



NEWSWAVE

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

June is Ocean Month!

Spring 2021

Q&A with Secretary Haaland in Celebration of Ocean Month

The U.S. Department of the Interior (DOI) manages millions of acres outdoors, including ocean, Great Lakes, and coastal areas. Nationwide, stewardship responsibilities extend from coastal areas to the deepest parts of the ocean floor and across the globe in insular areas.

In celebration of June as Ocean Month, we met with Secretary Deb Haaland to hear her thoughts on DOI's important role in protecting our ocean, Great Lakes, and coastal resources.

Read the story on page 3.

"Interior is wholly committed to mobilizing the next generation of Americans to help protect, conserve, and restore our public lands and waters." said Interior Secretary Deb Haaland

Funding for Tribal Youth Coastal Conservation Program

Environmental and Economic Empowerment Projects

Secretary Haaland announced the approval of nearly \$1 million for the Tribal Youth Coastal Restoration Program. Projects under this program are estimated to restore up to 1,000 acres of wildlife habitat on Tribal lands along the Gulf coast.

Read the full story on page 4.



Secretary of the Interior, Deb Haaland. Photo credit: DOI

Funds to Restore and Conserve Coastal Wetlands

See stories on pages 17 and 21



The Hawai'i Department of Land and Natural Resources, Division of Aquatic Resources, is awarded \$966,501 to restore a rare freshwater wetland system in the He'eia wetlands located on the island of O'ahu. The restoration project will increase biodiversity, opening up waterways and recreating the hydrological and vegetation conditions necessary for native birds and diadromous and estuarine fish to thrive. This test plot shows stream channel restoration through the removal of invasive vegetation. Photo credit: Leah Bremer, University of Hawai'i

Rescuing Cold-Stunned Sea Turtles

See the full story on page 8.



More than 1,000 volunteers across Texas worked together to rescue cold-stunned turtles during record low temperatures in February. Photo credit: NPS

Invasive Zebra Mussels Found in Pet Stores in 21 States

See the story on page 5



A moss ball sold in pet stores containing an invasive zebra mussel. Photo credit: USGS

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“See” and “Hear” the Sights and Sounds of Midway Atoll National Wildlife Refuge

Midway Atoll National Wildlife Refuge (NWR) is far away from the U.S. mainland and home to many plants, animals, and marine species you may never see. It is home to Wisdom the Laysan albatross (*Phoebastria immutabilis*), among other remarkable bird species, and monk seals, one of the most endangered seal species in the world. It is also a significant part of American history and culture.

The Friends of Midway Atoll NWR bring us closer to this remote place through their “Soundscapes” project. Close your eyes and listen here: <https://friendsofmidway.org/soundscapes/>

Even if you can’t visit in person, you can follow the Friends of Midway Atoll NWR’s Facebook account to connect with this remarkable place:

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



Three albatross species from left to right: Laysan, black-footed (*Phoebastria nigripes*), and short-tailed (*Phoebastria albatrus*). Photo credit: USFWS

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

Visit us online: <https://www.doi.gov/ocean/newswave>

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Q&A with Secretary Haaland

By DOI

Q: How does the stewardship of ocean and coastal resources fit into the Department's overall portfolio?

A: The responsibility to leave a livable planet for future generations would not be possible without the conservation of our ocean and coasts. The ocean plays a critical role in clean energy development and the nature-based solutions we seek to combat climate change.

Our “blue” portfolio provides tremendous economic, cultural, recreational, and biological value to the country. I am so impressed with the commitment of Bureaus and offices across the Department to uphold their stewardship responsibilities and respond to ever growing threats and complex changes to ocean, Great Lakes, and coastal resources through increased understanding, conservation, responsible use, and collaborative science-based management.

Q: Climate change presents complex challenges and threats to our ocean, Great Lakes, and coastal resources as well as the communities that depend on them. Can you tell us about some specific ways DOI is working to address them?

A: Too many members of coastal communities find themselves faced with the tough decisions to relocate or continue to face extreme storms, intense heat or sea-level rise. It's a clear indication of the devastating impacts greenhouse gases have on our ocean, Great Lakes, and coasts.

However, we also know that that the ocean absorbs heat from human-caused warming; that wetlands create natural barriers to more frequent and intense storms; and that healthy coasts help all who rely on their resources to thrive. So, we're working to make those resources more resilient by making decisions guided by science, the expertise of our career staff, innovative technologies, and Indigenous

knowledge. Our Bureaus are working incredibly hard on capturing carbon, flood mitigation, water purification, protecting valuable habitats, and restoring balance in our ecosystems.

Q: How do you see DOI empowering local organizational levels to address the new administration's priorities for COVID-19, climate, social justice, and infrastructure?

A: For generations, we've put off the transition to clean energy and now we face a climate crisis. It's a crisis that doesn't discriminate—every community faces more extreme weather and the costs associated with the pain and heartache that those events bring. But not every community has the resources to rebuild, or even get up and relocate when a climate event happens in their backyards. The climate crisis disproportionately impacts communities of color and poor families.

As our country faces the interlocking challenges of a global pandemic, an economic downturn, racial injustice, and the climate crisis—we have to transition to a brighter future for everyone.

The Biden-Harris administration believes that addressing climate change is not only a challenge but also an opportunity to set our world on a path toward equity and prosperity. That's why President Biden hit the ground running and set ambitious goals that meet the urgent demands of the climate crisis, which will not only help communities who carry the burdens of climate injustice, but also empower American workers and businesses to lead a clean energy revolution.

To achieve this, DOI is committed to empowering our Federal, State, and local partners and Tribes to meet our shared goals by providing communities the information, guidance, and support they need to create strong, resilient communities that can flourish.

Q: The ocean is a vast resource that covers many issues. How does DOI work with other departments and agencies who also help manage blue portfolios?

A: The ocean connects all of us and one single agency cannot manage these wide-ranging responsibilities alone. Like any other issue, it's important to work as a team across the cabinet. Our ocean, Great Lakes, and coasts have an overarching impact on several issues that many agencies manage. The scientists and experts who work at DOI collaborate with other teams at different departments and agencies on efforts ranging from studying the ocean floor and clean energy development to protecting habitat for rare coastal species and managing public lands.

Q: So far we've talked a lot about policy and agency specifics. How does DOI reach the American people and help them better understand and connect with ocean and coasts?

A: When I was growing up, I learned that everything was connected, from spending time in the outdoors with my dad and helping my grandpa in the cornfield in our village at the Pueblo of Laguna. As a child, I spent many hours of many days near the ocean on both coasts. Sometimes my dad felt it important to just walk on the beach, and other times we relished in the ocean's bounty. I've watched sunrises and sunsets on our ocean and those experiences remain constant in my belief that we will always benefit from a healthy ocean.

During this pandemic, people from all walks of life have found solace in the outdoors and we have a renewed appreciation for our natural treasures. Spending time out in nature is something everyone should have regular opportunities to do, which is why at DOI we're making it a priority to make the outdoors more accessible for everyone no matter where they live, their ability, their access to resources, or their background.

Tribal Youth Coastal Conservation Program Projects

By DOI

On April 28, 2021, the Secretary of the Interior Deb Haaland announced the approval of nearly \$1 million as part of the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) for the Tribal Youth Coastal Restoration Program.

The Tribal Youth Coastal Restoration Program projects are estimated to restore up to 1,000 acres of wild-life habitat on Tribal lands along the Gulf Coast, and will provide hands-on opportunities for Tribal youth, including environmental projects and career training, to enhance community resilience, protect natural resources and the environment, and teach cultural values.

The funds will support projects run by the Chitimacha Tribe of Louisiana, Miccosukee Tribe of Indians of Florida, Seminole Tribe of Florida, Mississippi Band of Choctaw Indians, Poarch Band of Creek Indians, and the

Coushatta Tribe of Louisiana. Each Tribe has proposed its own unique teaching and experiential learning opportunities to prepare students to understand and respect their natural environment, such as native plant restoration, site cleanup, and water and soil sampling.

“Innovative strategies are urgently needed to help protect and enhance our fragile ecosystems. Investing in programs that simultaneously provide economic opportunities for young people and protect our environment must be part of the solution to our climate crisis,” said Interior Secretary Deb Haaland.

Participants will be encouraged to pursue additional courses and degree programs that will enable them to pursue careers in natural resources conservation. The activities also provide skills needed to work on restoration throughout the Gulf and engage the Native Gulf community in the larger restoration effort that will continue for decades.

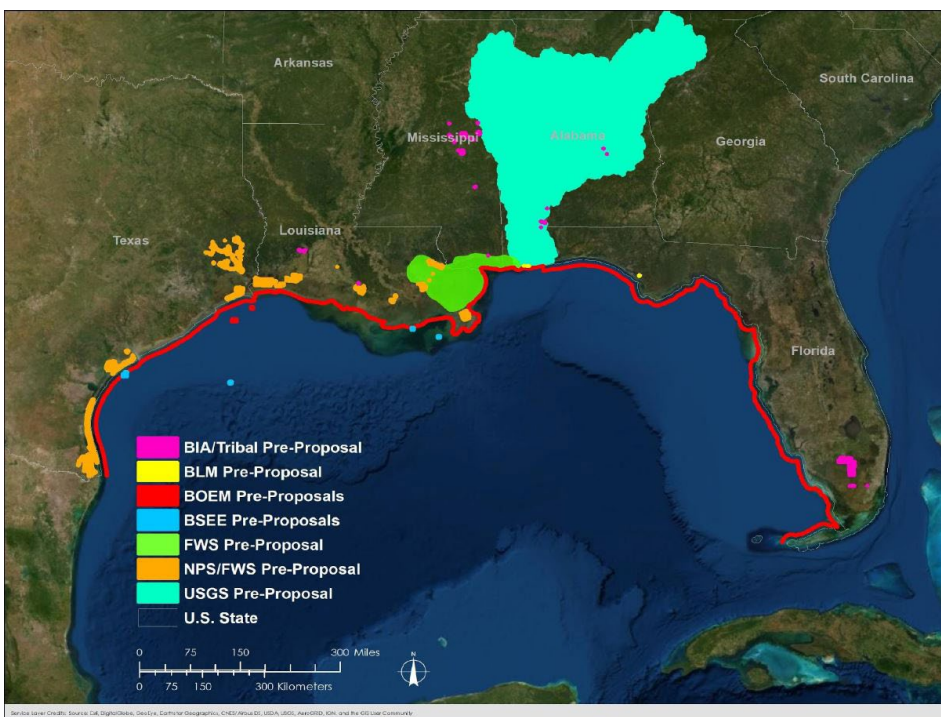
The Tribal Youth Coastal Restoration Program was initially approved by the RESTORE Council in 2015 and trained 239 students in five Tribes, who restored 995 acres. The Tribal program proved so successful that the 11-member RESTORE Council, which includes Gulf State and Federal members, unanimously approved this three-year program that builds on the initial investment and adds the Coushatta Tribe of Louisiana, which was not part of the original program.

Funding for the program, which is sponsored by DOI, comes from the Gulf Coast Restoration Trust Fund, established in 2012 through the RESTORE Act in the wake of the *Deepwater Horizon* oil spill.

Press release: <https://www.doi.gov/pressreleases/secretary-haaland-announces-funding-six-tribal-youth-environmental-and-economic>

Learn more about the RESTORE Act: <https://www.restorethegulf.gov/history/about-restore-act>

Tribal Youth Coastal Restoration Program: https://restorethegulf.gov/sites/default/files/FPL3b_DOI_BIA_Description_Activity_Description.pdf



Location map of six Tribal youth projects along the Gulf of Mexico coastline. Image credit: RESTORE Council

Destroy! Don't Dump!

Invasive zebra mussels (*Dreissena polymorpha*) have recently been found in "moss balls," an aquarium plant product sold at aquarium and pet supply stores. Zebra mussels are regarded as one of the most destructive invasive species in North America. If you recently purchased moss balls for your aquarium, they must be properly destroyed—don't dump them! Follow the DESTROY, DISPOSE, and DRAIN instructions. Agencies and industry work in a coordinated response to help stores and consumers find and destroy troublesome shellfish.

Invasive Zebra Mussels

DOI Experts Trigger Alert and Coordinated Response

By Heather Dewar, Jason Burton, and Marisa Lubeck (USGS)

In March, a citizen's report of an invasive zebra mussel found in a pet store prompted the U.S. Geological Survey (USGS) invasive aquatic species expert to trigger nationwide alerts. The alerts led to the discovery of the destructive shellfish in pet stores in at least 21 States from Alaska to Florida. The zebra mussels were living among ornamental moss balls used in the aquarium hobby industry.

The coordinator of the Nonindigenous Aquatic Species Database, USGS fisheries biologist Wesley Daniel, learned about the presence of zebra mussels in moss balls on March 2 and alerted others nationwide about the issue. Moss balls are ornamental plants imported from Ukraine that are often added to aquariums.

“The issue is that somebody who purchased the moss ball and then disposed of them could end up introducing zebra mussels into an environment where they weren't present before,” Daniel said. “We've been working with many agencies on boat inspections and gear inspections, but this was not a pathway we'd been aware of until now.”

On February 25, an employee of a pet store in Seattle, Washington, filed a report to the database that the employee had recently recognized a zebra mussel in a moss ball. Daniel requested confirming information and a photograph and received it a few days later.

Daniel immediately notified the aquatic invasive species coordinator for Washington State and contacted invasive species managers at the USGS and U.S. Fish and Wildlife Service (USFWS). He visited a pet store in Gainesville, FL, and found a zebra mussel in a moss ball there. At that point Federal non-indigenous species experts realized the issue was extensive.

Amid concerns that the ornamental aquarium moss balls containing zebra mussels may have accidentally spread the pest to areas where it has not been seen before, Federal agencies, States, and the pet store industry are working together to remove the moss balls from pet store shelves nationwide.



Invasive zebra mussels are causing significant ecological and economic impacts as they continue to spread across North America. Photo credit: USFWS

They have also drawn up instructions for people who bought the moss balls or have them in aquariums to carefully decontaminate them, destroying any zebra mussels and larvae they contain using one of these methods: freezing them for at least 24 hours, placing them in boiling water for at least one minute, placing them in diluted chlorine bleach, or submerging them in undiluted white vinegar for at least 20 minutes. The decontamination instructions were developed by the USFWS, the USGS, and representatives of the pet industry.

Zebra mussels are an invasive, fingernail-sized mollusk native to freshwaters in Eurasia. They clog water intakes for power and water plants, block water control structures, and damage fishing and boating equipment, at great cost. The Federal Government, State agencies, fishing and boating groups, and others have worked extensively to control their spread.

The USFWS is coordinating the response along with the USGS. The U.S. Department of Agriculture, several State wildlife agencies, and an industry group, the Pet Industry Joint Advisory Council, are also taking steps to mitigate the problem. National

What to Do if You Have a Moss Ball Aquatic Plant Product?

