



# NEWSWAVE

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

Special Feature—Shorebird Conservation, see p. 16

Fall 2020

## USGS Scientists Respond to 2020 Hurricanes

By USGS

When subtropical storm Theta formed on November 10th, the 2020 hurricane season became the most active on record.

Tropical storms, hurricanes, and other large coastal storms can affect coastal and inland communities and ecosystems with high winds, storm surge, erosion, and flooding. The U.S. Geological Survey (USGS) works with partners and emergency managers to provide science and build capabilities that reduce risk and improve situational awareness when a major storm makes landfall.

When a major storm threatens the United States or its territories, the USGS provides comprehensive scientific capabilities and information

*See Hurricanes page 9*



Deputy Secretary Kate MacGregor (at left) and Norway's Ambassador to the United States Kåre R. Aas at the signing ceremony. Photo credit: Faith Vander Voort, DOI

## DOI and Norway Strengthen Partnership

By DOI

On August 18, the U.S. Department of the Interior (DOI) formalized its partnership with the Ministry of Petroleum and Energy of the Kingdom of Norway to strengthen cooperation in offshore mineral, oil and gas, and wind-energy activities. Deputy Secretary of the Interior Katharine MacGregor and Norwegian Ambassador

*See Norway page 23*

## Long Wharf Nature Preserve

### Habitat Conservation in the Big City

By Chris Eng (USFWS)

Nature has a positive effect on people's health and happiness. With 80 percent of Americans living in cities, it is important for people to maintain a connection with nature. The natural world also provides other benefits for local communities.

Read more: <https://medium.com/usfws/investing-in-nature-e33b4f09472e>

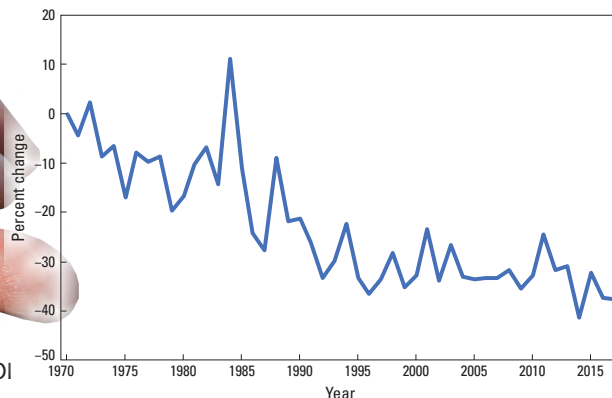
Local communities are recognizing the important value of nature and are working to conserve natural places. New Haven, CT, has a long tradition of conserving nature. The city is built around a green space known as the New Haven Green (Green). The elm trees surrounding the Green were planted in 1686 as part of the first public tree-planting program and gave the city its nickname, Elm City.

*See Long Wharf page 14*

**Shorebird populations are in decline. A collection of stories shows how DOI fulfills its conservation mission. See Special Feature page 16**



Stewardship of birds, including this sandpiper (*Scolopacidae* sp.) chick, is an important part of the DOI mission. Photo credit: Lisa Kennedy, USFWS



Declines over the last four decades document a 37-percent loss of shorebird species. Image credit: North American Bird Conservation Initiative, U.S. Committee 2019, The State of the Birds, 2019, and U.S. Cornell Lab of Ornithology

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**Contribute to NEWSWAVE!**

If you have any questions, comments or want to receive NEWSWAVE by email, contact: Ann Tihansky: [tihansky@usgs.gov](mailto: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](mailto:liza_m_johnson@ios.doi.gov)



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**Geologic Evolution of Delmarva Peninsula Provides Key to Understanding Future Coastal Vulnerability**

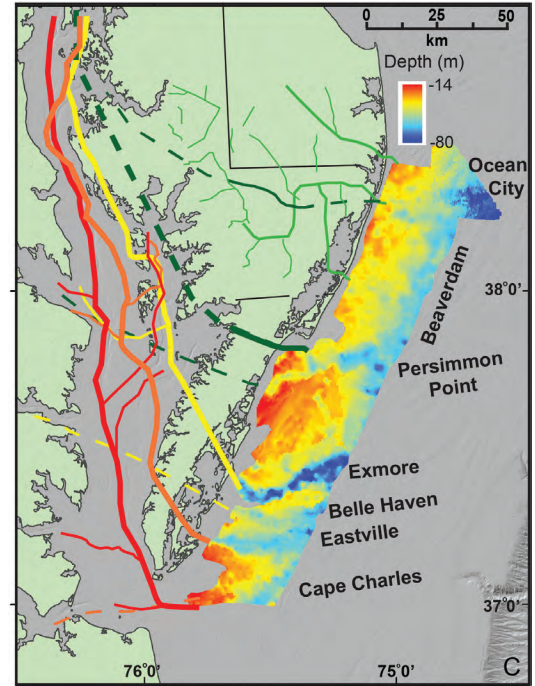
A recent article in Marine Geology used extensive data collected by the USGS on the continental shelf of the Delmarva Peninsula to define the region’s geologic framework. This understanding lays the groundwork to better understand the geologic evolution from 2.6 million years ago up to present day. This helps scientists understand present-day coastal vulnerability and is useful for delineating potential sediment resources (for example, sand) and hazards to development (for example, paleochannels).

Read the article:

<http://ow.ly/Hqyl50BbScW>

Learn more: <http://ow.ly/QOXZ50BbSbc>

Gridded seismic stratigraphic horizon shows the depth to the top of Tertiary-age sediments overlain on the present shoreline with modern rivers labeled.



**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:**

- |                          |                             |                                 |
|--------------------------|-----------------------------|---------------------------------|
| BOEM                     | USGS                        | Jin-Si Over, USGS               |
| DOI                      | Matt Baker, USGS            | Meg Palmsten, USGS              |
| Tanya Joshua, DOI        | Patrick Barnard, USGS       | Robert Schmitt, USGS            |
| Tami Heilemann, DOI      | Kevin Befus, USGS           | Curt Storlazzi, USGS            |
| Faith Vander Voort, DOI  | Erin Bessette-Kirton, USGS  | Ann Tihansky, USGS              |
| NPS                      | Uri ten Brink, USGS         | Lisa Wald, USGS                 |
| Stacia Backensto, NPS    | Antonio Celis-Murillo, USGS | Erica Warner, USGS              |
| Donna Hauser, NPS        | Rob Clendening, USGS        | Janet Watt, USGS                |
| Deanna Ochs, NPS         | Jeffrey Coe, USGS           | NOAA                            |
| David Swanson, NPS       | Heather Dewar, USGS         | Mark Bias, USACE                |
| Sarah Swanson, NPS       | Kara Doran, USGS            | The Forecaster                  |
| USFWS                    | Li H. Erikson, USGS         | Firefly Imageworks              |
| Brad Andres, USFWS       | Sara Ernst, USGS            | Global Fishing Watch            |
| Chris Eng, USFWS         | Meaghan Faletti, USGS       | New Haven Land Trust            |
| Steve Hillebrand, USFWS  | Juliette Finzi-Hart, USGS   | North American Bird             |
| Lisa Hupp, USFWS         | Jessica Fitzpatrick, USGS   | Conservation Initiative         |
| Lisa Kennedy, USFWS      | Ann E. Gibbs, USGS          | U.S. Cornell Lab of Ornithology |
| Amanda Lawrence, USFWS;  | John Haines, USGS           | Bill Hubick, photographer       |
| 2020 Knauss Fellow       | Jenna Hill, USGS            | Sydney Johnson,                 |
| Bridget Macdonald, USFWS | Kyle Kelso, USGS            | photographer                    |
| Taylor Pool, USFWS       | Dave Krabbenhoft, USGS      | Kristin Laidre, photographer    |
| Erica Roberts, USFWS     | Alex Laffoon, USGS          | Kirk Rogers, photographer       |
|                          | Drew LaPointe, USGS         | Sara L. Tolwin, photographer    |
|                          | Nathan Miller, USGS         | Gabe Wolken, photographer       |
|                          | Daniel Opstal, USGS         |                                 |



## Junior Duck Stamp Program—Art and Science Come Together for Conservation

The Federal Junior Duck Stamp Conservation and Design Program is a dynamic art- and science-based curriculum that teaches wetland and waterfowl conservation to students in kindergarten through high school. The program crosses cultural, ethnic, social, and geographic boundaries, encouraging students to explore their natural world and to investigate biology and wildlife management principles. By challenging students to express and share what they have learned with others, this educational program fosters greater awareness of our Nation's natural resources.

Winning artwork selected from a national art contest is used as the design for the Junior Duck Stamp, which the U.S. Fish and Wildlife Service (USFWS) produces annually and is a popular collector's item. All revenue from the sale of the \$5 Junior Duck Stamps goes to support recognition and environmental education activities for students who participate in the program.

The program began in 1989 as an extension of the Migratory Bird Conservation and Hunting Stamp, commonly known as the Federal Duck Stamp. The national Junior Duck Stamp art contest started in 1993 with eight participating States. By 2000, the program included all 50 States, the District of Columbia, and the U.S. territories. The program encourages partnerships among Federal and State government agencies, nongovernment organizations, businesses, and volunteers to help recognize and honor thousands of teachers and students throughout the United States for their participation in conservation-related activities.

Learn more: <https://www.fws.gov/birds/education/junior-duck-stamp-conservation-program/junior-duck-stamp-contest-information.php>

The four-part curriculum guide with activities and resources assists students in exploring science in real-life situations. Using scientific and wildlife observation principles, students



Madison Grimm, a 13-year-old from South Dakota, took top honors in the USFWS National Junior Duck Stamp art contest with her acrylic rendition of an wood duck (*Aix sponsa*). Her artwork is on the 2020–21 Junior Duck Stamp and supports conservation education for students in kindergarten through 12th grade. Photo credit: USFWS

are encouraged to communicate visually what they have learned through an entry into the Junior Duck Stamp art contest. This nontraditional pairing of subjects brings new interest to the sciences and the arts.

Explore the curriculum: <https://www.fws.gov/birds/education/junior-duck-stamp-conservation-program/conservation-education-curriculum.php>



2021–22 Federal Duck Stamp winner Richard Clifton's acrylic painting of a single lesser scaup (*Aythya affinis*) drake. Photo credit: USFWS

### Duck Stamps—Put Your Stamp on Conservation

One of the easiest ways that anyone can support bird habitat conservation is by buying Federal Duck Stamps, which is among the most successful conservation tools ever created to protect habitat for birds and other wildlife.

Federal Duck Stamps are conservation revenue stamps; 98 percent of the purchase price goes directly to help acquire and protect wetland habitat and to purchase conservation easements for the NWR System. Wetlands acquired with Duck Stamp dollars help purify water, aid in flood control, reduce soil erosion and sedimentation, and enhance outdoor recreation opportunities.



## New Sites on Rota Considered for U.S. National Park Service System

By Tanya Joshua (DOI)

According to the National Park Service (NPS), Rota in the Commonwealth of the Northern Mariana Islands is a special place with significant cultural and natural resources. A recent study concluded that the Chamorro archaeological sites, the World War II Japanese defensive sites, and the ancient limestone forests are the most intact found anywhere in the United States and notable due to the species diversity. These resources are deemed to be nationally significant and suitable for inclusion in the National Park System. Based on these preliminary findings, NPS staff developed concepts for the preservation and public enjoyment of these sites. The next steps involved engaging with the community.

