



NEWSWAVE

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

Introducing the Secretary's NEWSWAVE 5 (see page 6)

Winter/Spring 2022

\$4.37 Billion Wind Sale Sets Offshore Energy Record

The New York Bight offshore wind sale was the Nation's highest-grossing competitive offshore energy lease sale in history.

Read the full story on page 3.

"The enthusiasm for the clean energy economy is undeniable, and it's here to stay. The investments we are seeing today will play an important role in delivering on the administration's commitment to tackle the climate crisis and create thousands of good-paying, union jobs across the Nation."

— Secretary Deb Haaland

Secretary Haaland in Virginia after announcing the environmental review of the first proposed commercial wind project offshore Virginia, July 2021. Photo credit: DOI

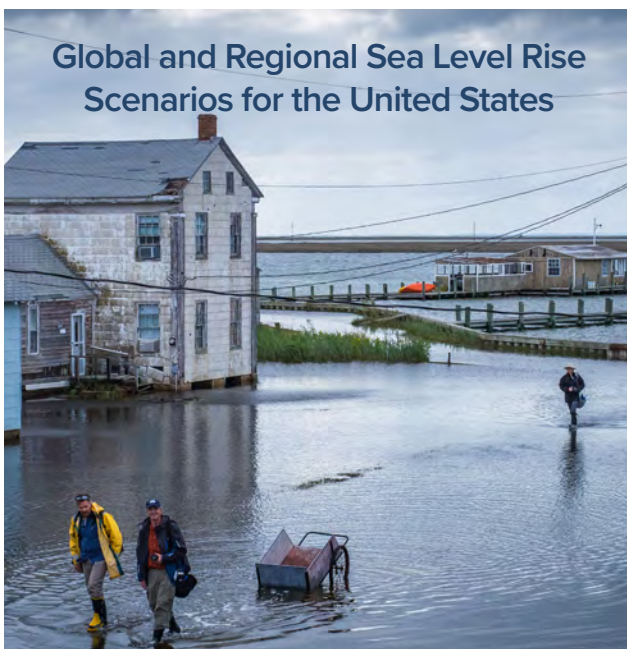


Alarming Predictions for All U.S. Coastlines

Tens of millions of people in the United States live in areas at risk of coastal flooding, and are at increasing risk from coastal hazards, especially with projected sea-level rise.

The U.S. Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force, co-chaired by Interior's U.S. Geological Survey (USGS), offers information to help coastal communities prepare for the effects of sea-level rise. In February, the group published updated sea-level rise projections out to 2150 and extreme water-level probabilities for the Nation's coasts out to 2050.

Read the full story on page 4.



A new interagency report shares key findings about global and regional sea level rise scenarios. Read the report: <https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report-sections.html>

Battle of the Atlantic

The footprint of World War II (WWII) stretches across the globe. The effects of this conflict are lasting not only in the social and geopolitical reshuffling of world powers, but also in the physical evidence of the war that remains on the bottom of the ocean just offshore our Nation's coastline. A new report by the Bureau of Ocean Energy Management (BOEM) and the National Oceanic and Atmospheric Administration (NOAA) includes a complete inventory of shipwreck sites offshore North Carolina.

Read the full story on page 5.



American tanker *Byron D. Benson* burns after a torpedo strike from U-552 during WWII. Photo credit: National Archives and Records Administration

In This Edition

Sea Level Planning in Hawaii 2
 Record Offshore Energy Sale 4
 WW2 Shipwreck inventory..... 5
 Secretary Haaland’s NEWSWAVE 5 6
 HABs in NPS Waters 7
 Great American Outdoors Act 8
 DOI’s Climate Action Plan 8
 Arctic Coastal Changes..... 9
 Gulf of Mexico Wind 10
 Environmental Justice
 and Conservation..... 10
 RAY Diversity Fellowship 11
 Urban Waterways..... 12
 Migrating Monarchs 12
 Solutions for Seabirds
 and Marine Debris 14
 Birds of Poplar Island 15
 Pirates in Parks..... 17
 Building Better Wetlands 18
 Restoring the Mattole 20
 Golden Aster Recovery..... 21
 Partnership Training..... 22
 Satellites: Eyes on Coasts 24
 Working with Nature 25
 Building with Driftwood 27
 Koa Talking to Me 28
 Coastal Wetland Grants..... 29
 NPS COAST Team Priorities 29
 Restoring Coastal Wetlands..... 30
 Invasive Lupine 32
 Lionfish genetics..... 34
 DOI and UN Ocean Decade 35
 The Surfing Bison: Protecting
 North Atlantic Species..... 36

Contribute to NEWSWAVE!

If you have any questions, comments or want to receive NEWSWAVE by email, contact: Ann Tihansky: tihansky@usgs.gov

For more information, contact:

Liza Johnson, Ocean, Great Lakes, and Coasts Coordinator, Office of the Assistant Secretary for Insular and International Affairs
 1849 C Street, NW, Mail Stop 3117
 Washington, D.C. 20240
 Telephone: 202–208–1378
liza_m_johnson@ios.doi.gov



Connect to Images and Multimedia via Social Media

LIKE and FOLLOW us on Facebook:



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

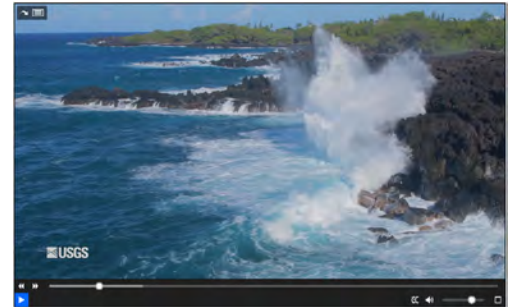
Sea-Level Rise Response Planning in Hawai’i

By Peter Pearsall (USGS)

A video produced by the Pacific Islands Climate Adaptation Science Center (PI-CASC) highlights how coastal change science along different types of shorelines on Hawai’i Island is used to inform community response to climate change and sea-level rise.

The PI-CASC is a partnership between the USGS and a consortium: the University of Hawai’i (UH) at Manoa, the University of Guam, and UH at Hilo. The scientifically based coastal change information will help natural and cultural resource managers across the Pacific anticipate and adapt to climate change.

Watch the video to learn more:
<https://www.usgs.gov/media/videos/hawaii-island-voices-community-based-climate-adaptation>



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>

Editor: Ann Tihansky (USGS)

Technical Editor: Rebekah Davis (USGS); **Layout:** Bethany Fuss (USGS)

Contributors:

- DOI
- Secretary Deb Haaland
- BLM
- Zane Ruddy, BLM
- BOEM
- Mary Boatman, BOEM
- John Filostrat, BOEM
- James Kendall, BOEM
- Sara McPherson, BOEM
- BSEE
- Guillermo Auad, BSEE
- Kimberly Gallo, BSEE
- Julia Leo, BSEE
- NPS
- Claire Alix, NPS
- Eva DiDonato, NPS
- Nicki Gibney, NPS
- Owen K. Mason, NPS
- USFWS
- Dana Bivens, USFWS
- Mike Budd, USFWS
- Sandra Demberger, USFWS, Knauss Fellow
- Graham Evans-Peters, USFWS
- Craig Koppie, USFWS
- Tiffany Lane, USFWS
- Roy W. Lowe, USFWS
- Samantha Luginbuhl, USFWS
- Samantha Marcum, USFWS
- Peter McGowan, USFWS

- Chelsea McKinney, USFWS
- Todd Mecklenborg, USFWS
- James Miller, USFWS
- Lauri Munroe-Hultman, USFWS
- Fred Pinkney, USFWS
- Dimitri Rucker, USFWS
- Keith Shannon, USFWS
- Caleb Spiegel, USFWS
- USGS
- Patrick Barnard, USGS
- Donyelle Davis, USGS
- Meaghan Emory, USGS
- Ann Gibbs, USGS
- Jeffrey Hansen, USGS
- Margaret Hunter, USGS
- Cordell Johnson, USGS
- Marisa Lubeck, USGS
- Peter Pearsall, USGS
- Hilary Stockdon, USGS
- Ann Tihansky, USGS
- Sean Vitousek, USGS
- Jonathan Warrick, USGS
- Stephanie Yelenik, USGS
- Library of Congress
- National Archives and Records Administration
- NOAA/SRI International
- Theresa Keith, NOAA, Knauss Fellow
- James Morris, Jr., NOAA

- Steve Fitzgerald, Harris County Flood Control District
- Nathan Queener, Mattole Salmon Group
- T. Marchant, Nature Collective
- Sabine Dukes, Science Buddies
- AMAPPS
- The Cape Espenberg Birnirk Archaeology Project
- City of Bellingham, Washington
- New England Aquarium Aerial Observers
- Save the Sound
- Unsplash.com
- Washington State Department of Ecology
- Western Governors’ Association
- Matthew Limbert, designer
- Franco Auad, designer
- Steve Jacobus, photographer
- Vincent Legrand, photographer
- Hugh McGee, photographer
- Ingrid Taylor, photographer

\$4.37 Billion for Wind Sale

Winning Bids Set Offshore Energy Records

By DOI

On February 25, the U.S. Department of the Interior (DOI) announced the results of the Nation’s highest-grossing competitive offshore energy lease sale in history, including oil and gas lease sales, with the New York Bight offshore wind sale.

The results are a major milestone towards achieving the administration’s goal of reaching 30 gigawatts of offshore wind energy by 2030.

The lease sale offered six lease areas totaling >488,000 acres in the New York Bight for potential wind energy development. Competitive winning bids, totaling about \$4.37 billion, has the potential to power nearly two million homes.

The United States’ growing offshore wind energy industry presents a \$109 billion revenue opportunity to businesses in the supply chain over the next decade. Before the leases are finalized, the U.S. Department of Justice and Federal Trade Commission intend to complete an anticompetitiveness review of the auction, and the provisional winners will be required to pay the winning bids and provide financial assurance to BOEM.

The New York Bight offshore wind leases include innovative stipulations designed to promote the development of a robust, domestic U.S. supply chain for offshore wind energy and to enhance engagement with Tribes, the commercial fishing industry, other ocean users, and underserved communities. DOI will hold companies accountable for improving their engagement, communication, and transparency with these communities. The stipulations will also advance

flexibility in transmission planning. Stipulations include incentives to source major components domestically—such as blades, turbines, and foundations—and to enter into project labor agreements to ensure projects are union-built. All these stipulations intend to promote nationwide offshore wind energy development in a way that coexists with other ocean uses and protects the ocean environment for generations to come.

“We must have a robust and resilient domestic offshore wind-supply chain to deliver good-paying, union jobs and the economic benefits to residents in the region,” said BOEM Director Amanda Lefton. “Because we understand the value of meaningful community engagement, we are requiring lessees to report their engagement activities to BOEM, specifically noting how they’re incorporating any feedback into their future plans.”

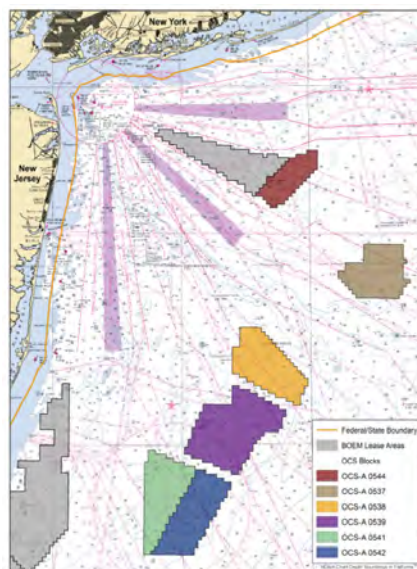
On January 12, Secretary Haaland, New Jersey Governor Phil Murphy, and New York Governor Kathy Hochul announced a shared vision for developing a robust, domestic offshore wind-supply chain that will deliver benefits to residents of New York

and New Jersey and the surrounding region. This collaboration serves as a model for future engagement and establishes the United States as a major player in the global offshore wind energy market.

BOEM initially asked for information and nominations of commercial interest on 1.7 million acres in the New York Bight. Based on BOEM’s review of scientific data and extensive input from the commercial fishing industry, Tribes, partnering agencies, key stakeholders, and the public, BOEM reduced the acreage offered for lease by 72 percent to avoid conflicts with ocean users and minimize environmental effects. BOEM will continue to engage with the public, ocean users, and key stakeholders as the process unfolds.

The recent lease sale is part of the Secretary’s ambitious offshore wind leasing strategy announced this past fall. BOEM expects to review at least 16 plans to construct and operate commercial offshore wind energy facilities by 2025, which would represent more than 22 gigawatts of clean energy for the Nation.

Learn more: <https://www.doi.gov/pressreleases/secretary-haaland-outlines-ambitious-offshore-wind-leasing-strategy>



Provisional Winners of the New York Bight Lease Areas, \$4.37 Billion in High Bids

OCS-A 0544	Mid-Atlantic Offshore Wind LLC, \$285,000,000
OCS-A 0537	OW Ocean Winds East, LLC, \$765,000,000
OCS-A 0538	Attentive Energy LLC, \$795,000,000
OCS-A 0539	Bight Wind Holdings, LLC, \$1,100,000,000
OCS-A 0541	Atlantic Shores Offshore Wind Bight, LLC, \$780,000,000
OCS-A 0542	Invenergy Wind Offshore LLC, \$645,000,000

Mapped wind lease areas and provisional winners of the New York Bight offshore energy lease sale. Image credit: BOEM

Four Key Messages About Sea-Level Rise

Adapted from: <https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html>

1. The Next 30 Years of Sea-Level Rise

Sea level along the U.S. coastline is projected to rise, on average, 10–12 inches in the next 30 years (2020–50), which will be as much as the rise measured over the last 100 years (1920–2020). Sea-level rise varies regionally along U.S. coasts because of changes in land and ocean height.



Along the southern end of Ocean Beach, San Francisco, California, the bluff severely eroded the shoreline 55 meters during the winter 2009–10 El Niño season, including this damage along coastal California's Highway 1. Photo credit: Jeffrey Hansen, USGS

2. More Damaging Flooding Projected

Sea-level rise will profoundly shift coastal flooding over the next 30 years by causing tide and storm-surge heights to increase and to reach farther inland. By 2050, “moderate” (typically damaging) flooding is expected to occur, on average, >10 times as often as it does today.



Storms create large waves during an El Niño season, causing flooding along waterfronts like this one in Capitola, California. Photo credit: Patrick Barnard, USGS

3. Emissions Matter

About 2 feet of sea-level rise along the U.S. coastline is increasingly likely between 2020 and 2100 because of current and previous emissions. Failing to limit future emissions could cause an additional 1.5–5 feet of rise for a total of 3.5–7 feet by the end of this century.



Extensive inland flooding in Texas associated with Hurricane Harvey in 2017. Photo credit: Steve Fitzgerald, Harris County Flood Control District

4. Continual Tracking

Our ability to monitor and understand the individual factors that contribute to sea-level rise allows us to track sea-level changes in new ways (for example, using satellites to track global ocean levels and ice sheet thickness). Ongoing and expanded monitoring of sea level change is a critical part of adapting and planning.



The waterfront in Capitola, California, severely flooded during a large storm in March 2014. Photo credit: Sabine Dukes, Science Buddies

Sea-Level Rise Task Force Reports Alarming Predictions for all U.S. Coastlines

By Meaghan Emory, Hilary Stockdon, and Patrick Barnard (USGS)

The U.S. Sea Level Rise and Coastal Flood Hazard Scenarios and Tools Interagency Task Force report concluded that sea level along the U.S. coastline is projected to rise an average of 10–12 inches in the next 30 years (2020–50). To put that into perspective, that rise will be as much as the rise measured over the last 100 years (1920–2020).

The main drivers for global mean sea-level rise are atmospheric and ocean warming, which increase both the mass of the ocean (primarily through the melting of land ice) and the volume of the ocean (primarily through thermal expansion).

Sea-level rise varies regionally along U.S. coasts because of factors such as variability in vertical land motion and sea surface height driven by ocean currents. About 2 feet of sea-level rise along the U.S. coastline is increasingly likely between 2020

and 2100 because of greenhouse gas emissions, such as carbon dioxide, to date contributing to increased global temperatures.