Zebra mussels have been detected within a variety of moss ball products designed for aquarium use (for example, “Betta Buddy Marimo Balls” or “Marimo Balls”). Zebra mussels are regarded as one of the most troublesome invasive species in North America. They are small, fingernail-sized mollusks native to the Caspian Sea region of Asia. Zebra mussels have three life stages—larval, juvenile, and adult. In the microscopic larval stage, the mussels live freely in the water column, allowing them to be easily transported. Adult zebra mussels can stay alive for several days outside of water and are common hitchhikers on boats, fishing equipment—and aquarium plants! In spite of their small size, zebra mussels clog pipelines used for water filtration, render beaches unusable, and damage boats and infrastructure. They also negatively impact aquatic ecosystems by harming native organisms. Moss balls or untreated water should not be disposed of in any location where they could reach local waterways.

If you have recently purchased a moss ball aquatic plant product, we recommend that you take the following steps to destroy and dispose of the moss ball and zebra mussels as well as decontaminate your aquarium and accessories: <https://www.fws.gov/fisheries/ANS/zebra-mussel-disposal.pdf>

See *Invasive* page 6

Invasive continued from page 5

alerts have gone out from the USFWS, the Federal Aquatic Nuisance Species Task Force, and regional aquatic invasive species management groups. Reports of zebra mussels in moss balls have come from Alaska, California, Colorado, Florida, Georgia, Iowa, Massachusetts, Michigan, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, Tennessee, Vermont, Virginia, Wisconsin, Washington, and Wyoming.

“I think this was a great test of the rapid-response network that we have been building,” Daniel said. “In two days, we had a coordinated State, Federal, and industry response.”

The USGS is also studying potential methods to help control zebra mussels that are already established in the environment, such as low-dose copper applications, carbon dioxide, and microparticle delivery of toxicants.

Learn more: https://www.usgs.gov/centers/umesc/science/management-tools-dreissenid-mussels?qt-science_center_objects=0#qt-science_center_objects

The USGS Nonindigenous Aquatic Species Database tracks sightings of about 1,270 non-native aquatic plants and animals nationwide, including zebra mussels. State and local wildlife managers use the database to find and eliminate or control potentially harmful species. It was created in 1990 in response to the first wave of zebra mussel invasions.

To report a suspected sighting of a zebra mussel or another non-indigenous aquatic plant or animal, please visit <https://nas.er.usgs.gov/SightingReport.aspx>.

Learn more: <https://nas.er.usgs.gov/default.aspx>

Dreissenids affect industrial and municipal infrastructure, and recreational water use by encrusting and clogging pipelines and machinery. Photo credit: DOI

Aquatic Nuisance Species Task Force “Dedicated to the Prevention and Control of Aquatic Nuisance Species”



Dedicated to the prevention and control of aquatic nuisance species

Aquatic Nuisance Species (ANS) are nonindigenous species that threaten the diversity or abundance of native species; the ecological stability of infested waters; or commercial, agricultural, aquacultural, or recreational activities dependent on such waters. ANS include nonindigenous species that may occur within fresh, estuarine, or marine waters and that presently or potentially threaten ecological processes or natural resources.

The ANS Task Force was established by Congress with the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) in 1990 and reauthorized with the passage of the National Invasive Species Act (NISA) in 1996 (collectively, the Act). Composed of 13 Federal and 15 ex-officio members, the ANS Task Force is the only Federally mandated intergovernmental organization solely dedicated to preventing and controlling ANS. The Act charges the ANS Task Force with implementing the Act by developing and executing a program that

- Prevents the introduction and dispersal of ANS;
- Monitors, controls, and studies such species;
- Researches methods to monitor, manage, control, and eradicate such species;
- Coordinates ANS programs and activities of ANS Task Force members and affected State agencies; and
- Educates and informs the general public and program stakeholders about the prevention, management, and control of these species.

Co-chaired by the USFWS and the National Oceanic and Atmospheric Administration (NOAA), the ANS Task Force works in conjunction with Regional ANS Panels and issue-specific committees to coordinate efforts among Federal and State agencies as well as efforts of the private sector and other North American interests. The ANS Task Force strives to create opportunities and synergies among members and participants to work collaboratively by sharing resources, expertise, and ideas across agency and organizational lines.

Learn more: <https://www.fws.gov/anstaskforce/default.php>



Long-Awaited Improvements to Public Lands!

Great American Outdoors Act and the National Parks and Public Land Legacy Restoration Fund

By DOI

DOI will invest \$1.6 billion in 2021 to address critical deferred maintenance projects and improve transportation and recreation infrastructure in national parks, NWRs, recreation areas, and at Bureau of Indian Education schools.

The funding was made possible by the newly created National Parks and Public Land Legacy Restoration Fund established in 2020 by the Great American Outdoors Act. This historic investment will create nearly 19,000 jobs and contribute \$2 billion to the Nation's gross domestic product in 2021.

“Through the Great American Outdoors Act, we are investing in the American people, and in the future of our public lands and sacred spaces,” said Secretary of the Interior Deb Haaland. “We must address the long-delayed maintenance needs of the Nation's aging buildings and infrastructure. Importantly, this funding also honors our commitment to Tribal communities by investing in Bureau of Indian Education-funded schools for current and future generations.”

The 165 deferred maintenance projects planned by the DOI using fiscal year 2021 funding will improve recreation facilities, visitor centers, historic structures, dams, marinas, and water and utility infrastructure, and will aim to increase public access by restoring and repairing roads, trails, bridges, and parking areas.

Here are other examples, by Bureau, that are specifically addressing improvements at DOI's ocean, Great Lakes, and coastal facilities, which include the iconic Statue of Liberty in New York and the remote Izembek NWR in Alaska.



The Statue of Liberty was dedicated in 1886 well before the establishment of the NPS. Today, NPS rangers welcome visitors and help them to connect with any number of the evolving meanings of the Statue of Liberty. Repairs to the statue's base are just some of the improvements to Federal public lands that are taking place through the Great American Outdoors Act. Photo credit: NPS

Bureau of Land Management (BLM):

Jupiter Inlet Lighthouse Outstanding Natural Area, FL—The Jupiter Inlet shoreline is collapsing into the inlet and trees are falling into the water creating boating hazards. This project will repair and stabilize the shoreline. Potential partnership with U.S. Army Corps of Engineers (USACE) and other agencies with responsibility for the Intracoastal waterway are being explored. <https://www.blm.gov/visit/jupiter-inlet-lighthouse-outstanding-natural-area>

National Park Service (NPS):

Statue of Liberty National Monument, NY—Fort Wood is a massive stone fort constructed on Liberty Island in 1807 that is the base for the Statue of Liberty. The project will address deterioration of the fort structure and provide long-term protection to accommodate more than four million visitors annually. <https://www.nps.gov/stli/index.htm>

Boston National Historical Park, MA—The work includes repairing the structure and restoring the commemorative tower at Dorchester Heights Monument, an iconic feature of Boston's cultural landscape. <https://www.nps.gov/bost/index.htm>

Everglades National Park, FL—In 2021, the project will repair bulkheads at Whitewater Bay Marina, Florida Bay Marina, Visitor Center Bulkhead, and Maintenance Basin Marina, all of which protect cultural resources and ecosystems. <https://www.nps.gov/ever/index.htm>

Visitors on the Tustumena Ferry have the opportunity to visit Izembek NWR during a brief stop along the ferry route. In addition to impacts from marine environmental conditions, the remote location and accessibility presents challenges for regular maintenance and repairs. Photo credit: Lisa Hupp, USFWS

U.S. Fish and Wildlife Service (USFWS):

Izembek NWR, AK—Cold Bay, Alaska, is a remote community only accessible by aircraft or ship. There are few local licensed trades people to call in cases of emergency and the costs are significant owing to mobilization and travel costs. By completing multiple projects in one effort, the NWR reduces the costs of mobilization and the need for near future work on these assets. Seismic mitigation work is needed as two active volcanoes nearby increase the likelihood of earthquake activity. <https://www.fws.gov/refuge/izembek/>



The Great American Outdoors Act provides up to \$1.6 billion a year for five years to help address a multibillion-dollar deferred maintenance backlog at national parks, on other public lands, and at Tribal schools.

Read the act: <https://www.congress.gov/116/plaws/publ152/PLAW-116publ152.pdf>

Learn more: <https://www.doi.gov/news/interior-invests-16-billion-improve-infrastructure-public-lands-and-tribal-schools>

Nearly \$249 Million to Gulf Coastal States

GOMESA Funds Conserve and Restore Coasts, Support Hurricane Protection and Coastal Resilience Planning

By DOI

On March 30, the DOI announced disbursements of nearly \$249 million in fiscal year 2020 energy revenues to the four offshore Gulf oil- and gas-producing states—Alabama, Louisiana, Mississippi, and Texas—and their coastal political subdivisions (CPS). Funds from the Gulf of Mexico Energy Security Act (GOMESA) of 2006 are disbursed annually based on oil and gas production revenue, and are used to support coastal conservation and restoration projects, hurricane protection programs, and activities to implement marine and coastal resilience management plans.

The GOMESA created a revenue-sharing model for oil- and gas-producing Gulf States to receive a portion of the revenue generated from oil and gas production offshore in the Gulf of Mexico. The GOMESA also directs a portion of revenue to the Land and Water Conservation Fund (LWCF).

This action represents the second largest disbursement since the DOI first began disbursing GOMESA revenues to States and their CPS in 2009.

Since GOMESA's passage, DOI has disbursed more than \$1 billion to the coastal States and their CPS to further



Alabama, Louisiana, Mississippi, and Texas receive energy revenues from Gulf offshore oil and gas production. Photo credit: Bureau of Safety and Environmental Enforcement (BSEE)

conservation efforts of critical coastal wildlife habitats.

Read more: <https://www.doi.gov/news/interior-disburses-nearly-249-million-gulf-states-coastal-conservation-restoration-and>

Texans Come Together to Rescue Thousands of Cold-Stunned Sea Turtles During Historic Winter Cold Snap

Deepwater Horizon Settlement Funds Supported Some of Their Efforts

By Taylor Pool and Nanciann Regalado (USFWS)

In February 2021, while the State of Texas was caught in a record-setting cold snap, plunging the region into freezing conditions and pushing the limits of the power grid—the extreme temperatures also affected the coastal ecosystem. The persistent cold paralyzed unprecedented numbers of sea turtles by lowering their body temperatures and causing a condition known

as cold-stunning, which can be fatal. Cold-stunning is the most significant cause of green sea turtle strandings in Texas.

But Texans are prepared. Generous organizations supported hundreds of rescue volunteers and conservation workers who turned out in droves and worked together to save the turtles. Funds provided by Deepwater Horizon settlement helped to support some of these heroic and life-saving actions.

The Laguna Madre, a shallow body of water that extends 130 miles along the Texas coast from Corpus Christi to Port Isabel, beckons green sea turtles to its warm, productive waters. There's little question as to why—the shallow waters of this long, narrow coastal basin are an extensive sea grass meadow, containing almost 80 percent of all of Texas' sea grasses. Green sea turtles are herbivores,

and sea grasses are a staple of the adults' diet.

The Laguna Madre is buffered on the west by vast areas of undeveloped mainland and sheltered on the east by Padre Island. With few outlets, the shallow, protected body of water, while offering a seemingly endless buffet of tasty seagrass treats, can also become a deadly trap if winter storms cause sudden and extreme drops in water temperature below 50 degrees Fahrenheit. At that temperature, sea turtles become cold-stunned; their heart rates and circulation slow, inducing lethargic behavior. Unable to move, they stop swimming, float to the surface and are pushed by water and wind where they become stranded on beaches, sandbars, and islands.

The cold snap Texas experienced in February 2021 marked the beginning of the largest sea turtle cold-stunning



NPS personnel and volunteers document and examine rescued cold-stunned turtles of various species in sheltered recovery area at PAIS in February 2021. Photo credit: NPS

See *Turtles* page 9



PAIS employee applies a Passive Integrated Transponder (PIT) tag to a cold-stunned sea turtle. This tag will allow biologists to recognize this turtle if encountered again anywhere in the world. Photo credit: NPS

Turtles continued from page 8

ever experienced in Texas waters.

See related story, page 12.

Researchers at Texas A&M Corpus Christi determined that during this historic event there was a water temperature low of 34.3 degrees Fahrenheit and an air temperature low of 19.9 degrees Fahrenheit.

The shallowness of Laguna Madre prevented turtles from seeking refuge in deeper waters as they do in the Gulf of Mexico. The limited entry points made it very difficult for turtles to quickly swim out of the lagoon. Combined with a failing infrastructure that prevented rescuers from reaching the cold-stunned reptiles and warehouses with no electricity to house the rescued, intensely complicated conservation workers' efforts.

"It really was a perfect storm the way the cold impacted sea turtles in Texas," said Mary Kay Skoruppa, USFWS biologist at the Corpus Christi Texas Ecological Services Field Office.

Fortunately, Texas loves its sea turtles and groups were more than willing to lend a hand, a warehouse, or a boat.

Sea Turtle Stewards Jump into Action

As temperatures began to fall before Valentine's Day, a collective of concerned Texans watched forecasts anticipating the impacts. Knowing the shallow Laguna Madre would prevent turtles from seeking refuge in deeper waters as they do in the Gulf of Mexico, and the difficulty for turtles to quickly swim out of the lagoon, folks prepared to rescue and rehabilitate the turtles. The enormous rescue effort was a grassroots community response. Many of the rescuers were members of the Sea Turtle Stranding and Salvage Network (STSSN), a national network of Federal and State agencies, nongovernmental organizations, and trained volunteers. Together, the agencies, corporations, and citizen volunteers had a common purpose of helping the struggling reptiles survive.

The STSSN documents sea turtles that are found stranded in the United States, whether taken by boat from the water or discovered washed ashore. Its rescue efforts were empowered by the network's long-standing partnerships and friends—truly a village of caring Texans.

For example, live stranded turtles found at Padre Island National Seashore are traditionally taken to nearby rehabilitation facilities at the Amos Rehabilitation Keep (ARK) in Port Aransas, the Texas Sealife Center in Corpus Christi, or the Texas State Aquarium in Corpus Christi. When there are particularly large stranding events, turtles also may be taken to the Texas State Aquarium or Texas Parks and Wildlife Department CCA Marine Development Center in Corpus Christi.

Traditional operating procedures for turtle rescues are relatively straightforward. But February's extreme weather event created serious additional challenges. Limited travel along freezing

roadways prevented rescuers from reaching many of the cold-stunned reptiles. Additionally, housing the sea turtles proved to be particularly difficult. The damaged power grid could not provide consistent power to heat warehouses. Fortunately, the South Padre Island Convention Centre, with its 22,500 square feet of exhibit hall space, could accommodate sea turtles lined up in hallways and any other available area to ensure the reptiles had a warm space to recover. And, when power outages at the Convention Centre posed risks to recovery efforts, SpaceX rushed in and donated a generator.

The Naval Air Station at Corpus Christi also answered the call to house rescued turtles when the CCA Marine Development Center was without power and freezing closed the bridges. Staff also braved frigid waters to pull turtles ashore. As written in the *Navy-Times*, base retirees, Coast Guardsmen, sailors, soldiers, and spouses joined in to help save the turtles.