On August 26, the NPS announced that it would conduct a series of virtual public meetings to share the study's preliminary findings and to engage stakeholders and the public in discussions about several preliminary alternative concepts for the future.

“The National Park Service is pleased to share our preliminary findings and hear from the public their thoughts for how these special resources may be managed in the future,” said NPS Acting Director Margaret Everson. “Establishing a unit of the National Park System in Rota would require the support of the Commonwealth of the Northern Mariana Islands

(CNMI) and Rota Municipal governments and action by the United States Congress.”

In September, the NPS held a series of virtual public meetings where NPS park staff and planners discussed the preliminary findings of the Rota Special Resource Study and gathered public thoughts and ideas. The meetings were recorded for people to stream and share. Comments were accepted from August 26 to October 26, 2020.

“We applaud the National Park Service from the regional San Francisco office, assisted by Superintendent Barbara Alberti and her staff, in these efforts. We also applaud Rota Mayor Atalig and his team, including CNMI leaders and all stakeholders for their continued support and ongoing efforts to ascertain whether these important historical, cultural, and natural resources on Rota will be deemed suitable for inclusion in the National Park System. We encourage the public and especially the people of the CNMI to engage fully in these

proceedings with the National Park Service,” said Interior Assistant Secretary, Insular and International Affairs, Douglas W. Domenech. In December 2019, Domenech visited many of the important sites that are included in the current study, including the archaeological site that houses the largest latte stones found in the Mariana Islands and the limestone forest, which has been identified in the NPS study as the most intact of its kind across the entire United States and its territories.

### Learn More

Rota Special Resource Study: <https://parkplanning.nps.gov/projectHome.cfm?projectId=65104>

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

Rota newsletter: <https://parkplanning.nps.gov/document.cfm?parkID=422&projectId=65104&documentID=106250>

Office of Insular Affairs on Facebook: <https://www.facebook.com/InsularAffairs>



Images of Rota's natural and cultural resources that are part of the NPS study are Rota's rare limestone forest resources and archaeological sites as pictured (Māya Latte Site Complex, As Nieves Latte Quarry, and the Ginalagan Defensive Complex from WWII). Image credits: NPS



## Nationwide Accomplishments for Coastal Conservation

By Amanda Lawrence (USFWS)

U.S. coastal habitats are economically significant and ecologically complex. Managing these types of ecosystems, therefore, requires a thoughtful balance of working landscapes and habitat conservation strategies. The USFWS Coastal Program works around the Nation to specifically protect and conserve these habitats for the benefit of fish, wildlife, and people. Coastal habitats require a set of management tools that are equally as unique and dynamic as the habitats are. From constructing ponds and protecting federally threatened Puerto Rican crested toad habitat to removing fish passage barriers for Coho salmon (*Oncorhynchus kisutch*) in Alaska, the management strategies required for Coastal projects vary greatly.

Here we highlight two of these many successful projects; the first using fire as a management strategy, and the second where children created an outdoor classroom benefiting pollinators and the local community.

### The Power of Managing with Fire

Fire is an important tool for managing coastal habitat. At just under 12,000 acres, the Ernest F. Hollings Ashepoo, Combahee, and Edisto Rivers (ACE) Basin National Wildlife Refuge (NWR) is an undeveloped wetland ecosystem, part of which lies within the ACE Basin and represents

**The USFWS's Coastal Program** is a voluntary conservation initiative that works with communities to restore and protect land and water resources important to them. The Coastal Program provides technical and financial assistance for habitat conservation on public and private lands along the coast, including the Great Lakes, Alaska, Hawaii, and Puerto Rico.

Learn more: <http://www.fws.gov/coastal/>



The 2019 USFWS Coastal Program's Annual Accomplishment Report highlights the breadth of ecosystems, types of projects, and partners that are involved with the Coastal Program. Learn more: [https://www.fws.gov/coastal/pdfs/Annual-Accomplishment-Report-\(508-compliant\)-2020-06-29.pdf](https://www.fws.gov/coastal/pdfs/Annual-Accomplishment-Report-(508-compliant)-2020-06-29.pdf)

### 2019 Project Statistics



In 2019, the USFWS supported 186 projects in 17 States contributing \$2.4 million and working with 83 partners to restore 16,400 acres and to bring communities together leveraging \$22 for every \$1 funded by the USFWS Coastal Program. Image credit: USFWS

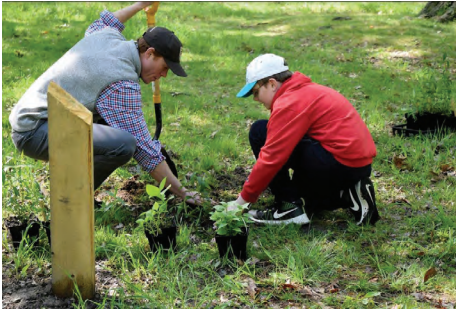
one of the largest undeveloped wetland ecosystems on the Atlantic Coast.

Not all NWRs are staffed at full capacity with certified firefighters to carry out controlled and prescribed burns. During early 2019 in South Carolina, the USFWS Coastal Program and Ecological Services staff joined NWR staff in filling that void by taking the opportunity to help out with some greatly needed controlled burns on the refuge. The staff had previously received their Wildland Fire Incident Qualifications, called a "red card." They needed to take their annual refresher course and undergo physical exams and testing to enable them to assist with any burns for the year.

Two burns were prescribed and conducted. The planning and strategy that went into each of these burns were very different. The first burn took place in an overgrown wetland habitat alongside a river to reduce vegetation overgrowth and restore native species. The second burn was carried out in a pine forest bordered by a busy roadway. A priority was to focus on monitoring weather conditions to ensure wind would not compromise visibility on the road. This burn was carried out to reduce hazardous fuel (leaves and grasses that accumulate on the forest floor); which can exacerbate naturally occurring wildfires. By burning and clearing this fuel, it restores natural fauna, by allowing native grasses and species to thrive and creating space for native songbirds such as the Painted bunting (*Passerina ciris*). A few days post-burn, with the pines standing tall and new green shoots poking out of the ash, the firefighters noted this transformation was a success.

Both prescribed fires in the Ernest F. Hollings ACE Basin NWR have helped to reduce future wildfire threats to the wildlife and surrounding

See Accomplishments page 6



Restoring native plants at Deering Oaks Park (Portland, ME) are Chris Meaney (USFWS) and Conner Burns (right), one of 80 sixth-grade participants from King Middle School. Photo credit: The Forecaster

*Accomplishments continued from page 5*

community and have improved 400 acres of critical habitat; this habitat specifically provides homes for the Wood stork (*Mycteria americana*) and other migratory shorebird species including herons, egrets, and ibis. The fire management tool promotes native species, providing homes for critical bird species and top predators such as the American alligator (*Alligator mississippiensis*) and Bald eagle (*Haliaeetus leucocephalus*). It also provides a safer environment for hikers, nature-goers, and bird watchers by reducing the risk of future and possibly more dangerous and destructive wildfires. Natural elements like fire bring restorative power to coastal ecosystems.

**Students Create a Community Classroom**

Eighty sixth-grade students planted over 30 types of native species that restored an area in Deering Oaks Park for people and pollinators. King Middle School sixth graders participated in the project, a collaborative effort supported by Maine Audubon, City of Portland, ME, USFWS, and others, that is reaching and educating over 50,000 park visitors. The partnership assisted teachers with planning, scheduling, and coordinating; and provided native seeds and necessary tools and equipment that empowered inner city youth of Maine to restore native tree and shrub species as part of a long-term habitat restoration project transforming a mowed and

**Getting “Red Card” Certified**

By Amanda Lawrence (USFWS and 2020 Knauss Fellow)

A prescribed burn, also known as a controlled or hazard reduction burn, is an intentionally set fire that can provide management benefits for ecosystems from prairie land to forest. Prescribed burns can aid in invasive species removal and biodiversity restoration, abate greenhouse gases, and reduce future wildfires, as well as other ecological benefits. This type of burn is carried out by certified professionals under a set of conditions that accounts for public safety and the safety of firefighters. To participate in controlled burns, each firefighter is required to train and earn a red card. Red card certification is an interagency accepted status that indicates a person has received proper fire training and is qualified to do the fire-related job at hand when arriving on an incident.

I received my red card certification in 2014, as a requirement for Maryland Conservation Corps employee for Americorps. Obtaining this certification requires hours of intense training on all fire-related aspects, from how to evaluate weather conditions to the various types of burns that can be carried out. I completed my course training online via virtual classroom and completed exams for each of the sections. Follow up in-person training was required to learn hands on skills such as how to effectively use a fire shelter and how to properly role up a firehose. The successful completion of a pack test was the final step in obtaining my red card. This part of the training required individuals to walk 3 miles with a 45-pound backpack in under 45 minutes.

After many hours of online training, demonstrating basic hands-on fire skills



competency, and passing the pack test, I hold a red card with my name on it.

Learn more: <https://www.fws.gov/fire/>

Trained firefighters on a controlled burn at Earnest F. Hollings ACE Basin NWR. Photo credit: USFWS

barren landscape to a native meadow-like ecosystem for wildlife, birds, and pollinators. The intentions behind this project were indeed multidimensional; not only was habitat restored, but a highly visited nature space within the City of Portland was enhanced for the many nature goers in surrounding communities.

Back in the classroom, the students shared what they had learned. They crafted animated online cartoons identifying and describing the plant life at Deering Oaks Park and made them accessible to the general public

via QR codes printed and distributed around the park. The outdoor classroom was shaped by combining the restored habitat at Deering Oaks Park with the ability to interact with educational resources, conveying the effects restoration can have on an ecosystem and a community. The idea is that this type of work demonstrates to visitors that it can truly be accomplished anywhere.

Learn more: <https://www.pressherald.com/2019/06/11/portland-middle-schoolers-bring-native-plants-back-to-deering-oaks/>



## Illegal, Unlicensed, Unreported Fishing—Addressing a Challenging International Problem with Geospatial Information

By Daniel Opstal (USGS)

The ocean is a big place. Fish move freely around and across invisible political boundaries that are designed to help manage fish stocks, protect the fisheries and the economic potential they hold for nations around the world. Many marine policies, such as the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Mammal Protection Act, and the Endangered Species Act (ESA), are tools to help ensure compliance with fisheries regulations, to end wasteful fishing practices, to promote sustainability, and to prevent lost economic potential associated with overfishing, declining species, and degraded habitats. Even so, illegal, unlicensed, and unreported fishing (IUUF) activities persist. The United Nations Food and Agriculture Organization estimates this problem costs

the global economy between \$10 and \$23 billion annually in global economic losses.

