



# NEWSWAVE

NEWS FROM THE U.S. DEPARTMENT OF THE INTERIOR: OCEAN, GREAT LAKES AND COASTS

NEWSWAVE—Winner of NAGC's 2015 Blue Pencil Award

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DOI's blue portfolio includes many diverse coastal and submarine resources. Photo credit: Susan White, USFWS

## DOI's Blue Portfolio

The Department of the Interior's (DOI) blue portfolio and stewardship responsibilities for ocean and coastal resources have recently increased with President Obama signing a proclamation expanding the Papahānaumokuākea Marine National Monument (*see related story, page 1*) and designating the first marine national monument in the Atlantic Ocean. While the Papahānaumokuākea Marine National Monument is one of the largest marine protected area (MPA) on the planet, the Northeast Canyons and Seamounts Marine National Monument is the first to protect 4,913 square

*See Portfolio page 3*

## Expanding Papahānaumokuākea Marine Monument

By Randy Bowman (DOI)

On August 26, 2016, President Obama issued a proclamation under the authority of the Antiquities Act expanding the Papahānaumokuākea Marine National Monument to include 582,578 square miles of land and sea. The designation more than quadruples the size of the existing marine monument, including all the waters and submerged lands within the seaward limit of the U.S. Exclusive Economic Zone west of 163° west longitude. Previously the largest contiguous fully protected

*See Expansion page 4*

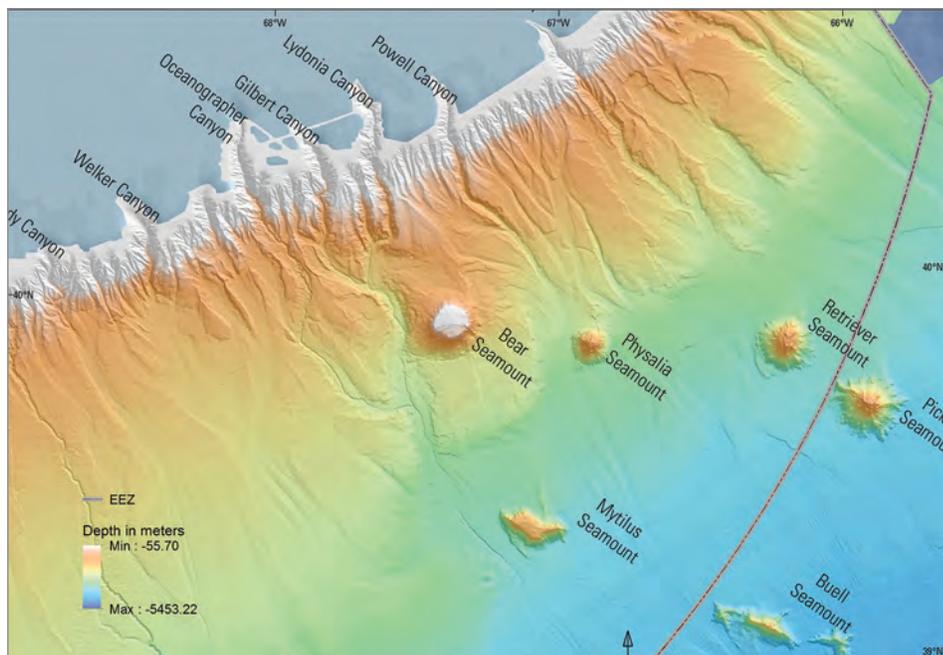
## First U.S. Marine National Monument in Atlantic

### See it as You've Never Seen it Before!

By Ann Tihansky (USGS) and Erica Wales (DOI)

On September 15, 2016, President Obama designated the first Marine National Monument in the Atlantic Ocean on the first day of the 3rd "Our Ocean" Conference. The Northeast Canyons and Seamounts Marine National Monument will protect 4,913 square miles of fragile deep-sea ecosystems off the coast of Cape Cod National Seashore. By protecting this striking underwater landscape of mountains and canyons, critical ecosystems for deep-sea coral and

*See Northeast Monument page 3*



This high-resolution terrain map of the seafloor shows the peaks and valleys of the new Northeast Canyons and Seamounts Marine National Monument. See the plate from USGS Open-File Report 2012-1266: [http://pubs.usgs.gov/of/2012/1266/appendix\\_2.html](http://pubs.usgs.gov/of/2012/1266/appendix_2.html). Image credit: Brian Andrews, USGS

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## Follow Us on Facebook! Science for Coastal Safety

<https://www.facebook.com/USInterioroceanscoastsgreatlakes/>



The U.S. Geological Survey (USGS) responded to Hurricane Matthew by forecasting coastal change and monitoring it using "before and after" photos.

New low-altitude aerial photos of Southeastern U.S. beaches taken before and after Hurricane Matthew show roads, dunes and structures lost. At left, these "before and after" photos show a new inlet that formed between the Atlantic Ocean and the Matanzas River near St. Augustine, Florida, stripping away a 3.7 meter (12-foot) dune and carrying sand into the estuary. Read more at <https://www.usgs.gov/news/and-after-photos-se-beach-dunes-lost-hurricane-matthew>

Photo credits: Public domain

**NEWSWAVE** is a quarterly newsletter from the Department of the Interior featuring ocean, Great Lakes and coastal activities across the Bureaus.

**Visit us online:** <http://www.doi.gov/pmb/ocean/newswave>

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miles of fragile deep-sea ecosystems off the coast of Cape Cod National Seashore (see related story, page 1). As one of our Nation’s principal stewards for our ocean, Great Lakes and coastal (OGLC) resources, DOI recognizes the vital connection between the health of our Nation’s natural resources and human health and economy. DOI’s responsibilities continue to grow with expanding our oldest Marine National Monument and adding our Nation’s newest Atlantic marine national monument.

DOI’s blue portfolio includes more than 35,000 miles of coastline and 34 million acres in 88 marine and coastal National Parks, including many of America’s favorite beaches from Cape Cod and Cape Hatteras to the Golden Gate National Recreational Area and beyond to Hawai’i Volcanoes National Park and 756,477,162 acres in marine national monuments and national wildlife refuges in the Pacific alone as of September 2016. We protect 180 marine and coastal national wildlife refuges, 1,100 miles of coastline of the

California Coastal National Monument and DOI plays an important role in ensuring safe and responsible energy development in our coastal areas and offshore waters.

In addition, Interior Bureaus provide robust scientific programs that inform decisions and reduce risk; ensure safe and responsible development of natural, mineral and energy resources; promote healthy and productive ecosystems through informed management and monitoring; protect native species and their habitats; preserve rich cultural and recreational opportunities for the public; and support Tribal, state, regional and local partnerships.

In the past 2 years, the DOI invested more than \$50 million from the Land and Water Conservation Fund to acquire and conserve nearly 20,000 acres of critical coastal lands for all Americans to enjoy.

See related story about the DOI’s coordinated ocean, Great Lakes and coastal team on page 27.

Read more: <https://www.doi.gov/blog/our-ocean-one-future>

Read more about the DOI’s role: <https://www.doi.gov/pmb/ocean/>

Northeast Monument continued from page 1

endangered whales and sea turtles are preserved. See related story, page 1.

Three of the underwater canyons are deeper than the Grand Canyon and the underwater mountains, known as seamounts, provide habitat for invertebrates like sponges, corals, octopus, skates, crabs and bottom fish like flounder. Seamounts are some of the most biologically diverse habitats on Earth, and the New England seamounts are known to house many rare and endemic species, several of which are new to science and are not known to live anywhere else on Earth. The canyons and seamounts also attract larger open water marine species, such as sea turtles, marine mammals, tuna, billfish, squid, and sharks.

Bathymetric terrain models, showing measurements of water depth, were created with data collected by several agencies; these data were compiled by the USGS Coastal and Marine Geology Program and published as a collaborative effort between USGS, National Oceanic and Atmospheric Administration (NOAA), and University of New Hampshire. Learn more about the USGS Atlantic Margin bathymetry at [http://pubs.usgs.gov/of/2012/1266/title\\_page.html](http://pubs.usgs.gov/of/2012/1266/title_page.html)

Read the full Presidential Proclamation creating the Monument here: <https://www.whitehouse.gov/the-press-office/2016/09/15/presidential-proclamation-northeast-canyons-and-seamounts-marine>

Watch President Obama give his remarks at the 2016 Our Ocean Conference here: <https://www.whitehouse.gov/photos-and-video/video/2016/09/15/president-obama-delivers-remarks-2016-our-ocean-conference>



This map shows coastal lands and waters conserved by the Obama Administration since 2015. Photo credit: DOI

## The Nation's First Ocean Plans!

By Robert LaBelle (BOEM; Mid-Atlantic RPB Federal Co-Lead) and Betsy Nicholson (NOAA; Northeast RPB Federal Co-Lead)

On December 7, the National Ocean Council finalized the Nation's first ocean plans, taking an historic step toward fulfilling President Obama's commitment to healthy ocean ecosystems and a strong, sustainable marine economy. The two regional plans, the Northeast Ocean Plan and the Mid-Atlantic Ocean Action Plan, promote the use of integrated ocean data and best practices for informed and efficient management of the Nation's shared marine resources.

After years of collaboration among States, Tribes, Federal agencies, and Fishery Management Councils, with input from marine stakeholders, the Northeast Ocean Plan and the Mid-Atlantic Ocean Action Plan build on the data provided in the Northeast and Mid-Atlantic Data Portals, which are publicly accessible and provide new maps and data products. The plans also describe best management practices to guide effective interagency coordination and to ensure that agencies have the data needed to inform planning and environmental review of new activities. This approach is designed to work across all levels of government and to advance economic, environmental, and cultural priorities within each region. The plans are the result of extensive participation from marine stakeholders representing fishing, recreation, energy, transportation, telecommunications, and many other interests. Once implementation begins, the plans will reinforce the commitment to healthy ocean ecosystems and a strong, sustainable marine economy.

Read more:

White House blog: <https://www.whitehouse.gov/blog/2016/12/07/nations-first-ocean-plans>

Northeast Ocean Portal: <https://www.northeastoceandata.org/>

Mid-Atlantic Data Portal: <http://midatlanticocean.org/data-portal/>

*Expansion continued from page 1*

conservation area in the United States, the expanded boundaries make it one of the largest MPAs on the planet that is nearly the size of the Gulf of Mexico. Read the full proclamation here: <https://www.whitehouse.gov/the-press-office/2016/08/26/presidential-proclamation-papahanaumokuakea-marine-national-monument>

The expansion provides critical protections for more than 7,000 marine species and is also considered a sacred place for the Native Hawaiian community. Important geological features of the expansion area include more than 75 seamounts, as well as a nonvolcanic ridge that extends southwest towards Johnston Atoll. Together, these features form biodiversity hotspots in the open ocean that provide habitat for deep-sea species, including sponges, other invertebrates, fish, and corals—some of which are thousands of years old. Albatrosses (*Diomedea* spp.) and Great Frigatebirds (*Fregata minor*) rely on the expansion area while feeding their chicks, when their foraging is focused within 200 miles of the nesting colonies on the Monument's islands. The expansion area is also a foraging and migration path for five species of protected sea turtles.

Additionally, there are sunken vessels (including the USS *Yorktown*) and downed aircraft from the Battle of Midway in World War II, a battle that marked a major shift in the progress of the war in favor of the Allies, within the expansion area.



On September 1, 2016, President Obama visited Midway Atoll National Wildlife Refuge where Refuge Manager Robert Peyton provided geographic reference information on the recent Marine National Monument expansion which was followed by a tour of Turtle Beach. Photo credits: Pete Souza, Chief Official White House photographer, Obama Administration

On September 1, 2016, the President visited Midway Atoll National Wildlife Refuge (Refuge), within the Monument, to mark the significance of the expansion and tour some of the Monument's resources in person. The President visited the memorial to the Battle of Midway, met with island staff, toured wildlife and plant restoration sites, and observed corals and other marine resources while snorkeling. Read President Obama's full remarks from Turtle Beach here: <https://www.whitehouse.gov/the-press-office/2016/09/01/remarks-president-designation-papahanaumokuakea-marine-national-monument>

The Monument was originally created in 2006 by President George W. Bush and designated as a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site in 2010. Since that time, scientific exploration has revealed new species and deep-sea habitats in the expansion area, as well as important ecological connections between the existing monument and the expansion area. In addition to marine areas, the Monument includes (1) the Midway Atoll Refuge, (2) the eight atolls, reefs, and islands of the Hawaiian Islands Refuge, and (3) Kure Atoll, which is under the jurisdiction of the State of Hawai'i.