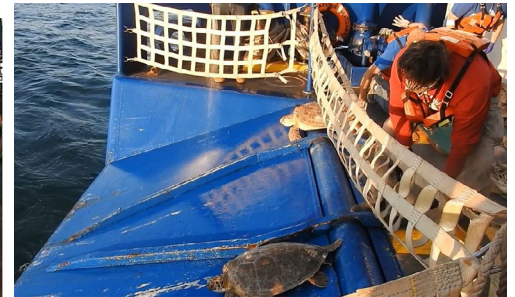
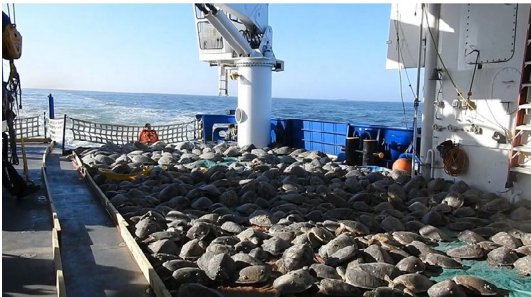
The partnership effort didn't end there. Staff at the Marine Spill Response Corporation (MSRC) offered NOAA the support of its 210-foot oil spill response vessel, the *Southern Responder*, plus 16 members of their staff to transport turtles to warmer and safer waters offshore.

There was a potential catch: the Endangered Species Act requires

See Turtles page 10



PAIS biologists and volunteers document a cold-stunned green sea turtle in 2021. Photo credit: NPS



More than 1,000 volunteers across Texas worked together, observing COVID-19 distancing guidance, rescuing cold-stunned turtles, helping to rehabilitate them, transporting them, and releasing those that survived. This series of images show storage in available warm spaces that included office spaces, locker rooms, and warehouses. Turtles that regained activity and were fit for release, which included a swim test, were released. Many were lucky to be transported via truck and ultimately a ship that took them offshore where they were released in deeper water of the Gulf of Mexico. Photo credits: NPS

Turtles continued from page 9

private citizens to get a permit to handle a listed species; green sea turtles are listed as threatened within the North and South Atlantic distinct population segments. The MSRC's offer set off a chain of communication between regional NOAA offices, NOAA field staff, and DOI field staff to ensure that all precautions were being taken. The USFWS issued a permit in rapid fashion and a total of 2,200 rehabilitated green sea turtles were returned to safety in warmer waters 30 miles off the coast of South Padre Island. At around \$20,000 per trip, the company spent about \$80,000 of their own money to make these recovery trips happen. According to the MSRC, "[We] used every square foot of deck space that did not obstruct walkways, with over 300 turtles on the upper decks. The size of the sea turtles ranged from 25 to 400 pounds, with most of them under 70 pounds. They had warmed up and were awake and lively, flapping vigorously as we carried them onto the boat."

"If MSRC hadn't stepped up in this crisis, we really don't know how

all these turtles would have been returned to the wild after they were rehabilitated," said Stacy Hargrove, Sea Turtle Early Restoration Project coordinator within NOAA's Office of Protected Resources.

Since many STSSN organizations are volunteer driven and have limited funding, the National Fish and Wildlife Foundation (NFWF) stepped in to let groups know that the foundation will compensate them for their costs. Organizations involved in the rescue and rehabilitation effort in Texas may submit receipts to the foundation to be reimbursed. On top of these repayments, NFWF announced in March that an additional \$500,000 in grants will be made available to help offset the financial burdens encountered by organizations that respond to emergency events like February's historic cold-stunning event along the coast of Texas.

In the NFWF announcement, Jeff Trandahl, executive director and CEO stated, "...[w]ithout the efforts of the heroes in Texas, thousands of green turtles would not have been rescued and released back to the wild after being cared for."

Overall, through the incredible partnerships built over years of established relationships in Texas and the Gulf region, 26 organizations including Federal and State agencies, nonprofits, zoos, aquariums, and private companies helped to save the lives of these sea turtles.

"Four thousand sea turtles were saved during this epic event. That seems like an impossibly large number given the conditions the rescuers had to endure," added Hargrove. "But we believe we saved enough individuals to keep the population from crashing as a result of this perfect storm."

See Turtles page 11



Dr. Brian Stacy (left) and Dr. Donna Shaver (right) carry a cold-stunned turtle in a covered tote to a vehicle for transport to a local rehabilitation facility. Photo credit: NPS

Turtles continued from page 10

Deepwater Horizon Funding Supported Rescue Efforts

More than 11 years ago, green (*Chelonia mydas*), loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), and leatherback (*Dermochelys coriacea*) sea turtles were affected by the *Deepwater Horizon* oil spill. During the spill, rescuers collected more than 300 sea turtles. Also, eggs from 275 nests were collected and relocated out of harm's way. Sadly, these numbers represent only a portion of the sea turtles injured. Biologists estimated that as many as 173,600 sea turtles were killed by the spill. They also estimated 35,000 hatchlings were lost—victims of the oil's toxic effects as well as the impact of cleanup work conducted on sea turtle nesting beaches.

In 2016, an enormous settlement with BP earmarked \$162 million for restoration of sea turtles. The *Deepwater Horizon* Trustees have already approved several sea turtle restoration projects, primarily in Texas, Florida, and Alabama.

The Sea Turtle Early Restoration Project was one of the first projects approved for the Texas restoration area. The \$45 million project has four components; one, entitled Enhancement of the STSSN and Development of an Emergency Response Program, directly provides funds to support rescues, salvage, rehabilitation, and associated activities. This project distributes funds through three Trustees—the DOI, NOAA, and Texas—to a number of agencies and organizations that contribute to rescue efforts along the Gulf coast. The recipients include Padre Island National Seashore; Texas Parks and Wildlife; Sea Turtle, Inc.; Texas A&M-Galveston; and the Amos Rehabilitation Keep. All of these entities, plus many other organizations and volunteers, worked hard during the cold-stunning event to save disabled sea turtles.

“Worldwide, stranding networks lack the funding needed to meet demand,” said Dr. Donna Shaver, chief of the STSR Division at the NPS. “The funding from the Early Restoration project was truly needed to accomplish all we did with this year's historic event. It's been a blessing for the Texas sea turtle stranding network.”

Through incredible assistance from partners throughout Texas, multiple funding streams supporting the backbone of this work, and flexible government, a terrible event was prevented from becoming a catastrophe for the sea turtle population off the waters of Texas.

Learn more:

Natural Resource Damage Assessment (NRDA) Early Restoration Program: <https://www.gulfspillrestoration.noaa.gov/restoration/early-restoration>

Sea Turtle Strategic Framework: https://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/Sea_Turtle_Strategic_Framework_6.23.17.pdf

USFWS Endangered Species: <https://www.fws.gov/endangered/?s8fid2=112761032791&s8fid2=112762573891&searchTerm=sea+turtle>

Marine Spill Response Corporation: <https://www.msrmc.org/documents/MSRMC%20Provides%202010%20ft%20Vessel%20to%20Transport%20Turtles%20to%20Safety.pdf>

NPS Padre Island National Park (PAIS): <https://www.nps.gov/pais/learn/seaturtles.htm>

NavyTimes story: <https://www.navytimes.com/news/your-navy/2021/02/19/massive-volunteer-effort-rescues-nearly-1000-cold-stunned-sea-turtles-at-nas-corporus-christi/>

NFWF story: <https://www.nfwf.org/media-center/press-releases/nfwf-announces-more-12-million-support-sea-turtle-conservation-and-respond-cold-stun-event-texas>

Organizations Involved in Sea Turtle Rescue Effort

- Amos Rehabilitation Keep at University of Texas Marine Science Institute
- Coastal Conservation Association-Texas
- Coastal Bend Bays and Estuaries Program
- Conrad Blucher Institute, Texas A&M University-Corpus Christi (TAMU CC)
- Fisherman's Wharf (F/V Scat Cat)
- Friends of the ARK
- Gladys Porter Zoo
- Gulf Copper Ship Repair, Inc.
- Houston Zoo
- Keep Aransas County Beautiful
- Marine Spill Response Corporation
- Mission Aransas National Estuarine Research Reserve
- NOAA-National Marine Fisheries Service
- NPS-Padre Island National Seashore
- Port Isabel Logistical Offshore Terminal, Inc. (PILOT)
- Sea Tow
- Sea Turtle, Inc.
- Sea World San Antonio
- South Padre Island Convention Center
- SpaceX
- Texas A&M University-Galveston, Gulf Center for Sea Turtle Research
- Texas General Land Office
- Texas Master Naturalists-Galveston Bay Area Chapter, Mid-Coast Chapter, South Texas Chapter, Rio Grande Valley Chapter
- Texas Parks and Wildlife Department, Texas Game Wardens and Coastal Fisheries
- Texas Sea Grant
- Texas Sea Life Center
- Texas State Aquarium
- University of Texas
- U.S. Coast Guard
- U.S. Fish and Wildlife Service, Region 2
- U.S. Navy-Naval Air Station Corpus Christi
- Wildlife Response Services

Cold-Stunning Statistics

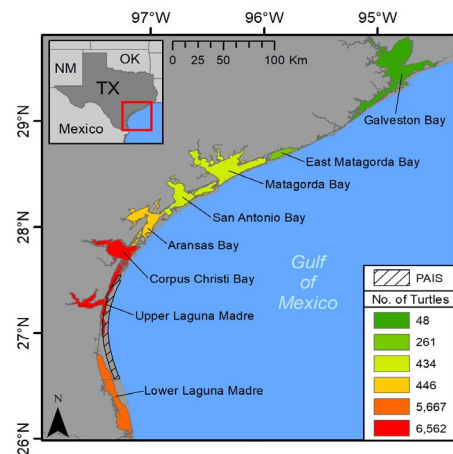
By Donna Shaver (NPS) and Ann Tihansky (USGS)

February 2021 set records for extreme weather in Texas and that includes records regarding sea turtle strandings associated with cold-stunning. The persistent plunging temperatures led to the largest sea turtle cold-stunning event recorded in the United States since the STSSN was established in 1980. The event primarily affected green sea turtles, which feed on seagrasses and algae in the warm Laguna Madre along the Texas coast. Rescue teams also found a few loggerhead turtles.

See related story, page 8.

Here is the summary as of April 4, 2021:

Area	Total
Galveston Bay/Christmas Bay	48
East Matagorda Bay	261
Matagorda/Lavaca/San Antonio/Espiritu Santo Bay	434
Mustang Island/Aransas Pass/San Jose Island/Aransas Bay/Copano Bay	446
Upper Laguna Madre/North Padre Island/Corpus Christi Bay	6,562
Lower Laguna Madre/South Padre Island/Boca Chica Beach	5,667
Total	13,418



Total number of recorded cold-stunned turtles and locations, corresponding to the map image. Image credit: NPS

- For winter 2020–21 (January through April 4), an approximate total of 13,418 cold-stunned turtles were recorded in Texas (92 from a brief event on January 11–15 when all 92 turtles were located alive, and the 13,326 from the event beginning in mid-February).
- Of the 13,418 cold-stunned turtles recorded in Texas during winter 2020–21, 4,368 green turtles (including all 92 from the brief event in January) and three loggerheads were rehabilitated and released. Most were minimally injured when found and only needed gradual warming, a swim test, and then prompt release. Most were released into warmer, deeper Gulf of Mexico waters off Mustang, Galveston, and South Padre Islands from February 21–23. However, the 92 green turtles found in mid-January, along with 20 found in mid-February, were more severely injured and required more time to rehabilitate. They were released in the Gulf surf at Padre Island National Seashore in late January and on March 21, respectively, when water temperatures there were warmer than cold-stunning levels.

To put these numbers into perspective, the total found more than triples the 3,702 cold-stunned turtles found in Texas during the winter of 2017–2018, which previously was the largest cold-stunning event in Texas since the STSSN was established in 1980. It also more than doubles the 4,613 cold-stunned turtles recorded in Florida during 2010, which was previously the largest cold-stunning event recorded in the United States since the STSSN was established in 1980. The historic 2021 numbers could possibly represent the largest sea turtle stranding event ever documented worldwide since 1980. Understanding the significance of this event will be part of both ongoing and future scientific assessments of sea turtle populations and habitat use in the Gulf of Mexico.

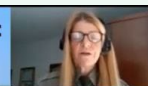
The STSSN and DOI staff thank the many Federal agencies, organizations, businesses, and concerned individuals who helped to find, document, rehabilitate, and release cold-stunned turtles on the Texas coast during these events. Please contact Dr. Donna J. Shaver, Texas Coordinator of the STSSN, for further information: Donna_Shaver@nps.gov.

Turtle Champion Recognized by Texas Academy of Science

On February 27, 2021, the Texas Academy of Science presented NPS scientist Dr. Donna Shaver with the 2021 Distinguished Texas Scientist Award from the Texas Academy of Science at their 124th annual meeting. Shaver, who is chief of the Division of Sea Turtle Science and Recovery, NPS, Padre Island National Seashore, and the Texas Coordinator of the STSSN delivered a taped presentation, “Sea Turtle Science and Recovery at Padre Island National Seashore: Over 40 Years of Research, Conservation, and Public Education” during the meeting.

Watch the presentation here: <https://youtu.be/dVHI9GAXtxk>

Sea Turtle Science and Recovery at Padre Island National Seashore: Over 40 Years of Research, Conservation, and Public Education



A screen grab of Dr. Donna Shaver presenting virtually to the Texas Academy of Science annual meeting in February 2021. Image credit: DOI

Donna Shaver, Ph.D.
National Park Service, Padre Island National Seashore, Corpus Christi, TX, USA

Sand Lance, Beach Renourishment, BOEM Stewardship

New Video Highlights How Scientific Research Informs Ocean Resource Management

By Sara McPherson (BOEM)

The Bureau of Ocean Energy Management (BOEM) shared a new video about the importance of science in informing policies related to stewardship, conservation, coastal resilience, and beach renourishment practices.

You can see how this all comes together using the example of the sand lance (*Ammodytes* spp.), a favorite food on which many marine species depend.



A new video illustrates how learning more about the sand lance can help BOEM make informed, science-based decisions that balance ocean uses with the protection of coastal communities and the environment. Watch the video: <https://www.youtube.com/watch?v=bYxExZ3lc98>

BOEM provides sand to coastal communities to restore and protect coastal areas affected by storms of increasing frequency and power. Making sand from the Outer Continental Shelf (OCS) available to coastal communities helps them improve their resiliency in the face of climate change. The sand that BOEM provides communities comes from the sea floor on the OCS. It is often the same sand

preferred by a tiny fish that humans and animals greatly depend on—the slender, silvery sand lance.

Sand lance are a small fish that serve as a crucial link in the ocean food web, burrowing

into the sandy bottom of the sea floor. To better understand the potential impacts sand harvesting could have on the sand lance—and the fish, birds, whales, and seals that depend on them—BOEM partnered with the Stellwagen Bank National Marine Sanctuary located offshore of Massachusetts. No mining or leasing activities are permitted in the Sanctuary, making it an ideal living laboratory to better understand sand lance populations and sea floor ecology. BOEM’s investment in scientific research helps our partners and programs work more efficiently together.