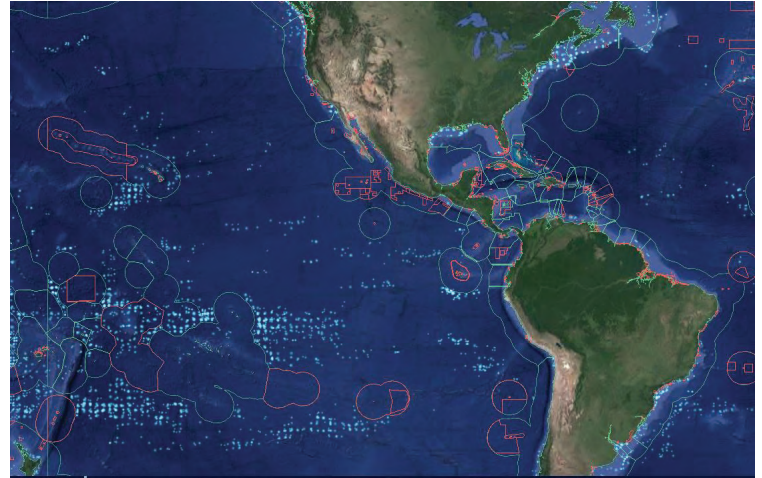
There are many examples of these activities, from the macro to the micro ie: (1) A fishing fleet from one nation explores waters just off another nation's Exclusive Economic Zone (EEZ), looking for opportunities to build its stocks of fish meal, (2) A lone trawler turns off its Automatic Identification System (AIS) and crosses into the EEZ, fishes, and cleverly mixes its stocks in with legitimate

catches. Port inspectors don't catch the illegal fishing.

These two examples are just a few of the immensely complex problems facing fisheries managers in their detection and deterrence efforts against IUUF activities. They require an equally complex set of U.S. inter-agency and international partnerships to effectively combat them.

One of the most important aspects of this issue is understanding and being able to monitor the problem in a geospatial context. To do that, the U.S. interagency Federal community countering this IUUF activity is using satellite remote-sensing data and other technologies to address the monitoring and enforcement of IUUF. One such example is the Vessel Management System, which is mandated in certain types of waters.

The interagency Civil Applications Committee (CAC) is chartered by the Secretary of the Interior and the Director of National Intelligence (DNI). The CAC facilitates the use of Department of Defense (DoD) and Intelligence Community overhead satellite remote-sensing capabilities for



Screen grab from the Global Fishing Watch interactive map that provides geospatial information about fishing activity worldwide. The EEZ is shown in green, Marine protected areas are outlined in red, and blue areas are fishing activity on September 3, 2020. Image credit: Global Fishing Watch



When commercial fishing activities follow rules and regulations, global fish stocks can be managed more sustainably. Photo credit: NOAA

See IUU page 8



## Civil Applications Committee

The CAC is an interagency committee that facilitates the appropriate civil uses of overhead remote-sensing technologies and data collected by military and intelligence overhead capabilities, including commercial remote sensing.

The CAC, established in 1975 by President Ford, is chaired by the USGS by Charter (signatories are the DNI and the Secretary of Interior). CAC sponsored activities

include the following:

- Mapping, charting, and geodesy
- Hazard, disaster, and public health assessments
- Environmental monitoring
- Scientific research, such as Earth system investigation

- Land use, water use, and natural resource management
- Law enforcement, regulatory, and homeland security missions
- Derived information supporting national policies and objectives

Examples of these activities include monitoring volcanoes, sea ice, and glaciers; detecting and tracking wildfires; supporting emergency response to natural disasters, such as hurricanes, earthquakes, and floods; and monitoring invasive species, ecosystems, and global change. In cooperation with the USGS National Civil Applications Center (NCAC), the CAC certifies that requested data will be properly used and coordinates collection. The CAC also supports remote-sensing research and development activities at USGS facilities such as the Advanced Systems Center/ NCAC, where exploitation tools are available to CAC scientists and analysts.

## Principal Members

- DOI
- Department of Agriculture
- Department of Commerce
- Department of Health and Human Services
- Department of Transportation
- U.S. Army Corps of Engineers (USACE)
- U.S. Coast Guard
- U.S. Environmental Protection Agency (EPA)
- Federal Emergency Management Agency
- National Science Foundation
- National Aeronautics and Space Administration
- Tennessee Valley Authority

For more information contact: CAC Executive Secretary: Dan Opstal

Email: [dopstal@usgs.gov](mailto:dopstal@usgs.gov)

*IUU continued from page 7*

appropriate use by the U.S. Federal Civil Community (see sidebar).

In February 2020, the interagency CAC held its first community of interest meeting on IUUF. This meeting brought together specialists from diverse parts of the U.S. Government, including elements of the Department of Interior, Naval Research Laboratory, and the State Department's Office of Marine Conservation. They discussed tools, capabilities, and policy measures. Subsequently, interagency discussions based on the long-term implementation of the Maritime Security Fisheries and Enforcement or SAFE Act (P.L. 116-92) brought further attention to the policy aspects of the topic, enabling the CAC to focus its attention on geospatial tools and technologies. On July 21, 2020, the CAC hosted another meeting adding partners from Australia, Canada, and New Zealand to get their perspectives on this global problem. Future

meetings will be held in concert with interagency partners implementing the Maritime SAFE Act.

These activities are working to ensure that U.S. Federal civil government partners are using the most up-to-date data and technology to effectively combat and reduce IUUF and its detrimental impacts, not just in U.S. waters but as a supportive global partner.

## Learn More

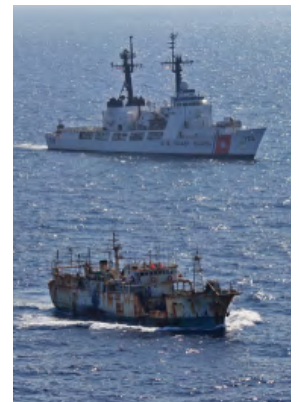
Regional Vessel Monitoring Information: <https://www.fisheries.noaa.gov/national/enforcement/regional-vessel-monitoring-information>

Vessel tracking map: <https://globalfishingwatch.org/map/>

Ending illegal fishing project: <https://www.pewtrusts.org/en/projects/ending-illegal-fishing-project>



When commercial fishing activities follow rules and regulations, global fish stocks can be managed more sustainably. Photo credit: NOAA



U.S. Coast Guard patrols over illegal fishing vessel. Photo credit: Global Fishing Watch



*Hurricanes continued from page 1*

that decision makers, emergency responders, and communities can use to help them prepare for, cope with, and recover from a storm. The USGS forecasts coastal change; tracks storm surge, streamflow, and levels and captures high-resolution ground elevation and topographic data; creates detailed maps, and measures coastal and inland flooding across entire regions. Before a storm's expected landfall, coastal change experts forecast how a storm may reshape the coastline using a sophisticated coastal change hazard forecast model.

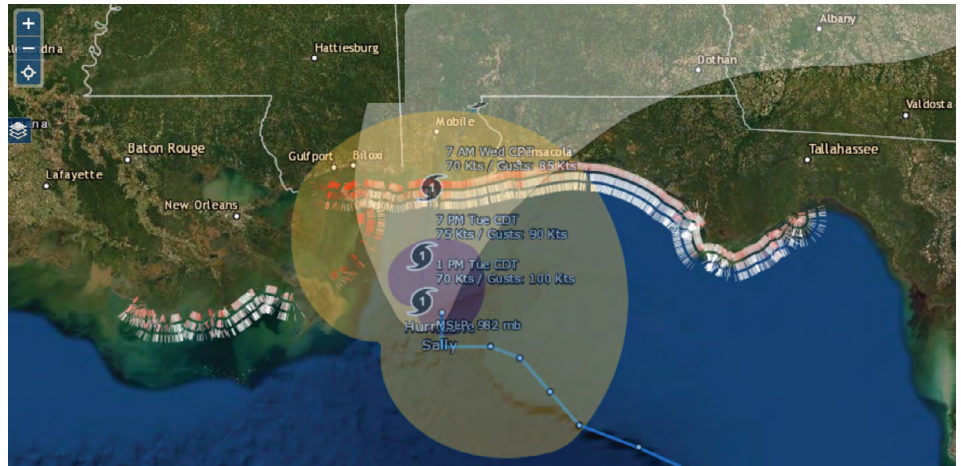
Each storm is unique, both in the individual storm characteristics and the areas each affects. Here we share how the USGS responded to the storms: Isaias, Marco, Laura, Sally, Paulette, and Teddy.

#### **Hurricane Isaias**

In July, Hurricane Isaias, a destructive Category 1 storm, caused extensive damage across the Caribbean and the East coast of the United States. As Isaias raced north up the Atlantic Seaboard at speeds of more than 30 miles per hour, USGS crews (including at least 87 hydrologists and hydrologic technicians) from South Carolina to New York fanned out across rain-swollen waterways to measure the effects of the storm.



Lori Lewis, USGS hydrologic technician, verifies the readings of a USGS streamgage on Bayou Marcus in Pensacola, FL, on September 17. Photo credit: Rob Clendening, USGS



This map illustrates the USGS Coastal Change Hazard Portal's prediction of September 15, 2020, for Hurricane Sally's potential erosional effects on beaches from Louisiana through the western Florida Panhandle. Map credit: USGS

Learn more about the USGS effort: <https://www.usgs.gov/news/usgs-field-crews-document-isaias-effects-along-atlantic-coast>

About Hurricane Isaias: <https://www.usgs.gov/special-topic/hurricane-isaias>

#### **Hurricane Marco**

On August 20, Hurricane Marco was the first of two tropical cyclones to threaten the Gulf Coast of the United States within a three-day period, the other being Hurricane Laura. Marco developed from a fast-moving tropical wave west of the Windward Islands and south of Jamaica. USGS scientists assessed coastal impacts, predicting

that 33 percent of the barrier islands and beaches across the region would see some storm-caused erosion, with effects concentrated in Louisiana. USGS scientists set storm-tide sensors to measure Marco's storm surge and left them in place to record the effects of Hurricane Laura, an unusual situation, having two storms on track for

landfall in the same area within days of each other.

About Hurricane Marco: <https://www.usgs.gov/special-topic/hurricane-marco>

#### **Hurricane Laura**

On August 27, Hurricane Laura was a Category 4 storm when it made landfall in Louisiana, bringing heavy rains, wind, and storm surge. The USGS provided real-time data on water levels for river and streams, as well as coastal change forecasts that predicted more than half of Louisiana's barrier islands and beaches would be inundated by hurricane's storm surge while the effects on sandy shorelines in Texas, Mississippi, and Alabama would be less severe. Laura made landfall only days after Marco, however, which created unique conditions and challenges for scientists.

"We are monitoring two storms that will likely make landfall in roughly the same area of coastline. Usually, there is time between storms that allows beaches to recover naturally, but in this case there won't be any time for recovery, which makes the coast more vulnerable and forecasting more unique," said research oceanographer Kara Doran, leader of the USGS Coastal Change Hazards Storm Team based in St. Petersburg, Florida.

*See Hurricanes page 10*



Hurricanes continued from page 9

Access the Flood Event Viewer:

<https://stn.wim.usgs.gov/FEV/#2020TSMarco-HurricaneLaura>

Watch the Storm Tide Sensor video:

<https://www.usgs.gov/news/track-potential-flooding-laura-usgs-flood-event-viewer>

About Hurricane Laura: <https://www.usgs.gov/special-topic/hurricane-laura>

By mid-September, four named storms and three tropical disturbances were on the move at the same time.