DOI Secretary Sally Jewell and Secretary of Commerce Penny Pritzker also announced that the Departments will soon sign an agreement with Hawaii's Department of Natural Resources and Office of Hawaiian Affairs (OHA), strengthening the coordination of management and adding OHA as the fourth Monument co-trustee.



## Centennial Celebrations Mark the National Park Service's 100th Birthday!

By Erica Wales (DOI)



Happy 100th birthday NPS!  
Photo credit: NPS

August 25, 2016, marked the 100th birthday of the National Park Service (NPS). Back in 1916, NPS was created by the “Act to Establish a National Park Service (Organic Act), 1916,” giving NPS the duty to promote and regulate parks and monuments in

order “to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

In honor of the momentous occasion, national parks from around the country and in the Pacific celebrated the centennial in style and opened the parks for free admission August 25–28. Here are a few ways OGLC parks marked the occasion:

- *American Memorial Park, Saipan*—The park held a Day of Service on Saturday, August 27, where more than 300 volunteers from the American Red Cross, schools, AmeriCorps, and the public assisted with park projects. The volunteers removed invasive vines, cleaned debris, painted the parking lot and amphitheater, and beautified the memorials.
- *Cape Cod National Seashore, Massachusetts*—The seashore held a Seashore Science Day on August 25. The day included a “Science Street Fair” in the morning, where visitors could engage in



Glacier Bay National Park tribal house dedication. Photo credit: NPS

hands-on, interactive presentations by staff, researchers, and interns; and a “Science in the Seashore Symposium” in the afternoon, where the public heard lectures from scientists on topics including seals, ticks and Lyme disease, landscape management, and climate change.



Touch tank at Cape Cod National Seashore Centennial celebrations. Photo credit: Kekoa Rosehill

- *Everglades and Dry Tortugas National Parks, Florida*—The Everglades National Park celebrated by hosting Sing Across America events to provide musical entertainment and hosted an exhibit, “This

Land is Your Land: A Second Century for America’s National Parks,” which featured images, videos, and artifacts from Florida parks and preserves. Reenactors at Dry Tortugas National Park highlighted daily life at Fort Jefferson during the Civil War area, and guided tours were given of the 110-foot Motor Vessel *Fort Jefferson*, the primary tender vessel of the park.

- *Cabrillo National Monument, California*—The national monument celebrated with an antique vehicle display, lighthouse postcard painting, guided park tours, NPS trivia, tours of the lighthouse tower, and other events to highlight the history of the NPS and the New Point Loma Lighthouse at Cabrillo.
- *Glacier Bay National Park, Alaska*—The park celebrated with a dedication of the Huna Tribal House (Xunaa Shuká Hit), which featured carvings, hand carved dugout canoes, traditional songs and regalia, Tlingit oratory, traditional ceremonies and dances, and the rhythm of drums.

Read the full text of the Act that established the NPS here: [https://www.nps.gov/parkhistory/online\\_books/anps/anps\\_li.htm](https://www.nps.gov/parkhistory/online_books/anps/anps_li.htm)

## Climate Change Threatening Alaska Coastal Villages

### Denali Commission Approves Funding

By Randy Bowman (DOI)

During the first-ever Presidential visit to the U.S. Arctic last fall, President Obama designated the Denali Commission, a Federal Regional development agency, as the lead Federal contact for Alaska Native Villages threatened by erosion, flooding, and other issues resulting from climate change. This was in response to recommendations from the Arctic Executive Steering Committee, established by E.O. 13689 to coordinate Federal Arctic policy, to designate the Commission as the lead contact and similar previous recommendations for a lead agency designation from the Government Accountability Office.

*The Denali Commission is providing \$6,650,000 in new funding. Most of this will go to the four most immediately threatened villages—Newtok, Kivalina, Shaktoolik, and Shismaref—with slightly more than \$1.5 million held as a contingency fund for unexpected developments.*

The village of **Newtok**, located between the Ningliq River and the Bering Sea, is eroding away and unlikely to be a viable site within 4 to 5 years. The village is in the process of relocating to a new site, called Metarvik, about 9 miles away on higher ground. The Commission approved \$3,020,000 to assist this effort. These funds will be in addition to money from the State of Alaska, U.S. Department of Agriculture, DOI's Bureau of Indian Affairs, and



Flooding in the village of Newtok during the 2005 Fall Sea Storm. Photo credit: Stanley Tom, Newtok Traditional Council

Federal Emergency Management Agency previously provided for the village.

The funds will be used for preparation of an overall National Environmental Policy Act document for the move; development of a final site plan; geotechnical investigation to supplement existing information for efficient design of roads, building foundations and other infrastructure; development of the quarry to provide stone for construction; design of a bulk fuel storage facility; preliminary design of community power, water, sewer and solid waste facilities; and to serve as matching/gap funds for other related activities identified by the community.

The village of **Shaktoolik** will receive \$1,020,000 to be used to support “soft erosion” protection measures and design of a consolidated fuel storage facility above the 100-year flood level, and serve as matching/gap funds for other related activities identified by the community.

The villages of **Kivalina** and **Shismaref** will each receive \$520,000 to be used as the local match for existing U.S. Army Corps of Engineers (USACE) funds for a site specific 100-year flood analysis and for design of an armor rock revetment to temporarily protect the islands on which the villages are located.

At all four villages, the funds will also be used to support the existing Community Relocation Coordinator; prepare emergency response plans, conduct emergency drills, and as matching/gap funds for other related activities identified by the community.

The Commission also allocated \$490,000 for other to-be-determined threatened communities and \$1,080,000 for a Statewide Disaster Response Fund that can be used to respond quickly, or to provide matching funds to complement other funders for disaster response and recovery and other statewide initiatives related to the problem.

## Celebrating the Next Phase of Everglades Ecosystem Restoration

On June 3, 2016, NPS and Florida Department of Transportation (DOT) announced the construction of the 2.6-mile bridge and roadway project in South Florida on the Tamiami Trail with a contract awarded to the joint venture team of Condotte America Inc. and Stantec. This next phase of bridging will allow additional fresh-water flow in Everglades National Park, improving ecological conditions both in the park and in the central Everglades north of Tamiami Trail.

The new trail will raise a 2.5-mile section of U.S. Highway 41 in the South Florida region and is the latest milestone in the Obama Administration's efforts to conserve the Everglades' historic and iconic wildlife habitat and water flows.

Secretary Jewell visited Everglades National Park on Earth Day 2016 with President Obama to highlight steps the Administration has taken to act on climate change. "It's a vital piece of this Administration's efforts with our Florida partners to deliver increased flows of clean, fresh water to an area that desperately needs them to make



Secretary Jewell and Pedro Ramos visited seagrass beds in Everglades National Park. These iconic wildlife habitats will benefit by restoring historic water flows. Photo credit: Tami A. Heilemann, DOI



Secretary Sally Jewell celebrated Earth Day with Florida DOT District Secretary Gus Pego by announcing the next phase of bridging on the Tamiami Trail in Everglades National Park. Photo credit: Tami A. Heilemann, DOI

*"This new bridge is part of the largest conservation effort ever undertaken by the National Park Service and will return water flows to more historic levels, favorably impacting key plant and animal species like the American crocodile and many native birds," said Secretary Jewell, on Earth Day, April 22, 2016.*

the ecosystem sustainable, including critical marsh lands, Florida Bay and aquifers important to South Florida's water supply. The Everglades is an internationally recognized ecological treasure that we must restore and protect for future generations," said Jewell.

"The partnership between the NPS and Florida DOT has helped advance the Everglades restoration effort," said Pedro Ramos, Superintendent of Everglades and Dry Tortugas National Parks. "The completion of the 2.6 mile bridging project is essential in establishing the natural flow of water to Everglades National Park and Florida Bay."

The event followed Secretary Jewell's conservation speech at National Geographic on April 19, where she outlined a major course correction in how we approach conservation to ensure a bright future for our public lands and waters. Read the Secretary's speech here: <https://medium.com/@Interior/the-next-100-years-of-american-conservation-397c42b8f1f2>

Read the press release: <https://www.doi.gov/pressreleases/earth-day-secretary-jewell-celebrates-next-phase-everglades-ecosystem-restoration>

Read more about the project: <https://www.nps.gov/ever/learn/news/everglades-national-park-and-fdot-award-contract-for-next-phase-of-tamiami-trail-enhancements.htm>

## Restored Beach Project Supports Science Education and Coastal Community at Virginia Beach

By Marjorie Weisskohl (BOEM)

On July 26, 2016, Bureau of Ocean Energy Management (BOEM) Director Abigail Ross Hopper toured the Virginia Aquarium and Marine Science Center in Virginia Beach, Virginia. Aquarium Executive Director, Lynn Clements, and Director of Conservation Programs, Mark Swingle, briefed Hopper and her team on the Aquarium's in-depth science program, which covers everything from global ecosystems to how the Chesapeake Bay was formed, including information about the oyster beds and other aquatic life living just off the back deck in Owl Creek.

Hopper joined students from the Young Men's Christian Association who were thrilled to be learning about ocean and coastal sciences and conservation through touching sting rays in a touch tank, seeing giant sea turtles and tiny yellow striped frogs, and seeing "Trash-Talking Turtles" made of marine debris from local beaches. Hopper then visited Sandbridge Beach, south of the city, to see the beach and



Director Hopper explores Virginia Aquarium's touch tank. Photo credit: Marjorie Weisskohl, BOEM



The Cockspar Lighthouse at Fort Pulaski National Monument needs to be stabilized for expected sea-level rise impacts. Photo credit: Paul Brennan

dunes that were restored with sand borrowed from the Outer Continental Shelf (OCS) through BOEM's Marine Minerals Program. Officials from the Virginia Beach Department of Public Works and the USACE, who had been involved in the project, joined her for an informative discussion. Over the years, the Sandbridge project has helped reduce damage to roads and other infrastructure from storms and hurricanes, restored wildlife habitat, and enabled Americans to enjoy the great outdoors.

For more information, visit: <http://www.boem.gov/Marine-Minerals-Program/>



The beach and dunes of Sandbridge Beach, restored with sand from the OCS through BOEM's Marine Minerals Program. Photo credit: Marjorie Weisskohl, BOEM

## Coastal Parks Adapt to Climate Change

Two new reports from NPS show how coastal parks across the country are devising innovative and unique solutions to adapt to climate change. "Coastal Adaptation Strategies: Case Studies" includes 24 park studies in a variety of settings that describe how they are preparing and responding to climate change impacts. A followup report, "Coastal Adaptation Strategies Handbook," highlights the need to plan for climate change in how we manage America's iconic natural, historic, and cultural landscapes. It is a summary of what scientists and park managers know about climate adaptation in coastal areas and includes processes and tools that parks have available to respond and recover from tropical storms and hurricanes and offers strategies to address rising sea levels.

The case study report highlights different ways NPS is mitigating these coastal impacts such as increased stormy weather, sea-level rise, shoreline erosion, melting sea ice and permafrost, ocean acidification, warming temperatures, groundwater inundation, precipitation, and drought.

Adaptation efforts include preserving historic structures, completing archaeological surveys, collecting baseline data, restoring habitat, engineering solutions, redesigning and relocating infrastructure, and developing broad management plans that consider climate change.

At Olympic National Park, Washington, work is focused on preparing archeological sites and traditional cultural resources, whereas ancient Indian shell mound sites threatened by sea-level rise and erosion are of concern in Florida at the Canaveral National Seashore. At Fort Pulaski National Monument in Georgia, NPS

See *Climate Change* page 9



The deepwater vessel *Chikyu* as deployed during the second joint Indian National Gas Hydrate Program Expedition 02. The vessel was designed by the Japanese government for international scientific drilling operations. Photo credit: Japan Agency for Marine-Earth Science and Technology

*Climate Change continued from page 8*

is designing a lighthouse stabilization system to incorporate sea-level rise. Gateway National Recreation Area, New York, is restoring Jamaica Bay wetlands, and the National Park of American Samoa is learning to recognize coral adaptations to environmental stressors. At Gulf Islands National Seashore, Massachusetts, large-scale restoration of barrier island systems and cultural resource protection is being done through sediment placement along the northern Gulf of Mexico shoreline. Along the mid-Atlantic shorelines of Maryland and Virginia, NPS is relocating visitor facilities that are threatened by erosion at the Assateague Island National Seashore. In California, NPS is working to develop a multiagency vision for an urban coastline at the Golden Gate National Recreation Area. You can read about more examples here: <https://www.nps.gov/subjects/climatechange/coastaladaptationstrategies.htm>

NPS Coastal Adaptation Strategies Handbook: <https://www.nps.gov/subjects/climatechange/coastalhandbook.htm>

## International Partnership Discovers Potentially Producible Gas Hydrate in Indian Ocean

By Alex Demas and Tim Collett (USGS)

USGS has assisted the Government of India in the discovery of large, highly enriched accumulations of natural gas hydrate in the Bay of Bengal during a research expedition, called the Indian National Gas Hydrate Program Expedition 02. This is the second joint exploration for gas hydrate potential in the Indian Ocean and is the first discovery of its kind in the Indian Ocean that has the potential to be producible. The first expedition, also a partnership between scientists from India and the United States, discovered gas hydrate accumulations but in formations that are currently unlikely to be producible.