Learn more:

<https://www.boem.gov/environmental-studies>

<https://www.boem.gov/marine-mineral-studies>

NOAA’s Stellwagen Bank National Marine Sanctuary: <https://stellwagen.noaa.gov/>

DOI Strengthens Scientific Integrity and Evidence-Based Policymaking

By DOI

In March, DOI took steps to recommit to scientific integrity and empower the agency’s scientific and technical experts to use the best available science by implementing Secretarial Order 3397. The order initiates a review of all agency activities taken pursuant to Secretarial Order 3369 and provides direction to the DOI to comply with President Biden’s memorandum to advance scientific integrity. DOI leadership has begun a review of the scientific integrity programs within the Department and is re-invigorating DOI’s Science Advisors’ Council.

“Science is at the heart of Interior’s mission—from protecting endangered species to conducting environmental

assessments for energy projects,” said Principal Deputy Assistant Secretary, Water and Science Tanya Trujillo. “Today’s Order puts the evaluation and decision-making authority regarding scientific information back where it should be—in the hands of the scientists. It’s an important step toward restoring trust in government and strengthening scientific integrity at the Interior Department.”

Signed on DOI’s 172nd birthday and the 142nd birthday for the USGS, Acting Secretary de la Vega’s Secretarial Order 3397 directs that scientific merit, not political interference, will guide agency decision making; prevents the suppression or distortion

of scientific or technological findings, data, information, conclusions, or technical results; and supports scientists and researchers of all genders, races, ethnicities, and backgrounds. Among the serious concerns with the Secretarial Order 3369’s directives, it hindered the Department’s ability to enter into contracts for cutting-edge research and precluded the Department from utilizing sensitive information (for example, regarding sacred sites or rare and threatened species) to inform complex policy decisions.

Press release: <https://www.doi.gov/pressreleases/interior-department-takes-steps-strengthen-scientific-integrity-and-evidence-based>

Sophisticated Tools for Managing Offshore Activities

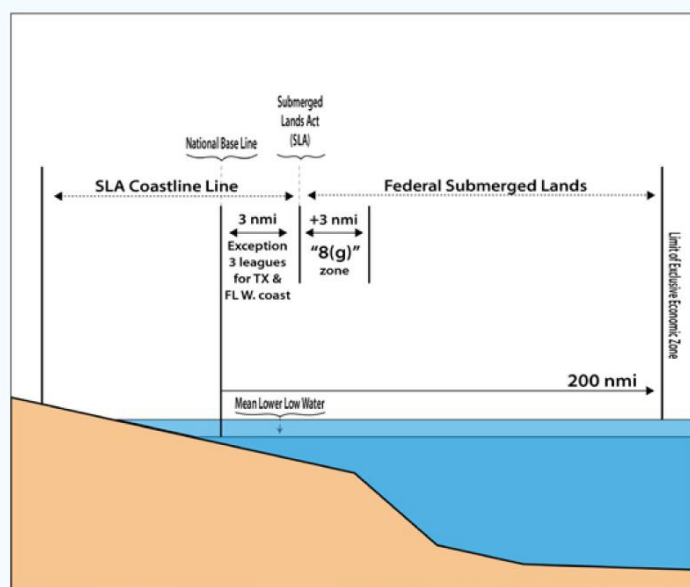
BOEM's Geospatial Team Sets Official Boundaries

By Bev Winston (BOEM)

If you purchase a house, you receive a land survey plat that delineates your property line and shows you the size of your lot. At sea, establishing a similar property line requires powerful computers, sophisticated software, consistent policies and procedures, and talented BOEM employees to pull it all together.

Every decision BOEM makes about managing development on the OCS depends on authoritative maps and other geospatial information to identify offshore boundaries, OCS blocks, and area measurements. To accomplish these tasks, BOEM increasingly relies on the Boundary Delineation System (BDS) geodatabase and a collection of offshore cadastre mapping tools and methods operated and maintained by the Geospatial Services Division (GSD).

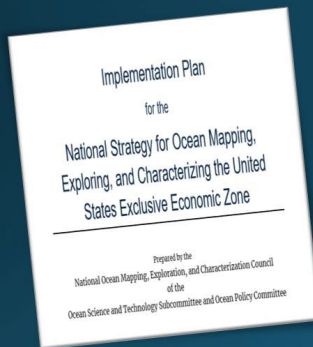
Likewise, the BSEE, the Office of Natural Resources Revenue (ONRR), and the public also rely on and benefit from the standards and automated



Boundaries delimiting U.S. maritime zones. Image credit: BOEM

Goal 2.1

Develop Standard Ocean Mapping Protocol



This protocol will (at a minimum) include specifications for the following (7) primary features

- ❖ Data management, access, availability and data stewardship
- ❖ Bathymetry data – (MBES, SBES, PDS, and Lidar)
- ❖ Seabed backscatter
- ❖ Water column data
- ❖ Sub-bottom profiling
- ❖ Magnetometer data
- ❖ Side Scan Sonar Imagery

This protocol will serve as a guide for all partners in data acquisitions to ensure the widest usability of the data, minimize duplication of effort, and quickly and efficiently collect, process, and publish data into the national archives and databases.

The SOMP outlines specifications on a number of primary mapping features and techniques to ensure consistent and compatible data. Image credit: NOMECS

capability of the BDS. Additionally, the BDS supports DOI’s goal of accountability and accurate reporting required for OCS energy and mineral development. All of these actions depend on a robust BDS working behind the scenes.

Using the BDS, the GSD calculates and prepares OCS Leasing Maps, Official Protraction Diagrams, Supplemental Official Block Diagrams, the Submerged Lands Act boundary, and the Limit of the “8(g) Zone” boundary.

In addition, the BDS is used to depict other offshore boundaries displayed on BOEM mapping products, including administrative planning areas, State offshore lateral boundaries, and U.S. maritime boundaries and existing treaty agreements.

To explain the BDS and its role in meeting

BOEM’s mission, the GSD has produced a collection of four fact sheets, providing an overview of the system, the various products it produces, and how critical offshore boundaries (such as those established in the Submerged Lands Act or the United Nations Convention on the Law of the Sea) are established and maintained.

BOEM BDS related fact sheets:

- Overview: https://www.boem.gov/sites/default/files/documents/FactSheet1-Boundary-Delineation-System-12-23-2020_0.pdf
- Official Mapping Products: https://www.boem.gov/sites/default/files/documents/FactSheet2-Official-Mapping-Products-01-08-2021_0.pdf
- Projected Boundaries: https://www.boem.gov/sites/default/files/documents/FactSheet3-Projected-Boundaries-12-23-2020_0.pdf
- Other Boundaries: https://www.boem.gov/sites/default/files/documents/FactSheet4-Other-Boundaries-12-23-2020_0.pdf

Learn more: BOEM’s maps and geographic information system (GIS) data: <https://www.boem.gov/oil-gas-energy/mapping-and-data>

Standard Ocean Mapping Protocol

DOI Shares Diverse Capabilities and Expertise with Federal Family

By Lora Turner and Bev Winston (BOEM)

Exploring and understanding the seas have captivated the imaginations of coastal humans for centuries, so it is not surprising that there is great enthusiasm among the agencies at the DOI when it comes to fulfilling a presidential directive to create and implement the National Strategy for Mapping, Exploring, and Characterizing the U.S. Exclusive Economic Zone (EEZ) in support of the DOI co-chaired National Ocean Mapping, Exploration, and Characterization (NOMECE) Council.

But where to begin?

For a part of this project—mapping the seabed of the EEZ—the first step is to ensure scientists, cartographers, engineers, and other experts can speak the same language, so that the data they gather and provide to this effort work seamlessly together. To do that, an interagency team, including DOI experts, is working on establishing a Standard Ocean Mapping Protocol (SOMP). The first draft of the SOMP will be submitted to the NOMECE Council by May 28, 2021. This protocol will guide all the NOMECE agencies, and their academic and private sector partners, in planning of mapping programs, data acquisition, and processing to ensure the widest access to and use of the data, to minimize duplication of effort, and to efficiently move data from collection to accessible data repositories and portals. National data standards and best practices will be used, as required by the Geospatial Data Act of 2018. The draft SOMP will be published in the Federal Register for public comment at a date yet to be determined.

The hands-on work for this protocol is being done by the Interagency



Interagency Working Group on Ocean and Coastal Mapping Members

Working Group on Ocean and Coastal Mapping (IWG-OCM), which includes DOI specialists from the BOEM, USGS, and NPS.

“Mapping the EEZ is a huge task, too large for any one agency. We value the partnership and the expertise that the working groups brings together so that we’ll be able to fully share data and information to meet the goals of the National Strategy,” said Beth A. Westrom, chief of the Geospatial Services Division at BOEM.

The working group is operating under the auspices of the White House Ocean Policy Committee (OPC), which oversaw the National Strategy for Mapping, Exploring and Characterizing the U.S. EEZ (NOMECE Strategy) in 2020, and in 2021 released implementation plans to detail the steps agencies will take to fully map the deep waters of the U.S. EEZ by 2030 and nearshore waters by 2040.

“The USGS maintains sea floor and subsurface mapping as a core capability supporting our mission as the federal provider of research expertise in marine geology and geologic processes. We are focused on mapping, understanding, and characterizing the resources and hazards potential of the Nation’s submerged lands in the support of the management and other missions of our Federal partners in and beyond DOI. Our leadership within NOMECE, and our support of the SOMP, is a reflection of the USGS mission and the substantial ocean

interests of DOI and its bureaus,” said John Haines, USGS, and DOI co-chair of the NOMECE Council.

Monique LaFrance Bartley, marine ecologist with the Ocean and Coastal Resources Program at NPS said, “The SOMP provides the opportunity for Federal agencies to express data needs and exchange ideas regarding ocean mapping. NPS is especially excited to be involved in this collaborative effort to work with our sister agencies to carefully consider mapping protocols that best support science and management needs across agencies and disciplines.”

An interim goal of publishing the SOMP is to encourage consistency in data acquisition and stewardship across a subset of ocean sensing capabilities for mapping and characterization in order to improve the useability of bathymetry (acoustic and airborne), seabed backscatter, water column sonar, side scan sonar, sub-bottom profiling, and magnetometer data readings—all of which are needed to draw an accurate representation of the water column, sea floor, and sub-bottom.

Learn more: National Strategy for Mapping, Exploring, and Characterizing the U.S. EEZ: <https://www.federalregister.gov/documents/2020/02/11/2020-02626/strategy-for-mapping-exploring-and-characterizing-the-us-exclusive-economic-zone>

BOEM Holds First Tribal Ocean Summit

By BOEM

BOEM held its first virtual Tribal Ocean Summit in March 2021 to address the issues and concerns of the 574 Tribal nations and also honor and respect the Bureau's relationship with the 13 Alaska Native Claims Settlement Act Corporations. Designed to encourage meaningful consultation between decision makers, detail early tribal involvement in the design of a process implicating tribal interests, enable mutual exchange of information, and improve working relationships and meaningful consultation practices, the summit was organized with input from the Tribal Steering Committee and facilitated by the John S. McCain III National Center for Environmental Conflict Resolution (Udall Center). The virtual meetings took place over several days and sessions from March 2–4, 2021, and March 16–18, 2021.

Nearly 200 participants registered for the Tribal Ocean Summit, including at least 70 tribal representatives from at least 53 different Tribes, as well as 33 BOEM staff. DOI Chief of Staff Jennifer Van der Heide and BOEM

Director Amanda Lefton provided opening remarks. Lefton emphasized BOEM's commitment to learning about tribal concerns and responsibilities and incorporating that knowledge into its decision making. She also hoped the summit would help tribes and BOEM become better acquainted and build a strong foundation for future partnerships. On March 17, Secretary of the Interior Deb Haaland made a surprise guest appearance in one of her first official duties as Secretary on her first official day in office.

“DOI applauds your diligence and determination to bring this summit to fruition. You all have created an ambitious agenda that tackles important issues including government-to-government relationships, and meaningful consultation from both Tribal and Federal Government perspectives and experiences. Though they may be difficult at times, I trust that the conversations you have had here—both with each other and with Federal representatives—have been informative and enlightening. I also hope that they will move us forward and strengthen our

relationships with one another,” said Secretary Haaland.

BOEM Director Amanda Lefton said, “We are here to listen, to learn about Tribal concerns and responsibilities, and to incorporate that knowledge into our decision making. We want to hear directly from Tribal representatives on issues that are important to you and your communities. One of our hopes is that the summit will help tribes and BOEM become better acquainted and build a strong foundation for future partnerships.”

Topics covered during the summit included the following:

- The importance of the oceans
- BOEM's leasing and permitting process
- Underwater paleolandscapes and cultural heritage
- Tribal and Departmental perspectives on meaningful consultation

The summit also included Tribal Caucus and Agency breakout sessions where Tribal representatives and BOEM agency staff had the opportunity to candidly reflect and discuss what they had learned from the sessions.



BOEM TRIBAL
OCEAN SUMMIT

BOEM
Bureau of Ocean Energy
Management

<https://www.boem.gov/about-boem/tribal-engagement>

Learn more about BOEM Tribal engagement: <https://www.boem.gov/about-boem/tribal-engagement>

Partners Address Vanishing Marshes Along the Atlantic Coast

\$6 Million in Federal, State Funds

By Kit Straley and Meagan Racey (USFWS)

Federal and State agencies are investing \$6 million in an Atlantic coastwide initiative to strengthen and restore 1,667 acres of salt marshes by 2025. The award is shared among Connecticut, Maine, Maryland, Massachusetts, Rhode Island, and Virginia.

Coastal wetlands provide \$23.2 billion a year in storm protection services by reducing the impacts of hurricanes in the United States. The restoration effort will have far-reaching benefits for coastal communities, as healthy coastal marshes support clean water, storm and flood protection, and multibillion-dollar fishery, recreation, and tourism industries. These vital benefits are at risk, with more than half of the original salt marsh habitat



The saltmarsh sparrow is a species of conservation concern. This bird lives exclusively in Atlantic coast salt marshes. This adult is perched on the flexible saltmarsh cordgrass (*Spartina alterniflora*). USFWS and partners are studying saltmarsh sparrow populations to guide conservation efforts and create a healthy salt marsh ecosystem for all. Photo credit: Brian Harris, USFWS

See more pictures: <https://www.flickr.com/photos/usfwsnortheast/albums/72157715197580986>

in the United States already lost, and the sea level on the North Atlantic Coast expected to rise between 13 to 19 inches by 2050.

Scientists point to the disappearing saltmarsh sparrow (*Ammodramus caudacutus*) as a warning sign of these changes and a call to action for restoration. A network of wildlife biologists, salt marsh ecologists, engineers, academic researchers, and non-governmental partners spanning 14 States are working together to restore tidal salt marshes for the wildlife that call them home and the communities that rely on them.

“The next decade is a critical window for shoring up our salt marshes against rising seas,” said Wendi Weber, USFWS regional director. “We will continue to work with our many partners across the saltmarsh sparrow’s range to find holistic solutions that turn the tide for saltmarsh sparrow and help coastal communities maintain natural defenses in a changing climate.”

Six States will fund implementing and testing of new management practices for restoring salt marsh. A \$1 million grant is matched by \$379,000 from the States and adds to \$4 million previously awarded from the USACE and other Federal funds for a total of \$6 million. State wildlife agencies will manage projects in each of the six States collaborating with many partners, including the Audubon Maryland-DC, The Trustees of Reservations, the Virginia Institute of Marine Science, the USFWS, and the Salt Marsh Habitat and Avian Research Program.

