwagen Bank NMS; common octopus, Gray's Reef NMS; white ibis, Florida Keys NMS; anemone, Gray's Reef NMS

NOAA; G.P. Schmahl/NOAA; Elliott Hazen/NOAA Fisheries permit #14245; Greg McFall/NOAA; David J. Ruck/NOAA; Greg McFall/NOAA

# Freeing a GIANT

— By ELIZABETH WEINBERG

## How do you disentangle a 45-foot-long, 40-ton animal like a humpback whale?

Very carefully...

...And the Hawaiian Islands Large Whale Entanglement Response Network has it down to a science.

Each year, numerous whales and other marine animals become entangled in a variety of materials, such as fishing gear, rope and plastic bags. Entanglement can physically harm animals while also impairing their movement. An entangled animal can find it difficult or impossible to feed, and at times the entanglement can drown them.

That's where the Hawaiian Islands Large Whale Entanglement Response Network comes in. These highly-trained professionals from Hawaiian Islands Humpback Whale National Marine Sanctuary, working closely with and under authority of NOAA Fisheries' Marine Mammal Health and Stranding Response Program, know how to safely rescue creatures like humpback whales from entanglement.

Humpback whales can hold their breath for much longer and swim faster than a human can, and an entangled whale is often stressed or panicked. Trying to free a 40-ton whale that likely doesn't realize rescuers are there to help can be dangerous for the animal and for humans. Rescuers never enter the water to free an entangled whale.




Jason Moore/NOAA permit # 932-1905

Instead, rescuers grab hold of the entangled lines using a grappling hook, then attach a series of buoys to the lines. This keeps the whale at the surface and slows it down enough for the disentangle team, following the whale in a small inflatable boat, to gain access to the animal and the lines it's tangled in. However, even with the buoys attached, the inflatable boat may still get towed behind the animal. Humpback whales are strong animals that can move rapidly through the water, so this can be quite dangerous. It is important that the disentangle team be trained and prepared to respond to the whale's movements.

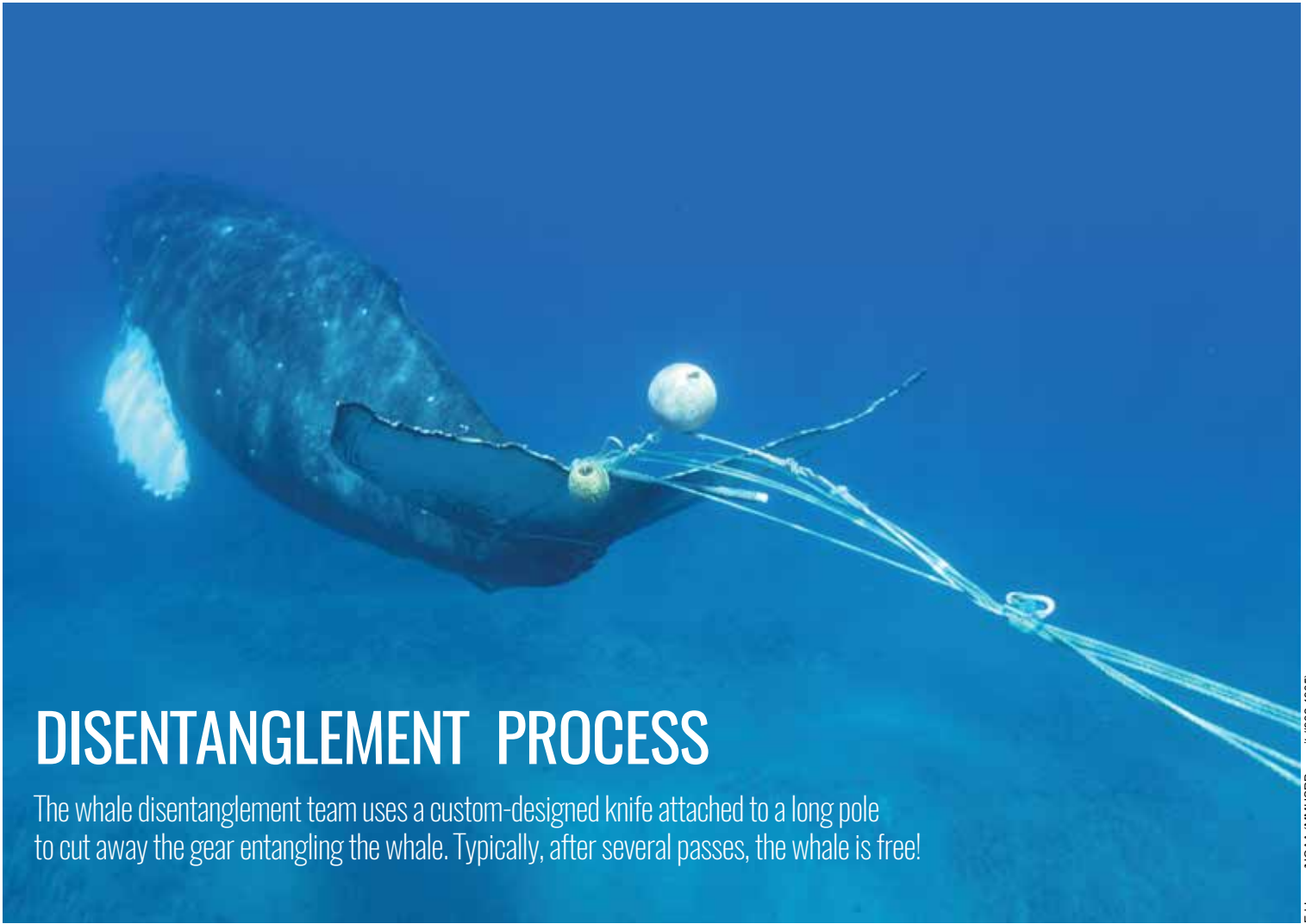
As the whale grows tired, the rescuers work their way closer. Once they're close enough, they use a custom-designed knife attached to a long pole to cut away the gear entangling the whale. These knives are specially designed to cut the rope but not the whale. Typically, after several passes, the whale is free!