Natural gas hydrates are a naturally occurring, ice-like combination of natural gas and water found in the world's oceans and polar regions. The amount of gas within the world's gas hydrate accumulations is estimated to greatly exceed the volume of all known conventional gas resources.

“Advances like the Bay of Bengal discovery will help unlock the global energy resource potential of gas hydrates as well help define the technology needed to safely produce them,” said Walter Guidroz, USGS Energy Resources Program Coordinator. “The USGS is proud to have played a key role on this project in collaboration with our international partner, the Indian Government.”

This discovery is the result of the most comprehensive gas hydrate field venture in the world to date, made up of scientists from India, Japan, and the United States. The scientists completed ocean drilling, conventional sediment coring, pressure coring, downhole logging, and analytical

activities to assess the geologic occurrence, regional context, and characteristics of gas hydrate deposits offshore of India.

Although it is possible to produce natural gas from gas hydrates, there are substantial technical challenges, depending on the location and type of formation.

“The results from this expedition mark a critical step forward to understanding the energy resource potential of gas hydrates,” said USGS Senior Scientist Tim Collett, who participated in the expedition. “The discovery of what we believe to be several of the largest and most concentrated gas hydrate accumulations yet found in the world will yield the geologic and engineering data needed to better understand the geologic controls on the occurrence of gas hydrate in nature and to assess the technologies needed to safely produce gas hydrates.”

The international team of scientists was led by the Oil and Natural Gas Corporation Limited of India on behalf of the Ministry of Petroleum and Natural Gas India, in cooperation with USGS, the Japanese Drilling Company, and the Japan Agency for Marine-Earth Science and Technology. In addition, USGS is working closely with the National Institute of Advanced Industrial Science and Technology Japan on the analysis of pressure core samples collected from sand reservoirs with high gas hydrate concentrations. USGS has a globally recognized research program studying natural gas hydrates in deepwater and permafrost settings worldwide. USGS researchers focus on the potential of gas hydrates as an energy resource, the effect of climate change on gas hydrates, and seafloor stability issues.

Read more about the study and other USGS energy research here: <http://woodshole.er.usgs.gov/project-pages/hydrates/>

## Dive Your Park!

### SCUBA is an Important Tool for Managing NPS Resources

Many NPS coastal parks are underwater. For example, 95 percent of Biscayne National Park in South Florida is underwater; therefore, park managers and scientists use SCUBA diving to get firsthand understanding of these resources to effectively manage them. This is helpful for a variety of missions, including natural and cultural resource condition assessments, scientific studies, invasive species management, restoration activities, maintenance projects, and law enforcement. During 2015, 20 park divers collectively logged 1,228 dives completed in support of various park missions. These dives account for 39,473 minutes spent underwater; if all that work was done by one person, that person would have spent almost an entire month underwater!

Learn about NPS Submerged Resources Center: <https://www.nps.gov/subjects/underwater/index.htm>

Follow NPS Submerged Resources Center on Facebook: <https://www.facebook.com/National-Park-Service-Submerged-Resources-Center-106606389416924/>



SCUBA divers working at Biscayne National Park. Photo credits: NPS

## Understanding Benefits from Carbon Storage

### Partnering with the Nisqually Indian Tribe

By Mike Murray (USFWS)

The U.S. Fish and Wildlife Service (USFWS) and Nisqually Indian Tribe have restored 902 acres of tidally influenced coastal marsh in the Nisqually River Delta (NRD), making it the largest estuary-restoration project in the Pacific Northwest to date. Marsh restoration increases the capacity of the estuary to support a diversity of wildlife species. Restoration also increases carbon production of marsh plant communities that support food webs for wildlife and can help mitigate climate change through long-term carbon storage in marsh soils.

In order to better understand the benefits of carbon for wetland wildlife and storage in the NRD, in 2015 an interdisciplinary team of USGS researchers began scientific work to advance our ability to determine marsh ecosystem carbon balance and understand wildlife benefits and carbon storage from restored and natural coastal marshes in the NRD.



Messy work! Walking through the thick mud can be exhausting. This researcher takes a break on some solid ground. Photo credit: Mike Murray, USFWS

Learn more about the USGS project: <http://www.werc.usgs.gov/Project-SubWebPage.aspx?SubWebPageID=1&ProjectID=277>

Read Fact Sheet 2016–3042: <http://dx.doi.org/10.3133/fs20163042>



Walking across the wetland to get out to the study site. The mud came up to the researchers' hips in some parts of the muddy wetland, making it extremely difficult to get out. Plus, they had to get through the mud carrying all the gear they would need for the day. Photo credit: Mike Murray, USFWS

## Historic NRDAR Settlement Reached for Deepwater Horizon Spill

By Nanciann Regalado (DOI)

On April 20, 2010, the *Deepwater Horizon* oil rig blew up and was consumed by fire. Eleven men died and many others were injured. For 87 days the well spewed oil—a total of 134 million gallons were released into the Gulf of Mexico. Ultimately, more than 43,000 square miles of the Gulf and its shoreline were oiled. The *Deepwater Horizon* oil spill was the worst environmental disaster in our Nation's history. See related story, page 12.

As the volume of oil released grew, and the inevitability of widespread injury and death of wildlife became apparent, many people worried whether or not those responsible for the spill would be held accountable. On April 4, 2016, District Judge Carl Barbier approved a settlement for \$20.8 billion and effectively ended almost 6 years of litigation over British Petroleum's (BP) responsibility for civil penalties and future litigation for natural resource damages arising from the 2010 *Deepwater Horizon* oil spill. The settlement included provisions for the largest recovery of natural resource damages ever approved for injuries to natural resources.

Under the settlement, BP will pay the Natural Resource Damage Assessment and Restoration (NRDAR) Trustees (five Gulf States and four Federal agencies) as much as \$8.8 billion for restoration to address natural resource injuries. The settlement includes the following:

- \$1 billion already committed during early restoration.
- \$7.1 billion for restoration over 15+ years, beginning in April 2017.
- As much as an additional \$700 million to respond to natural resource

damages unknown at the time of the agreement, provide for adaptive management, or both.

The settlement also provides an additional \$5.5 billion in funding from Clean Water Act civil penalties. As required by legislation adopted after the spill only 20 percent of those penalties will go directly to the Oil Spill Liability Trust Fund. In accordance with the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act, 80 percent or \$4.4 billion will be sent directly to a fund specifically established to support the environmental and economic restoration of the Gulf of Mexico. The remainder of the \$20.8 billion total of the settlement includes claims under the False Claims Act, royalties and reimbursement of natural resource damage assessment costs, and other expenses due to the incident.

The USFWS and NPS played a critical role in assessing injuries to Federal lands and other natural resources that were caused by the *Deepwater Horizon* oil spill. They not only assessed injury to the Refuges and national parks all along the Gulf coast but also assessed injury to migratory birds, threatened and endangered species, some jurisdictional fish, and natural resource services, such as recreational use of Federal lands.

Other parts of the *Deepwater Horizon* oil spill injury assessment were completed by our fellow Trustees; for example, the NOAA assessed the spill's effects on the water column, deep sea environment, and marine mammals. Together, the Trustees undertook an ecosystem-based approach to assessing and restoring the natural resources injured by the spill.

The injury assessment shaped the restoration plan approved by the Trustees in March 2016. The "Programmatic

Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement" provides a framework for future restoration strategies, plans, and projects. It identifies five restoration goals: restore and conserve habitat; restore water quality; replenish and protect living coastal and marine resources; provide and enhance recreational opportunities; and provide for monitoring, adaptive management, and administrative oversight to support restoration implementation. The programmatic plan also identifies 13 restoration types that will address the injury experienced by the Gulf's natural resources: wetlands, coastal, and nearshore habitats; habitat projects on federally managed lands; nutrient reduction; water quality; fish and water column invertebrates; sturgeon; submerged aquatic vegetation; oysters; sea turtles; marine mammals; birds; mesophotic and benthic (low light and ocean floor) communities; and provide and enhance recreational opportunities.

The *Deepwater Horizon* oil spill settlement is bringing an unprecedented amount of restoration funding to the Gulf of Mexico. For the NRDAR funds, the schedule for payment extends across more than 15 years. There will be much work to do and much to learn over the next two decades. We look forward to sharing our successes and lessons learned.

Read more: <https://www.doi.gov/restoration/historic-nrdar-settlement-reached-deepwater-horizon-spill>



Illustration credit: Cole Goco

## The New Carissa Oil Spill—Restored from Environmental Disaster

By Elizabeth Materna (USFWS)

During a major winter storm in 1999, the freighter *New Carissa* ran aground on a beach near Coos Bay, Oregon. The vessel spilled 140,000 gallons of heavy fuel oil and created one of the worst ecological disasters in Oregon’s history—killing an estimated 2,875 seabirds and 40 different types of shorebirds, including 262 threatened marbled murrelets (*Brachyramphus marmoratus*) and several threatened western snowy plovers (*Charadrius alexandrinus*).

Although the oil spill was a natural resource disaster, it created a legacy of restoration in its wake. Working closely with the other Federal and State agencies and two tribes, USFWS developed a suite of projects to restore species and habitats affected by the spill. *See related story, page 11.*

The largest project involves the purchase and management of 4,300 acres of coastal forest for nesting marbled murrelets. Other projects include:

- Monitoring colonies of nesting seabirds for predators in order to trap and remove problem individuals.



Shorebirds return to the Ni-les’tun unit in Oregon. Photo credit: USFWS



*New Carissa* oil spill. Photo credit: USFWS



An oiled murre killed by the *New Carissa* oil spill. Photo credit: USFWS

- Purchasing predator-proof trash cans to help control predators near seabird colonies along with signage to inform people that leaving trash can lead to increased mortality of chicks.
- Creating a smartphone app to teach Oregon coast beachgoers about nesting seabirds.
- Producing 60 interpretive panels to be placed at State parks and waysides along the Oregon coast to teach people about seabird biology, conservation, and the need to leave nesting colonies undisturbed.
- Restoring 400 acres of tidal marsh at Bandon Marsh Refuge.
- Restoring 30 acres of coastal dune habitat for nesting Western Snowy Plovers.

Thanks to this multiagency effort led by USFWS, devastating effects from the *New Carissa* oil spill have been lessened by a suite of projects designed to restore habitat, protect nesting seabirds, and educate the public about marine resources along the Oregon coast.

## Historic Anchor Discovered During the Decommissioning of an Oil and Gas Platform

By Christopher Horrell (BSEE)

The trawl vessel was dragging the seafloor during the final stages of decommissioning an oil and gas platform in the Gulf of Mexico. It was a routine mission in 70 feet of water depth about 40 nautical miles off the coast of Louisiana—part of a comprehensive effort to fulfill the platform operator’s legal requirement to bring the leased parcel of seafloor back to prelease conditions. Dragging the bottom usually results in the retrieval of sections of pipe, bumper tires, and random pieces of metal, but during one of the net pulls, something unusual was spotted: an historic anchor from the age of sail.

The next step should have been to cease operations and notify the DOI’s Bureau of Safety and Environmental Enforcement (BSEE). Specifically, the Federal regulation instructs those who “discover any archaeological resource while conducting operations in the lease or right-of-way area” to “immediately halt operations within the area of the discovery and report the discovery to the BSEE Regional Director.” Instead, the anchor was brought to Port Fourchon, Louisiana, where the operator’s company representative contacted his supervisor, who then claimed the anchor for his private collection, displaying it beside his backyard pool.

Time had definitely left its mark on the anchor, although it was pretty well intact after many years beneath the water’s surface. What the boss may not have known, however, is that iron submerged in seawater will come to a stable equilibrium over time. Once anything iron is removed from the marine environment and begins to dry out, the chlorides from the seawater that have permeated the iron structure will start to expand. At that

*See Historic Anchor page 13*

*Historic Anchor continued from page 12*

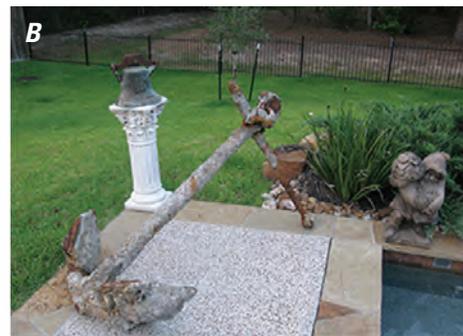
point rapid deterioration begins. For this reason, archaeologists typically keep metal artifacts such as anchors submerged in seawater tanks until conservation efforts can begin.