“Saltmarsh sparrows are declining at an alarming rate across our region. This project will test five of the most promising management techniques for retaining salt marsh resilience, reducing high-marsh flooding, and

increasing nesting success,” said Rick Jacobson, Connecticut chief of Fisheries, Forestry and Wildlife. “This funding will support regional collaboration, an integral element of our State Wildlife Action Plans.”

More than four out of every five saltmarsh sparrows have already disappeared since 1998—an estimated population decline of 87 percent. The species is the only bird that breeds solely in the salt marshes of the Northeast, and rising sea levels and more frequent storms are increasingly flooding its nests. When nests flood, eggs float away or chicks drown.

See related stories, pages 18 and 19.

The short-term goal of the Atlantic Coast Joint Venture (ACJV), the USFWS, and partners is to halt the decline of the sparrow by 2030 by providing 23,000 acres of high-quality breeding habitat. The long-term goal is to restore 80,000 acres of high-quality breeding habitat by 2069, which would support a population of 25,000 birds. Conservation recommendations are outlined in the ACJV’s landmark Saltmarsh Sparrow Conservation Plan. This work will be guided by a joint Federal/State executive committee, which includes the USACE.

“The U.S. Army Corps of Engineers North Atlantic Division is proud to join this tremendous partnership,” said Karen Baker, programs director for the USACE North Atlantic Division. “This initiative demonstrates our responsibility for maintaining waterways and our commitment to forging economic and environmentally sustainable solutions with our regional partners.”

Press release: [https://www.fws.gov/news/ShowNews.cfm?ref=\\$6-million-in-federal-state-funds-will-shore-up-vanishing-marshes-along-&_ID=36837](https://www.fws.gov/news/ShowNews.cfm?ref=$6-million-in-federal-state-funds-will-shore-up-vanishing-marshes-along-&_ID=36837)

The Power of Partnerships and Personal Connections

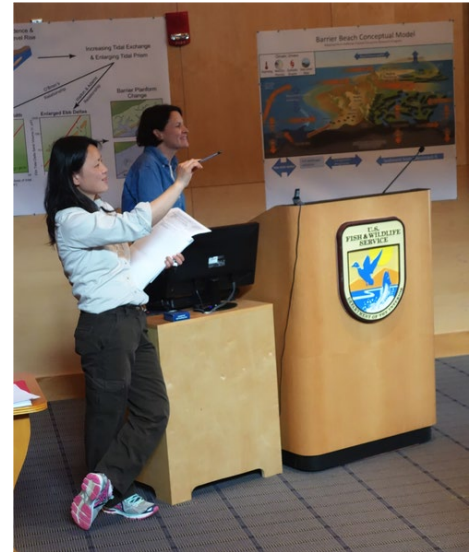
By Lauri Munroe-Hultman (USFWS)

At 10 years old, Nancy Pau's whole world changed when she moved from a small island on the coast of China—with no running water or electricity—to New York City.

“We went from a place where everyone knew each other and kids had free run of the outdoors to one where we were told to lock the doors and not answer the phone,” said Pau. She adapted, and eventually thrived, in her new home. Pau's strong science and math skills landed her an internship working on the human genome at Iowa State University during her sophomore year in high school. The next year, she studied turf science at Cornell University, returning later to earn her bachelor's degree in natural resources. Now a wildlife biologist at Parker River NWR in northeastern Massachusetts, she works to restore the Great Marsh and make it more resilient to a changing world. In doing so, she hopes to rewrite the life story of the saltmarsh sparrow, a small brown bird that relies on coastal marshes for survival.

In her 18 years at Parker River NWR, Pau has focused on restoring the Great Marsh, the largest continuous salt marsh in New England. Nearly 20 percent of the 16,000-acre marsh lies within the refuge. Over centuries, people drained and divided the marsh, changing its natural tidal flow. This killed marsh plants—through root exposure in higher areas and standing water in lower areas—leading to lowering of the marsh and loss of its natural ability to absorb storm waters.

Sea-level rise over the last century has made matters worse, and more-frequent intense storms bring destructive tidal surges. For the last five years, Pau has helped USFWS biologist Dr. Susan Adamowicz and partners test experimental salt marsh restoration methods at various places on the refuge. These include filling drainage ditches, building up mounds to create microtopography, and digging shallow channels to drain standing water. “We took time to figure out how certain techniques work with changing environmental conditions and have



Connecting with people keeps Pau feeling positive about conservation challenges. Photo credit: Bridget Macdonald, USFWS

successfully increased the marsh's height in certain areas,” she said. She looks forward to applying all of the methods in an upcoming holistic restoration of a 100-acre plot on the refuge. A healthy, more-resilient marsh will benefit wildlife and act as a buffer to protect coastal properties from the sea.

One species that has a lot to gain from Pau's work is the saltmarsh sparrow. It is found only in tidal marshes along the U.S. east coast, but scientists estimate its population has dropped 80 percent in just the last 15 years, owing mostly to sea-level rise. *See related story, page 17.*

The female sparrow has always faced a limited time frame for rearing her young. After building a nest slung between blades of marsh grass, she must lay eggs and raise chicks to fledging between monthly ultra-high tides that coincide with the full moon. If her timing is off, the eggs and chicks can float away or drown.

With rising seas, the time frame when the tide can reach nests is growing, and the sparrow's nesting window is shrinking. Without a concerted effort by public and private conservation



Parker River NWR, in northeastern Massachusetts, includes a large portion of the Great Marsh, the largest continuous salt marsh in New England. Photo credit: Matt Poole, USFWS

See Personal page 19



Pau holds an adult saltmarsh sparrow. Photo credit: Matt Poole, USFWS

Personal continued from page 18
groups, the species could disappear in the next 50 years.

At Parker River NWR, sparrow numbers have been holding steady over the last 20 years. Pau strives to maintain that trend. “We hope the combination of restoration techniques we’re using will keep the refuge’s sparrow population where it is,” she said. But remember, less than one-fourth of the Great Marsh lies within the refuge. Fortunately, more than half of the marsh is managed by organizations committed to restoration. Pau sees this as an opportunity to create lasting change beyond refuge boundaries.

And that’s where her people skills have paid off. Although trained as a scientist, she understands the value of communication and knows that “data travel further through personal relationships.” She works closely with the other land stewards.

“It’s one thing to manage a refuge, but to affect conservation on a much bigger area feels like I’m really able to make a difference,” Pau said. “In the same day, I could be talking to a Ph.D. about really technical science, mentoring high school students on how they

can make a difference in conservation, or just chatting with visitors about our mutual enjoyment of the refuge,” she said. These conversations keep her optimistic while tackling difficult, long-term conservation issues. “They give me confidence that we humans can be part of the solution to nature’s challenges,” she said. Membership in her local garden club led to working with other residents to combat invasive plants and sustain native landscapes. Her town is blessed with large tracts of forest, grassland, and wetland habitat. “I’m happy to see more native landscaping in town,” she said. “We need native habitat on private lands to maintain wildlife corridors between larger conservation areas.”

Nancy Pau has held onto the lessons that there is power in personal connection and possibility in the great outdoors. She has applied them in her personal and professional lives, to the benefit of wild things and people alike.

Read the full story: <https://medium.com/usfishandwildlifeservicenorthwest/nancy-pau-resilience-champion-40a4f64142c1>

Nearly \$80 Million Through NAWCA To Conserve Wetlands, Restore Habitat, Support Migratory Birds

By DOI

On April 21, Secretary Haaland announced that \$78 million in grants has been approved by the Migratory Bird Conservation Commission, which will provide the USFWS and its partners the ability to help conserve or restore nearly 500,000 acres of wetland and associated upland habitats for waterfowl, shorebirds, and other birds across North America—including Canada and Mexico. The grants, made through the North American Wetlands Conservation Act (NAWCA), will be matched by nearly \$125 million in partner funds. In addition, the Commission approved \$1.8 million from the Migratory Bird Conservation Fund to conserve land in three NWRs for public use and hunt programs.

“It’s remarkable that the programs we are discussing were established before we appreciated what climate change was—or how threatened many bird populations are,” said Secretary Haaland. “Not too long ago, a study found that there are 3 billion fewer birds in North America than there were 50 years ago. This Commission’s investments are critical to keep habitats whole and connected and help birds flourish for the next hundred years and beyond.”

Wetlands provide many economic, ecological, and social benefits. They are also important protections from the effects of climate change such as flooding and rising seas. Partners in NAWCA projects include private landowners, States, local governments, conservation organizations, sportsmen’s groups, Tribes, land trusts, and corporations.

See NAWCA page 20



An oystercatcher (*Haematopus* sp.) trains its chick in coastal wetland areas.
Photo credit: Doris Rafaeli

NAWCA continued from page 19

One of this year’s projects includes \$1 million to restore and enhance habitat within the Terrebonne and Pontchartrain basins of coastal Louisiana, which will help offset dramatic coastal wetland losses.

In addition, funds through the Migratory Bird Conservation Fund will be used to purchase and conserve 2,052 acres of waterfowl habitat at the following NWRs.

- Currituck NWR in North Carolina—\$525,000 to acquire 70 acres of wetlands and surrounding uplands that will provide habitat for waterfowl including American black ducks (*Anas rubripes*), wood ducks, and mallards, as well as other migratory birds. The acquisition will provide road access to the northwestern portion of the refuge, simplifying access for the public and USFWS staff.
- Supawna Meadows NWR in New Jersey—\$94,000 to acquire 171 acres of tidal and freshwater

marsh that will provide habitat for thousands of wintering waterfowl, including American black ducks, Northern pintails (*Anas acuta*), and mallards (*Anas platyrhynchos*), as well as shorebirds and colonial-nesting wading birds.

- Umbagog NWR in Maine—\$1,267,700 to acquire 1,811 acres of wetlands and surrounding uplands that will provide nesting habitat for waterfowl including American black ducks, wood ducks (*Aix sponsa*), common goldeneyes (*Bucephala clangula*), and common mergansers (*Mergus merganser*), as well as other migratory birds. The acquisition will secure public access to the property and 5,000 acres of adjoining refuge lands.

The Migratory Bird Conservation Fund is derived primarily from the sale of Federal Migratory Bird Hunting and Conservation Stamps, commonly known as Duck Stamps, and import duties on imported arms and ammunition.

“These projects are a testament to the ongoing value of the Duck Stamp and funding support for the protection of wetland habitat for waterfowl and numerous other species in the National Wildlife Refuge System,” said USFWS Principal Deputy Director Martha Williams. “These new areas will provide increased public opportunities for wildlife-dependent recreation, including hunting, fishing and wildlife observation.” Because nearly all of the proceeds are used to conserve habitat for birds and other wildlife, outdoor enthusiasts including birders and nature photographers buy Duck Stamps to help preserve some of the most diverse and important wildlife habitats in our nation. Since 1934, the Federal Duck Stamp Program has provided more than \$1.1 billion for habitat conservation in the National Wildlife Refuge System.

The Migratory Bird Conservation Commission is chaired by the Secretary of the Interior. The Commission has helped in conserving much of this Nation’s most important waterfowl habitat and in establishing or enhancing many of the country’s most popular destinations for waterfowl hunting and birding.

NAWCA is the only Federal grant program dedicated to the conservation of wetland habitats for migratory birds. Since 1989, funding has advanced the conservation of wetland habitats and their wildlife in all 50 U.S. States, Canada, and Mexico, while engaging more than 6,500 partners in over 3,100 projects. Through NAWCA, Federal funds are typically leveraged at twice the legally required dollar-for-dollar non-Federal match-to-grant ratio. Learn more: <https://www.fws.gov/birds/grants/north-american-wetland-conservation-act.php>

Press release: <https://www.doi.gov/news/secretary-haaland-announces-nearly-80-million-funding-wetland-conservation-projects-and>

More than \$27 Million for Coastal Wetland Ecosystems

Grants Boost Economy, Support Conservation

By Vanessa Kauffman (USFWS) and Sandra Demberger (USFWS Knauss Fellow)



The Washington State Department of Ecology, in partnership with the Stillaguamish Tribe, is awarded \$1 million to acquire 537 acres of former coastal wetlands in Snohomish County, WA. It will link together conserved lands to the north and south and create a protected swath of over 1,200 acres that will benefit a range of fish and wildlife species. Monitoring data collected on the bird, fish, and vegetative communities at the site will inform future tidal wetland projects in Port Susan and Skagit Bay. Pictured is a northwest view of the newly acquired land. Photo credit: Washington State Department of Ecology

On February 24, the USFWS announced awards of more than \$27 million to support 33 projects in 14 coastal States to protect, restore, or enhance almost 28,000 acres of coastal wetlands and adjacent upland habitats under the National Coastal Wetlands Conservation Grant Program. State, local, and Tribal governments, private landowners, conservation groups, and other partners contributed more than \$22.2 million in additional funds to these projects.

“These grants will help ensure that coastal resources that are put at risk by pollution, development and the uncertainties of a changing climate are conserved,” said USFWS Principal Deputy Director Martha Williams. This grant program has wide-reaching benefits for local communities, people, and wildlife. Because 53 percent of the United States population and 45 percent of federally listed threatened and endangered species live in coastal watersheds, boosting



The South Carolina Conservation Bank is awarded \$1 million to acquire and protect 841 acres of diverse coastal habitats along the Black River in Williamsburg County, SC. The project will help protect high-priority species and habitats and will be part of a new State park along the river corridor. Kayakers enjoy seeing wildlife along the scenic Black River. Photo credit: USFWS

coastal resilience, reducing flood risk, stabilizing shorelines, and protecting natural ecosystems is vital. The diverse and complex wetland ecosystems in coastal watersheds support the Nation’s economy and are an important part of the Nation’s natural heritage. Conservation of these ecosystems is critical to ensure that habitat, wildlife, and coastal communities continue to thrive for future generations.

Fourteen States received funds this year: Alabama, Alaska, California, Florida, Georgia, Hawai‘i, Maine, New Jersey, North Carolina, South Carolina, Texas, Virginia, Washington, and Wisconsin. This year’s grants will support efforts to help recover coastal-dependent species, enhance flood protection and water quality, provide economic benefits to coastal communities and tribes, and increase outdoor recreational opportunities.

More information and a complete list of projects funded in 2021 are online: <http://www.fws.gov/coastal/CoastalGrants/index.html>

Press release: [https://www.fws.gov/news/ShowNews.cfm?ref=us-fish-and-wildlife-service-awards-more-than-\\$27-million-to-help-&_ID=36848](https://www.fws.gov/news/ShowNews.cfm?ref=us-fish-and-wildlife-service-awards-more-than-$27-million-to-help-&_ID=36848)

Where do National Coastal Wetlands Conservation Grant Monies Come From?

Recreational angling, boating, waterfowl hunting, and birdwatching benefit the wetlands on which they rely. Funding for the National Coastal Wetlands Conservation Grant Program comes from taxes and import duties collected from the sale of recreational fishing equipment, boats, electric motors, and motorboat and small engine fuels under the authority of the Dingell-Johnson Sport Fish Restoration Act.

The USFWS awards grants up to \$1 million to States based on a national competition, which enables States to determine and address their highest conservation priorities in coastal areas. Since 1992, USFWS has awarded more than \$400 million in grants under the program. These dollars benefit the communities in the vicinity of wetlands restoration projects.