### Hurricane Sally

On September 16, Hurricane Sally re-intensified in the Gulf of Mexico and made landfall as a Category 2 hurricane in Gulf Shores Alabama. Again, USGS crews worked to track, forecast, and measure record flooding and coastal change associated with the storm and provided water-level data to emergency managers.

About Hurricane Sally: <https://www.usgs.gov/special-topic/hurricane-sally>

### Hurricanes Paulette and Teddy

In mid-September, these two storms were out in the Atlantic brewing up large storm swells that affected the U.S. Atlantic coastline from North Carolina to Maine while

Hurricane Sally was active in the Gulf of Mexico.

“The tropical systems in the Atlantic, though far from the coast, have the potential to cause beach and dune erosion and even overwash along the U.S Atlantic coast from North Carolina north to Maine,” said Doran as her team prepared forecasts for coastal change and related hazards. “The swells from these storms are large, long-period waves that elevate water levels at the coast, even though there isn’t any accompanying storm surge. In fact, it could be a beautiful sunny day, but you wouldn’t want to go to the beach during these dangerous surf conditions. That’s why these continuously running forecasts of coastal water levels are important. They can alert people to coastal hazards in all kinds of situations.”

The USGS responded quickly to each of these storms. Much of the initial real-time streamflow data are used by other Federal agencies such as The National Weather Service, the U.S. Army Corps of Engineers (USACE), and local emergency managers to develop flood forecasts, make flood control decisions, track flooding, and identify evacuation routes. These data and forecasts help emergency



USGS Hydrologic Technician Mark Warzecha, installs a storm surge sensor in Port Lavaca, TX, in advance of Hurricane Marco’s landfall along the Gulf of Mexico’s northern coast. Photo credit: Alex Laffoon, USGS

management officials and coastal planners by informing decisions about which areas to evacuate, where and when to close coastal roads, and where to position clean-up equipment in advance of the storm. The enhanced emergency planning and response saves lives and property.

“The real-time information these streamgages provide is invaluable in providing timely, critical information to decision makers as they address public safety,” said Marie Pepler, USGS emergency management coordinator. “It’s

also very useful for the public as they track local conditions, but everyone should always follow the evacuation and safety guidance of their local emergency officials.”

In addition, as part of its mission, the USGS uses the scientific information gained by each storm to help scientists continue to improve the accuracy of forecasting for future storm surges, floods, and coastal change to help reduce risk and improve the resilience of our nation.



USGS hydrologic technicians Fisseha Mengistu (at left), lowers a water sampler into Rock Creek in Washington, D.C., to collect samples to track how Isaias affected water quality and Logan Jeffries (at right) uses a hand-held instrument called an Acoustic Doppler Velocimeter to measure streamflow August 4 on Tenmile Creek near Clarksburg, MD. Photo credits: Erica Warner, USGS (left), Matt Baker, USGS (right)



## 2017 Hurricane Recovery Funds Support Science— Improved Resilience in Active 2020 Hurricane Season

By Curt Storlazzi, Meaghan Faletti, Meg Palmsten, and Kara Doran (USGS)

The record-breaking 2020 Atlantic hurricane season is the first on record in which 9 tropical storms formed before August and 13 before September. Investments made in USGS coastal change science after the powerful 2017 hurricane season were focused on improving hazards planning for future storms. Those scientific advancements are paying off by improving forecasting tools, improving risk awareness, and creating more resilient communities.

See related story, page 1.

Here are a few examples:

- **Updated Hurricane-Induced Water-Level Forecasting**

The USGS has updated models forecasting hurricane-induced total water levels (<https://coastal.er.usgs.gov/hurricanes/research/twviewer/>) and coastal change hazards (<https://marine.usgs.gov/coastalchangehazardsportal/>) for the southeastern United States. These models provide real-time probabilities of hurricane induced coastal flooding and erosion that threaten U.S. coastlines during this active season, as well as for other extreme storms throughout the year. The models are based on USGS lidar-derived dune and



At Fire Island, NY, estuarine, wetland, coastal, and oceanic processes interact, affecting natural and human communities. The USGS has been conducting scientific investigations at Fire Island for more than 20 years. Photo credit: Kyle Kelso, USGS

beach features, USGS estimates of waves at the shoreline, and National Oceanic and Atmospheric Administration (NOAA) model-derived offshore waves and water levels, Federal agencies, such as NOAA, USGS, and the NPS, as well as local officials and emergency management offices, use the forecast as guidance to inform pre- and post-storm safety and property damage decisions related to.

- **Expanded Models for Coastal Change Hazards in Puerto Rico**

The USGS has expanded models for understanding storm-induced coastal change hazards in Puerto Rico. Because of different coastal terrain on the island, including coral- and rock-fronted coastlines, the USGS developed alternate modeling approaches.

For example, the USGS created a new method to delineate coastal cliffs from lidar data, to accurately map the coastline of Puerto Rico and model future coastal hazards. USGS also partnered with the University of Puerto Rico at Mayaguez to deploy a series of USGS instruments across the reefs and shoreline at Rincon, Puerto Rico to better understand flooding along coral reef-fringed coasts ([https://www.usgs.gov/centers/pcm/science/using-video-imagery-study-wave-dynamics-tres-palmas?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/pcm/science/using-video-imagery-study-wave-dynamics-tres-palmas?qt-science_center_objects=0#qt-science_center_objects)).

Scientists use these data to compare and contrast different coastal flooding models to accurately forecast coastal storm-induced flooding.

Early results show that storm damaged reefs off Florida and Puerto Rico in 2017 increased coastal flooding hazards to people and infrastructure, and that coral reef restoration could reduce those hazards. FEMA and the U.S. Army Corps of Engineers may use these data to inform strategies for restoring 2020 hurricane season impacts and to mitigate impacts in the future.

Learn more: [https://www.usgs.gov/natural-hazards/usgs-supplemental-disaster-recovery-activities/2018-supplemental-appropriations?qt-science\\_support\\_page\\_related\\_con=0#qt-science\\_support\\_page\\_related\\_con](https://www.usgs.gov/natural-hazards/usgs-supplemental-disaster-recovery-activities/2018-supplemental-appropriations?qt-science_support_page_related_con=0#qt-science_support_page_related_con)

## Offshore Sediment for Shoreline Restoration

By BOEM

While the Florida Gulf coast endured another hurricane season, the Bureau of Ocean Energy Management (BOEM) and the USACE Jacksonville District joined forces to be prepared when coastal counties needed sand to restore shorelines.

An historic agreement signed this summer cleared the way for offshore work to begin on a much-needed sand inventory offshore southwest Florida. The Southwest Florida Offshore

Sediment Inventory will help further BOEM's collection of data for the National Sand Inventory to foster coastal rebuilding.

“This Administration is better serving the Florida Gulf Coast through the support of the Southwest Florida Offshore Sediment Inventory, resulting in enhanced coastal resiliency. We look forward to working with USACE on this much-needed coastal restoration project,” said Acting BOEM Director Walter Cruickshank.



With the agreement, BOEM and the USACE will be able to share data and optimize engineering, economic, and environmental criteria by matching potential sediment sources with future restoration projects and postconstruction renourishment requirements.

Read the press release: <https://www.boem.gov/boem-and-usace-unite-support-florida-gulf-coast>

## Living Shorelines— Resilient Coasts the Natural Way

By Taylor Pool (USFWS)

As late summer comes around, the sun is shining, the air is thick with heat and humidity, and people begin to nervously watch weather forecasts for tropical storms and hurricanes.

Meteorologists at NOAA updated the 2020 hurricane season forecast in August to extremely active. With Hurricanes Hanna, Laura, Marco, and Sally in the Gulf of Mexico, fortunately, there are ongoing collaborative projects that are restoring coastlines to ensure they are resilient to surging waters and storm erosion.

These coastlines, called living shorelines, are protected by vegetated buffers and beach renourishment. Some are combined with harder structures such as breakwaters to help minimize storm damage. All are used to stabilize estuarine coasts, bays, and tributaries.

The benefits of living shorelines include increased habitat for fish and wildlife and safeguarded shores from wave impacts. Not only do the vegetated buffers protect from water coming inland, but they can also help filter water flowing into the Gulf. Living shorelines incorporating oyster reefs also help filter coastal waters. One



Fencepost hole diggers and shovels are used to plant black needlerush and cordgrass to create vegetated buffers. Photo credit: Erica Roberts, USFWS

adult bivalve can filter up to 50 gallons of water per day.

“Providing resilience against storm surge and erosion is crucial in the Gulf of Mexico,” said Ben Frater, chief of Restoration Planning and Compliance, USFWS, Gulf Restoration Office. “Living shorelines are able to provide this protection and defense, while also providing habitat for the region’s fish and wildlife populations.”

State and Federal agencies create living shoreline projects from Texas to Florida using funding from the *Deep-water Horizon* oil spill settlements, such as the Gulf Environmental Benefit Fund, RESTORE Act, and the Natural Resources Damage Assessment (NRDA). In total, \$224 million has been dedicated to planning and implementing projects focused on shorelines, and the growing project list will continue to benefit the Gulf.

One example in the fringe marshes of Louisiana is the Biloxi Marsh Living Shoreline. Louisiana’s Coastal Protection and Restoration Authority (LA-CPRA) is completing the expansive project within Eloi Bay. The nearly \$70 million project, which also involves the U.S. Environmental Protection Agency (EPA), will create living breakwater structures from bio-engineered oyster reefs to help reduce erosion from wind-driven wave

action. Overall, 11 miles of shoreline will serve as a storm buffer for New Orleans and provide vital habitat for coastal fish and wildlife. Project planning was funded by the RESTORE Act, whereas the NRDA is funding the implementation.

“Louisiana’s coast is a particularly sensitive area that is continually changing,” said Micaela Coner, project manager, LA-CPRA. “The creation of living shorelines and breakwaters like the



Bon Secour National Wildlife Refuge staff plant black needlerush along the refuge’s shoreline. Photo credit: Tami Heilemann, DOI

ones in Biloxi Marsh provide critical protections against storm damage to our ecological resources, our state’s residents, as well as Louisiana’s energy infrastructure which is vital for the country’s economic security.”

State agencies and nongovernmental organizations are executing many of the living shoreline projects. However, Federal agencies are also providing these natural defenses to Federal lands to ensure these resources remain intact for future generations.

The USFWS, as a Trustee of the NRDA, is currently completing a project on the Bon Secour National Wildlife Refuge that has provided valuable fish and wildlife habitat to an ecologically sensitive area. The Little Lagoon Living Shoreline project, although meager in its cost compared to other projects at just under \$261,000, will substantially affect the shoreline’s ability to defend against erosion from severe weather and will improve the water quality of the Little Lagoon. Dune vegetation planting at the shoreline includes black needlerush and smooth cordgrass plants.

Dune vegetation also provides habitat for threatened and endangered species that live in coastal areas. The Alabama beach mouse, for example, has a very

See Living page 13



Living continued from page 12

small range that includes the barrier islands of Gulf Shores, AL, and the Bon Secour National Wildlife Refuge. Planting dune vegetation will expand its range and aid in the recovery of the species.