In compliance with U.S. regulations, the platform operator filed a report listing the variety of items retrieved by the trawler, including the anchor. BSEE's Historic Preservation Program within the Office of Environmental Compliance was called, and an archaeologist at BSEE asked for a photo of the anchor and its current location. The photo confirmed an unusual find, possibly from the 19th century, but it would have been very unlikely that a ship of that era would have laid anchor 40 miles offshore in 70 feet of water. It was more likely to be evidence of a dire situation at sea more than 200 years ago, possibly a shipwreck. The anchor appeared to be an early 19th century Admiralty Anchor.

By listing the anchor, the operator avoided a variety of more serious violations, but the find was not handled in accordance with Federal regulations. The platform operator responded immediately once the violations were pointed out. An Incident of Noncompliance—BSEE's version of a citation—was issued along with a Corrective Action Order. The order required the operator to provide funds for the transportation, conservation, and long-term curation of the anchor. Additionally, the operator was ordered to complete a high-resolution remote sensing survey using a magnetometer, side-scan sound navigation and ranging (sonar), and subbottom profiler to identify any other remains of a potential shipwreck at the site.

Time was the enemy; deterioration had begun.

BSEE needed to find the best organization to restore and preserve the anchor. The operator, in coordination with BSEE, put together a conservation and curation plan for the anchor. BSEE's



Conservation of the historic anchor should have begun with its discovery during decommissioning operations. (A) and (B) The anchor was inappropriately transported to a private residence and began to deteriorate. (C) Dr. John Bratten and his students from UWF worked to conserve the anchor. (D) Through conservation, the name R. Flinn and a number appear on the crown and shaft of the anchor. Photo credits: John Bratten (Univ. of West Florida) and Christopher Horrell (BSEE)

Historic Preservation Program worked with the operator and the University of West Florida's (UWF) Archaeology Institute. The anchor, it was decided, should become the permanent property of UWF, where it would receive proper treatment and be used as a teaching tool for students.

During the conservation process, as decades of fouling were carefully removed, the name R. Flinn was discovered on the crown of the anchor. After completing historical research, UWF maritime archaeologist Dr. John Bratten and his students discovered that Robert Flinn manufactured chains and anchors in England up until 1826. We now knew the anchor was well over a century-and-a-half old, dating to a time that was somewhere around the War of 1812. *See related story, page 16.*

In addition, several promising targets of a potential shipwreck were identified during the high-resolution remote sensing

survey. BSEE archeologist and scientists, who are members of the Seafloor Compliance Monitoring Assessment Program and the BSEE Scientific Diving Program, mobilized to investigate the targets. Nothing of interest was located, so BSEE determined that the anchor was an isolated find and that a shipwreck was not present in the area where the trawling activities had occurred.

While the anchor tells the story of continued human use of the sea and connects us across the centuries, the story of the Flinn anchor also has raised awareness about preserving marine artifacts because other anchors have been reported since that event. It seems like offshore industry is now more aware of their responsibility to stop working when they encounter a marine artifact. That's good news.

What to do if you find historic maritime artifacts: <https://www.bsee.gov/sites/bsee.gov/files/research-guidance-manuals-or-best-practices/fact-sheet/guidance.pdf>

## Hidden Ocean 2016—Arctic Science Discovery

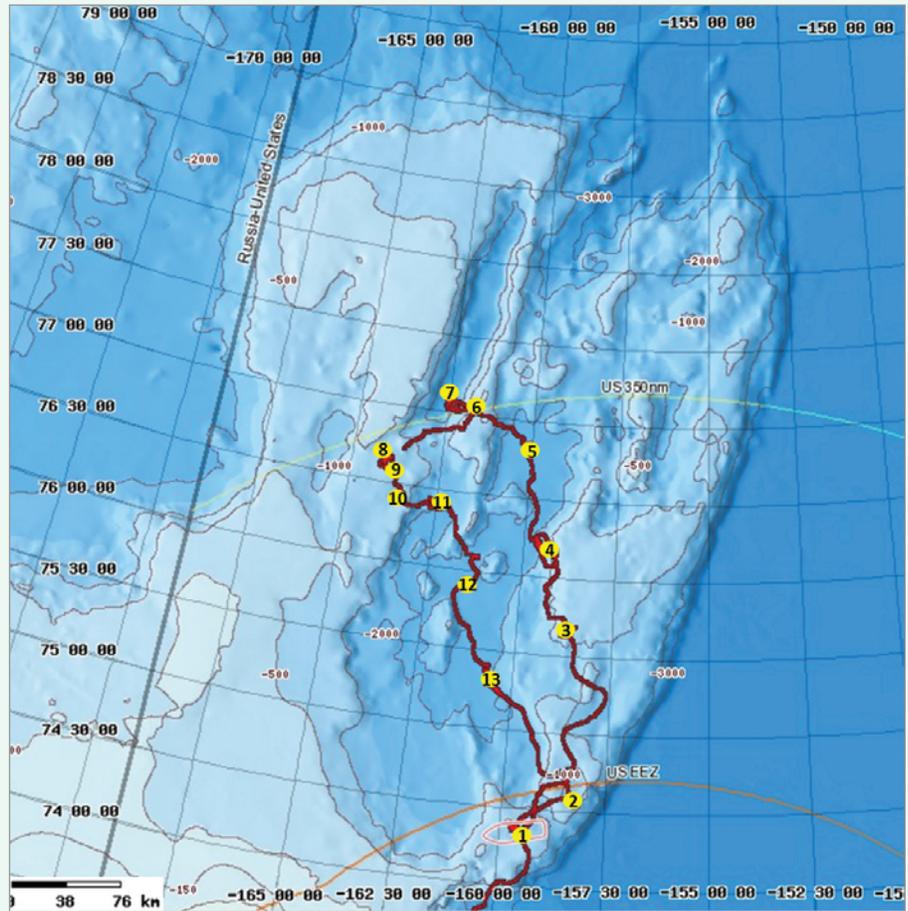


**Above:** Kate Segarra, an oceanographer for BOEM, was aboard the *Healy* in the Arctic Ocean for 40 days this summer. The view of the ice-covered Chukchi from the deck of the *Healy*. Photo credits: Kate Segarra, BOEM

**At right:** This map displays all 13 stations visited and sampled in the Chukchi Borderlands during the Hidden Ocean 2016 expedition. Image credit: Katrin Iken, UAF, and The Hidden Ocean 2016: Chukchi Borderlands

By Kate Segarra (BOEM)

This summer, I had the opportunity to sail aboard the U.S. Coast Guard Cutter *Healy* as part of the Hidden Ocean 2016, a NOAA-led expedition from Seward, Alaska, north into the Chukchi Sea. In the Chukchi Borderlands, water masses from the Pacific, Atlantic, and Arctic Oceans converge over an area of complex bathymetry. The primary focus of the Hidden Ocean 2016 was to explore this rapidly changing and poorly understood ecosystem. The science party was led by chief scientists, Dr. Russ Hopcroft and Dr. Katrin Iken, of the University of Alaska Fairbanks (UAF). Using both traditional oceanographic



methods (such as nets, CTD package, and box cores) and a remotely operated vehicle (ROV) equipped with ultrahigh-resolution video camera, known as 4K, the science party explored the pelagic and benthic biodiversity of the Chukchi Borderlands. The study subjects ranged from the microbial communities within sea ice to the polar bears that hunt upon it. The science party also included a seabird surveyor from USFWS, Elizabeth Labunski. As expedition coordinator for the cruise, I served as a liaison for NOAA's Office of Ocean Exploration and Research during the expedition. I worked very closely with the science party to track mission progress and communicate detailed updates to our colleagues back on shore.

The Arctic is warming at a rate around twice that of the global average (*see related story, page 6*). In the

weeks leading up to the cruise, data suggested that 2016 was on track to set the record for the lowest Arctic sea ice extent. Now that the melt season is over, 2012 still holds that title; 2016 tied for second with 2007 since records began in 1979. It's a depressing statistic, especially when one sees how critical sea ice is to these ecosystems; however, low sea ice does not mean no sea ice. Although there was a great deal of open water during our expedition, there were also plenty of patches of thick ice in the Chukchi. One ice floe was so thick (more than 4 meters in some places) that it took the *Healy* almost 4 days to break its way out of it.

While I was detailed on assignment with the NOAA for this cruise, the *Healy* experience will certainly enhance my work as an oceanographer for the BOEM. I have a new perspective on the Arctic research



A juvenile walrus swims up for a closer look at the *Healy*. Photo credit: Kate Segarra, BOEM



This is one of several (less than 10) polar bears observed during the expedition. Photo credit: Kate Segarra, BOEM



This is an undescribed ctenophore photographed in the water column by the ROV. Photo credit: The Hidden Ocean 2016: Chukchi Borderlands and Oceanengineering-Deep Sea Systems International

completed through our Environmental Studies Program; for example, Hanna Shoal is an ecologically important region on the Chukchi Plateau and described as a “walrus hotspot” in many environmental assessment documents. As we came upon Hanna Shoal in the faint light of the midnight sun, I saw what I thought were patches of dirty ice on the horizon. As we came closer, I realized those patches were walrus. There were at least 100 walrus in this one small area where they forage on the bountiful clam beds below. There were many similar examples of sightings and experiences, which brought life to textbooks and policy papers I’d previously read.

I understand now how, after the failure of the *Endurance* expedition and more than 1 year stuck in the ice, Shackleton returned to Antarctica for more. Not only is there a rhythmic zen to ship life, but the sense of discovery and adventure of this cruise was intoxicating. In just a few short weeks, the expedition collected at least six jellyfish and ctenophores that may represent new species. Of course “new” is a bit of a misnomer—these graceful animals were around long before human existence. The correct taxonomic term is “undescribed.” It will take members of the science party months to years to write the species description papers. It’s funny to think how these

strange creatures are still floating out there, waiting to be announced to the rest of the world. These and other discoveries from this cruise will greatly improve the understanding of this underexplored region. The Hidden Ocean 2016 will also serve as a comparison for past and future surveys of the region to allow scientists to examine how the ecosystem is changing over time, and whether or not climate change is a predominant factor.

We left the last of the Chukchi Sea ice behind around 01:00 on August 4. Forty days on a ship seemed like a long time before we left Seward in early July. But, as we transited back south at the end of the cruise and I watched the last few lone pieces of sea ice floating in the twilight, I wished we could turn around and do it all over again. I guess I’ll have to wait until the next Arctic adventure.

To learn more about the Hidden Ocean 2016 Expedition, please visit: <http://oceanexplorer.noaa.gov/explorations/16arctic/welcome.html>

## New Arctic Fish Species Inventory

USGS and BOEM recently released a report describing 109 marine fish species from the Chukchi and Beaufort Seas. Twenty of the fish species are newly confirmed, and the inventory includes 104 new descriptions that include distribution maps and life cycles.

The report summarizes the natural history of the species and discusses adaptations and limitations of fish populations in the Arctic. The information in the report will be used by BOEM, who requested the research carried out by USGS and the University of California, Santa Barbara, to evaluate potential environmental effects of oil and gas development offshore. Natural resource managers can also use the research to identify high-priority marine fish species to help guide future research, management, conservation, and environmental policy.

Keeping in mind the native and indigenous peoples of the Arctic, the report includes Inupiat names for the marine fish species. Salmon, whitefish, and char are used for subsistence and are key species for food security of Native Alaskan communities.