Buoy, Oh Buoy! West Coast Instrument Deployment Supports Offshore Wind

By Alicia Gorton (PNNL) and Frank Pendleton (BOEM)

Two offshore wind research buoys were deployed off the northern and central coasts of California. This buoy is located in about 1,000 meters of water off Morro Bay. Image credit: AXYS Technologies, Inc

Two light detection and ranging (lidar) wind research buoys were deployed off the coast of California for the first time in October 2020. The instruments were launched in support of BOEM, which is gathering data to support future leasing of wind energy sites that will bring a new renewable energy source to the Golden State.

BOEM is partnering with the Pacific Northwest National Laboratory (PNNL), which manages the buoys for the U.S. Department of Energy's Wind Energy Technologies Office. The northern coast buoy is stationed in approximately 625 meters of water off Humboldt County, whereas the central coast buoy is in 1,000 meters of water off Morro Bay.

The buoys will be collecting data for one year and are designed to capture a variety of oceanographic and

meteorological measurements. The lidar units collect wind speed and direction data at multiple heights, whereas other instruments collect data on air and sea surface temperatures, ocean currents, and wave height and direction. The data will be stored in the Data Archive and Portal managed by PNNL, where it is available to the wind research community and other interested parties.

Joining the Humboldt buoy this April is the PNNL-developed ThermalTracker-3D, a thermal stereo vision technology that quantifies bird and bat flight activity at remote locations targeted for offshore wind development. ThermalTracker-3D will collect data on seabird flight activity correlated with wind speed and direction to inform BOEM's wind energy planning.

Learn more:

BOEM's California offshore wind activities: <https://www.boem.gov/california>

Press Release: <https://www.pnnl.gov/news-media/offshore-wind-research-buoys-float-californias-waters>

PNNL: <https://www.pnnl.gov/projects/lidar-buoy-program>

- Data Archive and Portal (DAP): <https://a2e.energy.gov/about/dap>
- ThermalTracker-3D: <https://www.pnnl.gov/technology/thermaltracker-3d>

U.S. Department of Energy Wind Energy Technologies Office: <https://www.energy.gov/eere/wind/wind-energy-technologies-office>



2021
2030
United Nations Decade
of Ocean Science
for Sustainable Development

United Nations Ocean Decade Has Begun!

"The Science We Need for the Ocean We Want"

By Sandra Demberger (USFWS Knauss Fellow)

The United Nations (UN) "Decade of Ocean Science for Sustainable Development," also referred to as the UN Ocean Decade, is being held from 2021 to 2030. The UN Ocean Decade is bringing together ocean professionals from a variety of disciplines to strengthen ocean and coastal management for the benefit of humanity. This large-scale international collaboration of public and private ocean organizations is aimed at improving and strengthening ocean sustainability, research, and technology. The 12 major priorities focus on a healthy, sustainable, and prosperous future for our oceans. The Intergovernmental Oceanographic Commission of United Nations Educational, Scientific and Cultural Organization (UNESCO) is coordinating this momentous effort.

As a major ocean agency within the U.S. Federal family, DOI will be monitoring developments, and as the UN Ocean Decade continues, will likely play various roles in coordinating and supporting this global partnership effort.

Learn more: <https://www.oceandecade.org/>

USGS Expands Coastal Change Forecast Capabilities More Than 1,000 Miles

By Margaret Palmsten and Kara Doran (USGS)

The USGS Total Water Level and Coastal Change Forecasts have been extended across the U.S. coastline to provide coastal change hazard predictions to coastal communities in advance of potential storms threatening coastal areas. Stakeholders such as local cities, emergency managers, the public, and Federal partners use these forecasts to determine which areas are most vulnerable to coastal change, and where major impacts could occur. These are especially useful in the face of strong storms and hurricanes where potential impacts include dune erosion (when sand is removed by waves and currents), overwash (waves overtopping the dune and pushing sand inland), and inundation (water submerging the beach and dune).

The USGS began producing operational forecasts of Total Water Levels and Coastal Change five years ago. The [Total Water Level and Coastal Change \(TWL-CC\) Forecast Viewer](#) is a tool that estimates water levels and the potential for coastal change along

sandy shorelines based on local tides, storm surge, waves, and beach characteristics. The information provided by the TWL-CC viewer is critical for protecting lives and property along our Nation's coasts, and for conducting post-storm recovery.

Some critical components of the models that feed the forecasts are the timing, height, and frequency of waves in nearshore environments. This information comes from the Nearshore Wave Prediction System (NWPS) developed by our partners at the NOAA. This vital partnership, particularly with the NOAA National Centers for Environmental Prediction (NCEP), is needed to provide reliable predictions to help protect our Nation's coasts. The partnership, along with the model data it provides, allowed for recent expansion of the TWL-CC models to more than 1,000 miles of the Nation's coastline. This means the model now covers nearly a total of 3,000 miles of open, sandy coastline on the Atlantic Ocean and Gulf of Mexico coasts.

The forecasts now cover new areas in Texas, the northernmost Gulf coast, and new areas of the South Atlantic U.S. coast. These regions are frequently impacted by

tropical storms and hurricanes—most recently Isaias, Laura, Marco, Sally, Delta, and Zeta. USGS continues to work with NOAA NCEP to expand the use of NWPS data in new regions to help provide these critical data to additional coastal communities. Ongoing expansion efforts are focusing on the Pacific Coast and coral reef-lined coasts.

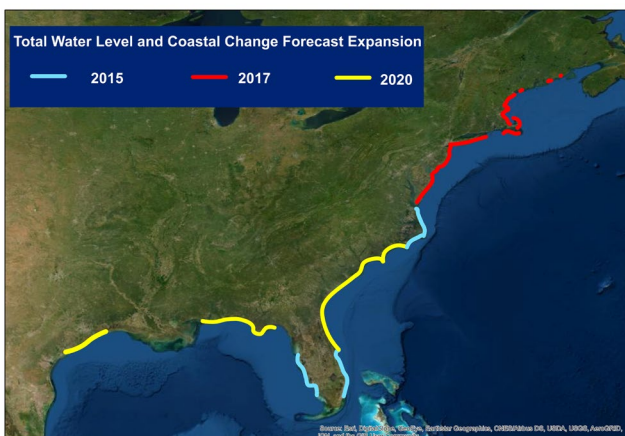
The TWL-CC forecast is a component of the USGS Coastal Change Hazards focus that aims to provide coastal citizens with information when and where they need it. Tools like these demonstrate how state-of-the-art USGS science provides societally relevant, actionable information in a timely manner. The forecast is used by National Weather Service (NWS) in their Advanced Weather Interactive Processing System (AWIPS) dashboard, by local emergency planners, and is available to the general public. Additionally, the model will be used for the Consumer Option for an Alternative System to Allocated Losses (COASTAL) Act, a law designed to reduce costs to the National Flood Insurance Program by delineating between wind and water damage for homes destroyed by a tropical cyclone.

Learn more: https://www.usgs.gov/center-news/total-water-level-and-coastal-change-forecast-expands-include-more-a-thousand-miles-new?qt-news_science_products=1#qt-news_science_products

coastal-change-forecast-expands-include-more-a-thousand-miles-new?qt-news_science_products=1#qt-news_science_products

Sound Waves—Special Issue on Coastal Change Hazards:

<https://www.usgs.gov/newsletter/sound-waves-newsletter-special-issue-coastal-change-hazards>



The TWL-CC Forecast has continually expanded since real-time forecasts began in 2015. In 2020, new regions of the Gulf and South Atlantic Coasts were added to the forecast and officially approved for use in NWS Forecasts. The TWL-CC Forecast Viewer is a web-based tool that visualizes forecasts of extreme water levels and coastal change along sandy shorelines based on local tides, storm surge, waves, and beach characteristics. This information is critical for protecting lives and property along our Nation's coasts, and for conducting post-storm recovery. Image credit: Kara Doran, USGS



At Fire Island, estuarine, wetland, coastal, and oceanic processes interact, affecting natural and human communities. The USGS has been conducting scientific investigations at Fire Island in order to protect coastal infrastructure. Photo credit: Kyle Kelso, USGS

“Why the Ocean”?

Hear from Inspired Coastal and Marine Women Scientists

By Meaghan Emory and Sara Ernst (USGS)

An inspiring collection of women scientists working at the USGS share brief thoughts about why they have focused their careers on studying our oceans and coasts.



Penny McCowen, a biologist with the USGS Wetland and Aquatic Research Center, is fascinated by the ocean because, “it contains most of the life on earth, and marine phytoplankton produce the majority of oxygen in the atmosphere. We are so dependent on the health of our oceans, yet we know so little about them. Since such a small proportion of the ocean has been explored, the possibility for amazing discoveries is infinite.” Here Penny prepares vials for sea floor creatures collected during a deep-sea expedition in 2019.



Dr. Nancy Prouty, a research oceanographer at the USGS Pacific Coastal and Marine Science Center, says the ocean, particularly the marine life, fascinates her “because it’s a world where I can only visit—I have to use special equipment or instruments to visit this world. And all marine life is specially adapted to live in this unique place—whether that’s the deep ocean absent of light, or the tidal pools of the nearshore environment.” Nancy is shown here on the left working with two graduate students from University of California, Davis on one of the EXPRESS deep-sea cruises in 2018 on the NOAA Ship *Bell M. Shimada*.



Jin-Si Over is a geographer with the USGS Woods Hole Coastal and Marine Science Center. So, why does she love the ocean? “I love the ocean because without it we wouldn’t have the amazing beaches I study and work on. Beaches host nesting grounds for piping plover, sea turtles, and are such a dynamic interface between the oceans and our own homes.” Jin-Si works on coastal hazard assessments and forecasts from hurricanes to improve hurricane impact models for coastlines and coastal vulnerability to future storms as well as aid in post-storm recovery efforts.



Jennie McClain-Counts is a biologist with the USGS Wetland and Aquatic Research Center. She is fascinated by the ocean because, “there is still SO MUCH to explore and so many unknowns. During every offshore expedition there is something new to discover or experience. Whether it is whale falls, shipwrecks, bubbling seeps, mussel beds, or expansive deep-sea coral reefs, it’s a constant learning process to try and understand the relationships between animals and habitats. The more we explore, the more we discover how much we don’t know.” Here Jennie examines a sediment push core collected during a deep-sea expedition.



Julie Richey leads paleoclimate research at the USGS St. Petersburg Coastal and Marine Science Center. Julie loves studying the ocean and the privilege of doing work to contribute to our collective understanding of global climate change, an issue that not only she finds important, but that has broad-reaching societal implications. Here Julie is aboard the research vessel (R/V) Pelican. Photo credit: Meaghan Emory, USGS

See Why page 25

Why continued from page 24



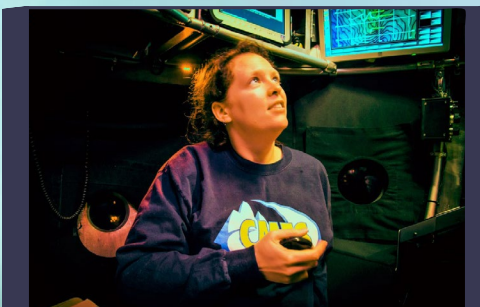
An inspiring collection of women scientists working on coastal and ocean topics at the USGS.
Image credit: Sara Ernst, USGS



Ilisa Kuffner is a research marine biologist with the USGS St. Petersburg Coastal and Marine Science Center. Ilisa says, "The ocean covers 71 percent of Earth's surface. While only 15 percent of Earth's species live in the ocean, one out of four of them lives on a coral reef! But, like many ecosystems on land, coral reefs are an ecosystem in crisis—and they need our help. I study coral reefs to help provide knowledge humans need to make decisions on how best to manage and restore these critical natural resources. Coastal communities throughout the tropics are safer and more economically prosperous with healthy coral reefs than without them."



Dr. Kimberly Yates is a research oceanographer with the USGS St. Petersburg Coastal and Marine Science Center. She has been studying ocean acidification for more than 20 years. Kim specializes in carbonate geochemistry and biogeochemistry. She's a member of the Interagency Working Group on Ocean Acidification, Chair of the Gulf of Mexico Coastal Acidification Network, and a member of the Southeast Ocean and Coastal Acidification Network. When asked why she studies the ocean, Kim states, "I can't remember ever considering any career other than science. My parents taught me an appreciation of nature and conservation through a very active life of outdoor recreation, especially on the water. I developed an insatiable curiosity about how nature works, and my favorite place was anywhere on or near the ocean. I couldn't decide whether I wanted to pursue a college degree in biology, chemistry, or physics. I discovered that by choosing a career in the earth sciences, I could have a career in all three."



Dr. Jill Bourque on her first dive in the human-occupied vehicle (HOV) *Alvin* exploring the Atlantic sea floor at the Norfolk Seep (about 1,600 meters), which lies off the Virginia coast. Jill is a biologist with the USGS Wetland and Aquatic Research Center, and she says "I am fascinated by the ocean because there are still so many unique animals to be discovered. They are a source for the imagination, and I feel very fortunate to be a part of broadening our understanding of both known and unknown habitats."