“One of the major concerns with these new projections is the significant increase in flood frequency by 2050, including a five-fold increase in major flooding,” said task force co-chair and USGS scientist Patrick Barnard. Sea level rise will lead to more beach erosion and the loss of coastal marshes,” said USGS scientist Davina Passeri. “Natural shorelines offer protection from flooding and waves during storms, while also serving as a key habitat for animals like birds and turtles. With sea-level rise, we will lose that natural buffer.”

The updated scenarios have been integrated into a new Interagency Sea Level Rise Scenario Tool that provides sea-level rise information for all U.S. coastal States and territories out

to the year 2150. The data conveyed in the tool and report can be accessed and downloaded by coastal practitioners and community planners to help enhance local coastal resilience.

Learn more: <https://oceanservice.noaa.gov/hazards/sealevelrise/sealevelrise-tech-report.html>

Interagency Sea level Rise Scenario Tool: <https://sealevel.nasa.gov/task-force-scenario-tool>

The task force consists of representatives from NOAA, the National Aeronautics and Space Administration (NASA), the U.S. Environmental Protection Agency (EPA), the USGS, the Federal Emergency Management Agency, the U.S. Army Corps of Engineers (USACE), and the U.S. Department of Defense, and operates under the umbrella of the U.S. Global Change Research Program and the Subcommittee on Ocean Science and Technology.

Battle of the Atlantic—The First Complete Inventory of WWII Shipwrecks

By Mary Boatman (BOEM)

Adapted from: https://espis.boem.gov/final_reports/BOEM_2021-076.pdf

The footprint of WWII stretches across the globe. The effects of this conflict are lasting not only in the social and geopolitical reshuffling of world powers that occurred at the end of the war, but also in the physical evidence of the war, which remain on the bottom of the ocean just offshore our Nation’s coastline.

The United States was drawn into WWII after the attack on Pearl Harbor on December 7, 1941. As the United States mobilized its military to engage the Axis Powers (Germany, Italy, and Japan), the war on the high seas continued to creep toward the United States, eventually reaching the waters off the Atlantic seaboard and into the Gulf of Mexico. The Battle of the Atlantic encompasses Germany’s effort to disrupt Allied supply lines throughout the war. This extended engagement pitted German Unterseebootes (U-boats) not only against military assets but also against civilian and merchant vessels of various nationalities carrying oil and other raw materials to the European theater. The events associated with this battle came within eyesight of Atlantic coastal towns and ports, into the Chesapeake Bay, and down to the mouth of the Mississippi River.

A new report by BOEM and NOAA includes a complete inventory of shipwreck sites (both located and historically reported) off the coast of North Carolina, totaling 91 vessel losses.

Of the 91, 79 are merchant vessels, 8 are Allied military vessels, and 4 are German U-boats. These vessels are documented in detail using historic and underwater forensic photography, multibeam bathymetry, side-scan sound navigation and ranging (sonar) acoustic imaging, and other technologies. The study includes the discovery of the final resting place of the German U-boat U-576 and the Nicaraguan merchant vessel *Bluefields*. The shipwrecks and other material remains associated with the Battle of the Atlantic off our Nation’s coasts are not entirely a secret. Some of the sites are well known by local communities, and there is no lack of historical documentation, photographic evidence, or living survivors to attest to the proximity of these engagements.

Despite this wealth of information, the story of how WWII came to our Nation’s coastline is not engrained in our collective memory of the war. The lasting remains of the Battle of the Atlantic are obscured as the general public does not readily encounter these resources on a daily basis. Moreover, the significance of the Battle of the Atlantic is not one or two individual shipwreck casualties but a complex interplay of merchant vessels and U-boats that is spread out along the Atlantic coast. Through achieving the challenging first step of developing a complete inventory of sites, our Nation can foster further research,

long-term monitoring, public outreach, and educational efforts in support of a holistic historical and archaeological assessment of the Battle of the Atlantic.

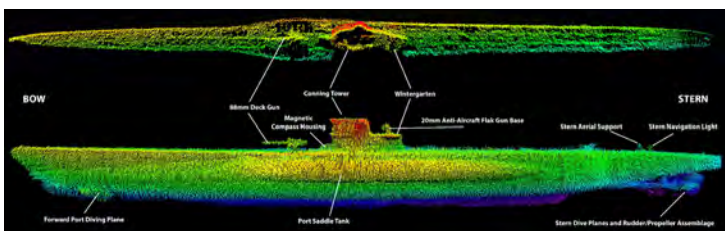
The “Battle of the Atlantic” project was born out of the overlapping information needs of BOEM and NOAA regarding stewardship of archaeological sites on the Outer Continental Shelf (OCS) offshore of North Carolina. This report details the results of the 8-year research effort to identify and investigate all archaeological sites associated with the Battle of the Atlantic off the coast of North Carolina, including environmental and historical context for understanding these sites.

Partnerships and collaborative sharing of resources and expertise among BOEM, NOAA, other Federal partners such as the National Park Service (NPS) Submerged Resources Center; State agencies, including the State of North Carolina; universities, such as the University of North Carolina Coastal Studies Institute and the East Carolina University’s Program in Maritime Studies; and citizen scientists, such as the Battle of the Atlantic Research and Expedition Group, all contributed to the project’s success. *See related story, page 22.*

Findings are informing BOEM’s planning efforts for the commercial wind energy development on the OCS offshore North Carolina. An inventory and assessment of WWII vessel losses offshore North Carolina will assist BOEM in considering the effects of its undertaking on historic properties under Section 106 of the National Historic Preservation Act (80 Stat. 915). Partnerships through interagency agreements allow BOEM to pursue its mission of identifying and collecting data regarding historic properties along the OCS with other Federal agencies engaged in similar work.

Learn more: <http://www.boem.gov/North-Carolina/>

https://espis.boem.gov/final%20reports/BOEM_2021-076.pdf



This image of the U-boat U-576 shipwreck on the seafloor, in plan and profile view, was created using a single high-resolution survey that was processed as a multibeam point cloud. Image credit: NOAA/SRI International



Secretary Haaland's NEWSWAVE 5

By Secretary Deb Haaland

Each NEWSWAVE issue, Secretary Haaland will share some highlights of the work DOI is doing to bolster our Blue Portfolio. See these and other press releases at <https://www.doi.gov/news/press-releases>



Photo credit: DOI

1. Offshore Wind Progress

It was incredible to be onsite for the groundbreaking of incredible new offshore wind projects in the past few months. The Vineyard Wind and South Fork projects are a tribute to the hardworking staff on our team. These new projects will power homes, businesses, and communities with clean energy. Not only that, but the jobs we create will make people's lives better, help families save for the future, and help build a better America.



Photo credit: DOI

2. United Nations Climate Summit

The climate crisis is a global challenge. I was honored to join leaders from around the world at the 26th United Nations Climate Change Conference of the Parties (COP26) to discuss climate change effects and the solutions that we must embrace to address this challenge. While in Aberdeen, I met with industry leaders to discuss DOI's goals to accelerate a sustainable clean energy economy.



Photo credit: DOI

3. Interagency Group on Insular Affairs (IGIA) Senior Plenary Meeting

As we work to preserve and protect our ocean, we are collaborating with our Insular partners to address coastal erosion, keep our oceans healthy, and ensure island and coastal communities have what they need to thrive. In February, I was grateful to hear Insular governors' recommendations and share more about the transformational investments in the Bipartisan Infrastructure Law that will create jobs, provide clean drinking water, and upgrade our roads, airports, and rail.



Photo credit: Western Governors' Association

4. Launching the Collaborative Conservation Task Force

As climate change intensifies environmental challenges, we have a unique opportunity to collaborate with our Western partners to advance our shared priorities, including implementing President Biden's infrastructure investments to bolster communities' resilience against extreme weather. That's why DOI and the U.S. Department of Agriculture (USDA) joined the Western Governors' Association launched Collaborative Conservation Task Force. This will be a critical forum as we endeavor to conserve and protect our natural resources.



Photo credit: DOI

5. Investing in Climate Resiliency and Environmental Justice

As we continue to help those affected by climate change, DOI recognizes that marginalized communities have fewer resources to rebuild or relocate when climate disaster strikes. Last year, during my visit to the Quinault Indian Nation on the coast of Washington State, I saw firsthand how climate change affects coastal communities. Land erosion, rising seas, and storm surges have displaced some in the community, forcing them from their ancestral homelands. We're making climate resiliency and environmental justice a priority with new, unprecedented investments that will allow Indigenous coastal communities to prepare for and adapt to the ever-changing climate while protecting their natural surroundings.

Identifying HABs in NPS Waterways

By Donyelle Davis and Marisa Lubeck (USGS)

In October 2021, scientists from the USGS and the NPS partnered on a first-of-its-kind, nationwide HAB field study. The project addresses critical management needs related to HAB monitoring and response in national parks. The partnership began in summer 2021 and will continue over the next two years. Scientists selected six marine and 12 freshwater parks for the sampling program that have recurring HABs and potential human or wildlife health issues.

HABs are a global concern that threaten human and aquatic ecosystem health and can cause severe economic damages. Algal toxins are produced by certain species of algae and microscopic water plants called phytoplankton and can cause acute and chronic illnesses in humans and wildlife. Economic damages related to HABs

include loss of recreational and fisheries revenues, decreased property values,



A Solid Phase Adsorption Toxin Tracking tool being deployed in Curecanti National Recreation Area, Colorado, to track toxin presence. Photo credit: Nicki Gibney, NPS

and increased drinking-water treatment costs.

The researchers involved in the project, “Rapid Response Strategy for Potential Toxin Exposures from HABs in Coastal and Shoreline Areas of National Parks,” aim to address critical management needs related to HAB monitoring and response in national parks. Professional and trained citizen scientists are using innovative techniques to sample and monitor HABs in freshwater and marine environments across 18 U.S. national parks that experience recurring HABs and potential human or wildlife health issues. The new suite of simple, low-cost sampling methods can analyze up to 32 freshwater and 25 marine algal toxins.

“We are very excited about this multiagency collaborative effort,” said Jennifer Graham, USGS project co-lead. “The end goal is to provide the information necessary for the National Park Service to develop comprehensive guidance on HAB monitoring, toxin testing and rapid response protocols.”

“We’re finding HABs in new areas,” said Jamie Kilgo, project co-lead and marine ecologist at the NPS.

“We need to monitor areas where they are a known issue and anticipate where we might find them in the future so we can protect visitors, pets, park staff, volunteers and wildlife.”

Over the summer, the agencies trained NPS technicians and 11 citizen scientists to safely monitor and collect water samples for further analysis so the USGS and partners can efficiently identify the presence of potential HABs. These groups are using a variety of sampling and monitoring techniques to test their efficacy. These techniques range from citizen scientists viewing phytoplankton species under a microscope to colorful, donut-shaped Solid Phase Adsorption Toxin Tracking tools, which track toxin presence over time. Scientists will sample for more than 30 different toxins, some of which are rarely tested but may be present at harmful concentrations.

“It’s important that we cover this wide range for both the toxins and sites in order to fully understand the extent of harmful algal blooms,” said Victoria Christensen, USGS project co-lead. “Therefore, we are also sampling a diverse range of waterbodies, such as rivers, lakes, coastal shorelines and backwater areas, that may harbor different types of blooms and different toxins.”

Collaborators, including the EPA Cyanobacteria Monitoring Collaborative, the University of Wisconsin, and NOAA’s Phytoplankton Monitoring Network, will supply equipment and protocols for low-cost HAB monitoring and toxin sampling needed for analyses in selected pilot parks.

Read more: <https://www.usgs.gov/news/national-news-release/project-underway-identify-algal-toxins-us-national-park-waterways>

Great American Outdoors Act

Funds Improve Infrastructure, Public Access

By DOI

Through the Great American Outdoors Act (GAOA), DOI is investing in much-needed maintenance for critical facilities and infrastructure in our national parks, forests, wildlife refuges, recreation areas, and Tribal schools. GAOA authorizes up to \$1.9 billion annually for five years to fund deferred maintenance projects, investments that will also benefit underserved communities and help advance the administration's commitment to racial equity. GAOA also authorizes permanent funding of the Land and Water Conservation Fund at \$900 million annually to improve recreational opportunities on public lands, protect watersheds and wildlife, and preserve ecosystem benefits for local communities.

The Legacy Restoration Funds (LRF) will update infrastructure from parking to bridges, trails, and utilities, as well as improve public access to recreation.

Learn more: <https://doi.gov/gaoa/projects>

For fiscal year (FY) 2021, 165 projects are underway across DOI's Bureaus, making a difference for American public in many ways:

- LRF-funded projects serve as catalysts for economic development and job opportunities in communities across the Nation. The \$1.6 billion investment for FY2021 alone will support an estimated 18,851 jobs and contribute \$2 billion to the Nation's gross domestic product.
- DOI honors its commitment to Tribal communities by investing in Bureau of Indian Education-funded schools for current and future generations.
- Improving water and utility infrastructure maximizes the resilience of land and water resources to



Youth education on public lands provide hands-on learning about our natural resources, history, and culture. Photo credit: NPS

protect communities and the environment against extreme wildfires, sea-level rise, hurricanes, and other climate crises.

- Building energy-efficient facilities helps put America on a path to a clean energy future.
- Focusing our efforts on communities of color, low-income families, and indigenous communities, which bear a disproportionate brunt of the harm from air and water pollution, addresses long-standing environment justice issues and racial inequities.

DOI's Climate Adaptation and Resilience Plan

By DOI

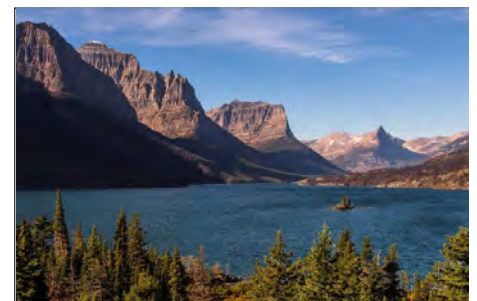
In October, DOI released its climate adaptation and resilience plan to strengthen our Nation's resilience to climate change and extreme weather. The plan outlines how DOI will use science as the foundation for planning and decision making related to climate change risks, effects, and vulnerabilities, part of the administration's whole-of-government approach to confronting the climate crisis.

"The Interior Department is committed to meeting the administration's ambitious climate and infrastructure goals," said Secretary Haaland. "As the climate crisis disproportionately affects underserved communities, Interior will center environmental justice,

build resilient communities and invest in a clean energy future that can create millions of good-paying union jobs, while protecting the communities, natural and cultural resources on which Americans rely."

DOI and its Bureaus face a multitude of risks caused by climate change, including rising costs to maintain and repair damaged infrastructure from more frequent and extreme weather, reduced program effectiveness, and health and safety challenges to Federal employees. Taking climate risk management actions now will mitigate disruptions to Federal operations, assets, and programs, and will create safer worker conditions.

See Climate Plan page 9



DEPARTMENT OF THE INTERIOR
CLIMATE ACTION PLAN
2021



Read the plan: <https://www.doi.gov/sites/doi.gov/files/department-of-interior-climate-action-plan-final-signed-508-9.14.21.pdf>

Climate Plan continued from page 8

As part of these efforts, DOI's plan outlines how it will embed adaptation and resilience planning and implementation throughout its operations and programs. The plan commits DOI to the following major categories of adaptation actions:

- Promoting climate-resilient lands, waters, and cultural resources;
- Advancing climate equity;

- Transitioning to a resilient clean energy economy;
- Supporting Tribal and Insular community resilience;
- Empowering the next generation of conservation and resilience workers;
- Enhancing climate literacy; and
- Bolstering climate resilience in the management of sites, facilities, and supply of products and services.

The plan also identifies the institutional approaches DOI will use

to tackle the climate crisis, as well as climate-related vulnerabilities to DOI's mission, and strategies to secure climate-ready sites, facilities, products, and services. DOI will plan and prepare by engaging with Federal agencies, Tribes, Insular areas, Native Hawaiian people, States, local communities, and other public and private partners, domestically and abroad.

Learn more: <https://www.doi.gov/priorities/tackling-climate-crisis>

Arctic Barrier Islands, 1947–2020

A Chronicle of Climate and Coastal Changes

By Ann Gibbs and Peter Pearsall (USGS)

Barrier islands and sediment spits shelter coastlines from storms, protecting coastal communities and providing habitat for native species. Formed under a variety of conditions, barrier islands are themselves highly variable, often changing in shape from season to season, year to year. Understanding the rates and causes of coastal change in Alaska is needed to identify and mitigate hazards that might affect people and animals that call Alaska home.