“One of the reasons why we love this project is because it’s community-driven,” said Jereme Phillips, refuge manager for the Gulf Coast National Wildlife Refuge Complex, which includes Bon Secour NWR. “The Little Lagoon Preservation Society reached out to us and we thought the project was a fantastic idea. Since then, we’ve been fortunate to work with our partners including Mississippi State University, The Nature Conservancy, and the University of South Alabama, with strong support from our colleagues with the Alabama Department of Conservation and Natural Resources, to make this project happen.”

Read the full article: <https://www.fws.gov/southeast/articles/in-defense-for-our-shorelines-the-natural-way/>

## \$160 Million for Wetland Conservation

By DOI

During May, American Wetlands Month, the Migratory Bird Conservation Commission approved \$160 million in funding for various wetland conservation projects that will benefit hundreds of bird species.

The commission, which is chaired by U.S. Secretary of the Interior David L. Bernhardt, allocated \$22.1 million under the North American Wetlands Conservation Act (NAWCA) to the USFWS and its partners to conserve or restore more than 160,000 acres of wetland and associated upland habitats for waterfowl, shorebirds, and other birds through 22 projects in 15 U.S. States. Partners will match these grants with an additional \$50 million.

“Wetlands are special places with an exceptional role to play in both the economy and conservation of our magnificent wildlife,” said Service Director Aurelia Skipwith. The grants positively affect wetland conservation and improve access to public lands

and outdoor recreation opportunities for all Americans.

Wetlands provide many economic, ecological, and social benefits and are critical to supporting bird populations, many of which are declining. Many birds in the United States spend part of their time in other countries, and NAWCA provides grants to Canada and Mexico to ensure waterfowl and other birds are protected throughout their life cycles. The commission approved \$40.5 million for 19 projects in those countries.

See *Special Feature* page 16

### Learn More

Funding press release: [https://www.fws.gov/news/ShowNews.cfm?ref=secretary-bernhardt-announces-\\$160-million-in-funding-for-wetland-&\\_ID=36565](https://www.fws.gov/news/ShowNews.cfm?ref=secretary-bernhardt-announces-$160-million-in-funding-for-wetland-&_ID=36565)

NAWCA projects: <https://www.fws.gov/migratorybirds/pdf/grants/nawcaprojects200527.pdf>

About NAWCA: <https://www.fws.gov/birds/grants/north-american-wetland-conservation-act.php>

## What is a Living Shoreline?

Living shorelines use plants or other natural elements to stabilize estuarine coasts, bays, and tributaries.

Read more: <https://www.habitatblueprint.noaa.gov/wp-content/uploads/2016/04/living-shorelines-b.jpg>

Gulf Spill Restoration website: <https://www.gulfspillrestoration.noaa.gov/>

Little Lagoon Living Shoreline Project: <https://www.fws.gov/southeast/articles/deepwater-horizon-settlement-funds-new-living-shoreline-at-national-wildlife-refuge/>

Biloxi Marsh Living Shoreline Project: <https://www.gulfspillrestoration.noaa.gov/project?id=244>

**LIVING SHORELINES SUPPORT RESILIENT COMMUNITIES**

Living shorelines use plants or other natural elements—sometimes in combination with harder shoreline structures—to stabilize estuarine coasts, bays, and tributaries.

- One square mile of salt marsh stores the carbon equivalent of 76,000 gal of gas annually.**
- Marshes trap sediments from tidal waters, allowing them to **grow in elevation** as sea level rises.
- Living shorelines improve **water quality**, provide **fisheries habitat**, increase **biodiversity**, and promote **recreation**.
- Marshes and oyster reefs act as natural **barriers** to waves. 15 ft of marsh can **absorb 50%** of incoming wave energy.
- Living shorelines are **more resilient** against storms than bulkheads.
- 33%** of shorelines in the U.S. will be **hardened by 2100**, decreasing fisheries habitat and biodiversity.
- Hard shoreline structures like **bulkheads** prevent natural marsh migration and may create seaward **erosion**.

The National Centers for Coastal Ocean Science | [coastalscience.noaa.gov](https://coastalscience.noaa.gov)

## Wetlands of International Importance

In 1971, an international convention was held in Ramsar, Iran, and participants signed a treaty entitled,

**“The Convention on Wetlands of International Importance, Especially as Waterfowl Habitat.”**

The Ramsar Convention provides a framework for voluntary international cooperation for wetland conservation:

- Recognizes wetlands’ importance to communities, cultures, governments, and businesses and encourages wetland conservation and wise use of wetlands.
- Establishes criteria for designating rivers, marshes, coral reefs, and other areas as a “wetland of international importance.”

Read the fact sheet: <https://www.fws.gov/international/pdf/factsheet-ramsar.pdf>

Long Wharf continued from page 1

In 1994, the New Haven Land Trust established the 15-acre Long Wharf Nature Preserve (Preserve) to conserve habitat for wildlife and to connect people with nature. The Preserve also restores important migratory bird habitat. Today, the city continues to be a model of community-led habitat conservation.

Organizations like Gather New Haven (formerly New Haven Land Trust and New Haven Farms) work together and with the USFWS Coastal Program and Urban Wildlife Conservation Program to conserve natural places for people and wildlife. One such place is Gather New Haven’s Long Wharf Nature Preserve.

To understand the importance of the Preserve and similar places, we talked to Sydney Johnson, a young local resident who has lived in New Haven for most of her life—first in Wooster Square and later in the East Shore neighborhood. Johnson said, “In the city, things can be fast-paced and feel confining. The preserve is a place to escape, slow down, and return into the moment.”

To encourage her connection with nature when she was younger, Johnson’s mother enrolled her in Gather New Haven’s Schooner Camp, a sailing and environmental camp on the preserve. The camp taught her to sail and fostered a sense of stewardship



The preserve has trails that wind through tidal wetlands, sand dunes, and grasslands within the city of New Haven, CT. Photo credit: New Haven Land Trust

*Natural places like the Preserve can be an epicenter for community engagement—connecting people with nature and inspiring future generations of environmental stewards. Through organizations like the Gather New Haven and partners like the USFWS, access and enjoyment in our natural world can be accessible to everyone, no matter where they live.*



As a youth, Johnson learned to sail at Schooner Camp, taking first and third place as a camper in sailing regattas. She returned to camp volunteering as a counselor to share this experience with the next generation. Photo credit: Sydney Johnson

for the wildlife and natural habitats near her home. Before attending the camp, Johnson had never been on a sailboat. Johnson said, “learning to sail was the coolest thing ever.” The experience instilled in her, and many other program participants, a sense of confidence and independence.

Johnson later returned to the camp as a volunteer counselor to lead nature walks and activities for five- and

### A Valuable Community Asset

Children learn the value of coastal environments and the importance of good stewardship by getting out in the environment and experiencing it firsthand.



Watch a video (<https://bit.ly/3ckW4op>) that highlights the value of the Long Wharf Nature Preserve to the local community. Collaborative partnerships among the USFWS Coastal Program, the Land Trust Alliance, the New Haven Land Trust, and Firefly Imageworks, Inc., made it all possible. Photo credit: Firefly Imageworks, Inc.

See Long Wharf page 15



Long Wharf continued from page 14

six-year-old campers. “It was the best. Everything blows their minds,” Johnson said as she recalled the day when her young campers saw their first horseshoe crab. What the campers learn can have a broader impact on the community. Sydney remembers excited kids telling their parents about horseshoe crabs and the parents helping to upright overturned crabs on the shore. She was appreciative to see her positive influence on the campers and their parents.

#### Learn More

Gather New Haven: <https://gathernewhaven.org/>

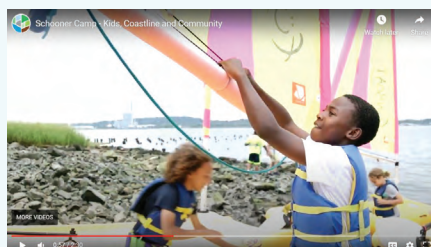
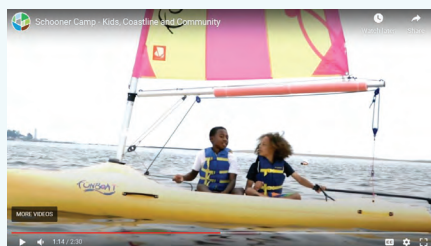
USFWS Urban Wildlife Conservation Program: <https://www.fws.gov/urban/>

USFWS Coastal Program (see sidebar): <https://www.fws.gov/coastal/>

### Schooner Camp

Gather New Haven’s Schooner Camp brings kids to the coastline to explore, learn, grow, get their feet wet, and—above all else—have fun! Camp is for youth ages 6–14, and leadership and youth development opportunities are for teens. Shore exploration and sailing programs engage campers in science-based learning and environmental education through hands-on activities, adventures, crafts, and games!

Watch the video to learn more: <https://bit.ly/32Ts2oD>



## Sea-Level Rise Can Increase Groundwater Levels in California Coastal Communities

By Patrick Barnard and Ann Tihansky (USGS)

A new model that combines sea-level rise scenarios and information about associated groundwater level responses shows that coastal water tables will rise as groundwater levels are pushed up by landward intrusions of seawater caused by sea-level rise.

The numerical model estimates the depth of the present-day coastal water table and the future response of these groundwater levels to a range of sea-level rise scenarios for the entire California coast. Projected sea-level rise and storms could result in coastal flooding that threatens communities, infrastructure, the economy, and natural resources. These scenarios were used to assess the potential threat posed along the California coastline.

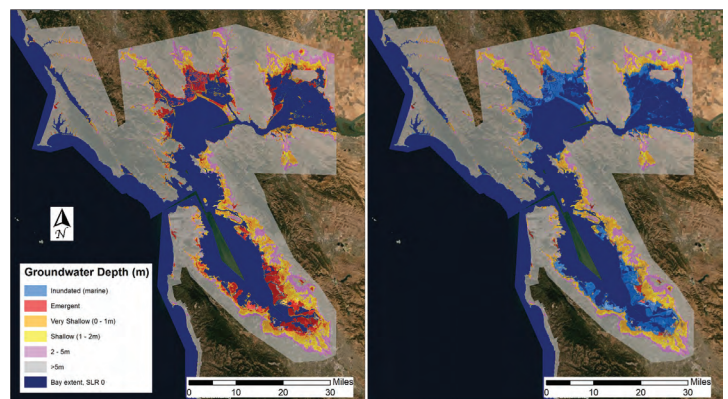
Scientists used the USGS model MODFLOW in this study. A unique aspect of this work is that the model covers a huge spatial domain (the State of California). The extremely high resolution allows the model to capture the effects of topography and drainage networks on groundwater levels. This can help pinpoint areas where ponding at land surface may occur, or where the water table intersects shallow, subsurface infrastructure, such as basements, parking garages, buried utilities, road beds, and other infrastructure.

The work is the first to quantify the potential coastal flooding that could result

from water-table rise along the entire coast of California. Findings show that low-lying coastal communities and critical infrastructure are most at risk of future rising water tables, including areas in San Francisco Bay, Santa Barbara, Ventura, Port of Los Angeles, Long Beach, Seal Beach, San Diego Bay, and San Francisco and San Diego Airports.