Read the report, “Alaska Arctic Marine Fish Ecology Catalog: Beaufort and Chukchi Seas,” here:

<https://pubs.er.usgs.gov/publication/sir20165038>



The report study area in the U.S. Chukchi and Beaufort Seas. The U.S. Exclusive Economic Zone is in red, and areas of interest for oil and gas are in yellow. Image credit: USGS

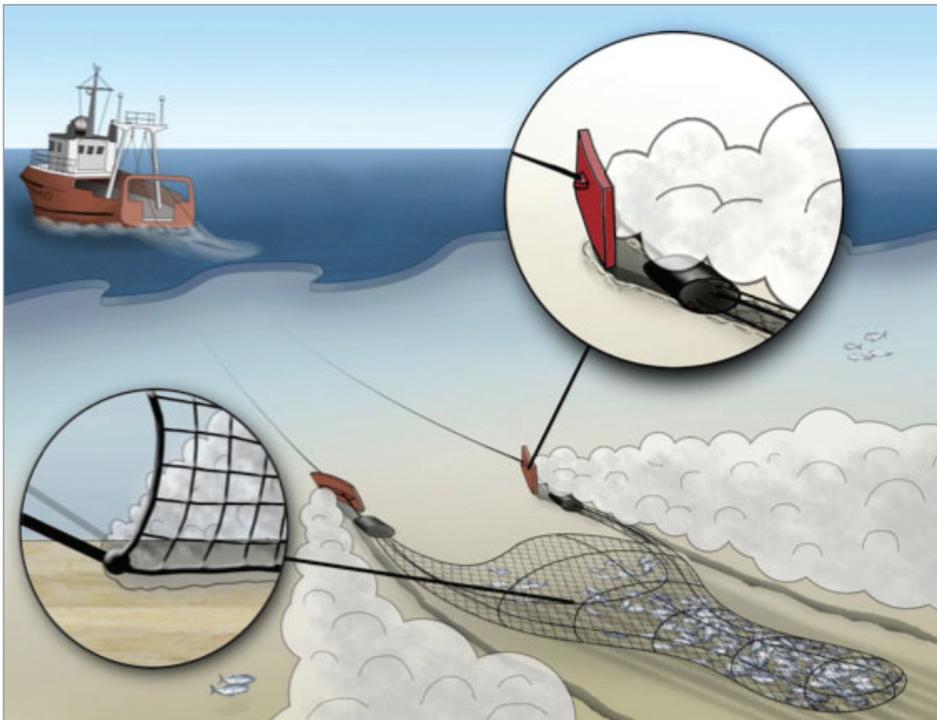
## USGS Researchers Study the Effects of Trawling on Sediment Resuspension

The fishing industry commonly uses trawling, a practice where large nets with metal doors and chains are dragged over the seafloor to catch fish. Because the equipment comes into direct contact with the seafloor, great environmental damage can be done (including removing seafloor dwelling marine life and resuspending sediment). Sediment in the water column can change the chemistry of the water (including nutrient levels), reduce light levels, and lower photosynthesis in plants. The resuspended sediment can be washed away by ocean currents, either deposited elsewhere on the shelf or in deeper waters and lost to the local environment. Removing sediment and changing the seafloor to rock removes habitat and lowers the diversity of life located within the seabed. Scientists have studied how bottom trawling can hurt the marine

environment, especially the effects on corals, sponges, fishes, and other animals; however, little research has been done on the effects of bottom trawling on the seabed itself. *See related story, page 12.*

While the seabed had been previously labeled as “trawled” or “untrawled” in studies, USGS researchers have developed a new method for calculating bottom-trawling-induced sediment resuspension, which allows for a range of classifications according to how often the seafloor was disturbed by bottom trawling. This new method of calculation provides a new tool for seafloor management and can help assess effects from bottom trawling. The researchers calculated how much sediment from the seafloor was resuspended during bottom trawling and determined the amount was about the same as the amount of sediment rivers deposit on the continental shelf (almost 22 gigatons).

Read the full article here: <http://www.sciencedirect.com/science/article/pii/S0924796315002328>

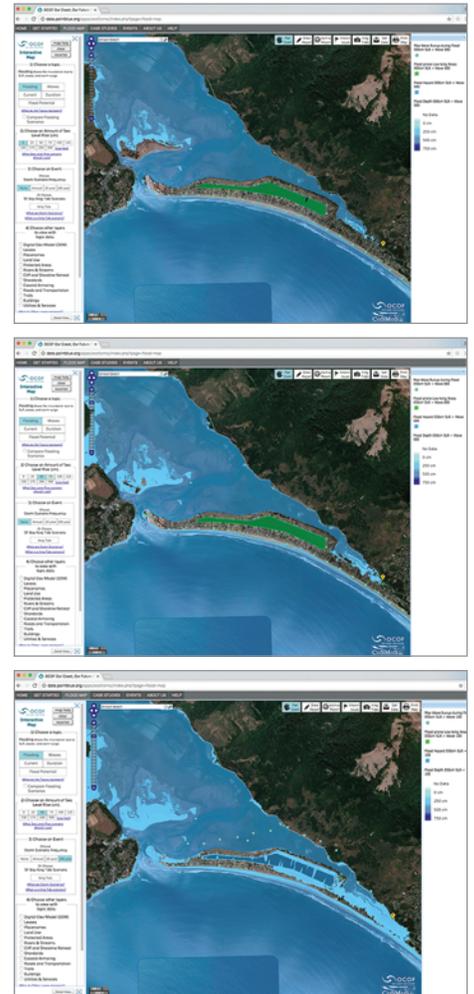


Conceptual drawing of bottom trawling from a fishing boat, showing a net and metal plate being dragged along the seafloor behind a boat on the water's surface. Image credit: Ferdinand Oberle

## Helping Communities Understand Future Coastal Hazards

By Juliette Finzi Hart (USGS)

With the stunning beauty of our coastline throughout the United States and its territories, it's no surprise that many people want to live along the coast. This coastal living, however, comes with vulnerability to impacts from



Examples of projections from the OCOF viewer for Stinson Beach in San Francisco for daily conditions for a day in October 2016 (top), daily conditions plus 50 centimeters of sea level rise—expected by about mid-century (center), and a 100-year (or 1 percent) storm with 50 centimeters of sea-level rise (bottom). These projections demonstrate how neglecting to plan for storm impacts could lead to a substantial underestimation of risk along the coast. Image credits: OCOF, CoSMoS Model Results Product Suite

*See Help for Coastal Hazards page 17*

*Help for Coastal Hazards continued from page 16*

natural hazards, such as hurricanes, winter storms, tsunamis, and erosion of beaches and coastal cliffs. Climate change will intensify these hazards. Even today, many coastal communities along the east coast are experiencing increased nuisance flooding—also referred to as sunny-day flooding—in which streets and infrastructure flood simply because of high tides or windy days. This flooding has been exacerbated in recent decades by sea-level rise. U.S. coastal communities look to expertise from USGS to provide cutting-edge projections of natural hazard impacts today and into the future.

On the west coast of the United States, the USGS Pacific Coastal and Marine Science Center's Coastal Processes Team, led by Patrick Barnard and a group of 10 modelers, geologists, engineers, and oceanographers, has developed the Coastal Storm Modeling System (CoSMoS, [http://walrus.wr.usgs.gov/coastal\\_processes/cosmos/](http://walrus.wr.usgs.gov/coastal_processes/cosmos/)) to help the 20 million residents of California coastal communities understand their vulnerabilities from storms and sea-level rise. CoSMoS is a state-of-the-art modeling system that models all the relevant physics of a coastal storm (for example, tides, waves, and storm surge), which are then scaled down to local flood projections. Rather than relying on historic storm records, CoSMoS uses wind and pressure from global climate models to project coastal storms under changing climatic conditions. Projections of multiple storm scenarios (daily conditions, annual storm, 20-year and 100-year return intervals) are provided under a suite of sea-level rise scenarios ranging from 0 to 2 meters, along with a catastrophic 5-meter scenario. This allows users to manage and meet their own planning horizons and specify degrees of risk tolerance.

To ensure that the modeling results meet the needs of the coastal communities it serves, the USGS has



Patrick Barnard (right) discusses some of the initial projections for Venice and Marina del Rey with City of Los Angeles planning officials at a recent AdaptLA meeting, cosponsored by the City of Santa Monica and USC Sea Grant Program. Photo credit: Holly Rindge

been working with a diverse group of partners and stakeholders to support the development of climate change impact plans through the Our Coast, Our Future (OCOF) program (<http://ourcoastourfuture.org>). The OCOF is a partnership among USGS, Point Blue Conservation Science, Greater Farallones National Marine Sanctuary, NOAA's Office for Coastal Management, National Estuarine Research Reserve System, Bay Area Ecosystems Climate Change Consortium, NPS, and Ecosystem-Based Management Tools Network. By working closely with Point Blue Conservation Science to develop the OCOF website and flood map, USGS is delivering tools and information that can inform California coastal communities about managing coastal flooding risks across the California coast. The OCOF web resources provide a user-friendly format in which coastal professionals and stakeholders are able to access and use information from the CoSMoS model for short- and long-term climate change planning.

To date, OCOF has directly served 14 San Francisco Bay Area communities/counties by supporting climate adaptation planning projects. Both CoSMoS and OCOF are recognized as leading tools and sources of information for short- and long-term planning by California State agencies, such as the California State Coastal Conservancy, California Coastal Commission, California DOT, and California's Office of Emergency Services. The CoSMoS results are also being used by

researchers at University of California, Berkeley and other local universities to identify vulnerability at finer scales for use by planners, emergency personnel, and natural-resource managers.

Earlier this year, the CoSMoS team was honored with the 2016 Point Blue Outstanding Partner Award. Accepting on behalf of the CoSMoS team, Barnard noted, "Working with Point Blue and all of our partners throughout the S.F. Bay Area has helped our group better understand what kind of information coastal communities need to prepare for natural hazards today and with climate change. We are honored to have received this tremendous accolade from Point Blue Conservation Science."

In 2014, the CoSMoS team began developing projections for southern California, from Santa Barbara to the United States/Mexico border. Results from this modeling will be released in fall 2016. Following the OCOF example from northern California, the CoSMoS team has established partners throughout southern California, such as the University of Southern California's (USC) Sea Grant Program, AdaptLA, and San Diego Regional Climate Collaborative, to engage coastal communities and fine-tune model projections and products to meet their needs. New work along the central coast of California will begin in winter 2017, which will lead to methodologically consistent coverage of nearly all the California coastline.

## River Herring Return to Saugatucket River

By Samantha Spiece (DOI)

For the first time in decades, during the 2016 spring migration, tens of thousands of river herring were able to migrate up Rhode Island's Saugatucket River without the help of humans lifting them over a dam.

River herring are born in freshwater ponds and lakes and then swim out to sea where they spend years growing to adulthood before returning to their birthplace to spawn. Unfortunately, for many years, river herring migration routes have been blocked along the Saugatucket River, where dams and mills stop the natural follow of water, serving as barriers between river herring and the freshwater lakes they need to reproduce. Over time, disruptions in migration have drastically reduced river herring populations. This is unfortunate for other species, such as otters, ospreys, and striped bass that rely on river herring as a primary food source.

One way to restore the food chain and bring back the fish is to help fish get

around the barriers by building fish ladders. Settlement funds from the 1996 North Cape oil spill off South Kingstown combined with financing through a host of Federal, State, and private partnerships provided \$772,000 to improve fish passage at the three barriers. USFWS staff from Fish and Aquatic Conservation (Bryan Sojkowski), Wildlife and Sport Fish Restoration (Colleen Sculley), and Ecological Services (Molly Sperduto) collaborated to provide technical assistance and funding for the effort. The new fish ladders make it easier for the river herring to navigate their way from the ocean to these important inland breeding areas.

For more information: <http://ripr.org/post/fishways-improved-along-saugatucket-river-wakefield>

<http://www.providencejournal.com/news/20160520/south-kingstown-fish-ladder-helps-herring-return-to-spawning-grounds>

<https://www.fws.gov/ecological-services/highlights/06132016.html>

<http://www.dem.ri.gov/news/2016/pr/0516161.htm>

## Hughesville Dam Removal—Improving the Environment and Human Safety

By Cathy Marion (USFWS)

On September 8, 2016, DOI Secretary Sally Jewell joined Federal, State, and local partners to celebrate the \$1.5 million Hughesville Dam removal project on the Musconetcong River in Warren and Hunterdon Counties, New Jersey. Located 3.5 miles upstream from the confluence with the Delaware River, the Hughesville Dam—18 feet tall and 150 feet wide—was built in 1889 to generate hydropower for local paper production but has not been in operation since 1999.

Secretary Jewell's visit was organized to highlight efforts by the Obama administration to work with local governments and private dam owners to remove obsolete dams. Functioning dams are intended to store and divert water, processes that can provide humans with benefits, such as drinking water, hydropower, irrigation, and flood control. However, the vast majority of dams in the United States are aging and obsolete, no longer serving the purpose that they were built to provide decades or centuries ago.