The Arctic region is warming faster than anywhere else in the Nation.

In the Arctic, barrier islands are subject to seasonal shifts in sea ice and permafrost during the brief Arctic summer—shifts that are becoming more pronounced with climate change. A new USGS report summarizes changes along Alaska's North Slope coast from 1947 to 2020. The authors pulled together data from a variety of sources including satellite imagery, past climatological records and light detection and ranging (lidar) scans of the coastline. During the past 50 years, barrier islands along the Alaskan Arctic coast have decreased in number but increased in area, possibly because of changes in

wave behavior and sediment supply. As sea ice retreats and permafrost thaws under a warming climate, high winds, waves, and freshwater currents can further destabilize these coastal features.

Barrier islands stretch across about 50 percent of Alaska's Arctic coast. Besides serving as a physical barrier against storms, these islands are used as resting and nesting habitat by birds, denning habitat for polar bears, and haul-out areas for walruses. They support energy and defense-related infrastructure on the North Slope and are home to Alaska Native villages and subsistence hunting camps.

“Understanding the drivers of the change we're seeing on these barrier islands is a challenge,” said USGS Geologist Ann Gibbs, an author of the report. “However, with potential threats to coastal habitat, infrastructure, and Alaska Native communities associated with climate change, there is an urgent need for better understanding of the rates and drivers of barrier island change, as well as for improved predictive modeling of future island conditions.”

Learn more: https://www.usgs.gov/center-news/tracking-changes-barrier-islands-arctic?qt-news_science_products=1#qt-news_science_products

Read the report: <https://doi.org/10.3133/ofr20211074>



Adult polar bear walking across a recently overwashed barrier island offshore of Barter Island on Alaska's north coast during a large Arctic storm in September 2016. Photo credit: Cordell Johnson, USGS

Offshore Wind in the Gulf of Mexico

By John Filostrat (BOEM)

On January 11, BOEM announced it is drafting an environmental assessment (EA) to consider the effects of potential offshore wind leasing in Federal waters of the Gulf of Mexico. The EA is another step toward the administration's goal of permitting 30 gigawatts of offshore wind by 2030.

The area that will be reviewed in the EA includes almost 30 million acres just west of the Mississippi River to the Texas/Mexican border. BOEM will narrow the area based on stakeholder and ocean user input before advancing

any Wind Energy Areas, which are offshore locations that seem most suitable for wind energy development.

“The Gulf of Mexico is well-positioned to support a transition to a renewable energy future, as much of the infrastructure already exists to support offshore wind development in the region,” said BOEM Director Amanda Lefton. “BOEM’s Environmental Assessment is an important step to ensure that any development in the region is done responsibly and in a way that avoids, reduces, or mitigates potential impacts to the ocean and to ocean users.”

The draft EA will consider potential environmental consequences of site characterization activities and site assessment activities associated with the possibility of issuing wind energy leases in the Gulf of Mexico. The EA represents the culmination of a collaboration between local, State, Federal, and Tribal Governments to use the best available science and traditional knowledge to minimize conflicts between ocean uses.

Learn more: <https://www.boem.gov/renewable-energy/state-activities/gulf-mexico-activities>

Secretary Haaland Highlights Environmental Justice and Conservation Investments

By DOI

On January 24, 2022, Secretary Haaland and U.S. Fish and Wildlife Service (USFWS) Director Martha Williams visited the John Heinz National Wildlife Refuge (NWR), underscoring the importance of connecting urban communities to the outdoors.

Celebrated as America’s first urban refuge, John Heinz NWR at Tinicum was established in 1972 to preserve and restore the natural area known as Tinicum Marsh. It was also created to provide environmental education and connect the surrounding urban communities to nature. More than 1.7 million people live within 10 miles of the refuge, and more than 35 million live within a two-hour drive.

“Urban wildlife refuges provide spaces where communities can connect with nature and wildlife and the bountiful gifts they offer. As we work to address inequitable access to the outdoors for communities of color and underserved communities, places like the John Heinz National Wildlife Refuge serve as a model of what it looks like to create inclusive spaces that all people, regardless of their background, can access,” said Secretary Haaland.

During the visit, Secretary Haaland highlighted how the surrounding Delaware River Basin area will be a direct beneficiary of funding from the Bipartisan Infrastructure Law, which represents the largest investment in physical and natural systems in American history. The infrastructure law includes \$200 million for fish passage restoration programs nationally and \$26 million for the Delaware River Basin Conservation Act.

Secretary Haaland discussed the importance of advancing environmental justice and DOI’s efforts to increase access to nature for all communities. The John Heinz NWR has been more inclusive and collaborative across its programs by actively listening to and partnering with surrounding communities that have historically been excluded from the conservation conversation. For example, through coordinating with communities and local stakeholders, the USFWS has implemented a curriculum-based environmental education program, a youth experience program, and a community engagement program.

The Urban Wildlife Conservation Program works through urban wildlife



Secretary Haaland visited the USFWS John Heinz NWR and discussed the important role of urban wildlife refuges in conservation, and community-building, and advancing environmental justice. Photo credit: DOI

refuges, urban partnerships, and urban bird treaty cities across the Nation to apply the tenets of community and partner engagement in their programs, targeting actions to be community and partner-focused, intentional, inclusive, and collaborative. This kind of conservation stewardship and efforts to increase equitable access to public lands is also an essential component of the Biden-Harris administration’s “America the Beautiful” initiative, a decade-long, locally led, and voluntary campaign to conserve, connect, and restore 30 percent of our lands and waters by 2030.

Press release: <https://www.doi.gov/pressreleases/secretary-haaland-highlights-environmental-justice-conservation-investments-during>

Mussel Research in the Anacostia and Potomac Rivers

First RAY Diversity Fellowship

By Dimitri Rucker (USFWS)

In 2021, USFWS' Chesapeake Bay Field Office (CBFO) made history by hosting fellows with the Roger Arliner Young (RAY) Diversity Fellowship. Managed by the Environmental Leadership Program (ELP), the RAY Diversity Fellowship is dedicated to creating opportunities for emerging leaders of color. These future leaders are passionate about engaging in conservation and clean energy and hold two-year positions with their respected organization.

The fellowship's inspiration is Roger Arliner Young herself, the first African American woman to earn her doctorate degree in zoology. Fitting enough to Dr. Young's legacy, one of the RAY Fellow positions offered at the CBFO is an at-risk species biologist. This position allows the fellow to serve as a fish and wildlife biologist who works daily toward addressing at-risk and listed species, which can include restoring critical habitat. Although there are many at-risk species to work with, such as butterflies (*see related story, page 12*) and turtles, an often-overlooked group of animals essential to healthy freshwater ecosystems is mussels.

In the first few months of starting his RAY Fellowship, Dimitri Rucker, worked with CBFO Toxicologist Dr. Fred Pinkney to construct and deploy mussel cages into the

Anacostia and Potomac Rivers. Both rivers run through the heart of Washington, D.C., and continue with tidal connections to the Chesapeake Bay. The caged mussels will be monitored monthly until August 2022 to record water-quality data and mussel growth. The mussel project is a collaboration with the University of Maryland-Baltimore County, which is providing passive contaminant samplers alongside the mussels to help understand the toxic compound concentrations in the rivers.

A total of 786 mussels (some eastern lampmussel [*Lampsilis radiata*] and some alewife floater [*Pyganodon implicata*]) were deployed between eight locations in winter 2021. The data gained through this mussel deployment will enable scientists to compare survival and, growth, and better understand how mussels bioaccumulate contaminants. The project also provided hands-on learning for RAY Fellow Rucker, who previously had no experience in developing a conservation project from start to finish. These efforts will also hopefully increase native mussel populations and help toxic compound cleanup.



USFWS staff in the field (left to right), Alex Vidal, Oliver Griffin, and Dimitri Rucker, deploy mussel cages in the Anacostia River. Photo credit: Fred Pinkney, USFWS

Environmental Leadership Program (ELP)

The mission of the ELP is to support visionary, action-oriented, and diverse leadership for a just and sustainable future. ELP aims to catalyze change by providing emerging leaders with the support and guidance they need to launch new endeavors, achieve new successes, and rise to new leadership positions. Since 2000, ELP has created a dynamic network of >1,300 of the country's top emerging environmental and social change leaders. One program of note is the RAY Diversity Fellowship.

The RAY Diversity Fellowship

The lack of racial diversity within conservation and clean energy fields is a persistent problem. RAY is working to rectify this shortcoming by striving for greater diversity, equity, and inclusion in conservation and clean energy through the RAY Diversity Fellowship. The fellowship focuses on increasing opportunities for emerging leaders of color to learn about, engage with, and enter the conservation and clean energy nongovernmental organization (NGO) sectors and is designed to attract and support recent college graduates of color who have exceptional promise, demonstrated accomplishment, and who seek to be leaders in these sectors.

Learn more: <https://elpnet.org/>

<https://rayfellowship.org/about>



Tagged alewife floaters organized for data collection. Photo credit: Dimitri Rucker, USFWS

A Scientist Dedicated to Creating Healthy Urban Waterways

By Lauri Munroe-Hultman (USFWS)

Adapted from: <https://medium.com/usfishandwildlifeservicenortheast/heeding-carsons-call-6368521495e0>



Pinkney in the field where he has spent nearly three decades studying the effects of toxic chemicals on aquatic life. Photo credit: USFWS

Fred Pinkney has studied the effects of toxic chemicals on aquatic life in Northeast waterways for nearly three decades as an environmental contaminants biologist at the USFWS CBFO in Annapolis, Maryland.

“A lot of these urban rivers are getting better in many ways,” Pinkney said. “Land uses are changing, and people are realizing we can enjoy and improve the streams and rivers close to home.” Pinkney has researched the connections between various contaminants and the health of frogs, insects, fiddler crabs, freshwater mussels, and fish. His work has taken him to most of the NWRs in the Northeast.

For many years, he has focused on the Anacostia River, which drains 176 square miles of Maryland and the District of Columbia into the Potomac River. More than 800,000 people live in the watershed.

“I hope to play a key role in the cleanup of the Anacostia and that my work leads to improving the health of fish and decreased concentrations of contaminants so that anglers may be able to eat more of the fish they catch,” said Pinkney.

Help for Migrating Monarch Butterflies in Coastal Areas

By Sandra Demberger (USFWS, Knauss Fellow) and Samantha Marcum (USFWS)

Monarch butterfly (*Danaus plexipus*) populations have been in decline for >20 years because of fragmented or lost critical habitat across their flyways. Today, the species is listed as a candidate species under the Federal Endangered Species Act (87 Stat. 884) because of shrinking populations. Scientists and land managers at the USFWS are working to better understand what resources are needed to better support monarchs along their migration pathways.

Monarch Watch, a nonprofit group dedicated to the education, conservation, and research of monarchs, designates important “monarch waystations” across North America, east of the Rocky Mountains, that helps identify habitat areas that provide the key resources (food and resting habitat) monarchs need to successfully migrate and reproduce. Traveling 50 to 100 miles per day is taxing on the insects, so having readily available resources along flyways is critical. As of January 2022, Monarch Watch has designated >37,000 monarch waystations to help monarchs pass through different parts of the country.

In March 2016, Monarch Watch designated Poplar Island, a large restoration project in the Chesapeake Bay (*see related story, page 15*), as a “colossal” monarch waystation (the size of a basketball court or larger). Not only do key monarch nectar plants, such as the eastern baccharis (*Baccharis halimifolia*), multiple milkweed species (*Asclepias* spp.), and other nectar producing species thrive on the restored lands, but high sun exposure and plentiful shelter (to protect from predation and the elements) provide other important resources that support the monarchs on their long-distance travels. USFWS staff at the CBFO

conduct tagging, maintain habitat, and support improved understanding of monarch migratory behavior.

See Monarch page 13



At top, Dimitri Rucker catches butterflies for tagging. At bottom, a monarch is perched on top of an eastern baccharis, their preferred “fuel up” plant. Photo credits: Ann Tihansky, USGS, and Sandra Demberger, USFWS



Once caught, monarchs are gently placed in a screen enclosure until the team begins processing. Photo credits: Ann Tihansky, USGS, and Peter McGowan, USFWS

Monarch continued from page 12

Tagging to Learn More

So far, the tagging efforts have paid off. Tagging has revealed that the monarchs migrating back to the wintering grounds are the great-great grandchildren of the butterflies that left the previous spring. How do they find their way back after four generations? We don't know!

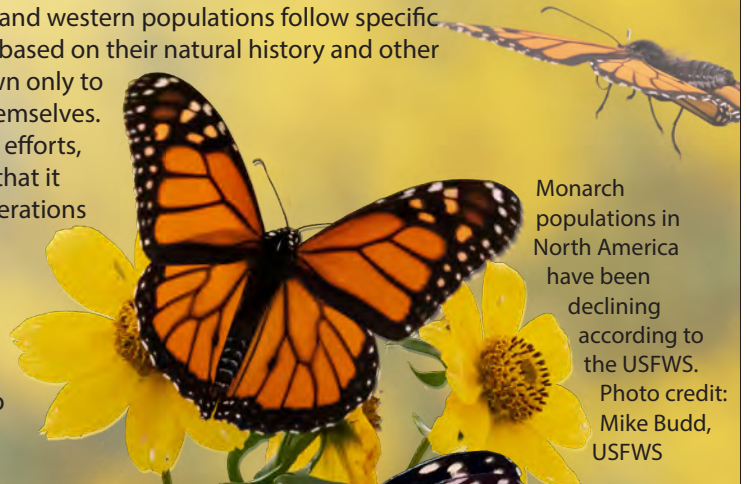
The USFWS, along with thousands of volunteers across North America tag monarchs as they migrate to help the Monarch Watch's mission: to better understand how to conserve the monarch migration. Tagging provides key information about the dynamics of the species' spectacular fall migration and how monarchs accomplish the amazing feat of traveling so far.

During the fall 2021 tagging season at Poplar Island, USFWS staff tagged 491 butterflies. Since 2018, nearly 2,000 monarchs have been tagged at Poplar Island, providing valuable information to Monarch Watch. The tagging efforts by USFWS and others will help Monarch Watch shed light on behavior and migratory patterns that can help advise successful management strategies, protection of waystations and improved public education.

Monarchs on the Move

With a wingspan of 3 to 4 inches, which is large for a butterfly, the monarch's brilliant orange and black markings make them one of the easiest butterflies to identify. Monarchs migrate great distances often as far as 3,000 miles, stopping along their flyways to rest and forage between summer and overwintering grounds. Eastern and western populations follow specific migratory routes based on their natural history and other information known only to the butterflies themselves.

Through tracking efforts, we have learned that it takes several generations to complete a migratory cycle; however, more information is needed to help address threats to these insects.



Monarch populations in North America have been declining according to the USFWS. Photo credit: Mike Budd, USFWS

Learn more:

<https://www.fws.gov/savethemonarch/>

<https://www.monarchwatch.org/>

<https://www.xerces.org/>

Read more:

<https://xerces.org/blog/western-monarch-thanksgiving-count-tallies-nearly-250000-butterflies>

Once the tag is firmly secured, the butterfly is released so it can resume its journey. Anyone who finds this butterfly (and can read the tag) can report the sighting on the Monarch Watch website (<https://www.monarchwatch.org/>). Photo credits: Sandra Demberger, USFWS

Seabirds: Marine Debris Impacts and Solutions

By Caleb Spiegel (USFWS)

A new report from the Atlantic Marine Bird Cooperative includes a plan to address effects of marine debris on birds and features an action-oriented “Implementation Framework.” The cumulative effect of marine debris on birds remains understudied, though it does affect avian species around the globe.

The report, which summarizes current research (both published and unpublished) and input from a wide array of regional stakeholders, describes the types of marine debris in the Gulf of Maine region of the United States and Canada and summarizes known effects on birds. The most prominent types of marine debris in this region include derelict fishing gear and consumer litter (cigarettes, food packaging, and miscellaneous plastics). Derelict fishing gear is described as recreational or commercial fishing nets, lines, and traps that are lost, abandoned, or discarded in the environment. The Gulf of Maine and its surrounding waters support several large, successful commercial fisheries, resulting in a substantial amount of gear in the water. This gear risks becoming derelict because of irregular ocean floor topography, adverse weather, interaction with other fishing gear, or misplacement and loss.