CREMA—Integrating Scientific Expertise to Enhance Coastal Management Decision Making

By Davina Passeri, James Flocks, Sara Zeigler, Nicholas Enwright, Julien Martin, and Simeon Yurek (USGS)

Scientists with different areas of expertise have joined forces to focus on understanding how different coastal processes (geomorphic, oceanographic, and ecological) integrate and change coastal environments over different times scales and areas. Their goal is to collect data, build models, and provide tools and assessments that can help inform management decisions for natural living coastal and marine resources such as habitats and ecosystems, as well as cultural resources such as historic infrastructure or archeological sites. Coastal environments are dynamic systems that provide high ecological, economic, recreational, and cultural value. Management of coastal systems requires a comprehensive understanding of the complex interactions between geological and ecological

processes, as well as the ability to predict near-term and long-term impacts of storms and global climate change, in particular sea-level rise. The USGS Coastal Resource Evaluation for Management Application (CREMA) project is a transdisciplinary effort with the following objectives:

- Characterize changes in the physical environment of coastal systems in response to long-term human alterations and climatic patterns (for example, storms, sea-level change) through data collection and analysis
- Develop and apply predictive numerical models to assess coastal evolution owing to natural (for example, storms, sea-level rise) and human-induced (for example, restoration) drivers
- Identify resulting habitat characteristics and evaluate how species’

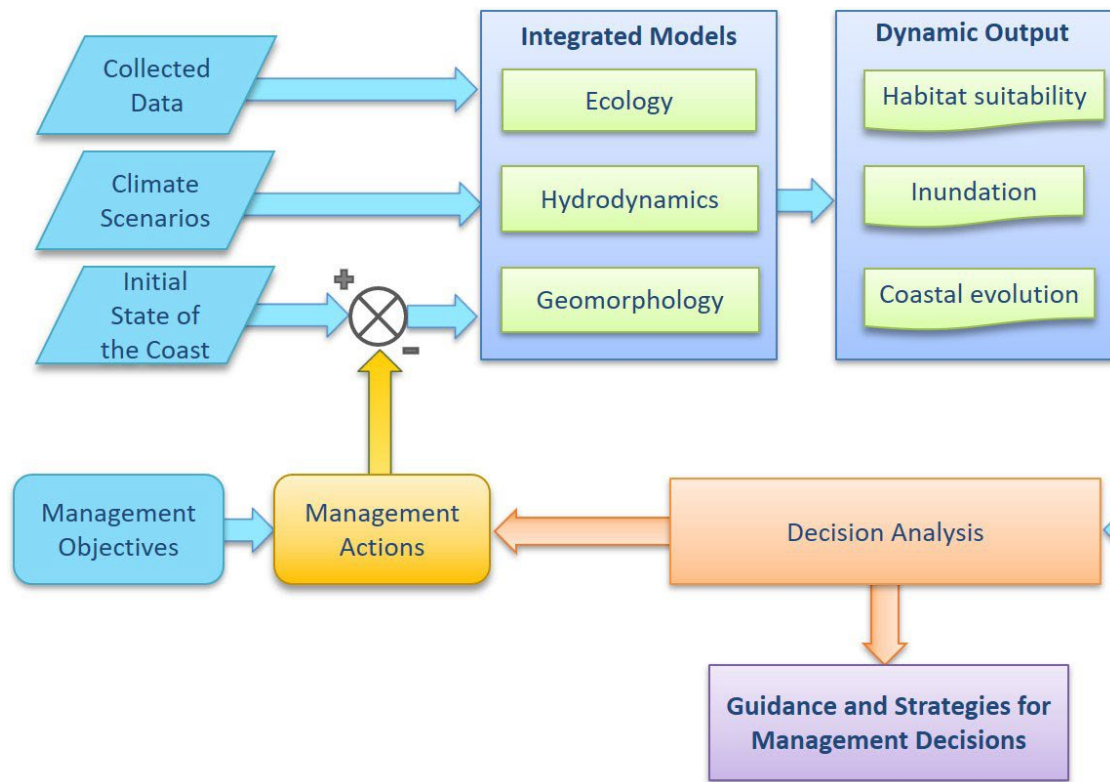
habitat use, abundance, and spatial distributions may change in response to these drivers

- Apply principles of structured decision making, decision analysis, and adaptive management to support natural resource managers in their decision making for coastal and marine systems

The research framework integrates data analysis and predictive modeling to assess the cumulative effects of environmental drivers and management actions on coastal systems. By considering multiple objectives simultaneously and integrating multiple models of system behavior, the scientists apply ecosystem-based management approaches that provide guidance and strategies for restoration efforts while also considering the uncertainty associated with future

decisions. The research team is currently applying science and capabilities in multiple restoration assessments on the Gulf and Atlantic Coasts in partnership with Federal and State agencies, university researchers, and the private sector.

Learn more:
https://www.usgs.gov/centers/spcm/science/coastal-resource-evaluation-management-application-crema?qt-science_center_objects=0#qt-science_center_objects



The USGS CREMA project is focused on using an integrated framework for assessing coastal resource evaluations for management applications. Management objectives and actions are central to the assessment process and approach. Image credit: USGS

International Partnership Tracks Shorebird Species, Informs Offshore Wind Activities

By Pamela Loring (USFWS), Paul Allen Smith (Environment and Climate Change Canada), and David Bigger (BOEM)

Many bird species migrate enormous distances throughout the year, crossing international boundaries. A highly collaborative study, funded by the BOEM as part of offshore wind energy assessments, provides exciting new information on shorebird migration and uses new technologies for tracking shorebird movement.

The United States and Canada have worked together to conserve these migratory birds for more than 100 years. The USFWS and Environment and Climate Change Canada (ECCC) recently completed a study on shorebird movements that brought together tracking data for 3,955 shorebirds of 17 species tagged by partners at 21 sites in the Western Hemisphere from 2014 to 2017. Focal species of shorebirds included: Black-bellied Plover (*Pluvialis squatarola*), Dunlin (*Calidris alpina*), Least Sandpiper (*Calidris minutilla*), Lesser Yellowlegs (*Tringa flavipes*), Pectoral Sandpiper (*Calidris melanotos*), Red Knot (*Calidris canutus*), Ruddy

Turnstone (*Arenaria interpres*), Sand-erling (*Calidris alba*), Semipalmated Plover (*Charadrius semipalmatus*), Semipalmated Sandpiper (*Calidris pusilla*), Whimbrel (*Numenius phaeopus*), and White-rumped Sandpiper (*Calidris fuscicollis*).

New Technology Advances Data Collection Capabilities and Knowledge

This shorebird movement study was the first and largest that used Motus technology to address the potential effects of offshore wind. With thousands of shorebirds tagged across dozens of sites, this new knowledge of flight routes, altitudes, and preferred weather conditions helps to predict the potential interactions between birds and offshore wind energy developments along the U.S. Atlantic coast. Working at sites spread from Nunavut, in Arctic Canada, to wintering areas in Brazil and Suriname, study partners tagged shorebirds with radio transmitters and tracked their movements using the Motus Wildlife Tracking System (www.motus.org), an automated radio telemetry network.

Using small, inexpensive tags, the Motus system allowed for greatly expanded sample sizes and geographic scale over what had been possible in previous shorebird tracking efforts.

The team applied models to data collected from Motus stations within a study area in the U.S. Atlantic region to estimate migratory routes, flight

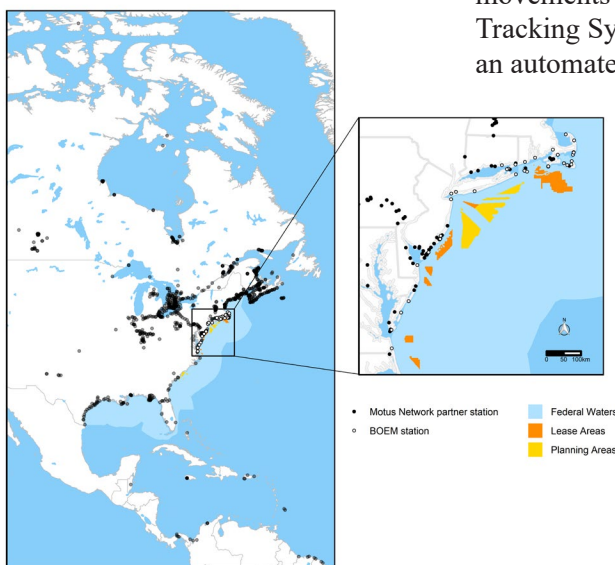


A Red Knot is released at Reed's Beach, New Jersey, carrying a VHF radio transmitter. The tag, weighing only 0.67 gram, is safely attached to the bird's back and will fall off when the bird molts. Photo credit: Yves Aubry, Canadian Wildlife Service

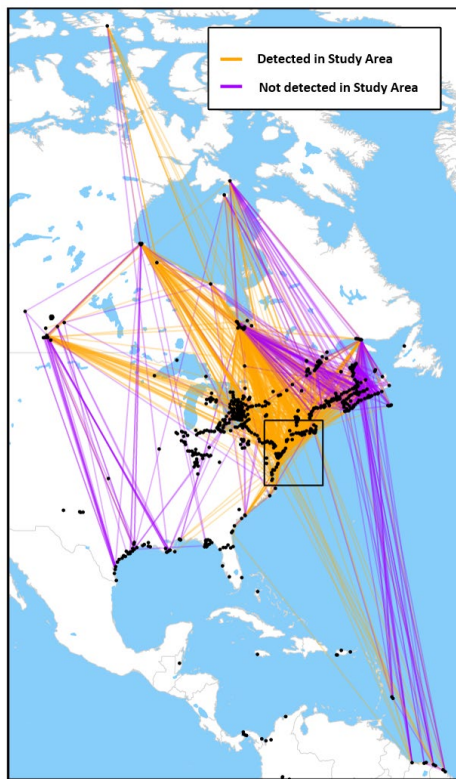
heights, and weather patterns associated with movements into Federal waters of the U.S. Atlantic (more than three nautical miles offshore), where wind energy developments have been proposed or are underway. The study area encompassed a portion of the U.S. Atlantic coast with coverage from an array of 30 Motus stations that were constructed from Cape Cod, Massachusetts, to Back Bay, Virginia. The Motus stations were capable of tracking bird movements up to approximately 12 miles (20 kilometers) offshore. Researchers used movement data collected from the Motus stations to estimate flight paths of birds throughout the study area and to analyze conditions associated with offshore flights. The results show that during spring, shorebird presence in offshore areas occurred from mid-May to early June and was greatest when winds were moderate and blowing to the north-northeast. In the fall, the probability of shorebird presence offshore areas was highest at the beginning of July, when winds were blowing to the south-southeast and atmospheric pressure was high. Our estimated flight altitudes indicated that 24 percent of flights occurred within the rotor-swept zone of offshore wind turbines (25 to 250 meters above sea level) during spring, and 36 percent were during fall.

Many migratory shorebirds species have shown alarming population declines in recent decades. The results of this study represent a significant

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Map of Motus stations operated during 2014 to 2017. Right panel shows the study area in the U.S. Atlantic with polygons showing U.S. Federal waters and BOEM Wind Energy Lease and Planning Areas (February 2019). Map credit: Ariel Lenseke, ECCC



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step forward in our understanding of potential effects of offshore wind energy development on migratory shorebirds populations. Despite these advances, some uncertainties remain. BOEM is currently funding the development of a stochastic model that uses Motus tracking data to estimate collision risk with offshore turbines and model uncertainty. Analyses like these will help to further develop strategies to understand and manage adverse effects to shorebirds and other avian species that migrate offshore. However, to fully understand the exposure and collision risk of shorebirds to

Estimated flight paths of tagged shorebirds tracked by the Motus Wildlife Tracking System from 2014 to 2017. Tracks of shorebirds detected in U.S. Atlantic study area (black rectangle) are shown in orange. Black points show locations of Motus tracking stations. Map credit: Ariel Lenseke, ECCC

offshore wind turbines, we require higher-resolution movement and altitude data than we were able to obtain using radio telemetry methods. Tracking technology continues to advance, and this project has shown how international partnerships can be the key to unlocking the potential of new technologies. The final project will be completed in November 2021.

Learn more: https://www.boem.gov/sites/default/files/documents/environment/environmental-studies/Transparent-modeling-of-collision-risk-for-three-federally-listed-bird-species-to-offshore-wind-development_1.pdf

The full report is available online: <https://www.boem.gov/sites/default/files/documents/renewable-energy/studies/Tracking-Migratory-Shorebirds-Atlantic-OCS.pdf>

Science to Enhance Piping Plover Recovery

By Donyelle Davis, Meaghan Emory, Sara Zeigler, and Vic Hines (USGS)

A new study on piping plovers (*Charadrius melodus*) by the USGS and USFWS can help experts conserve and restore habitats and predict how climate change impacts, such as increased storm frequency and sea-level rise, could affect habitat availability for this high-profile shorebird.

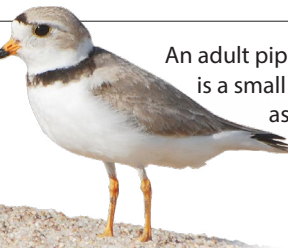
The U.S. Atlantic coast population of piping plovers relies on different kinds of coastal habitats in different regions along the coast. They are managed in three regional recovery units:

1. New England—Massachusetts and Rhode Island
2. Mid-Atlantic—New York and New Jersey
3. Southern—Delaware, Maryland, Virginia, and North Carolina

In all regions, piping plovers preferred to nest in sand mixed with shells and little plant life. This helps camouflage parents, eggs, and chicks, hiding them from predators. Piping

plovers breeding in the New England region mostly nested on the beach between the high-water line and the base of the dunes. In contrast, piping plovers in the Southern region mainly nested farther inland where storm waves flattened the dunes—a process known as “overwash.” Piping plovers in the Mid-Atlantic region selected a mix of the two habitats but selected overwash areas more frequently. Because overwash areas are less common, high-quality habitat in the Mid-Atlantic and Southern regions may be more limited than in the New England region.

“Knowing piping plovers are choosing different habitat for nesting up and down the Atlantic Coast is key information that resource managers can use to refine recovery plans and protect areas most needed for further recovery of the species,” said Sara



An adult piping plover. The piping plover is a small migratory shorebird listed as endangered in Canada and the U.S. Great Lakes and threatened throughout the remainder of its U.S. breeding and winter range. USGS studies nesting habitats of the threatened U.S. Atlantic coast piping plover population to help inform species recovery plans. Photo credit: Susan Haig, USGS

Zeigler, a USGS research geographer and the lead author of the study. “It will also help researchers predict how climate change impacts, such as increased storm frequency, erosion, and sea-level rise, could affect habitat for this high-profile shorebird.”

“This study will help us tailor coastal management recommendations in each region,” said Anne Hecht, a USFWS endangered species biologist and a co-author of the paper. Regional management strategies may help the population to recover, especially in the Mid-Atlantic and Southern regions where numbers have not recovered as well as in the New England region.

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The Atlantic Coast and Northern Great Plains populations of the piping plover were listed as federally threatened in 1985. The U.S. Atlantic coast population of piping plovers increased from 476 breeding pairs when it was listed in 1985 to 1,818 pairs in 2019, according to the USFWS. The population increased by 830 breeding pairs in New England but only 349 and 163 pairs in the Mid-Atlantic and Southern regions, respectively. Although overall Atlantic populations are growing, piping plovers have not recovered as well in the Mid-Atlantic and Southern regions as they have in the New England region. The habitat differences uncovered by the

study may be a factor in the unequal recovery.

“This research will fuel further studies on piping plovers, their habitat-use, and food resources,” Zeigler said. “Refining the models used in this research will help researchers predict habitat availability with future changes in shorelines, sea level, and beach profiles.”

The researchers thank the many partners who contributed data used in this research, including the USFWS, NPS, The Nature Conservancy, Massachusetts Audubon Society, Virginia Tech, New Jersey Division of Fish and Wildlife, Conserve Wildlife Foundation of New Jersey, and Virginia



Chicks and eggs of piping plovers. Photo credit: Susan Haig, USGS

Department of Game and Inland Fisheries.

Press release: <http://ow.ly/CepB50EjGiO>

Read the article: <https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ecs2.3418>

Benefits of Fish Passage and Aquatic Connectivity Considered Broadly in all USFWS Actions

By Eric MacMillan (USFWS), Mike Bailey (USFWS), and Sandra Demberger (USFWS Knauss Fellow)

Updates to the USFWS Manual Chapter (a document used by USFWS staff) provides policy and guidance on evaluating and addressing impacts of USFWS actions on fish passage and aquatic connectivity.

Fish passage is the ability of fish and other aquatic species to move among all aquatic habitats necessary to complete their life cycle, such as migrating upstream or into coastal waters for spawning. Aquatic connectivity refers to how those aquatic habitats are physically linked. The updated guidance applies to all USFWS actions such as infrastructure projects on USFWS lands (for example, replacing an undersized culvert or repairing a water structure like a dam or dike), projects where the USFWS is providing financial and technical support to partners, and projects where the USFWS issues a permit or consultation. Ecosystems, fish and wildlife, and local communities will all benefit from this new policy.