The cost of repairing and maintaining obsolete dams can be substantial and is often more expensive than removal. Additionally, the environmental costs of dams are high. Dams fundamentally alter rivers by blocking and slowing the flow of water, and they degrade water quality by increasing water temperature, increasing nutrients and algal blooms, and retaining sediments and environmental contaminants. Many fish and other aquatic species are sensitive to the habitat changes caused by dams. As a result, we often see decreases in resident fishes in dammed rivers and decreases in migratory fishes that are physically blocked from their historic spawning and rearing grounds. The

*See Hughesville Dam Removal page 19*



This educational sign at the Main Street fish ladder in Wakefield, Rhode Island, illustrates how fish ladders work to connect fish habitats that are bisected by dam structures. Photo credit: NOAA

*Hughesville Dam Removal continued from page 18*



Secretary Jewell visited the Hughesville Dam removal site in September 2016. Photo credit: Tami A. Heilemann, DOI

Hughesville Dam removal will permanently open up 9 river miles of habitat for migratory fish species, such as American eel, American shad, and river herring, and will generally improve water quality and habitat conditions for numerous resident fish species.

In addition to ecological benefits, the Hughesville Dam removal will help ensure the safety and well-being of people living in nearby communities by reducing the risk of flooding. It is projected that the Hughesville Dam removal has the potential to reduce local flood events by 1 to nearly 10 feet. Furthermore, the removal will improve water quality for humans and wildlife; reduce drowning risks associated with low-head dam hydraulics; and improve fishing, boating, and other recreational activities.

The Hughesville Dam will be the fifth dam removed on the Musconetcong River. The removals are part of a larger partner-based effort to restore the 42-mile Musconetcong River—designated as a “Wild and Scenic River”—to a free-flowing state. Funding for the Hughesville Dam removal comes from settlement funds under the Natural Resources Damage Assessment and Restoration Program for the Combe Fill South Landfill Superfund Site and Federal funds from the Hurricane Sandy Disaster Relief Appropriations Act of 2013.

## National Parks for Marine Science Education

By Gary Bremen (NPS)

One of Biscayne National Park’s main goals for celebrating the Centennial of the NPS was to more fully integrate the agency’s resources into marine science classrooms nationwide. Park staff worked to increase the agency’s presence at the National Marine Educators Association’s annual conference where some 500 teachers, aquarium staffs, and informal educators from parks and nature centers gather each summer. The effort started at 2015’s conference in Newport, Rhode Island, with a small sponsorship and grew considerably when NPS became a major sponsor of the 2016 conference in Orlando with financial support from the NPS’s Water Resources Division and logistical support from the Ocean and Coastal Resources Branch.

Staff from four national parks attended the conference and presented on topics like climate change, invasive species, citizen science light monitoring in sea turtle nesting areas, and sex underwater. Park volunteers staffed a booth sharing information about the 88 ocean, Great Lakes and coastal parks. A conference highlight was the keynote Stegner Lecture, which annually features an inspirational closing to 3 days of concurrent sessions. This year’s lecture used storytelling and music to highlight some of the many reasons national parks matter—not simply for protecting wildlife, scenery, and history, but also for building bonds of connection among families and friends. A nighttime field trip to Canaveral National Seashore was almost rained out, but those who went got to witness five turtles coming ashore to nest.

The centennial is nearly over, but the groundwork for future participation is set. Other projects generated at the conference are in the works, including



NPS Park Rangers told compelling stories and even played live music on the theme of “why parks matter” as part of the annual Stegner Lecture. Photo credit: Gary Bremen, NPS



Biscayne National Park volunteers staffed a booth to share information about opportunities in the 88 ocean, Great Lakes, and coastal parks. Photo credit: NPS

one with elementary schools, universities, and national parks in Florida and the Netherlands to release data-gathering miniboats that circumnavigate the Atlantic Ocean, and participation in the 2016 Youth Ocean Conservation Summit (held on December 10, 2016, <http://youth-oceanconservationsummit.weebly.com/2016-summit.html>) included not only the summit itself but also follow-up field trips to Biscayne National Park in the spring of 2017.

## Chesapeake Bay Science

The Chesapeake Bay is our Nation's largest estuary with an enormous watershed extending from New York to Virginia. The continued restoration and protection of this national resource is a priority for designated Federal and State agencies and non-governmental stakeholders through the Chesapeake Bay Program (CBP). Given the ecologic and economic importance of the Chesapeake Bay, in 2009, President Obama issued an Executive Order for increased Federal leadership to restore and protect the Bay and its watershed.



The Chesapeake Bay watershed spans six States and the District of Columbia. Image credit: EPA

DOI is an important partner in this effort, with USGS and USFWS providing resource science and management guidance. The USGS has the critical role of providing scientific information for improved understanding and management of the Bay ecosystem and working with Federal, State, and academic science partners to provide research, assessment, monitoring, and modeling. *See related story, page 21.*

USGS Chesapeake Bay science activities are grouped under four major topics:

- Land and Climate Change—Forecast and assess impacts of climate and land-use change.
- Water Quality—Assess and explain water-quality conditions and change.
- Fish, Wildlife, and Habitats—Document the status and change of the health of fish, wildlife, and critical habitats.
- Decision Support—Promote adaptive management and decision support to enhance ecosystem management.

## Intersex Fish Characteristics are Linked to Water Quality

USGS fish biologist, Vicki Blazer, brought her team to the Shenandoah River in Front Royal, Virginia, to collect and study smallmouth bass (*Micropterus dolomieu*), a species in which intersex characteristics have been linked to chemical contaminants in the Chesapeake Bay region.

Intersex conditions occur when exposure to chemicals disrupts the hormonal systems of an animal, leading to the presence of both male and female characteristics in an animal that should exhibit the characteristics of just one sex in its lifetime. In the case of smallmouth bass, male intersex fish are found with immature eggs in their testes, which indicates exposure to estrogenic and antiandrogenic chemicals.

“The sources of estrogenic chemicals are most likely complex mixtures from both agricultural sources, such as animal wastes, pesticides and herbicides, and human sources from wastewater treatment plant effluent and other sewage discharges,” says Blazer, who first discovered intersex characteristics in fish while studying fish kills in the South Branch of the Potomac River and the Shenandoah River.

## Science Seminar on Nutrients and Suspended Sediment Loads

USGS scientist Doug Moyer delivered the seminar, “Nitrogen, Phosphorus and Suspended Sediment Loads and Trends Measured at the Chesapeake Bay Non-Tidal Network Stations,” as part of the University of Maryland’s Center for Environmental Science Integration and Application Network (IAN) Seminar Series.

You can tune into the University of Maryland’s Center for Environmental Science IAN Seminar Series and find Doug Moyer’s presentation here: [http://ian.umces.edu/seminarseries/seminar/117/usgs\\_watershed\\_monitoring\\_results\\_2016-02-25/](http://ian.umces.edu/seminarseries/seminar/117/usgs_watershed_monitoring_results_2016-02-25/)

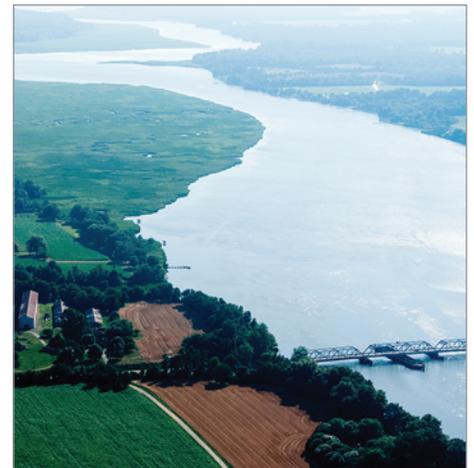
The goal of the IAN Seminar Series is to provide concise, thought-provoking ideas related to Chesapeake Bay science and management. Short presentations (less than 15 minutes) are immediately followed by a lunchtime discussion of the presentation. Each discussion is summarized and posted along with a PDF version of the seminar slides. The seminars also are captured on video and posted under a Creative Commons license so they can be freely shared.

Learn more about Chesapeake Bay science:

<http://chesapeake.usgs.gov/>

<http://www.chesapeakebay.net/>

<https://www.whitehouse.gov/the-press-office/executive-order-chesapeake-bay-protection-and-restoration>



The Choptank River flows past Dover Bridge in Easton, Maryland, on June 18, 2010. This aerial view shows a large stretch of the river lined by trees, wetlands, and farms. Photo credit: Matt Rath, CBP

## Watch the Video—Bay 101: Intersex Fish

Watch here: [http://www.chesapeakebay.net/videos/clip/bay\\_101\\_intersex\\_fish](http://www.chesapeakebay.net/videos/clip/bay_101_intersex_fish).



Video credit: Chesapeake Bay Program

## Restoring Wetlands on Agricultural Lands within the Chesapeake Watershed

By Jennifer Greiner (USFWS)

Healthy wetlands are vital to a healthy Chesapeake Bay. Located where land meets water, wetlands trap polluted runoff and slow the flow of nutrients, sediment, and chemical contaminants into rivers, streams and the Bay. By soaking up storm water and dampening storm surges, wetlands slow the erosion of shorelines and protect properties from floods. Wetlands also provide critical habitat for fish, birds, mammals, and invertebrates, and support recreational fishing and hunting across the watershed. Land purchases and conservation easements can protect wetland habitat. The removal of invasive species—like phragmites, purple loosestrife, or nutria—can help rehabilitate degraded wetlands.

Between 2010 and 2014, 6,191 acres of wetlands were established, rehabilitated, or reestablished on agricultural lands in the Chesapeake Bay watershed.

In 2014, the CBP adopted a goal to create or reestablish 85,000 acres of

tidal and nontidal wetlands by 2025. This goal is based on the wetland restoration targets outlined in the Watershed Implementation Plans that will help jurisdictions meet the goals of the Bay’s “pollution diet,” or total maximum daily load. Under this target, 83,000 acres of tidal and nontidal wetlands should be created or reestablished on agricultural lands. So far, just more than 7 percent of the goal has been achieved for the wetlands on agricultural lands. *See related story, page 20.*

Read more: [http://www.chesapeakebay.net/indicators/indicator/restoring\\_wetlands](http://www.chesapeakebay.net/indicators/indicator/restoring_wetlands)



**At left:** Microphotograph of *Schizothrix* from Water Conservation Area 3A/B in the Everglades, Florida. The living cells are illuminated with ultraviolet epifluorescence microscopy; pigments in the cells glow pinkish lavender, and the mucilaginous sheath material is blue, indicating the presence of calcium carbonate. **At right:** Calcium-rich sediments (marls) are illuminated using ultraviolet epifluorescence microscopy in this microphotograph of a sample from Water Conservation Area 3A/B in the Everglades, Florida. Photo credits: Barry H. Rosen, USGS

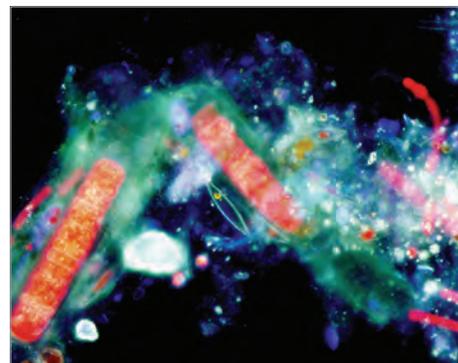
## Microscopic Organisms of the Everglades

By Barry H. Rosen (USGS)

A new report, “Catalog of Microscopic Organisms of the Everglades Part 1: The Cyanobacteria,” is part 1 in a series that describes microscopic organisms identified in the shallow wetland areas of the Everglades. The first report describes the cyanobacteria and includes a suite of images with the most current taxonomic treatment of each taxon. Most of the images are of live organisms, allowing their true color to be represented. A number of newly discovered species are illustrated that have not been described before.

The resource will be helpful to other researchers looking at these organisms in subtropical wetlands worldwide. It is anticipated that these images will facilitate current and future ecological studies on the Everglades, such as understanding food-web dynamics, sediment formation and accumulation, the effects of nutrients and flow, and climate change—all of which are needed to effectively manage water resources in the region. *See related story, page 7.*

Read the report: <http://dx.doi.org/10.3133/ofr20161114>



## Transfer of Submerged Lands to CNMI

By Randy Bowman (DOI)



USCRTF co-chairs Lori Faeth (DOI), left, and Eileen Sobeck (NOAA), far right, with Governor Ralph Deleon Guerrero Torres (CNMI) after the signing of the agreement on September 22, 2016, in CNMI. Photo credit: Erica Wales, DOI

After the business meeting of the USCRTF in Saipan on September 22, 2016, co-chairs Lori Faeth (DOI) and Eileen Sobeck (NOAA) signed on behalf of their agencies an agreement with Governor Ralph Deleon Guerrero Torres of the Commonwealth of the Northern Mariana Islands (CNMI) for the coordination of resource management on submerged lands within the Islands Unit of the Marianas Trench Marine National Monument, the next-to-last step in the process of transferring those submerged lands to CNMI’s jurisdiction. *See related story, page 22.*

Read the press release: <https://www.doi.gov/news/pressreleases/us-to-convey-title-for-submerged-lands-to-commonwealth-of-the-northern-mariana-islands>



During a scientific field trip associated with the 13th International Coral Reef Symposium, tour participants used SCUBA to explore the north side of Molokini Crater near Maui, HI to observe the area where a large coral bleaching event occurred during the El Niño event of 2015–16. Photo credit: Curt Storlazzi, USGS

## DOI Experts Join International Coral Reefs Community in Hawai‘i

By Amy West (USGS)

For a coral reef symposium that happens just once every 4 years, Oahu, Hawai‘i, is also the site for a variety of research done by USGS and other DOI partners.