The Gulf of Maine region also supports a thriving tourist and recreation



Sanderling (*Calidris alba*) tangled in beach debris. Photo credit: Ingrid Taylor, Creative Commons

Managing California Coastal Habitat for Western Monarchs

Every fall, monarchs west of the Rocky Mountains primarily migrate to the coast, and a few inland areas of California, where tree groves protect them from inclement weather, and provide suitable microhabitat conditions, nectar, and hydration sources through fall and winter.

The western monarch overwintering population has drastically declined from at least 4.5 million butterflies in the 1980s to nearly 250,000 in 2021.

The USFWS Coastal Program works with partners along the California coast to improve habitat conditions for the monarchs by developing and implementing overwintering grove land management plans and monitoring butterflies during the fall and winter seasons. The Coastal Program also co-leads a California coast-wide Monarch Overwintering Grove Land Manager Group. This group includes more than 80 members from Federal, State, local municipalities, resource conservation districts, and private businesses and individuals that are working together to reverse the decline of monarchs.

Monarchs overwintering at Lighthouse Field State Park in Santa Cruz, California, where the USFWS Coastal Program helped to fund, develop, and implement a land management plan with California State parks, the Xerces Society for Invertebrate Conservation, and Groundswell Coastal Ecology. Photo credit: USFWS



industry. During months of peak tourism, the increase in human use generates excess amounts of consumer waste, which can become litter and end up as marine debris if not properly disposed.

The effects of marine debris on birds can be grouped into three categories:

- entanglement and entrapment,
- ingestion, and
- degradation of nesting habitat.

The Implementation Framework uses information from the report and extensive partner engagement to recommend, prioritize, and guide implementation of future actions to minimize adverse effects of marine debris on birds and address priority information gaps. This framework was developed through extensive feedback collected during a facilitated, discussion-based webinar series hosted by the USFWS in partnership with the NOAA Marine Debris Program.

Priority Strategies

- Derelict fishing gear—Initiate, expand, and facilitate partner- and stakeholder-driven actions to aid in prevention and cleanup.
- Consumer litter—Identify effective methods to serve data and other information to inform and (or) affect legislation to reduce effects of litters such as balloons, plastic bags, and single-use utensils.

Read the report:

https://atlanticmarinebirds.org/downloads/impacts_of_marine_debris_final.pdf

Learn more:

<https://atlanticmarinebirds.org/news/>

The Atlantic Marine Birds Cooperative’s goal is to conserve marine birds through coordinated partnerships and actions to reduce threats and further our understanding of these unique species.

Learn more:

<https://atlanticmarinebirds.org/>

A Bird Sanctuary in the Making Poplar Island, Chesapeake Bay

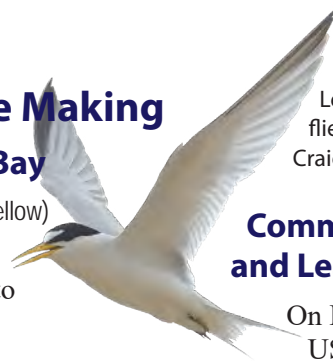
By Sandra Demberger (USFWS, Knauss Fellow)

In the 1800s, Poplar Island, more than 1,000 acres in size, was home to a thriving human community in the Chesapeake Bay with several farms, a church, and a school. Through the early 1900s, sediment erosion decreased the island's landmass. The roughly 100 residents decided to resettle on the Eastern Shore (Delmarva peninsula). Continued erosion of Poplar Island reduced it to less than 10 acres in size by the early 1990s.

In response to this loss of important coastal habitat, in the late 1990s, the USACE and the Maryland Department of Transportation Maryland Port Administration partnered to restore Poplar Island. To date, these efforts have been a win-win for industry and the environment. Sediment removal from the channels allow ships to navigate to and from ports, and sediment being deposited on Poplar Island is used to create a range of critical functional aquatic and terrestrial habitats for important species, including many at risk or threatened bird species. The project is one of the largest restoration projects in the world and has a long timetable. By the time of completion around 2044, Poplar Island will include 1,715 acres of wetland, upland, and open water habitat.

See related story, page 12.

The project also serves as a learning laboratory that is beneficial to scientists and wildlife managers who will inform the future of restoration science. The USGS has lead water-bird monitoring efforts related to this project, in collaboration with the USFWS, since the start of preconstruction surveys in 1996. Several bird species of high conservation priority that benefit from the restoration include the following:



Least terns are agile fliers. Photo credit: Craig Koppie, USFWS

Common Tern and Least Tern

On Poplar Island, USGS and

USFWS biologists are working to expand suitable nesting habitat to increase common (*Sterna hirundo*) and least tern (*Sternula antillarum*) populations. These species, listed as endangered and threatened by the State of Maryland, respectively, have suffered population declines because of ongoing habitat loss. As seen in the images, these species have differentiating characteristics such as their bill color and distinctive black markings on their head.

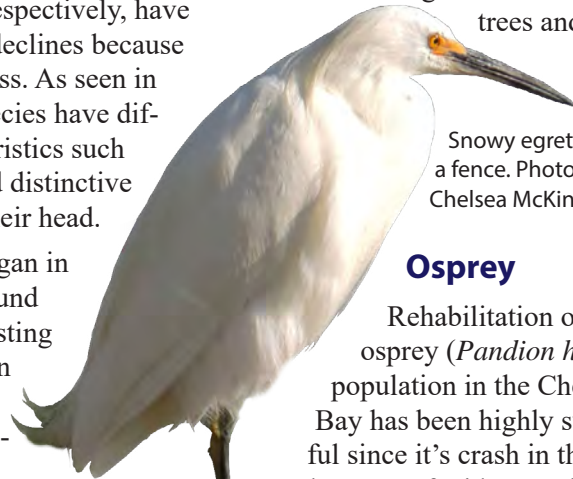
When monitoring began in 2002, there were around 400 common tern nesting pairs and 40 least tern nesting pairs on the island. Hatchling success was extremely low for both species because of predation challenges. Today, nesting success has increased thanks to predator control by the USFWS and expanded nesting habitat on the island. In 2020, >380 common tern nesting pairs were recorded. Least tern populations, benefitting from the same ideal conditions, reached nearly 300 nesting pairs in the 2020 nesting season.



Common terns nesting on Poplar Island's sandy habitat. Photo credit: Peter McGowan, USFWS

Snowy Egret

Snowy egrets (*Egretta thula*) are one of three white heron species in the Chesapeake Bay. Their black legs, bright yellow feet, and slender black bills are easily recognized. Once hunted for their elegant plumage, snowy egret populations throughout the Chesapeake Bay are steadily increasing. On Poplar Island, snowy egret pairs have increased from zero in 2003 to about 200 in 2020. The species thrives in Poplar Island's colonial bird nesting habitat composed of trees and shrubs.



Snowy egret sits on a fence. Photo credit: Chelsea McKinney, USFWS

Osprey

Rehabilitation of the osprey (*Pandion haliaetus*) population in the Chesapeake Bay has been highly successful since its crash in the 1960s because of widespread dichlorodiphenyl-trichloroethane (DDT) use. Today, Ospreys are quintessential raptors of the Chesapeake Bay's tidal waters. Populations on Poplar Island have been increasing because of the installation of nesting platforms by the USFWS. Since 2005, >28 osprey platforms have been built. Successful nesting pairs on the island have fluctuated over the last 17 years, ranging from

See Poplar Birds page 16



Two juvenile osprey waiting the return of their mother with food. Photo credit: Peter McGowan USFWS

Poplar Birds continued from page 15

20 pairs in 2019 to 9 pairs in 2020. Poor weather conditions (cold and rainy) during the primary incubation period (April–May) may have contributed to poor nesting success in some recent years.

American Black Duck

American black ducks (*Anas rubripes*) are dark brown in color and prefer quiet tidal wetlands in the Chesapeake Bay. Populations throughout the Chesapeake Bay have declined mainly because of food and habitat loss and hunting pressure. Although several avian species are finding refuge among Poplar Island’s restored wetlands, black duck populations have had variable success. From 2007 to 2020, several to many (10 to >50) pairs and broods have been recorded. Estimating black duck pairs and broods is challenging because of the species’ shy nature.

USGS recently developed an online tool showing habitat vulnerability for wintering black ducks and other migratory birds in Chesapeake Bay based on projections of sea-level rise and development pressure. This tool, other USGS studies, and the Chesapeake Bay Program’s Decision Support Tool help the Black Duck Joint Venture, Atlantic Coast Joint Venture, USFWS, and State partners develop and assess actions to restore wetland and near shore habitats supporting wintering black ducks and other waterfowl.

Monitoring efforts on Poplar Island indicate that the site has become very attractive for a diverse assemblage of avian species! More than 240 species have been observed on site, and >30 species have bred on Poplar Island since restoration efforts began. Similarly, increasing the population of the target species outlined above have been generally successful on site, which helps support broader regional populations. Overall,

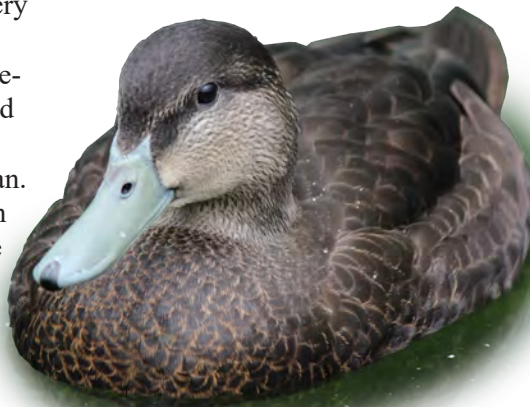
American black duck. Photo credit: USGS



Poplar Island’s wetland habitats provide abundant resources for a variety of birds. Photo credit: Sandra Demberger, USFWS, Knauss Fellow

Poplar Island has been successful in its goal of providing quality waterbird habitat through the beneficial use of dredge material.

While USGS biologists are actively engaged in research related to the factors driving reproductive success of waterbird colonies on Poplar Island, USFWS biologists are responsible for managing wildlife species on site. Biologists from both agencies are working together to inform both research questions and management actions. For instance, concerns of construction equipment forcing undue stress on tern colonies prompted the team to identify a successful approach for directing colony site selection to more appropriate habitats. This allowed construction to continue without potential effects on tern nesting success. Similar approaches have been used for factors such as predator control and habitat design and modifications.



Learn more:

<https://fws.gov/project/poplar-island-restoration>

<http://www.poplarislandrestoration.com/>

<https://www.usgs.gov/centers/eesc/science/productivity-species-concern-least-tern-and-common-tern-poplar-island>

<https://www.usgs.gov/centers/chesapeake-bay-activities/science/usgs-conducts-assessment-inform-black-duck-habitat>

Read more: <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2197&context=usgsstaffpub>

Poplar Island—A Restoration Partnership

Formally named the “Paul S. Sarbanes Ecosystem Restoration Project at Poplar Island,” after the Maryland Senator who led the effort to get the project authorized in the Water Resources Development Act of 1996 (110 Stat. 3658), the project at Poplar Island has become a national model for the beneficial use of dredged material. The project was designed to use clean dredged material obtained through maintaining the channels of the Port of Baltimore and the Chesapeake and Delaware Canals.

The success of the project has been the result of strong interagency partnerships among Federal, State, and local NGOs.

See related story, page 22.

Ye Parks of Pirates and Privateers

By NPS

Blackbeard

The name Blackbeard is synonymous with pirating in the eighteenth century. Blackbeard, born Edward Teach (or possibly Thatch), he served England as a privateer in Queen Anne's War until turning to piracy at war's end in 1713. His career in piracy began in the Caribbean with fellow pirate Benjamin Hornigold. In 1717, after Hornigold rewarded him with a hijacked ship, Blackbeard set out on his own. *Queen Anne's Revenge*, renamed by Blackbeard, carried a crew of about 300 men and 40 cannons. He and his men sailed the Caribbean and the Atlantic coast of North America, torturing merchant ship crewmen and passengers, stealing cargo, and gaining a reputation as one of the most notorious pirates in history.

In battle, Blackbeard was a savage opponent with a reputation for inhuman strength. In addition, he cultivated his image to strike fear into the hearts of other sailors, wrapping slow-burning lighted coils in his long, black hair and beard.

The image pirates such as Blackbeard cultivated was often just as important as their actions. Flags became an important aspect of that image. In Blackbeard's case, the flag flying over the *Queen Anne's Revenge* depicted a heart dripping blood and a skeleton holding an hourglass and spear. The flag, much like Blackbeard's personal image, was designed solely to intimidate.

Piracy became rampant in North Carolina after Blackbeard bribed colonial governor Charles Eden to ignore criminal activities. With commercial vessels using Ocracoke Inlet to access inland ports, Blackbeard and several other pirates found the coastal waterway an ideal target.

Despite his outlandish persona and reputation as one of the most feared men of the seas, Blackbeard's time as a pirate was short-lived. After tolerating Blackbeard's terrorism for 18 months, North Carolina residents and merchant sailors begged Virginia's colonial governor Alexander Spotswood for help. Acting in secrecy,

Spotswood arranged an ambush of Blackbeard, offering a bonus for Blackbeard's death.

Royal Navy Lieutenant Robert Maynard, the commanding officer of the arranged assault, found Blackbeard in Ocracoke Inlet on November 22, 1718. Maynard's two ships, *Jane* and *Ranger*, were immediately fired upon by Blackbeard and his crew, severely damaging the *Ranger*. When *Jane* began to take damage, Maynard ordered the crew to go below deck, creating the illusion of an abandoned vessel.

Blackbeard took the bait. Leading a charge aboard the vessel, he and his men were surprised by Maynard's crew. Blackbeard suffered 25 stab wounds and five gunshots before succumbing to his injuries. He was decapitated, his head hung on the *Ranger's* bowsprit, and his body tossed overboard, bringing a literal end to Blackbeard and a symbolic end to Atlantic coast piracy.

Explore the history of Blackbeard and the Outer Banks at the Cape Hatteras National Seashore in North Carolina: <https://www.nps.gov/caha/learn/historyculture/people.htm>

Piracy and Privateering History in our National Parks

From forts and seashores to ports of call, our national parks have it all. National parks—your national treasures—are a bounty shared by all Americans. You can learn about pirate history through your national parks:

- **Cumberland Island National Seashore** on Georgia's Atlantic coast—In 1684, two separate attacks by French and English pirates destroyed Spanish missions and drove away Spanish inhabitants of the island.
- **Cape Hatteras National Seashore's Ocracoke Island**, North Carolina—Ocracoke has a long history of pirates using its sheltered coves.

Blackbeard Quick Facts

NAME: Edward Teach (possibly Thatch), known as "Blackbeard"

SIGNIFICANCE: Notorious pirate

PLACE OF BIRTH: United Kingdom

DATE OF BIRTH: circa 1660

PLACE OF DEATH: Pamlico Sound near Ocracoke Island, North Carolina

DATE OF DEATH: November 22, 1718

<https://www.nps.gov/people/blackbeard.htm>

1725 engraving of Blackbeard. Image credit: Library of Congress



See Pirates page 18

Pirates continued from page 17

- **Cape Lookout National Seashore**, North Carolina—Many shipwrecks are in the waters near Cape Lookout, including two of Blackbeard's ships that ran aground in nearby Beaufort Inlet.
- **Fort Raleigh National Historic Site**, North Carolina: One of Sir Walter Raleigh's main sources of income came from privateering enterprises. This site's history doesn't stop there. Learn more: <https://www.nps.gov/fora/learn/education/piracy-and-privateering-with-elizabethan-maritime-expansion.htm>
- **Castillo de San Marcos National Monument** in St. Augustine, Florida—This monument was built

because of pirates. Castillo de San Marcos was constructed to protect St. Augustine, the oldest masonry fort in the United States, and defended against a 1668 attack by the pirate John Davis.