The research serves as a possible model approach for building out an assessment across the entire United States coastline in providing actionable science needed by other Federal agencies such as the Federal Emergency Management Agency (FEMA), the EPA, and DoD who are focused on mitigating natural hazards, reducing risk associated with disasters, protecting natural resources, and preparing for and reducing impacts of climate and land-use change on coastal populations and infrastructure.

Read the paper: <https://doi.org/10.1038/s41558-020-0874-1>



Examples of CoSMoS-GW mapping products. At left, modeled current groundwater tables with red depicting sites of emergent groundwater. At right, groundwater tables modeled in the same area with 6 feet of sea-level rise. Blue indicates coastal-driven flooding and inundation. Learn more: [https://www.usgs.gov/centers/pcmsc/science/cosmos-groundwater?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/pcmsc/science/cosmos-groundwater?qt-science_center_objects=0#qt-science_center_objects) Learn more about saltwater intrusion in California: [https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/mission-areas/water-resources/science/saltwater-intrusion?qt-science_center_objects=0#qt-science_center_objects) <https://ca.water.usgs.gov/sustainable-groundwater-management/seawater-intrusion-california.html>

Image credit: Juliette Finzi-Hart, Patrick Barnard, and Kevin Befus, USGS

# The Complex Task of Managing Migratory Shorebird Species

## An Overview of the USFWS Migratory Bird Program

By Brad Andres (USFWS)

Shorebird populations are declining. In fact, more than 50 percent of the shorebird populations in North America are declining. Analyses have indicated the most substantial declines occurred for long-distance migrants. Articles on pages 16–23 are examples of DOI efforts to better understand and address this topic.

In 2019, the “State of the Birds” report showed that bird populations have lost 3 billion birds. The population of all shorebird species declined by 37 percent. For 120 seabird species regularly occurring in U.S. waters, 53 percent are of high conservation concern or listed under the ESA. For the 76 shorebird populations occurring regularly in United States, the numbers are even higher—more than 55 percent are of high conservation concern or listed under the ESA.

Learn more: <http://www.stateofthebirds.org>

State of the Birds 2019: <https://sotb2019.wpengine.com/steep-declines/>

The USFWS has a responsibility to the Nation for managing migratory birds. The authority is designated primarily through the Migratory Bird Treaty Act, where the United States has treaties with Canada, Mexico, Japan, and Russia designed to help



Arctic tern (*Sterna paradisaea*) on Petit Manan Island, Maine Coastal Islands National Wildlife Refuge, Me. The arctic tern migrates from the North to the South Pole and back again every year, the longest migration of any bird. Photo credit: Kirk Rogers

manage flyways and habitats these birds rely on for their extensive voyages. Other supporting legislative resources include the Ramsar Convention on Wetlands (see page 13), the Agreement on the Conservation of Albatrosses and Petrels (in the works), and the Arctic Council, which has conservation of Arctic flora and fauna as part of its mission. The USFWS also participates in meetings with the Convention on Migratory Species as a nonvoting observer.

Many shorebird species use key ocean and coastal areas as part of their annual migratory life cycles; traveling extensively across hemispheres, continents, international borders, and habitats. For example, the *Limosa lapponica* (bar-tailed godwit) and *Calidris canutus* (red knot) travel more than 17,000 miles each year. These distances across international boundaries complicate management challenges. As part of the USFWS Migratory Bird Program, projects span regional areas through partnerships that help bridge with international communities to focus on conserving shorebirds.

Some intergovernmental and inter-agency efforts such as the East Asian-Australian Flyway Partnership (EAAFP) are dedicated to supporting multinational strategies for conserving shorebirds through flyway protections and partnerships. In the United States, the U.S. Shorebird Conservation Partnership works cooperatively with Federal and State agencies, nongovernmental organizations, migratory bird joint ventures, and the private sector to increase the awareness of shorebirds and further their conservation.



Least tern (*Sterna antillarum*) in flight. Image credit Steve Hillebrand, USFWS

USFWS Migratory Bird habitat programs include the NAWCA, the Neotropical Migratory Bird Conservation Act, Urban Conservation Treaty for Migratory Birds, and the Migratory Bird Hunting and Conservation Stamp (Duck Stamp).

### Learn More

NAWCA: <https://www.fws.gov/birdhabitat/grants/NAWCA>

NMBCA: <https://www.fws.gov/birdhabitat/grants/NMBCA>

About flyways: <https://www.flyways.us>

### The USFWS Migratory Bird Program

works with partners to protect, restore, manage, and conserve bird populations and their habitats through monitoring, assessment, partnerships (for example, Partners in Flight and the North American Waterfowl Management Plan) and grants for the benefit of future generations by:

- Ensuring long-term ecological sustainability of all migratory bird populations,
- Protecting, enhancing, and restoring migratory bird habitats,
- Increasing socioeconomic benefits derived from birds and their habitats,
- Improving hunting and bird watching and other outdoor bird-related experiences, and
- Increasing awareness of the value of migratory birds and their habitats for their aesthetic, ecological, recreational, and economic significance.

Learn more: <https://www.fws.gov/birds/about-us.php>

Watch the video: [https://www.youtube.com/watch?v=Nkl\\_Bd6SKbY](https://www.youtube.com/watch?v=Nkl_Bd6SKbY)



# Conserving Long-Distance Migrant Shorebirds at the Flyway Scale

## The Midcontinent Shorebird Conservation Initiative

By Brad Andres (USFWS)

Shorebirds—stilts/avocets, plovers, oystercatchers, and sandpipers—are some of the most mobile animals on Earth. Often traveling along routes (known as flyways) that cover global distances between northern and southern hemispheres, they rely on critical grasslands, wetlands, and beaches to breed, feed, and rest along the way. The habitats favored by shorebirds across their annual migratory cycles have been altered dramatically over the last century.

Shorebirds possess a unique set of life-history traits (for example, small clutch size) that make them especially vulnerable to environmental and anthropogenic perturbations. The combination of threatened habitats, vulnerable life history, and wide-ranging migrations create substantial challenges for conserving them.

An effective strategy for sustaining and recovering long-distance migrant shorebirds requires integrating conservation measures across the full suite of geographic, ecological, and cultural landscapes. To answer this challenge, flyway-scale shorebird initiatives have been launched on the Atlantic (<https://atlanticflywayshorebirds.org/>) and Pacific (<https://pacificflywayshorebirds.org/>) coasts of the Americas. An effort is currently



The stilt sandpiper (*Calidris himantopus*) nests in the Arctic tundra grasses and migrates through the Great Plains to South America, sometimes wintering as far north as Florida and Texas. Photo credit: Lisa Hupp, USFWS

underway to fill the interior gap in the Americas, including the Gulf of Mexico shoreline.

More than 16.5 million shorebirds use interior parts of the United States, Canada, and the western Gulf of Mexico as important stopover, wintering, and breeding areas during spring migration. Sixty-four percent of shorebirds using the North American midcontinent area travel to interior parts of South America to spend the boreal winter. Interior habitats in South America support numerous endemic species that are of high conservation concern. North and South American shorebirds share high elevation wetlands and grasslands with charismatic species like flamingos, guanacos, and pumas.

The Midcontinent Shorebird Conservation Initiative will include three components:

- Develop a hemispheric strategic conservation framework,
- Establish hemispheric and regional committees to oversee framework development and implementation, and
- Identify potential and existing revenue streams to facilitate implementation.

The proposed strategic framework will place local action in a flyway context and facilitate collaboration at the necessary scales. Developing the framework will also enhance partner and stakeholder abilities to collaborate and integrate their current efforts throughout the Midcontinent Americas Flyway. These actions contribute to fulfilling the goal of sustaining shorebird populations for present and future generations.

Integrating human benefits with conservation objectives is a challenging task. Meeting biological objectives (for example, increased



A map showing the Midcontinent Americas Flyway. Image credit: Brad Andres, USFWS

shorebird populations) requires more than natural-resource management for these species. An important part is conveying the value of investing in conservation and highlighting the positive outcomes that benefit human communities.

Large-scale conservation solutions will require large-scale investments that help align shorebird conservation goals with those of large-scale social and environmental programs. Such solutions require collaborative efforts among national governments, multilateral development banks, financial institutions, and the private sector. Engaging novel partners and demonstrating the value of these programs is critical to implementing them successfully.

*See related story, page 19.*

The Midcontinent Shorebird Conservation Initiative has technical advisors, coordinators, and steering committees that are busy planning virtual workshops to develop the strategy and framework during fall 2020 and early winter 2021. The goal is to have the framework completed by the end of 2021 so we can begin implementing it.

For additional information, please contact Brad Andres at [brad\\_andres@fws.gov](mailto:brad_andres@fws.gov)



## A Century of Advancing Avian Conservation

### The USGS Bird Banding Program

By Jessica Fitzpatrick, Antonio Celis-Murillo, and Ann Tihansky (USGS)

Birds contribute more than beauty to the environment; they connect society to natural resources and many related daily, seasonal, and global cycles. Many plants depend on bird species to pollinate them, and many fruit- and grain-eating birds help spread plants' seeds, enhance agricultural production, and provide valuable control of a range of pests from mosquitos to rodents.

Birds are also good indicators of environmental health because they are sensitive to habitat change. Changes in bird populations can indicate environmental stressors, such as extreme weather or human development, which could affect other parts of the ecosystem. For these and many other reasons, avian conservation science is needed.

This year marks the 100th anniversary of a program dedicated to that effort: the USGS Bird Banding Laboratory. The lab was established in 1920 to study and protect North American

birds. Currently, the lab issues permits for banding in the United States, distributes aluminum bands—about 1 million per year—to participating scientists in the United States and Canada, and serves as a central repository for banding records in both countries.



Blue-winged teal (*Spatula discors*) at Green Cay Wetlands, FL. Photo credit: Bill Hubick

*The USGS Bird Banding Laboratory staffers manage more than 77 million archived banding records and more than 5 million bird encounter reports. An average of nearly 1.2 million banding records and 100,000 encounter reports are submitted each year.*

#### Bird Banding Protects Birds

Scientists can keep track of individual birds by placing bands on a bird's legs. Each set of bands has a unique combination of colors and numbers. Highly trained researchers record the location and date, as well as the bird's species, gender, estimated age, and other features, and sends that information to the lab every time they band a bird. The USGS works with The North American Banding Council, which develops banding materials and addresses safety regulations.

People who see or catch a banded bird report that information back to the lab, which keeps records of all reported encounters.

“Scientists can tap this powerful archive of bird sighting information and combine it with other research tools to track birds' behavior, migration, lifespans, populations, diseases and levels of environmental contaminants,” said Antonio Celis-Murillo,

acting chief of the USGS Bird Banding Laboratory. “The archived information helps experts make important management and conservation decisions, which is especially important for the protection and recovery of endangered and threatened birds.”

“In the 100 years since the Bird Banding Laboratory was established, scientists have acquired an immense amount of data on the changing status and trends in bird populations, and they have documented movement patterns across the North America,” said Thomas O’Connell, center director for the USGS Patuxent Wildlife Research Center and Leetown Science Center. “Having long-term records is essential to seeing changes over time and learning about the state of the environment. The more we know about birds the better equipped land- and resource managers are to make the best decisions to protect them.”