The 13th International Coral Reef Symposium (ICRS), which has been held in the United States only three times during its four decades of existence, drew the largest attendance of any previous symposium—nearly 2,500 attendees representing 90 countries. Participants included a mix of coral reef scientists, resource managers, policy personnel, and even makeup manufacturers and heads of island nations. Topics of talks and posters ranged from potential damage to reefs by sunscreens, to how communities

manage their coastal areas, to the threats from bleaching, viruses, and pollution.

USGS scientist Curt Storlazzi explained that the meeting “twenty years ago was all science,” and now it includes policy, management, and even social media. “There was clearly a shift,” said USGS scientist Christina Kellogg, who noticed the difference from the ICRS meeting held in Florida just 8 years ago. For instance, “microbiology was a minor component of it in 2008,” said Kellogg. “But this meeting was crammed with microbiology!”

Several scientific field trips associated with the conference allowed attendees the chance to dive into some “science in action.” Storlazzi, along with colleagues from Hawai‘i’s Department of Aquatic Resources, the University of Hawai‘i, and NOAA, co-led a 3-day, 4-night field trip titled, “Managing Maui’s MPA’s from Watersheds to Co-Management” along West Maui. The

participants included scientists, professors and students.

They visited Olowalu, a place the USGS determined to be a vital source of coral larvae for West Maui and adjacent islands in Hawai‘i. Locals used USGS science to protect this important reef from a large proposed development project. Then the group dove in one of Hawai‘i’s oldest marine protected areas at Molokini to witness the effect of 2015–16 coral bleaching, which hit Olowalu as well. The tour also visited coral researchers at the island’s aquarium: the Maui Ocean Center. The final visit to two sites that have been areas of concern for the U.S. Coral Reef Task Force (USCRTF)—Honolua Bay and Kahekili, both now State of Hawai‘i marine protected areas—focused on the deleterious effects on corals from detrimental land-use activities.

Members of DOI played a prominent role in this coral reef meeting. USGS scientists chaired several meeting sessions; scientists from other DOI bureaus, such as NPS and USFWS, also participated by giving talks or chairing science sessions. As it was also the 10th anniversary of the Papahānaumokuākea Marine National Monument (<http://www.papahānaumokuākea.gov/>), managed by both USFWS and NOAA, the meeting helped highlight the threats to these coral ecosystems and benefits in protecting them. *See related story, page 1.*

## Hafa Adai! from the Mariana Islands

### News from the U.S. Coral Reef Task Force

By Cheryl Fossani (DOI)

In September 2016, the USCRTF held its 36th meeting in the Mariana Islands. This meeting brought together stakeholders and partners to address diverse issues affecting the health of coral reefs in several watersheds in Guam and the Northern Mariana Islands and the communities that rely on them. Governor Torres of the Commonwealth of the Northern Mariana Islands opened the meeting with remarks welcoming the USCRTF to Saipan and expressing the importance of the partnerships formed and accomplishments made through the efforts of the USCRTF. USCRTF Co-Chairs Lori Faeth, DOI's Deputy Assistant Secretary for Policy and International Affairs, and Eileen Sobeck, Assistant Administrator for NOAA National Marine Fisheries Service, also provided remarks about 2016 being a benchmark year for ocean and coral reef conservation.

With more than 200 registered participants, this year's USCRTF meeting was a great success! During the business meeting, the USCRTF heard several presentations that highlighted regional watershed management and coral reef conservation and restoration efforts, as well as coral reef challenges that pose threats on a global scale. Dr. David Burdick, from the Guam Coral Reef Monitoring Program, Dr. Peter Houk, from the University of Guam, and Mr. Marlowe Sabater, from the Western Pacific Regional Fisheries Management Council, informed the USCRTF of the status of coral reefs in the region; and Dr. Charles Birkeland, from the University of Hawai'i, gave a presentation about the future that coral reefs face with climate change and changes in ocean chemistry.



Members of the USCRTF at the business meeting in Guam. Photo credit: Trevor Boykin, University of Guam Sea Grant Program



Bamboo is an invasive species in Guam and causes problems for watersheds, including flooding when the clumps of bamboo fall and dam the river. Watershed workshop participants visited the Manell-Geus watershed and saw firsthand the issue of invasive bamboo and how Guam is working to find solutions to remove the invasive species. Photo credit: Erica Wales, DOI



U.S. Coral Reef Task Force Co-chairs Lori Faeth (DOI) and Eileen Sobeck (NOAA) are accompanied by staff during a visit to the War in the Pacific National Historical Park. Photo credit: Erica Wales, DOI

This year's USCRTF meeting included several site visits and workshops to address coral reef conservation issues specific to the northern Pacific Islands. The USCRTF Watershed Working Group convened a workshop that highlighted issues and management practices associated with sedimentation and stormwater runoff. Coral reefs ecosystems in the Pacific Islands are heavily impacted by sedimentation from many sources, including unpaved roads, unstable stream banks, and large areas of bare ground. During the Watershed Workshop, experts shared presentations and led discussions that focused on successful sediment control strategies and how they can be used locally to help stabilize sediments along stream banks and already entrained in stream channels. After the workshop, participants visited the Manell-Geus watershed to witness the challenges contributing to sedimentation and the mitigation projects currently underway. *See related story, page 22.*

While visiting, Lori Faeth met with National Park Superintendents, USFWS Refuge Managers, and staff, and toured the War in the Pacific National Historical Park and the Guam Wildlife Refuge. This visit offered an opportunity to discuss the local issues affecting coral reef health and how these conservation sites are working to manage and mitigate those issues.

Learn more: <http://www.coralreef.gov/>

## Collaboratives in the Great Lakes Basin—Joining Forces for a Collective Impact

By Josh Miller (USGS)

The Great Lakes ecosystem is divided by an international boundary, eight State boundaries, Tribal and First-Nations lands and jurisdictions, and countless local government boundaries. Though still a productive and stunningly beautiful ecosystem, the region has undergone dramatic changes in the past 200 years as a result of an industrial economy, urbanization, invasive species, and commercial fishing. The complexity of jurisdictions, provision of substantial ecosystem services to innumerable stakeholders (such as the \$7 billion fishery), and history of environmental change have made for an extremely challenging system for coastal, near-shore, and offshore natural resource managers.

USGS scientists in the Great Lakes region help managers address large-scale, challenging issues by providing Federal leadership in drawing partners together across jurisdictions and connecting science to management. The USGS Great Lakes Science Center has done this in recent years by establishing formal “collaboratives” that bring together scientists and managers from public, private, and academic sectors on both sides of the international border. These collaboratives rest upon the key elements of “collective impact” as identified by John Kania and Mark Kramer in 2011. The collective impact approach emerged as a method for addressing complex societal problems like childhood obesity, education reform, and restoration of urban watersheds in contrast to “isolated impact,” where one actor seeks to solve a complex problem alone or in competition with others. The Great Lakes collaboratives have been built



Dr. Mary Anne Evans, USGS limnologist and algal ecologist, studies the ecology of HABs in the shallow, western basin of Lake Erie and other Great Lakes bays. These HABs have gained increasing attention across the basin in recent years. The issue requires collaboration across vast areas because it spans from farm fields and urbanized landscapes to coastal and open-water ecosystems. Photo credit: Josh Miller, USGS

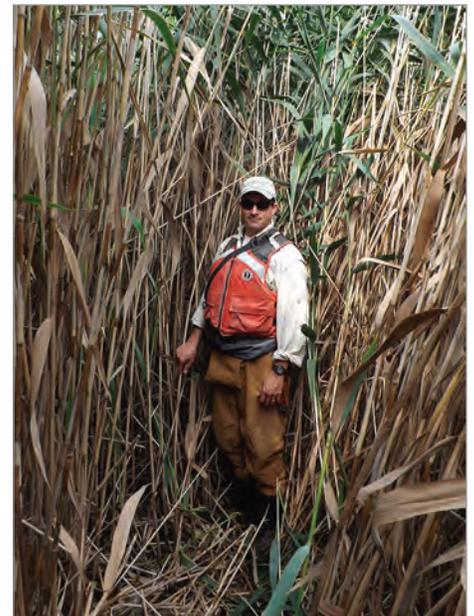
to address highly complex, natural resource management issues.

One of the issues in the region is the management and prevention of the spread of invasive *Phragmites australis*, or common reed, in coastal and inland wetlands. In partnership with the Great Lakes Commission (a binational and inter-State organization that is the crucial backbone-support role for all the Great Lakes collaborations), the USGS established the Great Lakes Phragmites Collaborative (<http://greatlakesphragmites.net/>), which draws together land managers from across the Great Lakes basin who are combating the invasive plant. The goal is to generate more coordinated, efficient, and strategic approaches to research, management, and restoration across the numerous boundaries within the Great Lakes basin. The binational collaborative serves as a communication conduit to facilitate access to information and resources, encourage technology transfer, and build networks among land managers,

governmental agencies, academic institutions, and private landowners.

This fall, the collaborative started the Phragmites Adaptive Management Framework, which will connect land managers and scientists across the basin, to facilitate a shift in management strategy that will, over time, refine and improve best management practices for controlling invasive *Phragmites australis* in a suite of site conditions throughout the Great Lakes basin. Watch a video on the Phragmites Adaptive Management Framework available on YouTube: [https://youtu.be/UChpKGaZN\\_M](https://youtu.be/UChpKGaZN_M)

A second large-scale, complex societal issue in the region is the reemergence of harmful algal blooms (HABs) in some nearshore areas and bays in the Great Lakes basin. These HABs, which can be toxic to wildlife, pets, and humans, are increasingly affecting coastal communities and their economies by fouling beaches, inhibiting recreational uses, and threatening



Dr. Kurt Kowalski, a USGS plant ecologist, studies the biology, ecology, and approaches to management of invasive *Phragmites australis*. The invasive plant can reach high densities and enormous heights, substantially affecting the value of wetlands and shoreline property. Collaboration among land owners and managers is critical. Photo credit: USGS

See Great Lakes page 29

*Great Lakes continued from page 28*

public safety. In August 2014, an HAB in Lake Erie's western basin caused local officials to issue a temporary "do not drink the water" advisory for the municipal water supply to more than 400,000 residents of Toledo, Ohio.

That same year, USGS helped to form the Great Lakes HABs Collaboratory. The collaboratory seeks to create a collective laboratory ("co-laboratory") that enables science-based information sharing among scientists and between scientists and decisions makers working on HABs in the Great Lakes. The collaboratory also provides a network for developing a mutual understanding of current science and science needs, strategies for transferring technology, and opportunities for receiving feedback from managers.

The collaborative approach has proven to be an effective means of drawing together scientists and managers at multiple scales to address complex coastal, nearshore, and offshore issues that cross jurisdictions and compromise the resilience of coastal communities. In 2014, Secretary Sally Jewell awarded the St. Clair-Detroit River System Initiative the prestigious Partners in Conservation award. This initiative began as the Huron-Erie Corridor Initiative, working to address fish habitat impairments under the Great Lakes Water Quality

Agreement, and has grown into a vast group of Federal, State, local, Tribal, provincial, First Nations, private, non-profit, and academic stakeholders with a shared vision statement and common agenda, restoring a major, bi-national connecting channel and world-class river. The collaborative and collective impact approach is beginning to work its way from the Great Lakes region across the Nation among USGS and partner agencies and organizations, connecting science to management to address complex issues related to natural resources.