- **Jean Lafitte National Historical Park and Preserve**, Louisiana—Lafitte's image changed from pirate to patriot during the War of 1812 when he aided American authorities during the Battle of New Orleans.
- **Salem Maritime National Historic Site**, in Salem, Massachusetts—Experience the story of the sailors, Revolutionary War privateers, and merchants who brought the riches of the world to a new America.
- **San Juan National Historic Site** in San Juan, Puerto Rico—Dutch

pirates attacked San Juan in 1625, capturing the city but not the fort.

- **Virgin Islands National Park**—One only need look at the names of Privateer Bay and Rendezvous Bay, among others, to see the long history of piracy in the U.S. Virgin Islands.
- **Biscayne Bay National Park**, Florida—The outer waters of Biscayne National Park have long been a superhighway for maritime trade including pirates and privateers.
- **Cape Cod National Seashore**, Massachusetts—The slave merchant and pirate ship *Whydah* met its end just offshore of Cape Cod National Seashore's Marconi Beach.

Learn more: <https://www.nps.gov/subjects/pirates/parks.htm>

Building Back a Better Wetland

By Dana Bivens (USFWS)

Adapted from: <https://medium.com/usfwspacificnw/building-back-a-better-wetland-ef52ba0df76c>

Robert Little has always been passionate about the outdoors. Raised on a farm in Southern Washington, he learned the importance of protecting natural resources and to appreciate their intrinsic value from a young age. It was only natural for Robert to join the USFWS in 1984 as a heavy equipment operator. He spent the next 36 years working to manage habitats and protect wildlife at USFWS National Fish Hatcheries and NWRs.

Robert's love for the outdoors led him to the Baskett Slough NWR, where he has played an important role in restoring these lands to support the USFWS mission. Baskett Slough NWR lands were previously used for agriculture; Baskett Slough Creek was straightened and channelized, and its wetlands were dried out to grow crops. The 2,500-acre refuge, established in 1965, is an important oasis for waterfowl in



USFWS MAT member Robert Little hard at work. "One thing I love about the U.S. Fish and Wildlife Service," said Robert, "is that when we have new scientific information or when we learn a better way of doing something, we work to upgrade our best management practices. When we installed the water-control structures in 1997, that was the best way to create a wetland on the refuge. With new information, we are now upgrading the design to allow for better fish passage and to improve habitat for native fish while still helping waterfowl."

Photo credit: USFWS

Oregon's Willamette Valley, especially for the many species of birds that travel along the Pacific flyway and use the refuge to feed and rest.

Restoring the Dusky Marsh at Baskett Slough NWR was a major project. The goal was to restore the drained marsh to maintain waterfowl habitat and provide seasonal wetland habitat for migrating birds such as dusky Canada geese (*Branta canadensis*). Creating more habitat would give these birds room to feed and encourage them to stay on protected refuge lands rather than on neighboring farms where they can damage crops.

In 1997, Robert Little joined a team working with NWR staff to create the wetlands needed to restore the Dusky Marsh. The team installed two water-control structures within the channelized waterway and built a 3,000-foot-long earthen dam to hold water. The restored Dusky Marsh was soon attracting wintering waterfowl and supporting thousands of Canada geese, cackling geese (*Branta hutchinsii*), and dabbling ducks (*Anas* spp.). In 2001, Robert left Baskett Slough NWR to share his expertise at NWRs

See Build Better page 19

Build Better continued from page 18

and hatcheries across the western United States.

Over time, biologists started to think more holistically about habitat restoration projects, considering fish passage barriers and their effects on ecosystems. Native fish require unobstructed waterways to travel upstream and spawn each year and the lack of navigable streams is a major reason for fish declines in the Pacific Northwest. When Dusky Marsh was built, the common practice used water-control structures to dam streams and collect water. After surveying Baskett Slough Creek, NWR staff biologists found that same water-control structures that helped to create the Dusky Marsh did not allow easy fish passage. This new information prompted a rethinking of how to manage the wetland while also improving fish passage.

In 2017, working with the Oregon Department of Fish and Wildlife, the NWR decided to return the creek to its original condition. The unnaturally high straight sides of Dusky Marsh's agricultural channels not only prevented seasonal wetland flooding but also made poor wildlife habitat for aquatic species. The plan was to re-establish a curving stream and add natural debris to protect migrating wildlife along with a new setback earthen dam that would run parallel to the creek, behind which water could pool for wildlife habitat. The 98-acre restoration project would improve fish passage, provide habitat for waterfowl, and support federally listed species such as Nelson's checker-mallow (*Sidalcea nelsoniana*), the Willamette daisy (*Erigeron decumbens* var. *decumbens*), and the streaked horned lark (*Eremophila alpestris strigata*).

Such investments can be costly and often have construction challenges associated with seasonal working conditions. The project needed to be completed during the short, drier summer months. Construction took eight weeks and required over a dozen

Maintenance Action Teams

MAT volunteers come from all over the country and bring a diverse set of skills with them. These projects are not only essential for habitat restoration, but they also allow seasoned workers to mentor newer employees, helping them to learn new skills and obtain necessary certifications on different types of machinery so they can continue to restore habitats for years to come. Learn more:

<https://www.fishwildlife.org/afwa-inspires/mat-team>



Heavy machinery operated by MAT staff was used to dig a new stream channel and place large woody debris to provide forage and protected areas. Photo credit: Graham Evans-Peters, USFWS

skilled maintenance specialists and heavy equipment operators to move >30,000 cubic yards of earth and remove two water-control structures. To obtain the necessary permits, the NWR collaborated with environmental engineers and mapped out how to complete this work without compromising waterfowl habitat or jeopardizing neighboring farmers' lands.

Funding provided through the GAOA in 2020 supported these investments. With the GAOA funds, USFWS hired Maintenance Action Teams (MATs) to travel to NWRs and tackle challenging habitat restoration and deferred maintenance projects like the Dusky Marsh restoration. When Robert Little heard about the Dusky Marsh restoration plans, he eagerly agreed to join a MAT and headed back to one of his first projects to participate in the upgrade, breaking ground in August 2021.

The MATs worked long hours and endured record heat to ensure the project was completed before the fall rains began, MATs laboring >70 hours a

week to get all the work done. By late September 2021, they had restored nearly one mile of Basket Slough Creek, removed an old dam on the eastern boundary of the property that blocked waterflow, and created a new setback dam parallel to the creek to ensure the wetlands persisted.

Projects like this need talented and hard-working MAT staff like Robert and Jeremy DePiero, who battled the elements, overcame equipment challenges, and moved mountains to get the job done. Without their skills and expertise, restoration stories like this would not be possible. The Dusky Marsh renovation project was one of Robert's last before retirement, after serving the USFWS for 36 years.

"Coming back here to work on this project at the end of my career feels like I've come full circle," said Robert. "This is the best way to celebrate my retirement, and I will head into the next chapter knowing that I helped make this habitat better for the plants and animals that I love."

Restoring the Mattole River and Estuary

Partnerships Vital to BLM Mission

By Zane Ruddy (BLM)

The final three miles of the Mattole River in California meander through the Bureau of Land Management's (BLM's) King Range National Conservation Area (NCA). This was the first NCA established by Congress in 1970. The 300-square-mile watershed is the largest along California's Lost Coast, the name given to the 50-mile stretch of rugged, earthquake-prone coastline that forced Highway 1 to turn inland. This isolation spared the watershed from logging until the 1940's, when logging equipment capable of harvesting the steep watershed arrived and left thousands of acres of bare hillslopes in their wake. The inherently unstable geology of the watershed could not hold together when heavy rains and record-setting floods happened in 1955 and 1964. An overwhelming amount of sediment worked its way downslope and downstream, and the lower section of the river once known for its cold water, deep pools, and complex habitat was transformed into a warm, shallow, featureless landscape.

Not long after, the Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and steelhead (*O. mykiss*) populations that had numbered in the tens of thousands began to crash at an alarming rate. The realization that the fish may soon disappear motivated a small group of watershed residents to organize a community-based restoration movement



The lower Mattole River flows through King Range NCA. Photo credit: Hugh McGee

in the early 1980s. Within a few years the movement manifested itself as two organizations, the Mattole Salmon Group (MSG) and Mattole Restoration Council (MRC), which are often cited as the first citizen-led watershed restoration groups on the West Coast.

Over the past several decades, the BLM, MSG, and MRC have worked together to rehabilitate the river. Before 2012, projects in the lower Mattole River were planned and permitted one at a time. This method was frustrating and inefficient because each project required a permit or authorization from at least five public agencies, and funds best used for work on-the-ground were being spent on regulatory compliance. In 2012, the BLM and partners formed a technical advisory committee and determined it was time to take a different approach.

“Our team recognized there was a need for a long-term, fully permitted, multiyear plan that would front-load compliance work and provide the regulatory certainty to take on large-scale projects,” said Dave Fuller, former Planning and Environmental Coordinator for the BLM Arcata Field Office. The BLM led the development of a plan that produced “shovel-ready” projects and shouldered the environmental compliance and permits workload, which



Juvenile Chinook salmon immediately schooled near new habitat created by the restoration project. The project area is the last stopping point for fish before they migrate to the ocean. Photo credit: Nathan Queener, Mattole Salmon Group

allowed the MSG and MRC to focus on their strengths—grant writing and implementing the restoration project. Within a year of finalizing the plan, the first grants were awarded, and work was underway. *See related stories, pages 18 and 22.* Based on post-project monitoring and accounts from those that know the area best, improvements to habitat and overall ecosystem health are tangible.



A restoration worker installs wetland plants in the newly excavated slough channel. Photo credit: Hugh McGee

“When I first started working in the lower Mattole River in 2007, there was little vegetation within the channel and almost no channel stability. It felt like walking through a desert,” said Conor Shea, a project team member and hydrologist with the USFWS. “Now, when I visit the Mattole River, I no longer see a desert. I see vegetated islands, new growth coming in, deeper pools, and increased habitat for salmon and steelhead.”

BLM manages the King Range Wilderness, which contains a total of 42,694 wilderness acres in California. Learn more: <https://www.blm.gov/visit/king-range-wilderness>



Willow and large wood structures were strategically installed to provide roughness in the channel and promote the formation of diverse habitats. Photo credit: Hugh McGee

Mattole River and Estuary Restored

From 2012 to 2021, more than \$3 million in grant funds were awarded to implement an array of projects aimed at improving the health of the ecosystem and that focused on habitat for imperiled salmon and steelhead.

In 2021, BLM's Arcata, California, Field Office and community watershed restoration group partners proudly announced they had completed the decade-long effort to restore three miles of the lower Mattole River and estuary.

In total, 1,800 feet of estuary slough channels were excavated and connected to the river, 500 trees were added using helicopters and heavy equipment to form complex wood jams, and 15,000 willow cuttings and 17,000 native plants were planted to add integrity to previously barren river islands and terraces.

Learn more: <https://www.mattole.org/wp-content/uploads/2021/08/MattoleWatershedNews2021.pdf>

Recovering the Florida Golden Aster

By Tiffany Lane (USFWS) and Todd Mecklenborg (USFWS), adapted by Sandra Demberger (USFWS, Knauss Fellow)

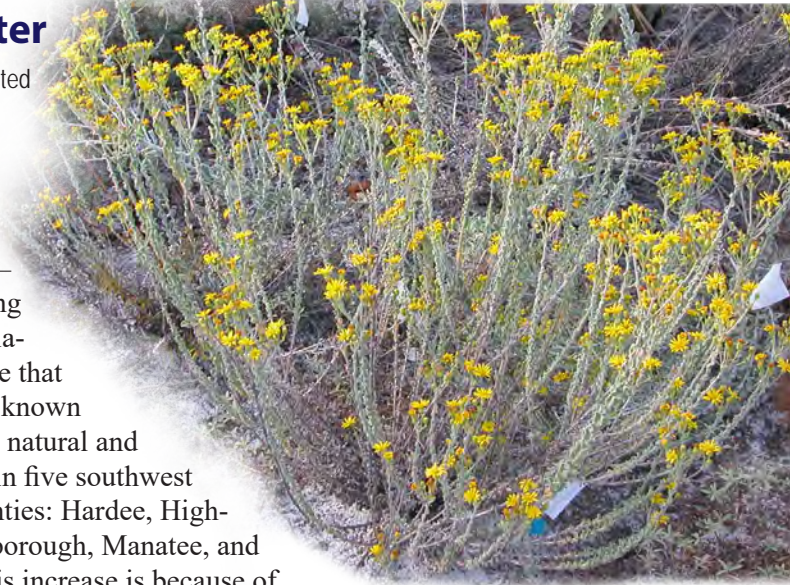
The Florida golden aster (*Chrysopsis floridana*) is a perennial plant that grows about 1 to 1.5 feet tall and has yellow daisy-like blooms about 1 inch in diameter. This herb has a short life cycle and reproduces by seeds, which are dispersed by the wind. It is found along scrub and sand hill communities in Florida in conditions that are similar to many coastal habitats.

The USFWS Coastal Program has been working with Florida land managers from Fort De Soto Park and biologists from the Rare Plant Conservation Program at Bok Tower Gardens to study and preserve this short-lived perennial. Experimental seed sowing in a coastal Pinellas County Park called Fort De Soto is one way biologists are learning more about what the species needs to thrive.

Although no asters were found on protected lands in 1986, the most

current surveys across the species range (2006–18, depending on the population) indicate that there are 30 known populations, natural and outplanted, in five southwest Florida counties: Hardee, Highlands, Hillsborough, Manatee, and Pinellas. This increase is because of additional surveys, habitat restoration, and plantings inside the aster's historic range. Reintroduction efforts have been very successful in helping to restore the species, which has led to a recommendation to delist the flower entirely!

This recovery success has been achieved because of almost 35 years of habitat acquisition and



A Florida golden aster in southwest Florida. Photo credit: Todd Mecklenborg, USFWS

management, and outplanting this species in strategic areas to bolster and expand the population on those conservation lands. Because of these efforts, the aster may no longer be considered in danger of extinction or at risk of becoming so in the foreseeable future throughout all or most of its range.

Learn more: <https://www.fws.gov/story/2021-06/florida-golden-aster-proposed-delisting>



Whitney Costner (at left), conservation biologist at Florida's Bok Tower Gardens, and USFWS Coastal Program biologist Tiffany Lane (at right) sowing seeds at Fort DeSoto in one of the two April plots. Photo credit: Todd Mecklenborg, USFWS



To reduce predation from rabbits during the establishment phase, USFWS staff installed fences around newly planted Florida golden asters. Photo credit: Tiffany Lane, USFWS

Achieving More Through Partnership

By Ann Tihansky (USGS), Guillermo Auad (BSEE), James Kendall (BOEM), Julia Leo (BSEE), and Kimberly Gallo (BSEE)

Partnerships promote and exemplify good governance by leveraging resources, encouraging collaboration, and leading to achievements otherwise out of reach for individual participants. Partnerships can also positively affect the quality of results, often supporting and advancing the foundations of multiple Executive and Secretarial Orders and DOI strategies.

In winter 2022, >70 DOI employees participated in “Building Research Partnership for Good Decisions: Making Possible the Impossible,” a course offered through DOI’s employee training and development system, DOI Talent. DOI employees from BOEM, the Bureau of Safety and Environmental Enforcement (BSEE), USFWS, and NPS designed and led the three-session training to serve as a guide for those involved or interested in collaborative work.

“Although fully applicable to any discipline, we shared several successful marine research case studies as robust, sustained partnership models. For ocean and marine research, partnerships often create synergistic ‘ships of opportunity’ where the partners achieve more than the sum of their parts,” said BSEE Senior Research Coordinator Guillermo Auad, who was one of the leaders in developing this program. Much of the training was based on the recently published book, “Partnerships in Marine Research: Case Studies, Lessons Learned and Policy Implications,” one of many references available for study. This reference book was co-edited and co-authored by many of the program’s lecturers and distributed to all participants.

Based upon the hypothesis that partnerships are complex social systems, the three sessions were organized so that the underlying social information

of partnerships and collaborative mechanisms could be examined and explored. During all three sessions, instructors Julia Leo, Dianna Bhagat, Guillermo Auad, Lisa Gilbane, Jim Kendall Rodney Cluck, Steven Whitaker, and Robb Kaler addressed many excellent questions, and the question-and-answer sessions quickly became substantive discussions.

- Session 1 covered definitions, motivations, history, and the benefits of partnerships.
- Session 2 examined five case studies of large, sustained partnerships.
- Session 3 provided a synopsis of lessons learned, policy implications, and recommendations. It also proposed a plausible 2050 scenario that emphasized partnerships’ enormous potential.