Once the whale is untangled, the team uses the grappling hook once again to collect and remove the debris from the water so that other animals don't become trapped in the future.

Entanglement is a problem around the globe, and sanctuary staff can only help a small percentage of entangled whales. Since 2002, Hawaiian Islands Humpback Whale National Marine Sanctuary has received more than 100 confirmed reports of entangled humpbacks, representing at least 70 different animals — and more entanglements go unseen and unreported.

With that in mind, prevention is the ultimate objective: by reducing the amount of derelict fishing gear and other debris in the ocean and making actively fished gear more "whale safe," we can reduce the number of whales and other animals that get entangled and hurt or killed. For more information, check out [sanctuaries.noaa.gov/mag/disentanglement](https://sanctuaries.noaa.gov/mag/disentanglement). 





# DISENTANGLEMENT PROCESS

The whale disentanglement team uses a custom-designed knife attached to a long pole to cut away the gear entangling the whale. Typically, after several passes, the whale is free!

Ed Lyman/NOAA (MMHSRP permit #632-1905)



Photos 1-3: NOAA permits #15240, 932-1489, and 932-1905/MA-009526-1; Photo 4: Ed Lyman/NOAA permit #15240

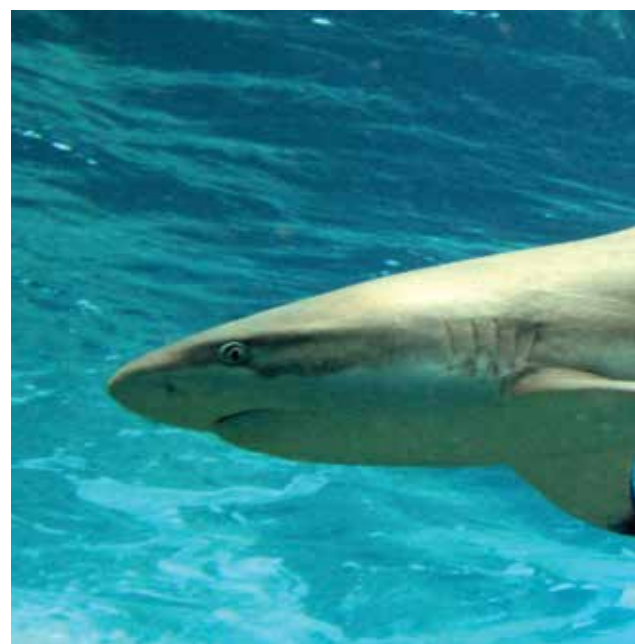


## ABUNDANCE OF LIFE

National marine sanctuaries provide homes and food for a vast array of life, from tiny krill to charismatic orcas. Sanctuaries seek to preserve the extraordinary biodiversity of these special places for current and future generations.

Left to right, from top: Northern elephant seal, Greater Farallones NMS; Laysan albatross, Papahānaumokuākea MNM; black seabass, Gray's Reef NMS; krill, Cordell Bank NMS; orca, Olympic Coast NMS; blacktip reef shark, NMS of American Samoa

Mike Baird/NOAA; NOAA; Greg McFall/NOAA; Sophie Webb/NOAA; NWFSC; Mike Nadon/NOAA





The protected waters of the National Marine Sanctuary System provide safe haven for many endangered species, including manatees. In the winter months, manatees are often found in shallow, quiet waters of Florida Keys National Marine Sanctuary where seagrass beds or vegetation flourish. Because they are slow-moving, manatees are often struck by boats, which can injure or kill them. But protections offered by the sanctuary and other locations on the Florida coast have been a boon to these gentle creatures. Since 1991, the number of manatees in Florida has grown from 1,200 to more than 6,300, prompting their reclassification from endangered to threatened under the Endangered Species Act.

Photo: Bob Bonde/USGS



# ENDANGERED SPECIES



An estimated 1,100 Hawaiian monk seals live in Hawaiian Islands Humpback Whale National Marine Sanctuary and Papahānaumokuākea Marine National Monument, but this population is still at risk due to limited food availability, entanglement in marine debris, and habitat disturbance. Since 2007, Papahānaumokuākea, with help from grants from the NOAA Marine Debris Program, has funded the removal of more than 50 tons of abandoned fishing gear annually from coral reefs in the Northwestern Hawaiian Islands in order to help this highly endangered species survive. By helping create safer habitats, the National Marine Sanctuary System gives endangered species the opportunities they need to regain a foothold.

Photo: Ed Lyman/NOAA

# EXPLORE THE

**N**inety-five percent of the ocean is unexplored, and sanctuaries act as living laboratories to help us better understand the ocean planet we live on. Each day, scientists in the NOAA Office of National Marine Sanctuaries dedicate themselves to better understanding these underwater treasures. From responding to invasive species like the Indo-Pacific lionfish to monitoring the effects of climate change and other human impacts on marine ecosystems, scientists help us understand what lives in these blue environments and how we can better restore and protect them.

Because national marine sanctuaries are located around the country, they offer unique opportunities to monitor, observe and investigate the ocean on a local, regional and national scale. These “sentinel sites” offer limitless research and monitoring opportunities, and also provide a sense of place that stimulates curiosity about the world and its diverse habitats.

Marine sanctuaries are places where government, academic and citizen scientists work collectively and share information on sanctuary conditions and emerging threats — and they are places where the next generation of scientists can prepare to lead the way.