#### What Scientists Learn by Banding

Through banding research, scientists can learn a bird's routine, such as where they spend most of the day, where they migrate, what they eat, and how much habitat they need to feed and reproduce. This information can help identify priority areas for conservation.



Wisdom, Laysan albatross (*Phoebastria immutabilis*), with one of her chicks named Kūkini. Photo credit: USFWS

See *Banding* page 19



*Banding continued from page 18*

Banding data can reveal other trends in life span and population. If the age of birds caught at a certain location changes, life expectancy may be getting shorter or longer. The number of birds captured overall may indicate whether populations are increasing or decreasing. Data such as weight and wingspan can show trends in overall health. Such insight can cue scientists to look for changes to birds' food sources, predators, competitors, habitats, or other factors that affect their survival and reproduction.



American flamingo (*Phoenicopterus ruber*) on the north shore of Puerto Rico. Photo credit: Bill Hubick

Scientists can help determine disease (such as Lyme disease and avian influenza) prevalence by sampling wild birds. Bird migration routes can identify which human and animal communities are at risk of exposure too. In toxicology research, banding data can also show birds' potential exposure to contaminants or other environmental threats.

In addition, the USFWS and other partners analyze banding information from game bird species each year to help set hunting regulations. These regulations ensure healthy populations while allowing sustainable hunting opportunities.

Examples of significant findings in the last 100 years:

- Impacts of the pesticide DDT
- Oldest known banded bird

USGS data helped discover the oldest known banded bird in the wild. Wisdom, a female Laysan albatross (*Phoebastria immutabilis*), is at least 69 years old and nests on Midway Atoll NWR, a remote Pacific Island. Scientists used to think the life span of the Laysan albatross was 12 to

40 years, but they now know these seabirds can live much longer and nest successfully for many years

- Tracking avian influenza in Blue-Winged Teal (*Spatula discors*)
- Conservation and recovery of wild Flamingo populations (*Phoenicopterus ruber*)

In 1950, there were about 5,000 wild flamingos in North America. Today, there are more than 70,000, and they are living longer, indicating that conservation efforts are working.

Citizens have also helped compile the immense amount of data that makes the lab's records so valuable. Anyone who sees a banded bird can be a citizen scientist by reporting the sighting. Report a banded bird: <http://www.reportband.gov>

[reportband.gov](http://www.reportband.gov)

Learn more: [https://www.usgs.gov/centers/pwrc/science/bird-banding-laboratory?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/pwrc/science/bird-banding-laboratory?qt-science_center_objects=0#qt-science_center_objects)

Read the full story: <https://www.usgs.gov/news/usgs-celebrates-100-years-bird-banding-lab#:~:text=This%20year%20marks%20the%20100,help%20protect%20North%20American%20birds>

## A Business Plan That Works for American Oystercatcher Recovery

By Bridget Macdonald (USFWS)

“Fifteen years ago, things just weren't adding up for the American oystercatcher; population numbers were down,” said Shiloh Schulte, American oystercatcher recovery coordinator for the Manomet Center for Conservation Sciences. “The metrics showed reproduction seemed to be declining: very few chicks were being produced.”

A drop in reproductive success might cause concern for any species, but it was particularly alarming for a bird whose offspring usually don't reach maturity. The species has evolved to compensate for this loss of eggs and juveniles, explained Caleb Spiegel, a biologist with the USFWS. “It is a long-lived shorebird, and when they

do make it to adulthood, they tend to survive and have a lot of chances to reproduce.” Because small numbers of young oystercatchers make it to reproductive age, scientists were alarmed when data showed a species-wide decline in reproductive success in the early 2000s. The drop in reproductive success was changing the species' population equation. There was an increasingly smaller number of young oystercatchers, facing the same long odds of survival.

By linking actions to outcomes and expenses, they developed a whole new way of implementing conservation. Working closely with shorebird experts from the American

Oystercatcher Working Group, the USFWS devised a different kind of plan: a business plan. Assuming the role of the conservation entrepreneur, the USFWS led the working group in fleshing out the plan, outlining what needed to happen where to increase the oystercatcher population and at what price, and pitched it to an interested investor—the National Fish and Wildlife Foundation (NFWF).

“Working with USFWS and the Foundation, we came up with a goal of a 30-percent increase in the population over ten years, as well as a set of specific conservation actions,” Schulte said. “Basically, what we would like

*See Oystercatcher page 20*



*Oystercatcher continued from page 19*

to do if we had the resources, and what kind of scale we would like to work at.”

In the context of conservation, this was a novel approach. “They were linking concrete management objectives to actual funding levels,” Spiegel said. “That’s challenging because the environment is inherently unpredictable, but it’s what funders want to see when they are looking for a return on investment.”

NFWF agreed to put up \$5 million over 10 years. With a roughly 1 to 1 match, that has amounted to about \$1 million per year toward oystercatcher conservation since 2009. It worked.

“Shorebirds are already living on the edge,” Spiegel said. “We need an international partnership to be working together throughout the life cycle of these species based on common goals and metrics, and the oystercatcher working group has been a model for how to do that well.”

Learn more: <https://www.arcgis.com/apps/MapSeries/index.html?appid=87690c02be3c4c0094bc59cfbfa5ed28>

Read more about American oystercatcher recovery: <https://medium.com/usfishandwildlifeservicenortheast/in-american-oystercatcher-recovery-partners-mean-business-19aa50a12ae>

## 20th Anniversary Successes of the Neotropical Migratory Bird Conservation Act!

USFWS

Recognizing that neotropical migrants—birds that breed in the United States and Canada but spend the winter farther south—need protection across their lifecycles, Congress passed the Neotropical Migratory Bird Conservation Act (NMBCA) in July 2000. The goals of the NMBCA include perpetuating healthy bird populations, providing financial resources for bird conservation, and fostering international cooperation. Learn more: <https://www.fws.gov/birds/grants/neotropical-migratory-bird-conservation-act.php>

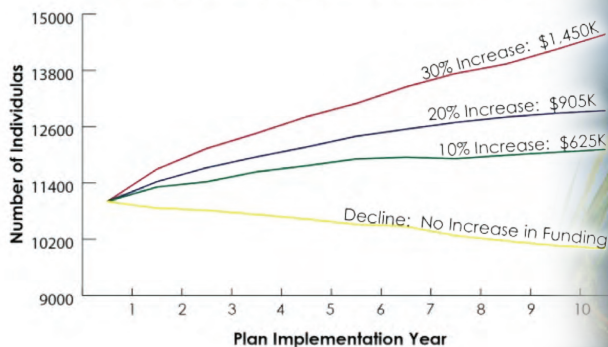
After 20 years, the impact has been incredible. Since the first projects were funded in 2002, NMBCA has provided 628 grants throughout the Western Hemisphere, totaling nearly \$75 million and leveraging over \$287 million in matching contributions. Projects benefit most of the 386 bird species that breed in the continental United States or Canada and usually spend the northern winter in

Mexico, Central America, the Caribbean, or South America by addressing the factors limiting populations of declining migratory bird species. The projects have strong local community involvement; and, because many of the conservation needs exist south of the U.S. border, at least 75 percent of the funding supports projects outside the United States. The NMBCA requires a partner-to-grant dollar match of 3 to 1. Outside of the United States and Canada, in-kind contributions can meet that matching contribution requirement.

One of the values of the program is that it can fund a broad array of efforts to conserve neotropical migratory birds and the habitats they need, including protecting, restoring, and managing habitat; conducting law enforcement activities; providing community outreach and education; and supporting bird population research and monitoring.

Learn more: <https://www.fws.gov/birds/news/200721NMBCA20.php>

Projected American Oystercatcher Population Size



This graph shows projected population-growth trajectories given different annual funding scenarios, including no funding, which would have led to a population decline. In line with the projections, the American oystercatcher population has grown 23 percent in 10 years with yearly investments of about \$1 million. Image credit: USFWS



American oystercatcher (*Haematopus palliatus*) and chick stand out in the bird world for their striking appearance and the specialized foraging technique they must teach to their young. Photo credit: USFWS



## Golden Anniversary of Counting Birds on Tomales Bay, CA

NPS

The 50th Christmas Bird Count (CBC) at Point Reyes took place in December 2019. Several NPS staff volunteered at sites throughout Point Reyes National Seashore and on Tomales Bay, where volunteers conducted the surveys aboard three separate boats.

Sponsored by the Marin Audubon Society and Point Blue Conservation Science, the Tomales Bay CBC is one of the longest continuous studies of waterbirds. The first count in 1957 was limited to the narrow, long estuary but became an annual event starting in 1970, and the count circle expanded to combine other habitat areas. Today, 27 territories within the Point Reyes Count circle are centered around Tomales Bay. In terms of total

*Tomales Bay is a 12-mile long, narrow estuary that separates the Point Reyes peninsula from mainland California. This globally significant waterbody was designated a Ramsar Wetland of International Importance in 2002, recognizing this important haven and habitat for migrating species and waterbirds. An estimated 35,000 birds spend their winters there, often migrating from distant destinations in the northern latitudes. Much of the data for long-term bird population trends are due to local citizens who participate in annual CBCs.*

species observed, number of rarities, and number of committed participants, the count ranks near the top of all North American CBCs. The Point

Reyes count welcomes participants of all ages and skill levels.

"Counting birds can be very exciting" said volunteer and NPS alumnus Sarah Allen described the scene on one of the boats during the December 2019 count:

The CBC contributes numbers for scientists and wildlife managers to understand waterfowl population trends and habitat use. The good news is that many species' populations have trended up at Tomales Bay over the past 50 years.

Learn more about the history of the Point Reyes CBC from this account by naturalist David Wimpfheimer: [https://www.audubon.org/sites/default/files/documents/AB\\_108\\_reyes.pdf](https://www.audubon.org/sites/default/files/documents/AB_108_reyes.pdf)  
Read more: <https://www.nps.gov/articles/50-years-of-counting-birds-on-tomales-bay.htm>

### Christmas Bird Counts

The National Audubon Society administers the CBCs, and 2019 was the 120th CBC season, the first was held in 1900. The CBCs are the longest-running citizen science program in the world. With over 2,300 individual count circles, these volunteers' bird counts provide valuable information about the long-term status of bird populations across North America and elsewhere. Each count area covers a 15-mile diameter circle in which teams of volunteers, from novice to expert, count every bird they encounter during the entire day.

Learn more: <https://www.audubon.org/conservation/science/christmas-bird-count>



### Bird Watchers Positively Affect the Economy

More than 45 million people watch birds near and away from home. Combined with other wildlife watchers, they contribute a total of nearly \$80 billion to the U.S. economy, according to the 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation produced by the USFWS. For example, a September 2017 presentation at the American Birding Expo found that, among other events, the Space Coast Birding Festival generated nearly \$1.3 million over 5 days.

Bird watchers spent nearly \$41 billion annually on trips and equipment, according to an addendum to an earlier national survey in 2011. The survey also found that local community economies benefit from the \$14.9 billion that bird watchers spend on food, lodging, and transportation and that 666,000 jobs were created in 2011 as a result of bird watching expenditures. When combined, outdoor recreation sales (gear and trips) for hunting, fishing, and wildlife watching—including bird watching—totaled \$325 billion per year according to a 2011 study commissioned by the NFWF.