The case studies helped highlight common features critical to sustained and large partnerships: flexibility, connectivity, networking, redundancies, and diversity in perspectives, participants, and resource streams.

The following case studies were included:

- **Argo** (global, 24-year duration, ongoing)—Argo is an international program that collects information from inside the ocean using a fleet of robotic instruments that collect profiles of temperature and salinity within the top 2,000 meters describing the evolving state of the of the ocean’s mid-water level. Learn more: <https://argo.ucsd.edu/>
- **Marine Arctic Ecosystem Study (MARES; Beaufort Sea, 6-year-duration)**—BOEM coordinated and planned the MARES international, interagency, and public-private partnership to enhance understanding of the structure and functioning of the Arctic marine ecosystem in the eastern Beaufort Sea, stemming from increased need to understand climate change, energy development, and sustainability in the Arctic region. The United States-Canada partnership included BOEM, the U.S. Navy Office of Naval Research, U.S. Arctic Research Commission, U.S. Coast Guard, and NOAA along with Canadian Federal agencies (the Department of Fisheries and Oceans and the Canadian Coast Guard). Read more: <https://nopp.org/2020/2019-excellence-in-partnering-award/>

See Partnership page 23



The MARES partnership international coordination meeting brought partners together in Seattle, Washington, in October 2019. Photo credit: Guillermo Auad, BSEE

Partnership continued from page 22

- **Nansen Legacy** (Barents Sea, 6-year duration)—Norwegian research focused on understanding causes and effects of changes in the Barents Sea and the Arctic as a whole. Rapidly changing conditions and sound sustainable management of ecosystems and marine resources can only be addressed properly through large-scale cooperation on national and international levels. Read more: <https://arvenetternansen.com/>
- **Coastal Observation and Seabird Survey Team** (COASST; U.S. west coast, 20-year duration, ongoing)—Through collaborating with coastal residents, natural resource management agencies and environmental organizations, COASST works to translate long-term monitoring into effective marine conservation solutions and responsible marine stewardship. Read more: <https://coasst.org/>
- **Multi-Agency Rocky Intertidal Network** (MARINE; Canada, U.S. west coast, 35-year duration, ongoing)—The MARINE is a consortium of research groups working together to create a centralized database from Long-Term Monitoring and Biodiversity Surveys done at >200 rocky intertidal monitoring sites, ranging from southeast Alaska to Mexico. Read more: <https://marine.ucsc.edu/>
- **Belmont Forum** (global, 12-year duration)—The Belmont Forum is an international partnership that

mobilizes funding of environmental change research and accelerates its delivery to remove critical barriers to sustainability. Read more:

<https://www.belmontforum.org/>

MARINE has brought together NPS and BOEM and expanded to many other partners. The Belmont Forum was discussed as a bridging organization and as a “partnership of partnerships.” Some of the partnerships are multidecadal, and many produce datasets that serve other needs beyond those for which they were designed, which is an added benefit.

Discussions also highlighted DOI Bureau collaboration; for example, the Atlantic Marine Assessment Program for Protected Species includes BOEM, the USGS, the USFWS, and non-Federal partners. Learn more:

<https://eros.usgs.gov/doi-remote-sensing-activities/2018/boem/atlantic-marine-assessment-program-protected-species-amapps-ii>

“Building bridges in support of creating a sustainable future is really the spirit behind communicating the importance of partnership,” said Auad. “There are many reasons to partner and during the sessions we highlighted different case studies, applications, and lessons learned, so that we can aim for a sustainable future.” The emphasis on partnerships also aligns with the United Nation’s 2030 Agenda for Sustainable Development and its 17 sustainable development goals.

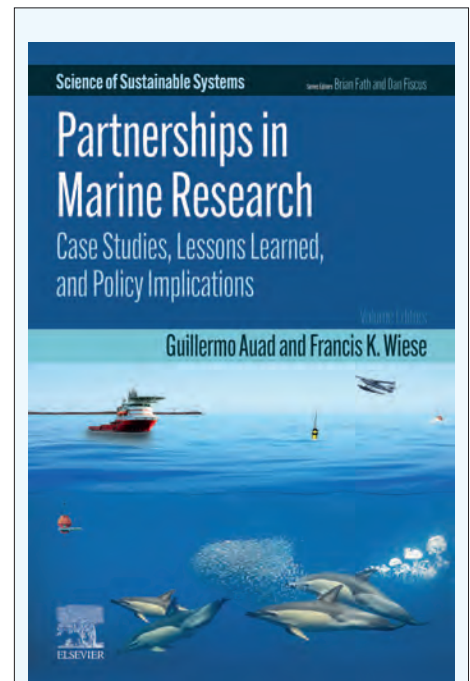
“Throughout my career I have been able to accomplish much more through partnerships than I ever would have been able to do on my own,” said BOEM’s Alaska Regional Director Jim Kendall. Kendall often uses the “Stone Soup” analogy, acknowledging that everyone brings a unique and important ingredient to the recipe of success regardless of the amount—it’s about trust, respect, acceptance, quality,

and teamwork. Kendall led participants in a discussion on the dynamic and evolving nexus between partnerships and policies, and how they could and should be viewed against the backdrop of society. Such foundations and perspectives build partnerships with a sense of community with common goals, and the ability to create a space where each member contributes their unique skillsets and resources. As demonstrated in one case study, a “Culture of Care” can evolve through collaboration on protocols, data sharing, transparency in funding decisions, and the sharing and the disseminating of results.

The program concluded with a retrospective look at the present day from the lens of a 2050 scenario. In it, an aging scientist tells his students and colleagues how partnerships managed to rebuild marine life in the world ocean, and how upcoming challenges can only be overcome by working together—because when doing so, “everybody wins.”



In successful partnering, everybody wins! Photo credit: Unsplash.com



This book was the basis for much of the training materials. Image credits: Matthew Limbert (designer), Franco Auad (designer), and Vincent Legrand (photographer)

Eyes in the Sky—Satellite Imagery Transforms Shoreline Monitoring

By Sean Vitousek, Jonathan Warrick, Patrick Barnard, and Peter Pearsall (USGS)

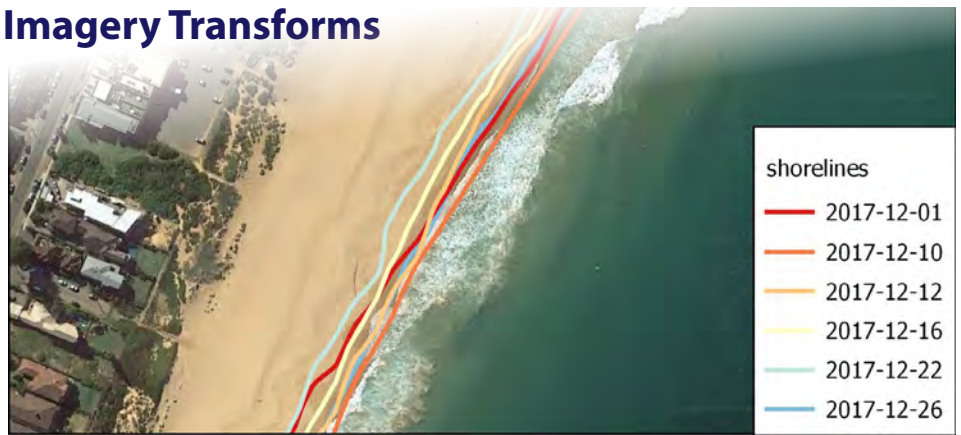
Monitoring coastal changes is important for the millions of people that live along coasts in the United States, particularly as climate change hastens coastal erosion by raising sea levels and fueling powerful storms. For decades, the USGS has monitored shoreline change along more than 95,000 miles of U.S. coastline by measuring and recording information using lidar or Global Positioning System (GPS) surveys.

Coastlines are always in flux. In addition to facing wind, waves, and currents, coasts are subject to fluctuating water levels, changing sediment supply, seasonal weather patterns, and growth cycles of biological organisms such as kelp and coral. Using meticulous methods to regularly monitor the shoreline has been a monumental and impractical task. That's why scientists are increasingly using Earth-observing satellites as their "eyes in the sky," collecting and analyzing satellite imagery to study coastal change.

There are currently hundreds of satellites orbiting and observing the Earth. Landsat, a joint program between the USGS and NASA, is the longest-running archive of satellite imagery in the world. Landsat 1 launched in 1972; the latest iteration, Landsat 9, launched in September 2021.

"Landsat was originally designed to characterize Earth's land cover and how it's changed over time," such as tracking urbanization and agricultural development, said USGS scientist Jon Warrick. "Since the 1970s, these satellites have amassed an enormous image archive that is being leveraged for coastal science and modeling."

"Satellite-derived coastal imagery offers to profoundly change how coastal data is collected," said USGS scientist Sean Vitousek. "For the first



An example of the high temporal frequency of satellite-derived shoreline from CoastSat. Image credit: USGS

time, scientists can look into the past to collect data."

For example, USGS scientists are integrating satellite-derived shoreline observations with dynamic, data-assimilated models as part of the Coastal Storm Modeling System (CoSMoS; <https://www.usgs.gov/centers/pcm/science/coastal-storm-modeling-system-cosmos>).

"With CoSMoS, we're putting together regional coastal hazard maps for flooding, erosion and groundwater and, using similar approaches integrated across the USGS. Our vision is to provide these maps on a national scale," said USGS scientist Patrick Barnard. "Satellite data provides the opportunity to build a consistent approach that's robust and data tested, with hundreds to thousands of data points in every location, all without having to spend the time and money to travel and work on site."

One major limitation of satellite-derived coastal data is image resolution, or the amount of spatial information that each image collects. "In general, the accuracy of satellite-derived data, such as shoreline position, is less precise than traditional survey methods, such as lidar and GPS surveys, which typically offer centimeter-scale accuracy of shoreline position," said Vitousek. Satellites, on the other hand, offer accuracy on the order of a few to several meters. Landsat 9 offers a spatial resolution of

15 meters, and other Earth-monitoring satellites can be in the realm of sub-meter resolution.

To use satellite-derived data for coastal monitoring, Warrick, Vitousek, Barnard, and others are developing automated techniques and machine learning tools to quickly process thousands of shoreline images and integrate them with coastal change models. Additionally, the USGS is collaborating with scientists at the University of New South Wales in Sydney, Australia, to develop CoastSat, an open-source software kit that enables users to obtain time-series of shoreline positions anywhere in the world.

"Ultimately, our goal is to develop an approach that extracts satellite data on a daily basis with national coverage and updates models continuously," said Barnard. "These data can be applied not only to studying fundamental coastal processes, but also informing future hazard assessments and emergency management response. It's an incredible opportunity to push the science into the 21st century."

Learn more: https://www.usgs.gov/center-news/eyes-sky-how-satellite-imagery-transforms-shoreline-monitoring-data-poor-data-rich?qt-news_science_products=1#qt-news_science_products

Explore this Landsat 9 geonarrative: <https://wim.usgs.gov/geonarrative/landsat9roadtolaunch/>

Committee on Earth Observation Satellites (CEOS)

CEOS is a consortium of 61 agencies operating 172 satellites worldwide working together to ensure international civil, space-based, Earth-observation programs are coordinated and to promote exchange of data to optimize societal benefit and inform decision making for securing a prosperous and sustainable future for all humankind.

As a long-term member of the consortium, the USGS is involved in a variety of CEOS working groups, virtual constellations, and ad hoc teams.

Learn more: <https://www.usgs.gov/centers/eros/science/committee-earth-observation-satellites-ceos>

CEOS: <https://ceos.org/>

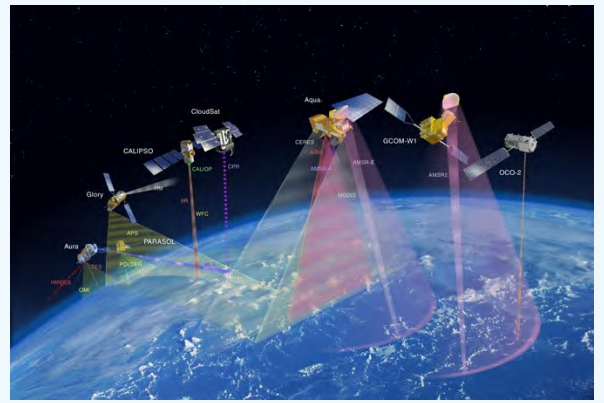


Illustration of NASA's satellite constellation known as the "A Train." Image credit: USGS

Working with Nature Pays Off

By James Miller and Lauri Munroe-Hultman (USFWS)

A changing climate calls for a change in thinking. Nature offers solutions that benefit people and wildlife, improve with time, and have high returns on investment...making the new normal exceptional.

After Hurricane Sandy, the USFWS, with numerous partners, restored and reinforced salt marshes, rivers, and coastlines. A geonarrative highlights some of the outcomes and valuable lessons we have learned that can help communities, State and Federal land managers, and others prepare for next time.

Partners created 10- by 30-foot breakwaters from interlocking concrete

blocks and bags of clam and oyster shells to protect 2,750 feet of shoreline—where endangered rufa red knots (*Calidris canutus rufa*) feed on horseshoe crab (*Limulidae* spp.) eggs—from erosion.

- Structures have withstood the bay's extreme conditions and reduced erosion rates.
- Oyster numbers are high, and horseshoe crabs pass easily through the gaps.
- Long-term monitoring of erosion rates, elevation changes, and oyster recruitment and survival is taking place.

- The work is informing development of new projects and helping address regulatory hurdles to make it easier to deploy natural approaches to climate adaptation.

The USFWS built 12 water-control structures to improve groundwater storage and reduce drainage effects to about 30,000 acres of the highly altered Great Dismal Swamp—and reduce flood risk to nearby communities.

- Groundwater and surface-water monitoring shows that structures are increasing water storage.
- More-natural drainage patterns are helping keep the peat soil moist and fire-resistant and are restoring its ability to absorb floodwaters.

See Working with Nature page 26



Gandys Beach living shoreline, Delaware Bay, New Jersey. Photo credit: Steve Jacobus



Great Dismal Swamp NWR hydrological restoration, Virginia. Photo credit: USFWS



Pond Lily Dam removal, Connecticut. Photo credit: Save the Sound

Working with Nature continued from page 25

- The groundwater table is leveling out at a higher elevation between rains and dry spells.
- In fall 2021, although the area was the driest it had been in 10 years, refuge ditches still had water.

The centuries-old dam, on the Pond Lily Nature Preserve, blocked economically and ecologically important migratory fish from spawning grounds and contributed to flooding in the adjacent urban neighborhood.

- Risk of dam failure disappeared upon removal.
- Native plants returned, and the site remains a popular community fixture.
- In September 2021, almost five inches of rain from Hurricane Ida generated significant, high-speed floodwaters. Floodplain vegetation held, and no nearby areas were inundated.
- In 2017, biologists found alewives (*Alosa pseudoharengus*)—one

of two species of river herring—upstream from the dam site for the first time. In 2021, alewife migration hit a record high since the dam was removed.

Restoration at Prime Hook NWR, one of the largest DOI-funded coastal marsh restorations ever, was a \$38-million project that returned 4,000 acres of a freshwater impoundment system to tidal marsh and repaired 9,000 feet of barrier beach.

- As of mid-November 2021, Prime Hook Road, which passes through the NWR to Prime Hook beach, hasn't closed because of flooding.
- In 2020, 16 nesting pairs of piping plovers (*Charadrius melodus*), federally listed as threatened, were counted at the NWR's restored Fowler Beach.
- The beach is also providing breeding habitat for State-listed endangered least terns, and the number of spawning horseshoe crabs has rebounded.
- Healthy, restored marsh areas provide habitat for wildlife, including saltmarsh sparrows (*Ammodramus caudacutus*) and American black ducks, birds that, without our help, could face extinction.

Excerpted from: <https://storymaps.arcgis.com/stories/47994f3bf56b49c4ad5065813aa82595>



Prime Hook NWR marsh restoration, Delaware. Photo credit Keith Shannon, USFWS

Driftwood Houses in the Arctic

By Claire Alix and Owen K. Mason (NPS)

Driftwood houses built by indigenous peoples in coastal Alaska are rich archaeological treasures that provide clues to their culture, technology, and surrounding environment. The preservation of driftwood at coastal sites in Alaska and in the Arctic is unique for archaeology and reflects a long knowledge of the material and accomplished craftsmanship. The excavation and detailed recording and analysis are necessary to better understand changes in access to and availability of driftwood and tools/technology through time.