# BLUE



In Florida Keys National Marine Sanctuary, coral restoration is done by partners to regrow damaged coral fragments by using "trees" made by PVC pipes.

Photo: Mitchell Tartt/NOAA

# SANCTUARY SCIENCE



Marine protected areas like Papahānaumokuākea Marine National Monument are hotbeds of biologic activity. Exploring deep waters with a remotely operated vehicle, the NOAA Office of Ocean Exploration and Research discovered a potential new species of octopod two and a half miles beneath the ocean surface. Unlike most described species of octopods, this one is equipped with only a single row of suckers down each arm, in contrast to the two rows most octopods have.

Photos: NOAA Office of Ocean Exploration and Research, Hohonu Moana 2016

Tagging marine animals helps sanctuary scientists better understand their behavior, which in turn helps inform how sanctuaries strive to protect these animals. Here, researchers in Papahānaumokuākea Marine National Monument measure and tag a Galapagos shark at Pearl and Hermes Atoll so they can track it in the future.

Photo: Greg McFall/NOAA



Documenting history: divers from the Office of National Marine Sanctuaries and Eastern Carolina University photograph the German U-boat U-352 off the coast of Morehead City, North Carolina.

Photo: NOAA



Marine technology like submersibles can help scientists survey deep ecosystems like those in Cordell Bank National Marine Sanctuary.

Photo: Kip Evans/NOAA





The Stellwagen Bank National Marine Sanctuary whale tagging boat got a treat when a humpback whale breached near them.  
Photo: Ari Friedlaender/NOAA Fisheries permit #14245



R/V *Manta* is used primarily as a research platform, conducting monitoring activities in the waters of the northwestern Gulf of Mexico.  
Photo: NOAA

# SENTINEL SITES



National marine sanctuaries are places where focused monitoring and research efforts take place that enhance our understanding of natural and historical resources and how they are changing. This allows them to serve as sentinel sites that provide early warning capabilities for detecting changes to ecosystem processes and conditions. The above icons identify the issues and threats that are common to multiple sanctuaries: climate change and ocean acidification, fishing impacts, human health, integrity of heritage resources, invasive species, marine debris, noise, vessel impacts, water quality, and wildlife health. For more information, visit [sanctuaries.noaa.gov/mag/sentinel-sites](https://sanctuaries.noaa.gov/mag/sentinel-sites).



## OCEAN ACIDIFICATION



From sea snails to scallops, many marine species like the red turban snail at right depend on hard shells made from calcium carbonate to protect them from predators, pounding surf and other threats. However, the changes in our climate are impacting these organisms.



When we burn fossil fuels like oil and gas, we release carbon dioxide into the atmosphere, some of which is absorbed by the ocean. With more and more carbon dioxide from the atmosphere dissolving into the ocean, the chemistry of the ocean is changing and becoming less basic.



This ocean acidification reduces the amount of building material, or calcium carbonate, available to animals in the ocean. That makes it harder for organisms to form their calcium carbonate shells or can cause their shells to dissolve, threatening a number of shelled marine organisms.



Some sanctuaries, like Olympic Coast National Marine Sanctuary, are particularly vulnerable to the effects of ocean acidification. Researchers within national marine sanctuaries are working to understand the effects of ocean acidification so we can better protect these animals and the ecosystems that depend on them. By reducing the fossil fuels we burn, we can all help protect these ecosystems for the future.

From top: Scallop, Gray's Reef NMS; pink and purple hydrocoral, Cordell Bank NMS; goose barnacles and mussels, Olympic Coast NMS; long-spined sea urchin, Flower Garden Banks NMS

Photos: Greg McFall/NOAA; Matt Vieta/BAUE; Elizabeth Weinberg/NOAA; G.P. Schmah/NOAA



Ocean acidification makes it difficult for organisms that depend on calcium carbonate to form and maintain their shells. Red turban snail in Monterey Bay National Marine Sanctuary.