Learn more online:

The USGS Great Lakes Science Center Web site: <http://www.glsc.usgs.gov/>  
St. Clair-Detroit River System: <http://scdrs.org/wp-content/uploads/2016/01/SCDRS-FactSheet-Final-1.6.16.pdf>

Great Lakes Commission: <http://glc.org/>

Great Lakes HABs Collaboratory: <http://glc.org/projects/water-quality/habs/>

Learn more about collective impact: [http://ssir.org/articles/entry/collective\\_impact](http://ssir.org/articles/entry/collective_impact)

Read more: <https://www.usgs.gov/news/huron-erie-corridor-initiative-partners-receive-prestigious-secretary-interior-honor>

## BOEM's Marine Archaeology Role

### The 50th Anniversary of the National Historic Preservation Act

By Melanie Damour (BOEM)

BOEM celebrates the 50th anniversary of the National Historic Preservation Act (NHPA) in October and highlights its Historic Preservation program in the July/August/September 2016 issue of their quarterly journal, "BOEM Ocean Science."

BOEM, as a regulatory agency with jurisdiction in Federal waters of the U.S. OCS, is responsible for oversight of conventional and renewable energy development and marine minerals extraction while complying with Federal laws enacted to protect the environment.

Part of BOEM's responsibility, as mandated by the NHPA, is to properly consider the potential impacts of BOEM-permitted activities on cultural resources, including historic shipwrecks, submerged indigenous archaeological sites, and Traditional Cultural Properties. BOEM's Environmental Studies Program (ESP), initiated in 1973 under Section 20 of the OCS Lands Act (1953), acquires the scientific information needed to inform BOEM's decision making. Through the ESP, BOEM has funded more than \$14 million toward cultural resource-related studies across all its OCS regions (Atlantic, Gulf of Mexico, Pacific, and Alaska). Regional inventory studies completed in the 1970s and 1980s formed the cornerstone of BOEM's Historic Preservation Program. Recent and ongoing studies continue to inform the program's best management practices for cultural resource management on the OCS. Several of these key cultural resources studies are highlighted in the new issue of "BOEM Ocean Science."

<http://www.boem.gov/Ocean-Science/>



In 2014, Secretary Sally Jewell (center) presented the prestigious Partners in Conservation award to the partners of the Huron-Erie Corridor Initiative (subsequently renamed the St. Clair-Detroit River System Initiative). Photo credit: DOI

## “Monumental” Changes in Ocean Protection

By Lauren Wenzel (NOAA)

In August 2016, just before the world’s conservation leaders met in Hawai‘i for the World Conservation Congress (WCC), President Obama announced the increase of the Papahānaumokuākea Marine National Monument. The expansion was motivated by a desire to increase the resilience of marine life to climate impacts, as was the creation of the new Northeast Canyons and Seamounts Monument off the Atlantic coast in September. *See related stories, page 1.*

The United States now has 26 percent of its waters (from 0 to 200 nautical miles) protected through MPAs. These include not only special places far offshore like Papahānamokuākea, but also the many national parks, refuges, marine sanctuaries, and similar State-managed programs that protect marine life across the country. Joining many other coastal countries, the United States has pledged to protect 10 percent of its oceans (including coastal waters and the Great Lakes) in MPAs to conserve marine biodiversity. Although the spatial part of this target has been met, challenges remain.

First, many scientists believe that the 10 percent target is not enough to protect biodiversity, leading to a resolution at the WCC calling for protection of 30 percent of the world’s ocean. Also, science-based global targets



Illustration credit: Cole Goco

emphasize that MPAs should be organized into well-managed, ecologically connected networks. Networks allow for marine species to move through different habitats they need at different life stages. They can also increase the “spillover” of young and adults of fished species into adjacent areas where fishermen can benefit. But ecological networks are still a fairly new idea in the United States, best seen in California’s statewide network of MPAs. Second, MPA networks must be well managed to achieve their goals, including having management plans and consistent resources to implement them. Many MPA programs are increasingly partnering with outside organizations to help bring additional resources to support activities, such as education, monitoring, and research.

The Marine Protected Areas Federal Advisory Committee is currently working on two sets of recommendations to address these issues. One report will focus on how MPA managers can apply tools and guidelines to incorporate spatial ecological connectivity when managing existing MPAs and when designing new MPA networks. The second report outlines options for tapping into external sources of funding for MPA management, including grants, corporate donations, and other sources. Both sets of recommendations were completed in December 2016.

Read about the Papahānaumokuākea expansion: [http://www.papahanau-mokuakea.gov/news/expansion\\_announcement.html](http://www.papahanau-mokuakea.gov/news/expansion_announcement.html)

Read about the status of MPAs: <http://marineprotectedareas.noaa.gov/about-mpas/status-of-usa-mpas-2016.html>

WCC resolution: <https://portals.iucn.org/congress/motion/053>

California’s MPA network: <https://www.wildlife.ca.gov/conservation/marine/mpas/network>

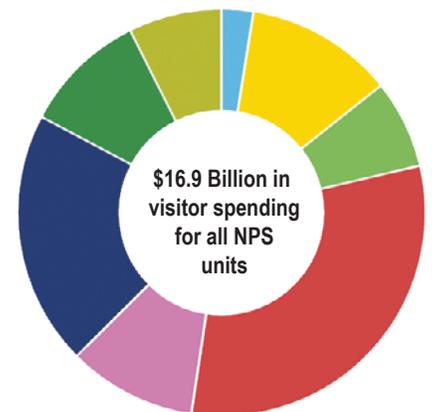
The Marine Protected Areas Federal Advisory Committee: <http://marine-protectedareas.noaa.gov/fac/>

## Our Valuable Ocean and Coastal Parks

In June 2016, NPS published the annual Economic Report for 2015. In 2015, park visitors spent an estimated \$16.9 billion in local gateway regions while visiting NPS lands across the country. These expenditures supported a total of 295,300 jobs, \$11.1 billion in labor income, \$18.4 billion in value added, and \$32 billion in economic output in the national economy. Learn more about park visitor spending effects: <https://www.nps.gov/subjects/socialscience/vse.htm>

For our 88 OGLC parks, this benefit translates to:

- Visitor spending: \$5,026,054
- Jobs: 72,237
- Visits: 89,212,379



Directly affected sectors

- Camping
- Gas
- Groceries
- Hotels
- Recreation industries
- Restaurants
- Retail
- Transportation

NPS visitor spending in 2015. Image credit: NPS

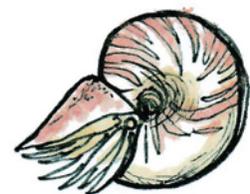


Illustration credit: Cole Goco

## Enhancing Exchange across the Ocean, Great Lakes and Coastal Team

By Liza Johnson (DOI)

In June 2016, after nearly 6 years working together to implement the National Ocean Policy, representatives from DOI's OGLC offices and bureaus met in Shepherdstown, West Virginia, for a strategic planning workshop. The group welcomed new team members from across DOI and included people from almost all regions and with different types of expertise, ranging from managers and policy experts to scientists and communicators. They gathered to celebrate accomplishments, talk about coordinating priorities and activities, and begin developing a strategy for OGLC work going forward into the next 5 years. DOI's previous Principal Deputy Assistant Secretary, Kris Sarri, gave opening remarks and underscored the importance of developing a strategy for a coordinated effort to implement OGLC actions through internal and external partnerships. Retreat participants left with a renewed sense of vision, commitment, a refreshed network, and great information they will use going forward. The team looks forward to sharing this progress in future issues of *NEWSWAVE*.



BOEM's July/August/September 2016 issue. See related stories, pages 12 and 25.



It takes a large group to coordinate the diverse ocean, Great Lakes and coastal (OGLC) activities across the DOI. These are most of the participants from the workshop who represent many more across the nation contributing to DOI's blue portfolio. Photo credit: Susan Goodwin, DOI

### Regional Contacts

DOI leadership supports State-led regional ocean partnerships (ROPs), as well as Federal-State-Tribal marine planning partnerships called regional planning bodies (RPBs). Five geographic regions now have operational RPBs: Northeast, Mid-Atlantic, Caribbean, the Pacific Islands and the West Coast.

#### Alaska/Arctic

**Jim Kendall (BOEM)**  
(Alaska)

#### Caribbean

**Sherri Fields (NPS)**  
(Puerto Rico, U.S. Virgin Islands)  
ROP: <http://caribbean-mp.org/en/>

#### Great Lakes

**Phyllis Ellin (NPS)**  
**Charlie Wooley (USFWS)**  
(Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin)  
Great Lakes Research Initiative:  
<http://www.epa.gov/glnpo/glri/>  
ROP: <http://www.cglg.org/>

#### Gulf of Maine

**Walter Barnhardt (USGS)**  
(Maine, New Hampshire, Massachusetts, New Brunswick, Nova Scotia)  
ROP: <http://www.gulfofmaine.org/2/>

#### Gulf of Mexico

**Linda Walker (USFWS)**  
(Alabama, Florida, Louisiana, Mississippi, Texas)  
ROP: <http://www.gulfofmexicoalliance.org>

#### Mid-Atlantic

**Bob LaBelle (BOEM)**  
**Leann Bullin (BOEM)**  
(New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia)  
RPB: <http://www.boem.gov/Mid-Atlantic-Regional-Planning-Body/>  
ROP: <http://midatlanticocean.org>

#### Northeast

**Bob LaBelle (BOEM)**  
**Leann Bullin (BOEM)**  
(Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut)  
RPB: <http://neocanplanning.org/>  
ROP: <http://northeastoceancouncil.org/>

#### Pacific Islands

**Matt Brown (USFWS)**  
(American Samoa, Commonwealth of the Northern Mariana Islands, Guam, Hawai'i)  
RPB: <http://www.PacificIslandsRPB.org>

#### South Atlantic

**Eric Strom (USGS)**  
(North Carolina, South Carolina, Georgia, Florida)  
ROP: <http://southatlanticalliance.org/>

#### West Coast

**Joan Barminski (BOEM)**  
(California, Washington, Oregon)  
RPB: <http://www.westcoastmarineplanning.org>  
ROP: <http://www.westcoastoceans.org>



Illustration credit: Cole Goco

## Protecting Marine Mammals— A Quick Reference Guide

<https://www.fws.gov/international/animals/marine-mammals.html>

### “Marine Mammal Policy” Fact Sheet:

<https://www.fws.gov/international/pdf/factsheet-marine-mammal-policy-2013.pdf>

## The Surfing Bison



By Erica Wales (DOI)

Marine mammals (whales, dolphins, porpoises, seals, sea lions, walrus, polar bears, sea and marine otters, dugongs, and manatees) may vary in taxa, habitat, and behavior, but they all share one thing in common—dependency on the ocean for survival. These mammals are a balancing factor in marine ecosystems, helping to steady the food chain and control prey populations. Because of habitat loss, by-catch, and exploitation, many of these species are in danger of survival and are legally protected under various U.S. and international laws to aid in their survival. DOI’s USFWS and NOAA’s National Marine Fisheries Service (NMFS) share responsibility in the protection, conservation, and management of marine mammals. Below are descriptions and links to learn more.

### Marine Mammal Protection Act

**(MMPA)**—The MMPA was enacted in 1972 and prohibits, with a few exceptions, the “taking” of marine mammals in U.S. waters and by U.S. citizens on the high seas, as well as the importation of marine mammals or products. A “take” is defined as “to harass, hunt, capture, collect, or kill, or attempt to harass, hunt, capture, collect, or kill any marine mammal.” NMFS has jurisdiction over whales, dolphins, porpoises, seals and sea lions, whereas the USFWS has jurisdiction over walrus, polar bears, sea and marine otters, dugongs, and manatees. <https://www.fws.gov/international/laws-treaties-agreements/us-conservation-laws/marine-mammal-protection-act.html>

**Endangered Species Act (ESA)**—The ESA of 1973 protects domestic and international species, and provides a framework to conserve and protect endangered and threatened species and the habitats upon which those species depend. Under the ESA, it is illegal to take (defined under

the ESA as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct”), import, export, sell or offer to sell, and possess or transport listed species. Like the MMPA, NMFS has jurisdiction over whales, dolphins, porpoises, seals, and sea lions, whereas USFWS has jurisdiction over walrus, polar bears, sea and marine otters, dugongs, and manatees. <https://www.fws.gov/international/laws-treaties-agreements/us-conservation-laws/endangered-species-act.html>

### Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

—The CITES treaty came into effect in 1975 and has the purpose of ensuring the survival of plants and animals is not threatened by international trade. USFWS is responsible for carrying out the provisions of this convention for all marine mammals protected under CITES (which includes whales, dolphins, porpoises, manatees, dugongs, seals, otters, walrus, and polar bears). <https://www.fws.gov/international/cites/index.html>

### Photos from top to bottom:

- Polar bear cubs. Photo credit: USGS
- An endangered Hawaiian monk seal in Papahānaumokuākea Marine National Monument. Photo credit: Mark Sullivan
- Walrus on ice. Photo credit: Joel Garlich-Miller, USFWS
- Sea otters. Photo credit: Kristine Sowl, USFWS