Early indigenous semi-subterranean houses of coastal Alaska are traditionally made from a driftwood frame and whalebone, covered with sod and turf. Such houses are on both sides of the Bering Strait and date back at least 3,000 years. In the 1950s, archaeologist James Louis Giddings uncovered unique wooden frame houses associated with Old Whaling tool assemblages at Cape Krusenstern. These old houses were built using a series of regular upright posts with large rooms

connected to small alcoves that were entered through short tunnels.

For thousands of years, driftwood continued to be an essential architectural material for these houses. The best-preserved archaeological houses are found on the western, northwestern, and northern coasts of Alaska and Saint Lawrence Island. In the last 1,500 years, these houses were associated with the Ipiutak, Birnirk, Punuk, and Thule archaeological cultures. Materials used in house construction varied. The ratio of wood versus slabs of stones, boulders and (or) whalebone is related to available raw materials and changes in driftwood at any given place and time. However, the use and incorporation of whalebone in the house frames may have also been driven by the importance of whales in those cultures.

Driftwood on the coast of the Bering Strait comes from the boreal forest of interior Alaska and, to a lesser extent, Siberia and further south. The trees fall from undercutting river erosion in the summer or break off during spring break-up and driftwood logs are carried down the main rivers to the sea.

Then logs travel with currents, wind, and sea ice before being delivered to shore.

Recent excavations at Cape Espenberg within Bering Land Bridge National Preserve also show an abundance of driftwood used in semi-subterranean houses along beach ridges that dated back to the 11th–18th century A.D. When embedded in the permafrost, the extremely well-preserved remains of



An excavation of a semi-subterranean driftwood house within the NPS Bering Land Bridge National Preserve. Photo credit: Courtesy of The Cape Espenberg Birnirk Archaeology Project

these house frames provide information on changing house shape, construction techniques, and what seems to be a declining abundance of wood over time.

In the earliest excavated houses, driftwood logs were large and often unsplit. Logs were split for flooring or benches. Walls were made of large horizontally stacked logs of various diameter supported by posts. In later constructions, log diameters were smaller, and posts and other structural elements were more commonly split. At the same time, signs of driftwood reuse are more common. Wood identification and tree-ring analyses show that logs were cut and split to be placed in different areas of the house; and, with time, the use of willow and poplar increased over spruce as major structural elements.

Cut marks on the driftwood are extremely well-preserved on the surface of posts and logs, which allow for analyzing woodworking techniques. Adze blades of metamorphic rocks, jade, and metal were used, sometimes together, in the same house. Between two pre-contact houses built around A.D. 1475–1685 and A.D. 1675–1780, respectively, cut marks show that the younger house builders had more regular or easy access to large metal blades to shape the base of their house tunnel posts than earlier builders.

Learn more: <https://www.nps.gov/articles/analyzing-early-driftwood-houses-of-coastal-alaska.htm>

CUT MARKS ON POSTS FROM TWO HOUSE TUNNELS AT CAPE ESPENBERG

Cut with blunt blade

KTZ-087-F68 A

Cut with sharp blade



Cut with sharp & wide blade

KTZ-088-F33

Cut with sharp & wide blade

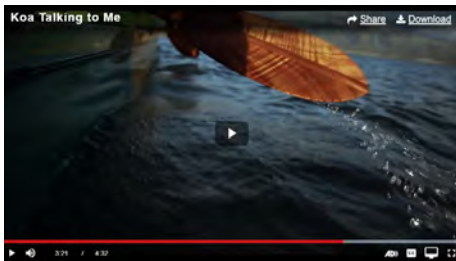


Cut marks on posts from two house tunnels at Cape Espenberg show different types of woodworking techniques. Photo credit: Images courtesy of The Cape Espenberg Birnirk Archaeology Project

Koa Talking to Me

By NPS

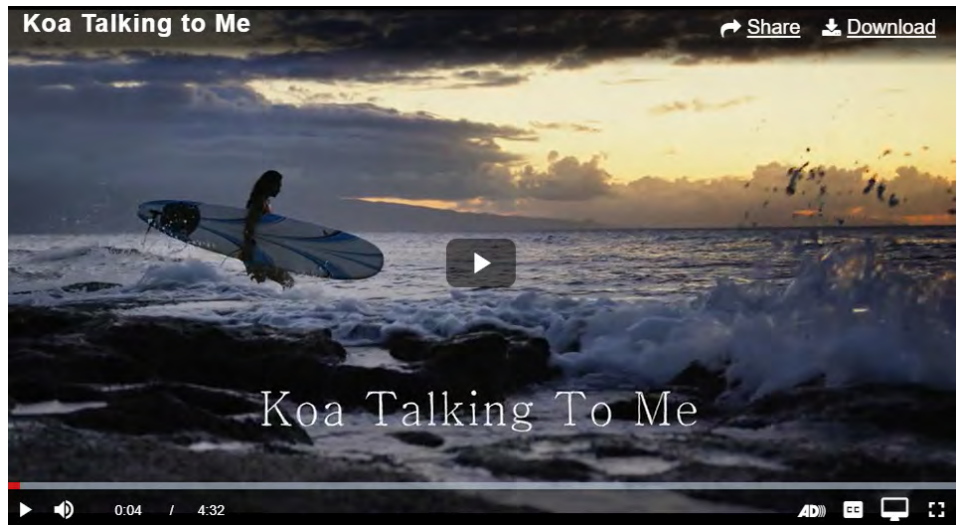
Calisto “Junior” Palos is a woodworker dedicated to conserving both koa trees (*Acacia koa*) and important Hawaiian cultural traditions whose love and respect for one of the rarest and most threatened trees in the world is showcased in a short 2020 video. The video follows the Hawaiian man’s connection with koa trees and their “mana” or power which compels him to conserve and honor the spirit of fallen trees that would normally be wasted. Through his woodworking skills, he is preserving and connecting with one of the oldest Hawaiian traditions: outrigger canoe racing.



The paddles handcrafted from koa wood provide great “mana” or power. Image credits: DOI

Here is some related science from the USGS that supports healthy Koa forest ecosystems:

- Understanding Koa Ecosystems:** A massive outbreak of the native koa moth (*Scotorythra paludicola*) defoliated more than one-third of the koa forest on Hawai‘i Island during 2013–14. Scientists are using this event to measure and record the dynamics of the moth outbreak and evaluate the forest ecosystem response. They also want to better understand select native and invasive species and communities at Hakalau Forest NWR. Read more: https://www.usgs.gov/centers/pierc/science/dynamics-koa-looper-moth-outbreak-and-response-native-forest-community?qt-science_center_objects=0#qt-science_center_objects



Opening shot of the NPS video, Koa Talking To Me. Watch the video: <https://www.nps.gov/media/video/view.htm?id=B7D5412A-E559-AFB5-D5AEA7E27F334C2B> Image credit: DOI

- Koa Seedling Science:** Koa is a tree species endemic to Hawai‘i that is highly valued in restoring degraded forests. Like many other species of acacia trees, koa forms symbioses with nitrogen-fixing bacteria, which makes it sensitive to water and phosphorus availability in soils. USGS and university researchers examined how koa seedlings adapted to reduced water and phosphorus conditions in the greenhouse, which also occur in degraded forest soils. They found that these stressful greenhouse conditions led to lower carbon dioxide uptake, increased water-use efficiency, and greater root growth, which could improve drought resistance of seedlings when planted to the field. Phosphorus fertiliza-

tion in the greenhouse promoted phosphorus storage in seedlings, which could aid seedling growth in field soils with low phosphorus. Collectively, the results show how tree seedlings can be conditioned during cultivation in the greenhouse to improve their use in forest restoration areas with limited soil resources.

Mesic forests of Hawai‘i island provide an ideal system for the study of forest restoration because they have a similar history to other tropical and subtropical forests globally while maintaining a relatively simple species assemblage. Learn more: <https://www.usgs.gov/pacific-island-ecosystems-research-center/science/thresholds-restoration>



Dense clouds of native koa moths swarm after emerging from larval stages that defoliated large tracts of native koa forest. Photo credit: Stephanie Yelenik, USGS



Sampling caterpillar densities on koa trees by clipping branch tips into bags for later sorting. Photo credit: Stephanie Yelenik, USGS

National Coastal Wetlands Conservation Grants

Connecting Habitats, Supporting Recreation, Working with Tribes

By USFWS

Coastal wetlands are vitally important—protecting us from floods, filtering our water, supporting recreation and local economies, and providing habitat for fish and wildlife. Despite their importance, coastal wetlands have steadily decreased.

The National Coastal Wetlands Conservation Grant Program supports long-term wetland conservation by awarding up to \$1 million for individual wetland conservation projects.

Between \$18 million and \$23 million are available for projects annually. Established by the Coastal Wetlands Planning, Protection, and Restoration Act of 1990 (Public Law 101-646), funding for the grant program is provided by the Sport Fish Restoration and Boating Trust Fund from taxes paid on fishing equipment and motorboat fuel. Eligible projects include the acquisition of real property interest in



The Washington State Department of Ecology, in partnership with the Stillaguamish Tribe, will protect and restore 537 acres of coastal wetlands that will benefit a wide range of fish and wildlife species. Photo credit: Washington State Department of Ecology

coastal lands or waters and the restoration, enhancement, or management of coastal wetlands ecosystems.

How to Apply: Coastal States receive funding through a national competitive process. State and U.S. insular area fish and wildlife agencies may apply for Coastal Wetlands Grants by contacting the specific WSFR office or apply online at GrantSolutions: <https://home.grantsolutions.gov/home/>

The grant program is co-administered by the USFWS' Wildlife and Sport Fish Restoration Program (<https://www.fws.gov/program/wildlife-and-sport-fish-restoration>) and CP (<https://www.fws.gov/program/coastal>).

Read more: <https://www.fws.gov/sites/default/files/documents/NCWCGP-Factsheet-2019-12-10-508-compliant.pdf>

Seven Priority Areas for the NPS COAST Team

By Eva DiDonato (NPS)

Adapted from: The NPS Coastal and Ocean Advisory and Support Team (COAST) has been working hard. In 2018, the NPS COAST team began a planning process with the NPS Regional Natural Resource Staff to identify the highest priority issues affecting coastal and marine NPS units. Together the team identified issues that require immediate attention:

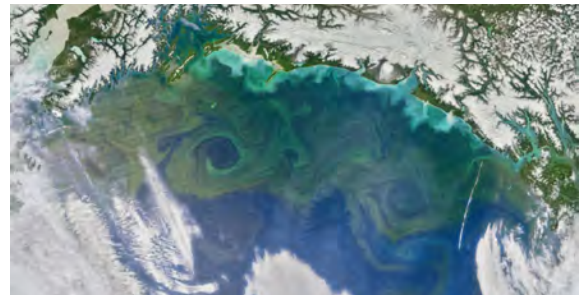
- Aquatic invasive species,
- Benthic habitat mapping,
- Fisheries management,
- Harmful algal blooms (HABs),
- Restoration, and
- Sea-level rise, shoreline, and sediment management.

The team developed a three-year work plan for each issue and has been steadily making progress on each.

Your feedback is welcome! Please contact Eva DiDonato via email at: eva_didonato@nps.gov

View the 2021 Annual Report: <https://storymaps.arcgis.com/stories/822aa533f7de4246b3e60e97936a5c7f>

A team works to restore habitat areas at Kaloko-Honokōhau National Historical Park, Hawai'i. Photo credit: NPS



A satellite image of algal blooms, south-central Alaska. Photo credit: NPS



Conserving and Restoring Coastal Watersheds

USFWS Annual Accomplishments

By Ann Tihansky (USGS) and Sandra Demberger (USFWS, Knauss Fellow)

In 2020, the USFWS' Coastal Program (CP) accomplished a lot for coastal watersheds. The CP completed 147 projects in 18 States and U.S. territories. Nationally, the program protected and improved >8,600 acres and 510 miles of streams of coastal habitat benefitting 45 threatened and endangered species. The projects leveraged more than \$72 million in partners contributions to accomplish shared goals.

The CP 2020 accomplishment report highlights these projects and illustrates the critical role in using partnerships and voluntary financial investments for restoring and protecting fish and wildlife habitat. The projects also illustrate the ability of USFWS to work cross-programmatically, and in partnership with landowners, other Federal and State agencies, tribes, schools, corporations, and NGOs to leverage funds, create jobs, and deliver habitat conservation for priority species across the country.

Through a coordinated effort, the USFWS CP delivers technical and financial assistance for habitat conservation projects in coastal watersheds. Biologists in 24 locations work with

diverse partners to deliver landscape-scale conservation and develop tools and resources to help land managers, practitioners, and coastal communities carry out habitat conservation actions.

A few examples follow:

Middle Fork Nooksack River Dam Removal, Washington: Salmon, steelhead, and other fish once migrated freely along the Middle Fork Nooksack River in northwest Washington before construction of a large dam in 1960. The CP partnered with the City of Bellingham, local Tribes, American Rivers, and other conservation organizations to remove the dam, reestablishing aquatic connectivity in the headwaters of the Nooksack River. Read more:

<https://fws.maps.arcgis.com/apps/Cascade/index.html?appid=d3e2066004e74e95bf4b8c4382a51771>

Urban Oasis and Outdoor Environmental Education at McGrath Park, Connecticut: Inspiring the next generation of conservationists. The USFWS is building outdoor classrooms in Prospect, Connecticut, and working with educators to develop environmental curriculum. McGrath Park's

newly constructed 4.5-acre urban oasis will serve as an outdoor classroom for the adjacent Long River Middle School students and as an outdoor retreat for the public. This urban oasis will attract songbirds and pollinators which will serve as the park's unassuming ambassadors for community stewardship. Volunteers helped plant native vegetation and installed interpretive signage to inform visitors of wildlife, native plants, and basic backyard stewardship tips year-round. The goal is to motivate students, joggers, and picnickers alike to be better informed stewards of these natural areas.

See Restoring Watersheds page 31



Removal of the Middle Fork Dam on the Nooksack River. Photo credit: City of Bellingham, Washington.



Volunteers installed signage and planted native vegetation to improve public awareness about the value of natural areas. Photo credits: USFWS



Native vegetation grows on restored dunes in California. Photo credit: J. Gilkeson, USFWS. Snowy plovers are already using the restored dune habitat. Photo credit: T. Marchant, Nature Collective

Restoring Watersheds continued from page 30

Restoring Dunes and Shoreline along US Route 101 in Encinitas, California: This project focused on restoring 2,900 feet of shoreline and vegetated dunes that provide habitat to native shorebirds and protect critical transportation infrastructure from coastal erosion and floods. The newly established dune system will provide snowy plovers (*Charadrius alexandrinus*) and least terns with suitable nesting habitat. In addition, signs along new footpaths describe the importance of dune ecosystems to

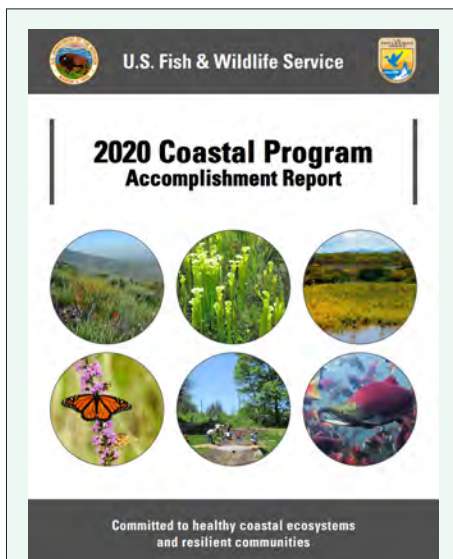
coastal resiliency and native species recovery efforts.

Restoring Rare Wetland Habitat in Florida State Parks: Millions of Floridians visit state parks to enjoy the outdoors and discover Florida’s natural landscape annually. The CP worked with Florida Department of Environmental Protection State Parks

and the Atlanta Botanical Garden over the past 9 years to restore 1,500+ acres of rare wetland habitat that is characterized by carnivorous pitcher plants (*Nepenthes* spp.). The work took place in three parks along the Florida panhandle (Deer Lake State Park, Grayton Beach State Park, and Ponce de Leon State Park).