Photo: Steve Lonhart/NOAA

# INVASIVE



# LIONFISH

BY THE

# NUMBERS

## BIOLOGY

**50,000**  
EGGS EVERY 3 DAYS

**1 YEAR**  
to maturity

**30 YEAR**  
LIFESPAN



## DISTRIBUTION

**17X**  
DENSITY in Atlantic vs. native Pacific range

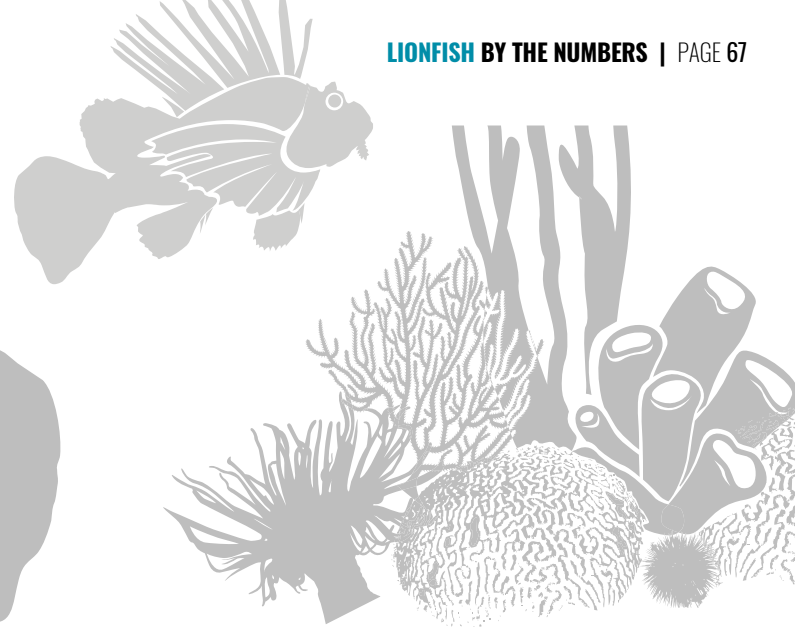
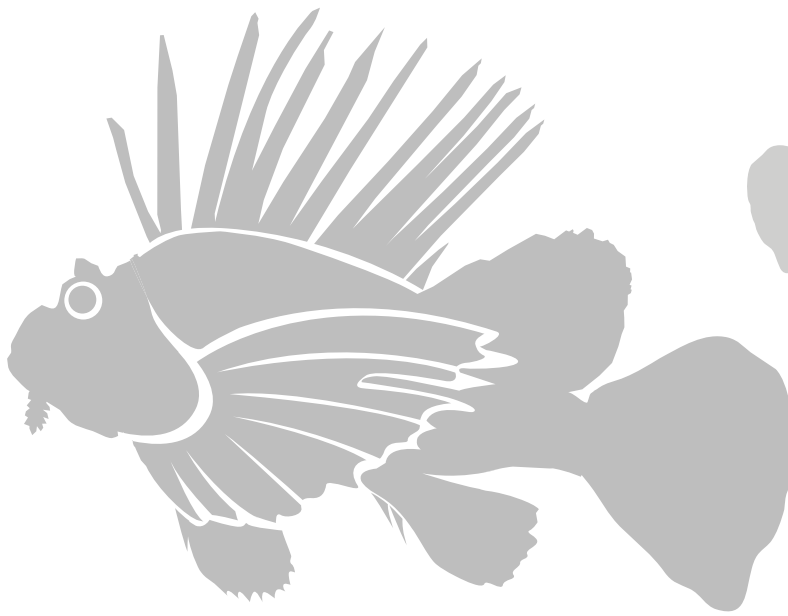
REACH DEPTHS of **1,000** feet

**1985** year first found off Miami FL



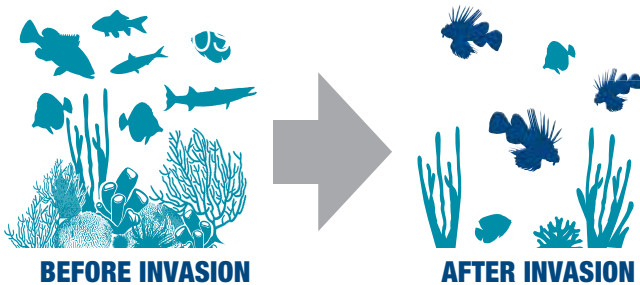
Invasive Indo-Pacific lionfish have been documented in Florida Keys, Flower Garden Banks, Gray's Reef and Monitor national marine sanctuaries. These fish wreak havoc on reef ecosystems thanks to their voracious appetite and lack of predators.

Left: G.P. Schmahl/NOAA; right: Lauren Heesemann/NOAA



## IMPACTS

### INVASIVE SPECIES THREATEN CORAL REEFS



**OVER 100**  
PREY FISH SPECIES

1,000 lionfish can consume

**5 MILLION**  
PREY FISH IN 1 YEAR

**0** KNOWN PREDATORS

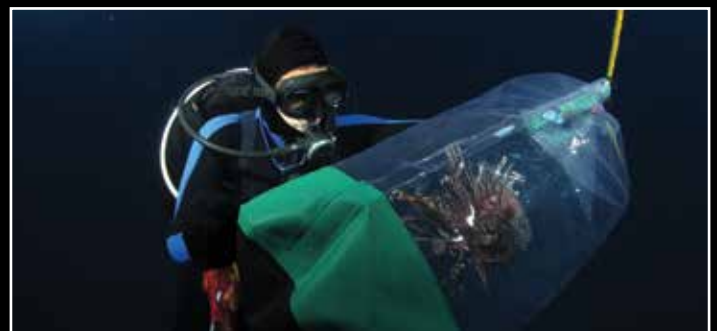
## CONTROL

**164**   
restaurants  
**SERVING**  
**LIONFISH**

**51,420** <sup>lbs</sup>  
commercial lionfish caught in U.S.  

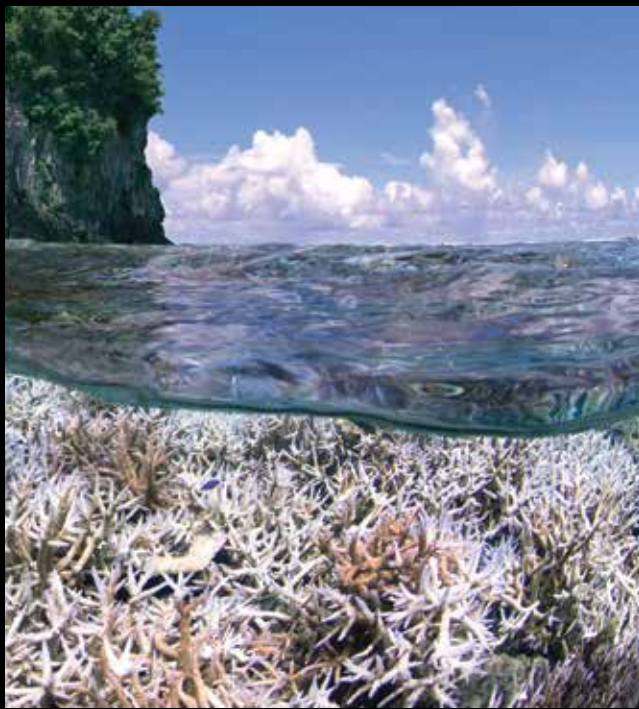

**28,770** lionfish  
**REMOVED**  
during REEF sanctioned lionfish derbies

Infographic: Lindsay Marks, NCCOS, and Matt McIntosh



Sanctuary scientists are working to control the lionfish invasion and better understand the impact of this invasive species on sanctuary habitats. You can help, too, by participating in lionfish derbies and encouraging local restaurants to put lionfish on the menu.