The new Manual Chapter updates bolster efforts to build and maintain

functioning aquatic and terrestrial ecosystems and will assist in efforts to provide safer and more resilient infrastructure for human communities. For example, replacing an undersized culvert with a bridge will provide a “fish friendly” road-stream crossing alternative that allows water and fish to move naturally. Additionally, these improvements are more resilient to flooding and benefit communities (and the USFWS) by saving money in long-term repair and replacement costs.

The chapter will serve as a helpful guide on when and how to evaluate potential impacts to aquatic connectivity and will show USFWS programs where to look for guidance and support when working on projects that could impact aquatic connectivity. Specifically, the USFWS’s National Fish Passage Program under the Fish and Aquatic Conservation Program includes experts in fish passage design, engineering, and policy. This new policy applies to all USFWS employees who are encouraged



Small creeks with inadequate fish passage habitat and connectivity can increase flood risk, decrease the resilience of aquatic species, and contribute to the loss of self-sustaining species. This set of photos show the conditions before (top) and after (bottom) restoration work at a small roadway creek crossing. Photo credit: USFWS

to contact experts in the National Fish Passage Program for guidance and assistance.

Learn more:

USFWS Manual chapter: <https://www.fws.gov/policy/710fw2.html>

USFWS Fish and Aquatic Conservation Program: <https://www.fws.gov/fisheries/index.html>

USGS Scientist Elected to the American Academy of Microbiology

By USGS

Dr. Christina Kellogg was elected to American Academy of Microbiology (AAM) for her contributions in microbiology, particularly for her research on the microbial ecology of tropical and deep-sea corals. She leads the coral microbial ecology laboratory at the USGS St. Petersburg Coastal and Marine Science Center. Fellows of the AAM, an honorific leadership group within the American Society for Microbiology, are elected annually from a pool of nominated candidates through a highly selective,

peer-review process based on their records of scientific achievement and original contributions that have advanced microbiology.

The AAM received 150 nominations this year and elected 65 into the 2021 Fellowship Class. Over the last 50 years, more than 2,500 distinguished scientists have been elected to the AAM representing all subspecialties of the microbial sciences and involved in basic and applied research, teaching, public health, industry, and government service. In addition, Fellows hail from all around the globe.

The Class of 2021 is a diverse class and represents 11 different countries, including Australia, Canada, China (Mainland), France, Ireland, Sweden, Slovenia, Mexico, and Singapore, the United Kingdom, and the United States.



USGS scientist Dr. Christina Kellogg. Photo credit: USGS

Protect Yourself, Protect the Reef

By Sara Melena (NPS)



By adopting an environmentally mindful sun protection routine, you protect yourself from the sun's harmful rays while helping the NPS protect the spectacular but fragile coral reef ecosystem below the ocean's surface. Colorful coral reefs are home to an enormous diversity of species. Healthy coral reefs found in our national parks attract visitors from around the world, and the NPS works hard to monitor the health and natural processes of coral reefs and educate people about the value of our reef ecosystems. Image credit: NPS

Join the NPS by choosing skincare that protects you and the reef—a safe and effective way to enjoy the beauty of our underwater environment!

Do you ever wonder if your sunscreen may impact the resources you are visiting?

"It never crossed my mind to look at the ingredients, and I can't pronounce them anyway."

"I always buy the same brand/cheapest/most convenient sunscreen."

"I don't even think about what I buy. I never thought about how sunscreens might affect plants and animals."

"The ocean is huge. How could a little sunscreen make a difference?"

Beyond a lack of awareness, there are a few barriers that visitors face when it comes to selecting reef-friendly sun protection when visiting coastal parks.

At the NPS, we learned about these barriers and more through a COAST

(see related story, page 31) team project that involved the NPS, George Mason University, Haereticus Environmental Laboratory, and ideas42, a non-profit organization dedicated to applying behavioral insights to social and environmental problems. The team developed a set of strategies that parks could implement to minimize the barriers and encourage visitors to adopt reef-friendly sun protection behaviors such as the use of non-nanotized, mineral-based sunscreens and wearing sun protective clothing. This project complemented communication strategies used by the NPS to raise awareness about the effects of sunscreens on coral reefs.

Coral-reef based parks in Hawai'i and the Virgin Islands have encouraged the adoption of sun protective clothing and mineral-based sunscreens

for years. Parks in Hawai'i began implementing a new program in 2021 where visitors can exchange their sunscreen for a locally made, reef-friendly brand. At War in the Pacific National Historical Park, staff offered an opportunity for kids to make their own sunscreens. Virgin Islands National Park offers complimentary sunscreen in dispensers, similar to the hand-sanitizer dispensers now ubiquitous in public spaces. The NPS also alerts park concessions providers to reef-friendly information and actions they can take to help protect reef ecosystems. Combined, the NPS believes these efforts will encourage visitors to make choices that will protect them from harmful ultraviolet rays while also protecting corals and aquatic life.



More than 1 million people immerse themselves in the ocean to explore coral reefs in national parks every year, and the sunscreen they apply washes off into the water and over the coral. This photo is from Dry Tortugas National Park in South Florida. Photo credit: NPS

The NPS COAST Team Ocean and Coastal Priority Accomplishments

By NPS COAST Team

The NPS Coastal and Ocean Advisory and Support Team (COAST) recently released their 2020 Annual Report—an internal report to help the NPS COAST team identify common challenges and priorities and to provide guidance to help coordinate across the 88 NPS park units that manage ocean and coastal resources. The report outlines seven priority areas and details the accomplishments of the related projects from the first year implementing the three-year plan.

The seven priority areas listed below were identified by Regional Natural Resource Chiefs as being the most pressing issues facing national parks. COAST aims to address these issues by collaborating internally and externally with other Federal, State, and local agencies and partners to support NPS management needs.

Many of the initial project tasks involved compiling information and resources through web-based literature and data searches, as well as actively participating in meetings and interagency working groups. This background information will serve as a foundation for the development and implementation of year two project tasks and will help to guide NPS coastal and ocean resource management into the future.

NPS Ocean and Coastal Park Unit Priorities and Accomplishments

Below are the actions COAST has taken in year one to address each priority area.

- **Aquatic invasive species**—Compiled information on universal and species-specific eDNA primers and on control and treatment methods starting with the species of greatest threat.
- **Benthic habitat mapping**—Compiled publicly available acoustic and

NPS Coral Friendly Sun Protection Tips

Are you preparing for a beach getaway full of swimming, sandcastles, and picturesque sunsets? As you pack your beach bag with snorkel masks and beach towels, don't forget this essential item for a safe and enjoyable ocean vacation—sun protection. Sun protection should always be a top priority, but it's even more important while visiting the beach:

- the sun's rays intensify as they reflect off the sand and water;
- bathing suits typically expose more skin; and
- swimming, sweating, and toweling off remove sunscreen applications.

However, your skin isn't the only thing to protect when you visit coastal parks this summer. Your sun protection choices can also affect the beautiful coral reefs. Sunscreen washes off more than 1 million people as they swim and explore coral reefs in national parks every year. Sunscreens that include the ingredients oxybenzone, octinoxate, and avobenzone can harm coral reefs, leading to coral bleaching and adverse effects of reef reproduction. Unfortunately, through water sampling around coral reef sites, the NPS has detected high concentrations of some of these harmful chemicals. You can protect yourself and the reef by making a few simple choices.

Learn more: <https://www.nps.gov/articles/protect-yourself-and-protect-the-reef.htm>



Help spread the word: Reef-Friendly Sun Protection Campaign Graphics: <https://www.nps.gov/subjects/oceans/reeffriendlycampaigngraphics.htm>, Image credit: NPS

lidar datasets and developed a data management plan template for NPS benthic mapping projects.

- **Fisheries management**—Assembled fishing regulations and license information for each park unit to provide visitors with the necessary information to understand how to legally fish in a park.
- **Harmful Algal Blooms (HABs)**—Compiled information on monitoring efforts in and near coastal parks, along with species-specific State and Federal guidelines.
- **Restoration**—Interviewed park staff to create a restoration needs



Channel Islands National Park encompasses five remarkable islands and their ocean environment, preserving and protecting a wealth of natural and cultural resources. Isolation over thousands of years has created unique animals, plants, and archeological resources found nowhere else on Earth and has helped preserve a place where visitors can experience coastal southern California as it was thousands of years ago. Watch the video: <https://www.nps.gov/media/video/view.htm?id=FFFC1B18-F686-F8E0-CAAF5A93BAB98E12>, Image credit: NPS

inventory database and developed a restoration case studies interactive map.

- **Sea-level rise**—Compiled information, including storm surge projections, coastal assets reports, and trainings.
- **Sediment and shoreline management**—Compiled information on sediment and shoreline issues facing parks and identified expertise within and outside of NPS.

For more information, please contact Eva DiDonato, Chief, NPS Ocean and Coastal Resource Program: eva_didonato@nps.gov

CoNED's Viewer and New Puget Sound TBDEM

New Products and Tools Support Understanding of Coastal Flooding and Risk

<https://doi.org/10.5066/P95N6CIT>

Learn more: <https://www.usgs.gov/core-science-systems/eros/coned>

The Surfing Bison



By Jeff Danielson (USGS)

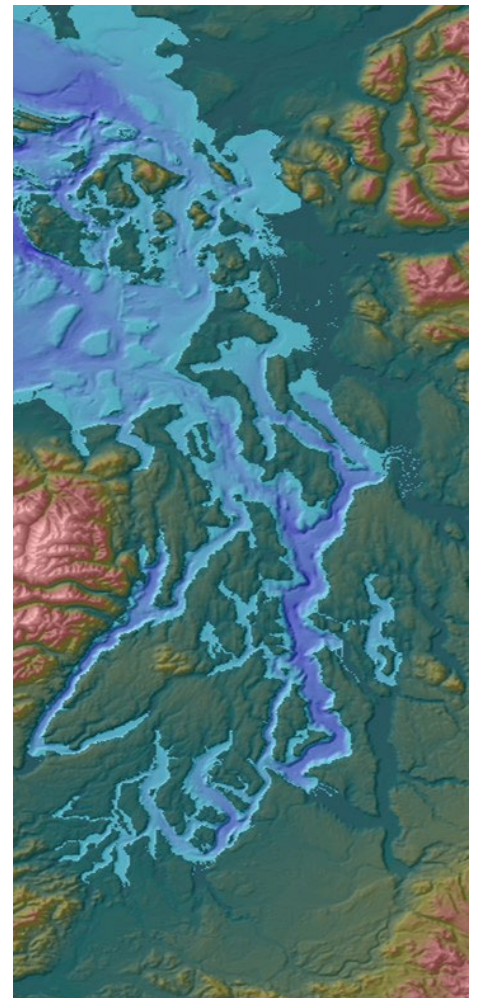
The USGS Coastal National Elevation Database (CoNED) Applications Project has developed an integrated 1-meter topobathymetric digital elevation model (TBDEM) for Puget Sound to support modeling of storm-induced flooding and associated risks.

The enhanced integrated regional high-resolution TBDEMs are valuable resources for coastal hazards research and Earth science applications. The USGS works with partners to develop these DEMs for a wide array of applications.

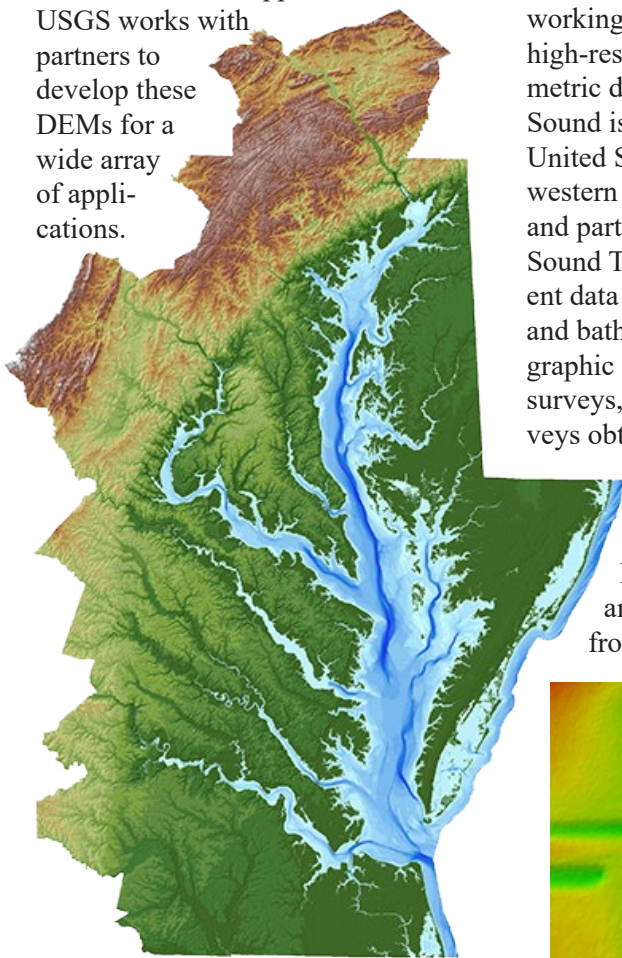
CoNED TBDEM development is focused in select regions around the U.S. coast.

The USGS CoNED Applications Project has also released an updated project viewer so you can browse, query, and custom download regional topobathymetric digital elevation data. CoNED TBDEM Viewer: https://topotools.cr.usgs.gov/topobathy_viewer/

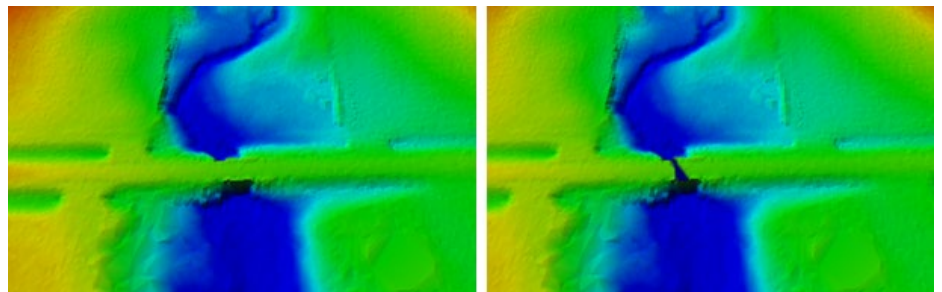
The CoNED Applications Project is working toward national coverage of high-resolution coastal topobathymetric digital elevation data. Puget Sound is the third largest estuary in the United States, located along the northwestern coast of Washington State and part of the Salish Sea. The Puget Sound TBDEM integrates 186 different data sources including topographic and bathymetric lidar data, hydrographic surveys, single-beam acoustic surveys, and multibeam acoustic surveys obtained from the USGS, NOAA, USACE, Puget Sound Lidar Consortium, and Washington State Department of Natural Resources. Input topography and bathymetry data ranges from 1887 to 2017.



USGS CoNED 1-meter topobathymetric digital elevation model for Puget Sound. Image credit: USGS



Topobathymetric digital elevation model of Chesapeake Bay. Image credit: Gayla Evans, Dean Tyler, and Jeff Danielson, USGS



Surfaces showing topographic elevation surface with road fill over a culvert (left image) and hydrologic elevation surface with hydrologic enforcement at the drainage structure (culvert) location. Image credit: Sandra Poppenga, USGS