A field crew transplants pitcher plants in the restored wetland habitats in Florida. Photo credits: USFWS



You can find more stories in the 2020 CP accomplishment report: <https://www.fws.gov/media/annual-accomplishment-report>

USFWS’ Partners for Fish and Wildlife(PFW) Program

Private land conservation is also delivered by the PFW Program. In 2020, the PFW Program invested \$9.35 million into 1,976 habitat projects, leveraging \$44.6 million partner dollars. The total investment of \$53.9 million supported habitat projects across all 50 States and territories. Working together, the PFW Program restored 280 miles of streams and rivers, >263,000 upland acres, and nearly 20,000 wetland acres were restored or enhanced. The PFW Program provides technical and financial assistance to private landowners interested in restoring and enhancing wildlife habitat on their land. These restoration projects are designed to meet landowners’ needs, allowing landowners to continue to own and manage their land to serve their needs while they improve conditions for wildlife.

Learn more: <https://www.fws.gov/program/partners-fish-and-wildlife>

Removing the Invasive Yellow Bush Lupine from Crook Point, Oregon Islands NWR

By Samantha Luginbuhl (USFWS)

Coastal areas are often challenging places for plants to grow because of sandy soils and exposure to salt and wind. Native plant species that are adapted to these conditions play an important role in creating specific habitats for other unique coastal species. Sometimes an invasive species can move in and alter the ecosystem. At Crook Point, yellow bush lupine (*Lupinus arboreus*) is an invasive shrub that was introduced and quickly

spread. Now, managers at Oregon coast NWRs are addressing this problem through a multiyear project that started in 2020 with the removal of most of the old-growth yellow bush lupine plants.

Yellow bush lupine is spreading throughout southern Oregon's coastal dune communities. Originally introduced as a dune stabilizer, this plant quickly spread and altered the native landscape. Yellow bush lupine increases nitrogen in the soil, which



A hybridized yellow bush lupine showing a mixture of purple, yellow, and white flowers. Photo credit: Samantha Luginbuhl, USFWS

makes it easier for other weed species to flourish along with it, and the weed communities can quickly take

See Lupine page 33



The invasive yellow bush lupine growing in the sandy environment of the Oregon Islands NWR. Photo credit: Samantha Luginbuhl, USFWS

Lupine continued from page 32

over. Yellow bush lupine also hybridizes with the native seashore lupine (*L. littoralis*), producing intermediate sized plants with a mixture of purple, yellow, and white flowers.

Native seashore lupine is adapted to this area and naturally occurs alongside other native plants. Native plants in general are more beneficial to local pollinators and are in unison with the plants around them. They have natural predators and are a natural part of the existing ecosystem.

“Cut stump” herbicide treatment is a method where an herbicide solution is applied directly to the exposed stump top immediately after cutting down the plant. It is a relatively novel approach at the Crook Point NWR to control the invasive yellow lupine shrub. The herbicide kills the stump and prevents new growth that would normally occur after cutting alone. Amongst other duties related to the Crook Point Coastal Prairie Restoration project, Biological Science Technician Samantha Luginbuhl spent the 2021 summer cutting and treating yellow bush lupine and yellow bush lupine hybrids at Crook Point to prevent further establishment of the invasives and to protect the native seashore lupine population found at the site.



Biological Science Technician Samantha Luginbuhl using the “cut stump” method to treat and ultimately remove a yellow bush lupine plant. Photo credit: Samantha Luginbuhl, USFWS



Close-up view of the native seashore lupine. Photo credit: Samantha Luginbuhl, USFWS

Crook Point NWR

The 134-acre Crook Point NWR was acquired in 2000 and is along the southern Oregon coast just south of Gold Beach. It contains rare plants, unique geological formations, and one mile of pristine beach with interspersed rocky intertidal areas. It's also a buffer, protecting seabird colonies from encroaching development. It is next to the Mack Reef archipelago, home to the second-largest concentration of

nesting seabirds in Oregon. This headland is closed to public use.

Learn more: https://www.fws.gov/refuge/Oregon_Islands/about.html

Rocks offshore from the Crook Point unit of Oregon Islands NWR are magnets for seabirds. Photo credit: Roy W. Lowe, USFWS



An aerial view of Three Arch Rocks NWR with Cape Meares NWR and Oregon Islands NWR in the background. Photo credit: Roy W. Lowe, USFWS

Genetics Helps Unravel Invasive Lionfish Arrival Scenarios

By Margaret Hunter (USGS)

Florida has long been considered the primary point of lionfish (*Pterois* spp.) introduction, but a new genetic study (October 2021) by the USGS suggests that the invasive species may have been introduced solely in the Bahamas or North Carolina, or in multiple locations, including the Bahamas, North Carolina, and (or) Florida.

The lionfish, native to the Indo-Pacific region, were first reported off the Florida coast in 1985. The study identifies alternative introduction pathways contrary to the widely accepted introduction scenario in which the invasive lionfish originated solely from Florida.

Initial recorded sightings led many scientists and environmental managers to believe that Florida was the invasive fish's only introduction point before it rapidly spread into the western North Atlantic, Caribbean, and Gulf of Mexico. The USGS study finds a lack of evidence to support this.

USGS scientists and partners investigated the genetic differences in almost 1,800 lionfish collected throughout the invaded range. Their findings point to three possible alternative introduction scenarios. One scenario is that lionfish may have been introduced in the Bahamas, before traveling north via the Gulf Stream to North Carolina and then dispersing south to Florida. Alternatively, lionfish may have been introduced in the waters off North Carolina, subsequently travelling to the Bahamas,

Florida, and the Caribbean. The third scenario supports lionfish being introduced at multiple locations, including the Bahamas, North Carolina, and (or) Florida.

Lionfish have disrupted marine food webs and negatively affected native marine ecosystems. Understanding where lionfish and other invasive species are introduced may shed light on how the species spread. It also can help natural resource managers design and implement effective strategies that can be used to control the invasive species locally or limit it from spreading even further. These findings highlight the complexity of invasive fish introduction and distribution scenarios and how genetic approaches can help guide the response to future non-native marine fish introductions.

Learn more:

<https://nas.er.usgs.gov/queries/collectioninfo.aspx?SpeciesID=963>

Read more: <https://www.int-res.com/abstracts/meps/v675/p133-151/>

For more information, visit:

- <https://www.usgs.gov/centers/wetland-and-aquatic-research-center-war/c/science-topics/lionfish>

- https://www.usgs.gov/centers/wetland-and-aquatic-research-center-war/c/science/lionfish-distribution-geographic-spread?qt-science_center_objects=0#qt-science_center_objects

- https://www.usgs.gov/center-news/genetics-helps-unravel-invasive-lionfish-introduction-scenarios?utm_source=Newsletter&utm_medium=Email&utm_campaign=sound-waves-newsletter-septemberoctober-2021&utm_term=Title



An adult lionfish can grow to be 5-7 inches long. Photo credit: James Morris, Jr., NOAA

The Science We Need for the Ocean We Want

By Theresa Keith (NOAA, Knauss Fellow) and Sandra Demberger (USFWS, Knauss Fellow)

U.S. agencies rely on ocean science for a wide range of needs, from understanding weather patterns, climate, commerce, fisheries management, offshore energy, national security, and recreation. The United Nations (UN) Decade of Ocean Science for Sustainable Development (2021–30) is a global initiative focusing worldwide attention on the state of our ocean to boost innovations in ocean-related science, technology, and management, toward a vision that ensures ocean and coasts are clean, healthy, productive, predicted, accessible, safe, and inspiring. This 10-year period spurs opportunities to rethink our approach

to ocean science and to incorporate end-users and communities from the beginning in a process of co-design.

In October 2021, representatives from 23 Federal agencies gathered for the first official meeting of the Inter-agency Working Group for the Ocean Decade (IWG–OD), a sub-body of the Subcommittee on Ocean Science and Technology, that is leading U.S. Federal engagement in the UN Ocean Decade. They discussed the future of ocean science and what kind of ocean science is needed for sustainable development and use of ocean resources. The meeting focused on ways U.S. agencies can use collective



UN Decade of Ocean Science for Sustainable Development

Proclaimed by the UN General Assembly as the “UN Ocean Decade”, the United States is positioned to lead the way in this global effort and has already received official “Decade Endorsement” for several of its actions. Learn more:

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

UN Ocean Science Actions:

<https://www.oceandecade.org/decade-actions/>

capabilities and science enterprises to make strategic accomplishments in the next 10 years, leading at home and abroad.

DOI Shares Ocean Science Expertise

Learn about DOI’s UN Decade representatives from several bureaus currently serving on the IWG–OD.

Laura Strickler (BOEM)

Laura Strickler is an International Relations Specialist in the Office of Strategic Policy and International Affairs (SPIA) at BOEM. Previously, she was a 2014 John A. Knauss Marine Policy Fellow and International Affairs Specialist in NOAA’s Office of International Affairs. Within SPIA, Strickler oversees and coordinates BOEM’s international environmental science cooperation, particularly in regional and global forums. The UN Ocean Decade could present unique opportunities for BOEM to build new partnerships and raise awareness of its Environmental Studies Program, which turns 50 in 2023. In the first “Call for Decade Actions,” BOEM contributed to a U.S. submission related to underwater acoustics, now the endorsed Ocean Decade Research Programme on the Maritime Acoustics Environment

John Schmerfeld (USFWS)

John Schmerfeld has held numerous leadership positions with the USFWS for over three decades. With purview over marine, freshwater, and terrestrial ecosystems, he provides guidance and leadership for staff and projects in all 50 States and most territories. Schmerfeld supports our Earth’s vast coastal and marine ecosystems conducting natural resources studies, implementing aquatic and terrestrial research and restoration projects, and representing USFWS at many international meetings. Schmerfeld’s experience in national-level coordination and science support on issues related to climate change adaptation, mitigation, and communication are valuable to the IWG–OD.

Pete Leary (USFWS)

Pete Leary, Marine Program Coordinator for USFWS, holds degrees in biology, biochemistry and molecular biology. Leary started his career with the USFWS on Midway Atoll NWR and at French Frigate Shoals in the Hawaiian Islands NWR, where he gained on-the-ground experience with large-scale issues such as marine debris, sea-level rise, and invasive species. Currently, he represents the 182 Coastal and Marine NWRs and 5 Marine National Monuments at the Marine Protected Area Center—a partnership between NOAA and DOI that serves as a resource to all federal, state, territorial and tribal programs responsible for the health of the nation’s oceans. Leary is hoping to develop meaningful partnerships that will lead to better ocean stewardship.

Candi Hudson (BSEE)

Dr. Candi Hudson is a Principal Engineer for the Office of Offshore Regulatory Programs Emerging Technologies Branch at BSEE. As a senior engineer for BSEE’s Headquarter Research Standards Branch, Dr. Hudson managed a diverse research portfolio assessing emerging technologies and novel materials performance to ensure safe drilling operations on the OCS supporting BSEE’s regulatory programs. Dr. Hudson’s current and past experience working in oil and gas, aerospace, defense, wastewater treatment, environment, and applied research and development industries, bring an important perspective to the IWG–OD’s mission. Dr. Hudson joined the IWG–OD because of the shared mission to ensure a healthy, clean ocean that can provide the resources needed by society



A whale fluke spotted in the Gulf of Mexico. Photo credit: BOEM

Information for Protecting Endangered North Atlantic Right Whales and Other Marine Species

<https://www.boem.gov/newsroom/press-releases/boem-announces-multi-agency-approach-enhance-existing-protection-efforts>

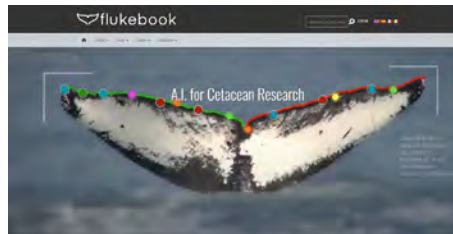
The Surfing Bison



By Sara McPherson (BOEM)

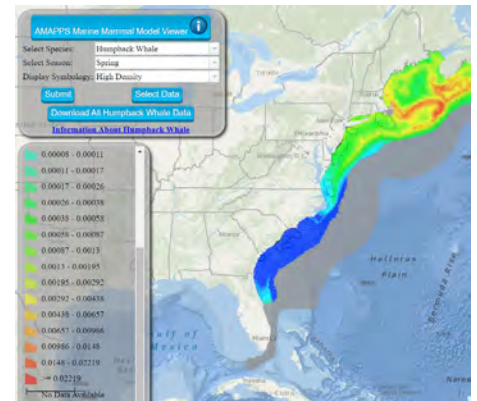
For more than a decade, BOEM has funded independent research studies and formed partnerships to better assess potential offshore wind energy development impacts on protected species. In February, BOEM began fostering multiple Federal and State partnerships to inform and strengthen protections for North Atlantic right whale (*Eubalaena glacialis*), an endangered species.

As offshore wind energy development expands in the Atlantic, BOEM is building on existing initiatives to study and assess effects of offshore wind energy development and is engaging with NOAA to develop a science and management strategy to protect and promote the recovery of North Atlantic right whales while responsibly developing offshore wind energy.

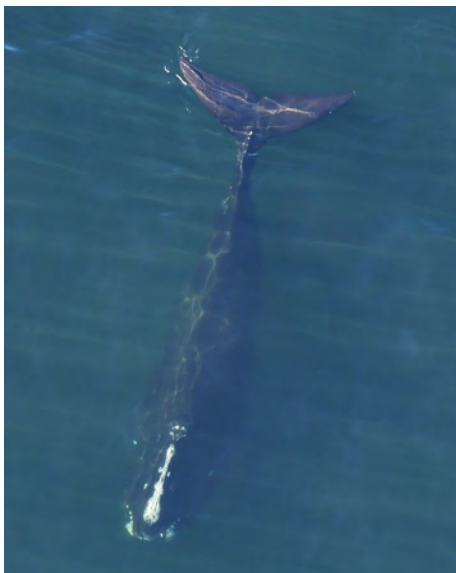


Learn more from the Flukebook website: <https://www.flukebook.org/>

"BOEM is deeply committed to ensuring responsible offshore wind energy development and to protecting marine species, like the North Atlantic right whale. Continued collaboration with our Federal and non-Federal partners is essential to our success in both endeavors," said BOEM Director Amanda Lefton



The Atlantic Marine Assessment Program for protected Species (AMAPPS) is a partnership effort that is developing models and tools like this geospatial data viewer, to provide seasonal abundance estimates that incorporate environmental habitat characteristics for marine mammals, turtles, and seabirds in the western North Atlantic Ocean. Image credit: AMAPPS



An aerial image of a North Atlantic right whale taken under NEFSC Permit # 19674 by New England Aquarium Aerial Observers during aerial surveys of wind energy areas sponsored by Massachusetts Clean Energy Center, BOEM, and wind energy developers.

BOEM and NOAA are also working with partners to develop a regional passive acoustic monitoring (PAM) network to identify the larger-scale movements and distribution of marine mammals, including the North Atlantic right whale. Real-time PAM systems will be deployed to detect animals near construction operations and prompt site-specific mitigation measures designed to reduce the effects of offshore wind energy projects on marine species.

BOEM is also working with NOAA Fisheries on a Federal Survey Mitigation Implementation Strategy that will describe steps to limit the effect of offshore wind energy development on NOAA Fisheries survey activities including those for North Atlantic right whales.

In addition to whales, BOEM needs robust species and site-specific information on the seasonal distribution

and abundance of many important marine species—including seabirds, marine mammals, and turtles—that could be affected by offshore energy activities. BOEM and USFWS are partnering on marine wildlife aerial surveys by using aerial photography and deep learning algorithms to improve the accuracy of protected species surveys off the Atlantic coast.

These are just some of the efforts that align with the recent interagency memorandum between BOEM and NOAA that will leverage the responsibilities, expertise, and relationships of both agencies to support offshore wind energy goals while protecting biodiversity and promoting cooperative ocean use.

Learn more: <https://www.boem.gov/newsroom/ocean-science-news/boem-and-usfws-partner-marine-wildlife-aerial-surveys>