Left: Greg McFall/NOAA; right: Ryan Eckert/NOAA



Coral bleaching can rapidly transform a reef. (Top) These images span just a few months: the left image was taken in December 2014, while the right was taken in February 2015. (Bottom) Bleached coral at Airport Reef near National Marine Sanctuary of American Samoa. (Background) Bleached coral in Hawaiian Islands Humpback Whale National Marine Sanctuary.

Photos: XL Catlin Seaview Survey, Wendy Cover/NOAA, NOAA



# IN HOT WATER

Coral reefs support an abundance of life in the ocean —  
but they need our help.

By ELIZABETH WEINBERG

Coral reefs are beautiful, delicate ecosystems that require specific ocean conditions, like warm, clear, unpolluted water, to survive. A healthy reef is a dynamic, lively place, able to support a dazzling array of life. But reefs — and the animals that call them home — are especially hard-hit by climate change.

We affect Earth's climate every day: when we burn energy sources like gasoline, oil and coal to fuel our cars or power cell phones and other technologies, those sources release carbon dioxide. That carbon dioxide builds up and acts as a heat-trapping blanket, keeping the heat from the sun close to the planet and warming the atmosphere.


As Earth warms, ocean temperature increases, and as a result, some tropical waters are

becoming too warm for many species of coral. Corals depend on algae called zooxanthellae for food and oxygen. These colorful algae are also responsible for the vivid hues of coral reefs. But when corals are stressed by factors like changes in water temperature, they expel the zooxanthellae. Without their zooxanthellae, corals turn white and cannot get the nutrients they need to survive; this is known as coral bleaching.

In places like National Marine Sanctuary of American Samoa, sanctuary staff are witnessing bleaching events that transform reefs over just a few months. In Hawaiian Islands Humpback Whale and Florida Keys national marine sanctuaries, bleaching events are also harming reef health.

Scientists across the National Marine Sanctuary System are studying the effects of climate

change on coral reefs and other ecosystems so that sanctuaries can better protect these crucial places. Mitigating other factors that might stress corals, like overfishing, water pollution, and impacts by diving and other recreational activities, can also help bleached corals recover and survive.

But it will take all of us to protect these reefs, and other sanctuary ecosystems, from climate change. By working together in our communities to reduce our fossil fuel consumption — through supporting local food consumption, public transportation options, and other initiatives — and minimize other stressors, we can help corals and other animals thrive. For more information on what you can do to help protect the ocean, check out [thankyouocean.org](http://thankyouocean.org). 



# DR. NANCY FOSTER SCHOLARSHIP

NOAA's Dr. Nancy Foster Scholarship, managed by the Office of National Marine Sanctuaries, provides financial support for students pursuing advanced studies in marine science to undertake research projects in our national marine sanctuaries. With its emphasis on outstanding scholarship and independent graduate-level research — particularly by female and minority students — this prestigious scholarship helps train the next generation of ocean scientists. Here are some of the current and previous Dr. Nancy Foster scholars.



Dr. Andrea Quattrini earned her PhD from Temple University. While a Nancy Foster Scholar, she studied the genetic connectivity of deepwater gorgonians in Flower Garden Banks National Marine Sanctuary and beyond.

Photo: Art Howard/NOAA



Mike Fox's (left) PhD research focuses on how nutrient pollution affects competitive interactions between reef-building corals and macroalgae within Hawaiian Islands Humpback Whale National Marine Sanctuary.

Photo: Matt McIntosh/NOAA



Richard Coleman's PhD research is investigating the connectivity of fish species within the main Hawaiian Islands and Papahānaumokuākea Marine National Monument.

Photo: Brian Hauk/NOAA



Previously a Nancy Foster Scholar, Dr. Kelly Keogh is now the Maritime Heritage Coordinator at Papahānaumokuākea Marine National Monument.

Photo: Tane Casserley/NOAA



Lindsay Marks' doctoral research investigates invasive species in the kelp forests of Channel Islands National Marine Sanctuary.

Photo: Sam Ginther



Jan Vicente's dissertation focuses on the impact that ocean acidification has on sponges.

Photo: Andrea Dingeldein

# THE BLUE AND

**W**hether young or old, everyone has a role to play in national marine sanctuaries!

National marine sanctuaries are living classrooms, providing hands-on, experiential spaces in which students and visitors can better understand their relationship to the ocean and Great Lakes and the ecosystems within them. Through programs like Ocean Guardian, students learn how they have the power to care for marine environments and implement projects that have direct impacts on the health of the ocean.

Sanctuary volunteers help educate the public in visitor centers and throughout sanctuary waters, and participate in citizen science efforts and beach cleanups. They also serve as a bridge to communities, ensuring that national marine sanctuaries remain America's underwater treasures for future generations.

By working together, we can all protect these special marine places — and the ocean as a whole.



# YOU



A young girl plays on the shores of Monterey Bay National Marine Sanctuary  
Photo: David J. Ruck/NOAA

# HANDS-ON EDUCATION

National marine sanctuaries are living classrooms where students and teachers can learn about the importance of our marine environments.

A student participates in the Sanctuary Explorer Program. Through hands-on activities, students learn about the treasures hidden beneath the waves and why they are protected by our national marine sanctuaries.

Photo: David J. Ruck/NOAA



Ocean Guardian Schools make a commitment to the protection and conservation of their local watersheds, the world's ocean, and special ocean areas like national marine sanctuaries. Here, a student participates in a project to remove invasive species and plant native species on California beaches.

Photo: David J. Ruck/NOAA



Sanctuary education programs work with teachers, students and communities across the nation to make the connection between America's waterways and our ocean treasures. Here, educators from the Atlanta metro area follow Georgia's rivers and streams that lead to Gray's Reef National Marine Sanctuary as part of the annual "Rivers to Reefs" workshop.

Photo: Gail Krueger/NOAA





Building remotely operated vehicles (ROVs) introduces students to marine technology career paths. In 2014, student teams from 13 countries around the globe gathered at Thunder Bay National Marine Sanctuary to put their engineering skills to the test at the MATE International ROV Competition.

Photo: Tane Casserley/NOAA



From little plastic bags that look like jellyfish snacks to sea turtles, to this giant mass of fishing nets that washed up on Lisianski Island in Papahānaumokuākea Marine National Monument, marine debris is an enormous problem for wildlife in and beyond our sanctuary system. Even if you don't live near the coast, your trash can end up in the ocean — so help protect animals like this Hawaiian monk seal by reducing the amount of plastic you use and always disposing of waste properly.

Photo: NOAA

## VOLUNTEERS TACKLE MARINE DEBRIS





By working together, we can reduce the amount of debris in the ocean. From top, debris clean-up in Olympic Coast National Marine Sanctuary, Papahānaumokuākea Marine National Monument and Gray's Reef National Marine Sanctuary.

Photos: Karlyn Langjahr/NOAA; NOAA; Greg McFall/NOAA

Through beach cleanups, volunteers with Florida Keys National Marine Sanctuary's Team OCEAN program help keep the sanctuary safe for the animals that call it home.

Photo: NOAA



# FROM COMPASSION TO ACTION

How do you protect 170,000 square miles of marine and Great Lakes waters?

— By DAYNA RIGNANESE

It takes a whole community. Each year, thousands of volunteers dedicate their time to making sanctuaries work.


This collaboration has been going on for decades. The first sanctuary volunteer programs launched in the mid-1990s, including Beach Watch at Greater Farallones National Marine Sanctuary and Team OCEAN at Florida Keys National Marine Sanctuary. Today, volunteers are an integral part of many sanctuary programs, contributing invaluable time and energy across the sanctuary system. The diverse skills, knowledge and support they provide help expand the reach of the national marine sanctuaries and build on the work of sanctuary staff.

As Claire Fackler, National Volunteer Coordinator for NOAA's Office of National Marine Sanctuaries, explains it, "volunteers are an essential link into local communities that help broaden awareness, appreciation and ultimately stewardship of these underwater parks."

Through activities like diving, participating in beach cleanups, and serving as visitor center docents, volunteers help ensure that the American public and other visitors learn about these special ocean areas and safeguard their protection now and for future generations.

Volunteers also help sanctuary staff better understand sanctuary ecosystems through citizen science projects. By collecting data, the general public can help scientists answer real-world questions. Citizen science programs engage volunteers in scientific study within the sanctuaries: volunteers participate in activities such as gathering important data on whale and seabird populations. These data are then used for scientific research and to help manage the sites across the system.

Volunteer programs continue to grow around the sanctuary system, and the total number of hours contributed rise every year. In 2015 alone, national marine sanctuary volunteers contributed over **149,000** hours across the system — a value of **\$3.4** million or 74 federal employee positions. Thanks to their dedication, sanctuary ecosystems can flourish, and the public can better understand these special places.

Want to help care for your national marine sanctuaries? To find out more about how you can volunteer for our special sanctuary places, visit [sanctuaries.noaa.gov/mag/volunteer](https://sanctuaries.noaa.gov/mag/volunteer). 





Left to right, from top: NOAA; NOAA; Liam Antrim/NOAA; Judi Duffy

# CITIZEN SCIENCE

Citizen science volunteers work with scientists to identify research questions, collect and analyze data, interpret results, make new discoveries, develop technologies and applications, and solve complex problems. In 2015, 8,485 volunteers contributed to citizen science efforts throughout the National Marine Sanctuary System, dedicating more than 72,000 hours of their time.



Through Beach Watch, dedicated volunteers in Greater Farallones and Monterey Bay national marine sanctuaries regularly survey assigned beaches. These volunteers collect data on birds and marine mammals, as well as human activities.

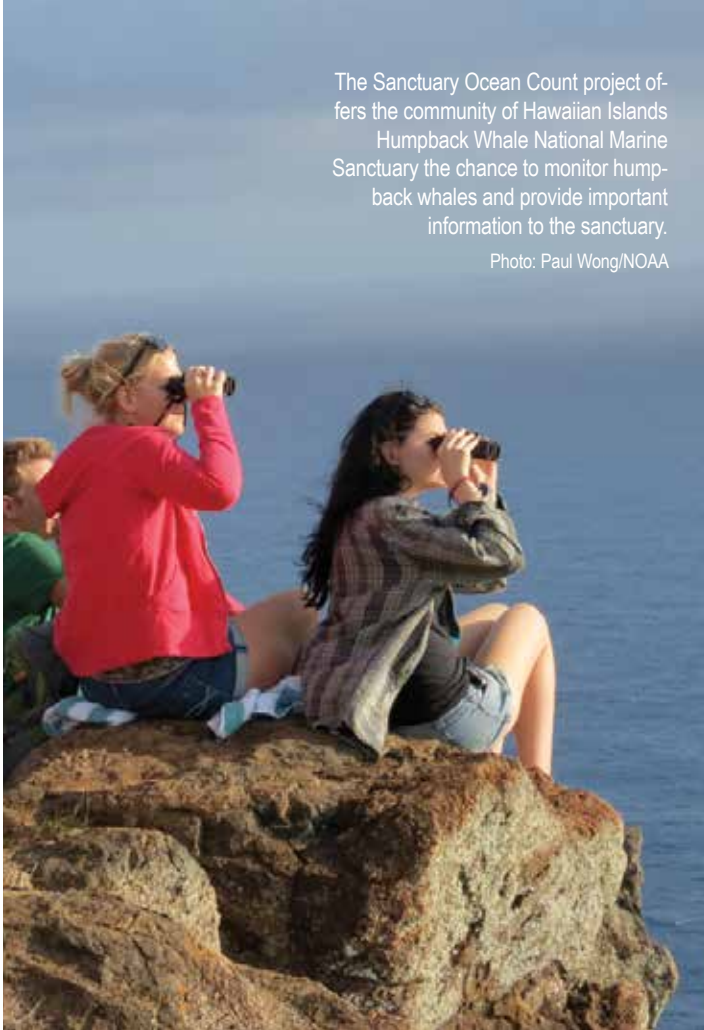
Photo: Philip Barlow

(Right) Volunteers participate in LiMPETS, an environmental monitoring and education program for students, educators and volunteer groups throughout California.

Photo: NOAA

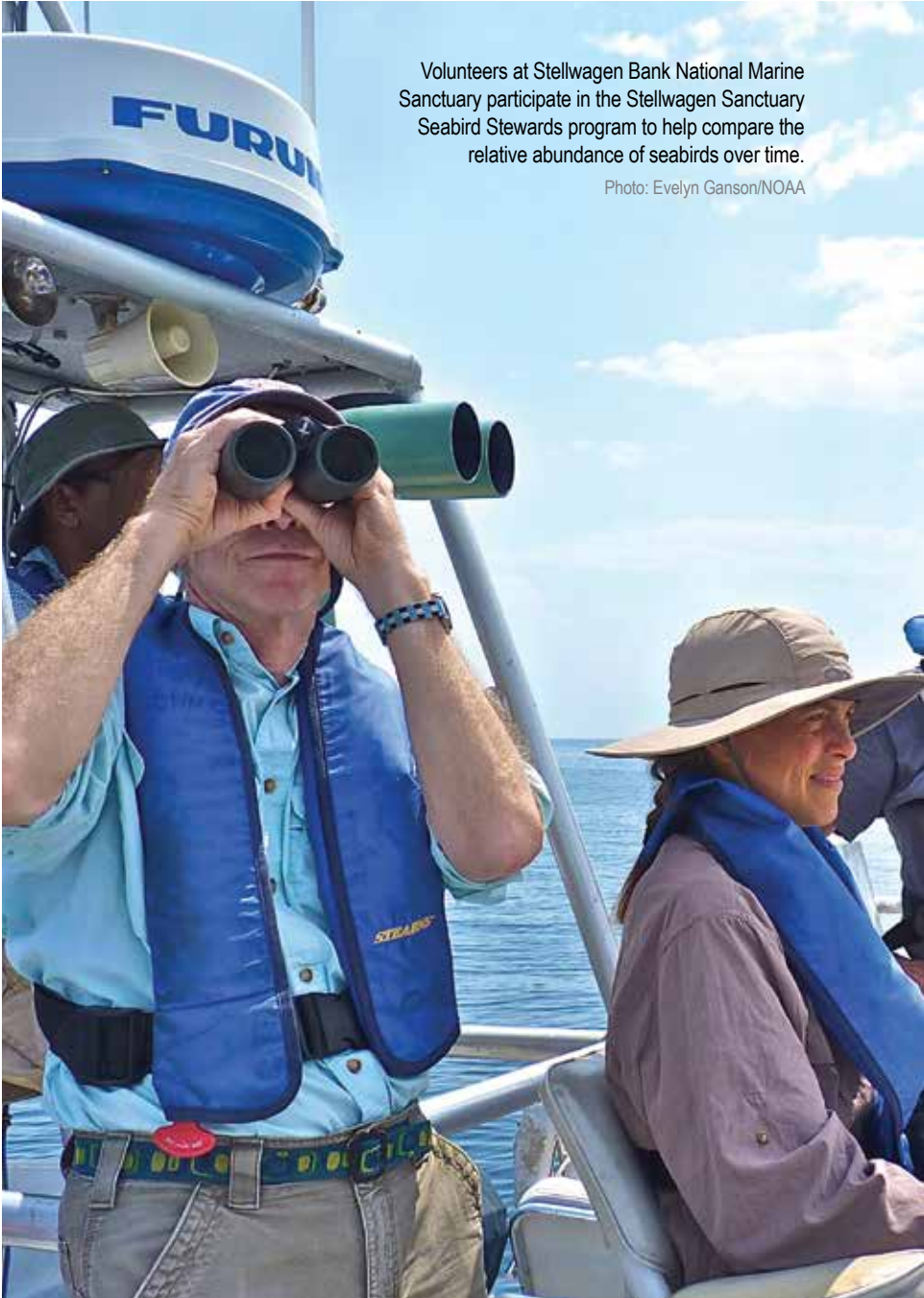
The Sanctuary Ocean Count project offers the community of Hawaiian Islands Humpback Whale National Marine Sanctuary the chance to monitor humpback whales and provide important information to the sanctuary.

Photo: Paul Wong/NOAA



Volunteers at Stellwagen Bank National Marine Sanctuary participate in the Stellwagen Sanctuary Seabird Stewards program to help compare the relative abundance of seabirds over time.

Photo: Evelyn Ganson/NOAA



# YOUR #EARTHISBLUE



Left to right: Black turban snails in Channel Islands National Marine Sanctuary; Anacapa Island in Channel Islands National Marine Sanctuary; kelp in Monterey Bay National Marine Sanctuary; coastline in Monterey Bay National Marine Sanctuary; humpback whales feeding in Monterey Bay National Marine Sanctuary; green sea turtle in Hawaiian Islands Humpback Whale National Marine Sanctuary

Mandi Chamberlin; Mandi Chamberlin; Nyssa Silbiger; Laura A. Shamas; Sarah Swope; Sarah Swope



Southern sea otters in Monterey Bay  
National Marine Sanctuary.

Photo: Douglas Croft



National marine sanctuaries belong to all of us, and by working together, we can protect these amazing places. Help us celebrate the National Marine Sanctuary System by sharing your best photos of the wildlife and scenic views they protect! The best photos will be selected for next year's *Earth Is Blue* magazine. Visit sanctuaries.noaa.gov/mag/submissions to learn how you can submit your photos.

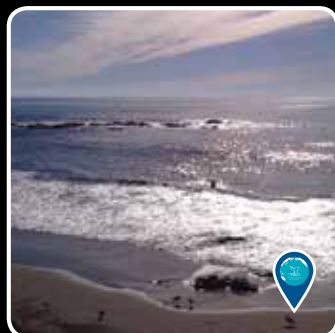
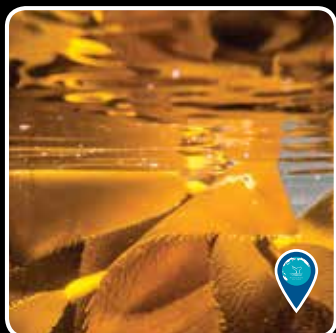
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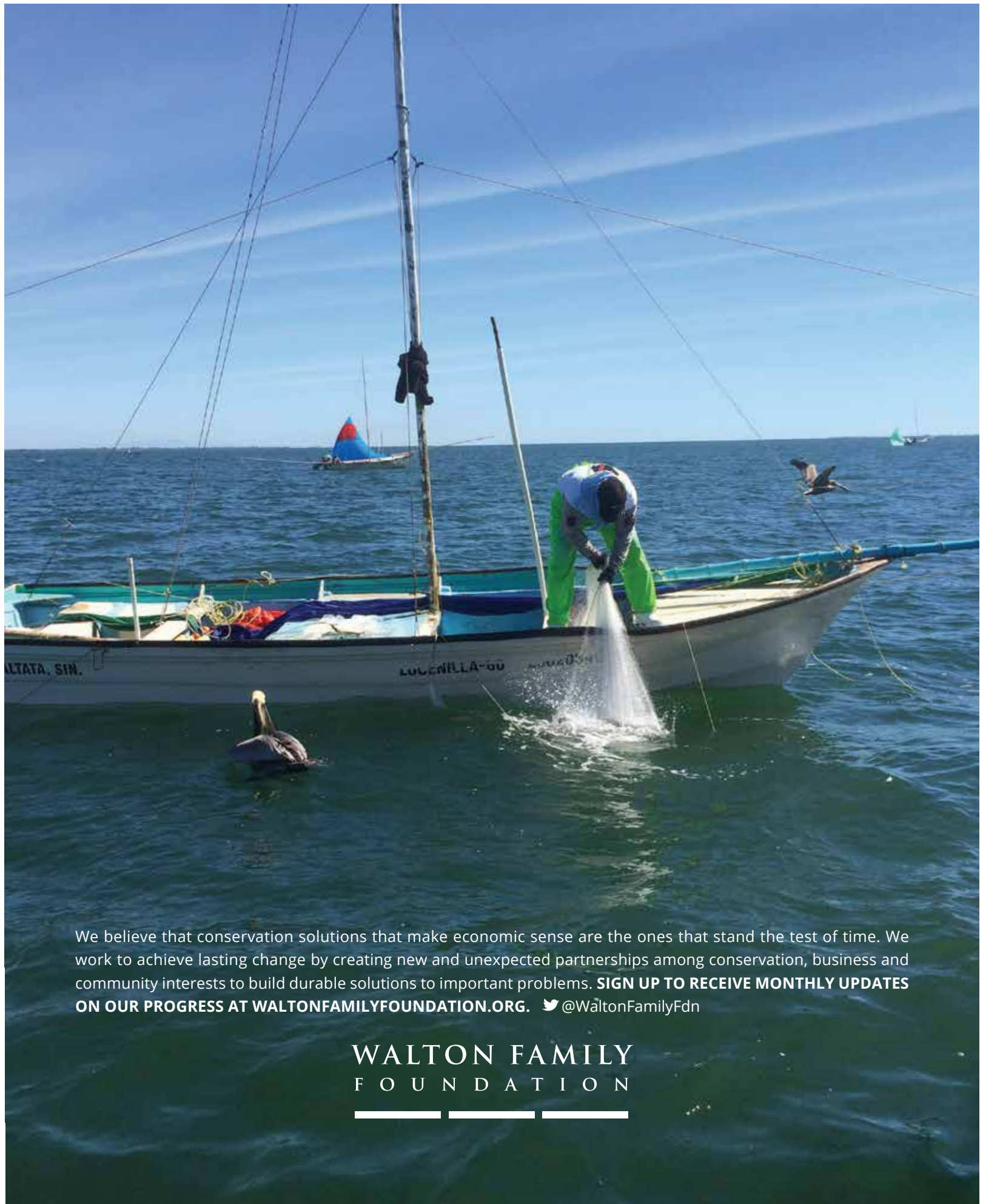
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Magazine of the National Marine Sanctuaries

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VOLUME 1

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Special thanks to:

**Jonathan Jarvis**, Director, National Park Service

**Sarah Allen**, Ocean and Coastal Resources Program  
Coordinator, Pacific West Region, National Park Service

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Photo: Ed Lyman/NOAA permit #14682

# OUR REACH IS DEEP

As Office of National Marine Sanctuaries' chief national charitable partner, NMSF supports wide-ranging programs promoting citizen science, learning for all ages, conservation and community engagement. NMSF is also a strong, respected advocate on behalf of the sanctuaries and a healthy ocean from Capitol Hill to local communities.

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