#### Learn More:

National survey addendum: <https://digitalmedia.fws.gov/digital/collection/document/id/1874>

Bird watching tools: <https://www.fws.gov/birds/bird-enthusiasts/bird-watching/bird-watching-tools.php>

Economic impact information: <https://www.fws.gov/birds/bird-enthusiasts/bird-watching/valuing-birds.php>



Birdwatchers contribute valuable information for wildlife managers. Photo credit: USFWS



## Loons Losing Lakes

### Looking at Potential Impacts from Loss of Arctic Breeding Habitat

By Deanna Ochs (NPS)

In the summer of 2018, biologists with the NPS Arctic Inventory and Monitoring Network noticed a disturbing trend while conducting aerial loon surveys in Bering Land Bridge National Preserve. Many large, coastal lakes were quickly draining away. The shallow lakes pockmarking this landscape are important breeding habitat used by three loon species, including the rare Yellow-billed Loon (*Gavia adamsii*). The abundant food sources, ample vegetation, broad expanse, and ready access to the marine environment have brought these migratory birds back to the same lakes to breed for centuries. The habitat changes resulted in a loss of fish, invertebrates, and vegetation that provide cover and nourishment to the birds while nesting and chick-rearing. Bering Land Bridge National Preserve is one of a handful of regions throughout the Circum-arctic that contain lakes suitable for Yellow-billed Loons.

According to long-term climate monitoring at Kotzebue, AK, the period encompassing the winter of 2017–18 through the summer of 2018 was the

warmest since records began in the 1940s, following a series of record warm years that began in 2014.

It is not uncommon for lakes in Bering Land Bridge National Preserve to dry up, as they are surrounded by permafrost, and periodic drainage is a natural part of their ecology. However, the pace of drainage has picked up. Since about 2000, the area has been losing about 3-square miles of water per decade. In 2018, the rate of disappearance increased dramatically, with 3 square miles draining in one summer. It is widely believed that the change is due to thawing permafrost as the climate warms. Such changes may affect loons and other species in this unique ecosystem.

To better understand the impact of these changes, several studies have been initiated. The NPS is collaborating with the USFWS to document long-term loon population trends in Bering Land Bridge and Cape Krusenstern National Park lands. While focusing on the Yellow-billed Loon, they are also collecting data on Pacific and Red-throated loons (*Gavia pacifica* and *G. stellata*, respectively).

In other studies, scientists at NPS, USGS, and the University of



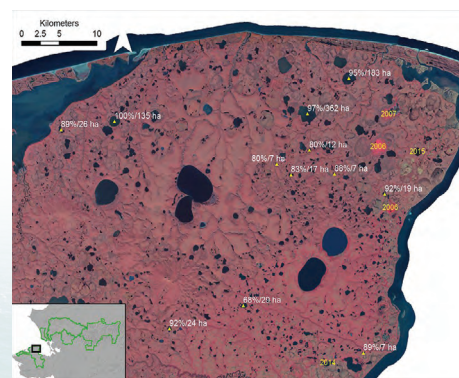
A Yellow-billed Loon sitting on a nest. Photo credit: Stacia Backensto, NPS

Alaska-Fairbanks are working to identify the characteristics of freshwater lakes in Bering Land Bridge to develop loon habitat-selection models. They are using environmental deoxyribonucleic acid (eDNA) to help assess the presence of loon species and prey fish that are using these lakes while other scientists are using genetics to look at variation within local populations of Alaska’s five loon species (*Gavia sp.*) that occur in Bering Land Bridge: Pacific (*G. pacifica*), Red-throated (*G. stellata*), Yellow-billed (*G. adamsii*), Arctic (*G. arctica*), and Common (*G. immer*),

Learn more: <https://www.nps.gov/articles/loons-without-lakes.htm>



A slider composite image of a large lake in Bering Land Bridge National Preserve. At left, in June 2009. Photo credit: Melanie Flamme, NPS. At right, in September 2018 after it rapidly drained sometime between June and early September. Photo credit: Sarah Swanson, NPS



Satellite image of northeastern Bering Land Bridge National Preserve. Lakes that drained in 2018 are marked with a yellow triangle and labeled with the water area loss in percent of the original lake area and water loss in hectares (about 2.5 acres). Image credit: David Swanson, NPS

### Youth Bring a Fresh Perspective to Wildlife Conservation

The NPS Arctic Inventory and Monitoring Network staff reached out to Alaska’s youth. Through partners and funding from Alaska Geographic and the Murie Science and Learning Center, five students joined biologists in the field to observe loons in their natural habitat. The students created videos from this first-hand experience that they shared within their communities and other youth. Watch the videos on Alaska NPS YouTube: <https://www.youtube.com/watch?v=zFGpfu2lauo>



## Food Web Changes Affect Mercury Levels in Fish

By Dave Krabbenhoft (USGS)

Fish consumption advisories for elevated concentrations of mercury in consumable fish are in place for all five Great Lakes. Although actions aimed to reduce mercury releases in the Great Lakes Region include the Clean Water Act, Mercury Export Ban Act, sulfur and nitrous oxide controls, Mercury and Air Toxics Standards Rule, and changes in energy production from coal to natural gas, have reduced mercury in air emissions, expected comparable decreases of mercury in fish tissue have not been observed.

USGS scientists studied methylmercury bioaccumulation in lake trout, a predator fish of Lake Michigan, looking at the combined effects of reduced environmental mercury source loading along with food web changes associated with establishment of invasive species populations.

Scientists looked at mercury, carbon, and nitrogen in lake trout tissues archived from 1975 to 2015 by the EPA and mercury isotopes in dated sediment cores from Lake Michigan. Scientists were able to determine that fish tissue concentrations were related to temporal changes in mercury sources and to changes in food web effects owing to increased populations of invasive species. This food



GeoHealth newsletter logo. Read more: [https://www.usgs.gov/geohealth-usgs?qt-newsletter\\_group=0#qt-newsletter\\_group](https://www.usgs.gov/geohealth-usgs?qt-newsletter_group=0#qt-newsletter_group)  
Photo credit: USGS

web shift dramatically changed carbon and nutrient dynamics in Lake Michigan and resulted in dietary changes of lake trout that presumably lead to consumption of prey items higher in mercury content, thereby dampening the expected decline in mercury concentrations in fish. These results reveal why trends in fish mercury concentrations may not mirror declining regional and national mercury emissions in the United States, and further imply that mercury concentrations in fish cannot be predicted by emission inventories alone.

Like this story? Read more environmental health research from the USGS. The *GeoHealth* USGS newsletter provides information on new USGS science activities pertinent to safeguarding the health of fish, wildlife, domesticated animals, livestock, and people from environmental exposures to contaminants and pathogens.

You can also subscribe: <https://www.usgs.gov/newsletter/geohealth-usgs-newsletter-august-2020>

*Norway continued from page 1*

to the United States Kåre R. Aas signed a Memorandum of Understanding (MOU) during a ceremony in Washington, D.C.

“We appreciate this opportunity to highlight our strong relationship with Norway and our continuing investment in safe and responsible offshore energy development,” said MacGregor. She added that this administration, “is committed to ensuring our Nation is in a position of strength when it comes to domestic energy production, to provide jobs, power our economy, and provide affordable energy for American families and businesses,”

Activities outlined in the MOU framework include the exchange of scientific and technical information and cooperation regarding research and development technologies. The United States and Norway will remain in regular contact and foster discussion of experiences, best practices, policy, and regulatory initiatives relevant to the development of offshore resources.

“The MOU signed today will further strengthen the longstanding energy partnership between our two countries. I’m convinced that sharing of best practices and experience will be mutually beneficial and contribute to sustainable resource management,” said State Secretary in the Norwegian Ministry of Petroleum and Energy Tony Christian Tiller.

The United States and Norway are two of the world’s largest offshore oil and gas producers and have decades of experience to draw upon in expanding discussions on oil and gas best practices. Both countries are interested in discussing strategies for identifying and inventorying new supplies of marine mineral resources of commercial or economic interest. Discussing offshore wind is also a priority, particularly as it pertains to floating wind technology.

Learn more: <https://www.doi.gov/pressreleases/interior-and-norway-strengthen-offshore-energy-and-mineral-resource-knowledge-and>

### What is a Joint Venture?

The USFWS works with many partners. Bird Habitat Joint Ventures are collaborative partnerships that enhance work in the United States, Canada, and Mexico to conserve habitat for the benefit of birds, other wildlife, and people. We bring strategic thought to bird conservation, including for species like the Yellow-billed loon. Read more: <https://pacificbirds.org/2019/04/yellow-billed-loons-on-the-move/>

#### Learn More

Joint Venture directory: <https://www.fws.gov/birds/management/bird-conservation-partnership-and-initiatives/migratory-bird-joint-ventures/joint-venture-directory.php>

Joint Venture network: <https://pacificbirds.org/about-pacific-birds/what-are-joint-ventures/>

Migratory Bird Joint Ventures website: <https://mbjv.org/>

# Rapid Post-Hurricane Coastal Change Data Assists NPS and Partners

By Sara Ernst (USGS)

Hurricane Isaias unleashed destructive winds, rainfall, and tornados when it made landfall in North Carolina on August 3, 2020, affecting lives, homes, infrastructure, and coastal features. Quantifying this coastal change is essential for communities to better plan for sea-level rise, changing storm patterns, and other coastal change hazards.

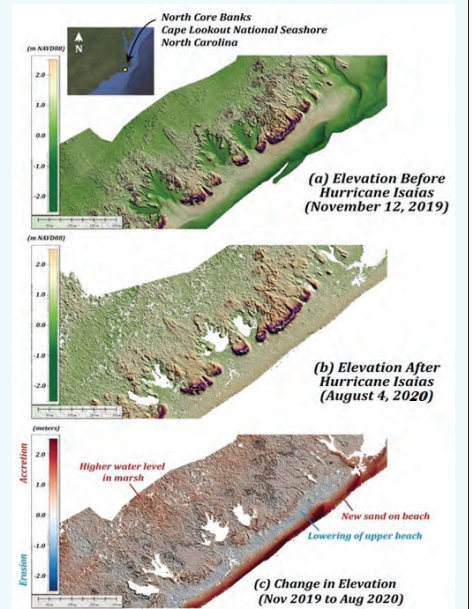
The USGS uses remote-sensing technologies, such as aerial photography, satellite imagery, and lidar (laser-based surveying), to measure coastal change along U.S. shorelines. Within a few days after Hurricane Isaias, the USGS Remote Sensing Coastal Change (RSCC) project rapidly processed emergency response imagery from NOAA, using the new digital elevation models (DEMs) to compare with previous 2020 data from November 2019 at the North Core Banks in Cape Lookout National Seashore. Using these models, RSCC produced difference maps to analyze storm-induced coastal change.

The results gave the NPS critical information before field-based teams were deployed, helping to decide how and where to approach response activities.

## What Are DEMs (Digital Elevation Models)?

USGS DEMs are arrays of regularly spaced elevation values referenced horizontally either to a map projection or other geographic coordinate system. These products are critical for modeling and analyzing elevation changes.

The grid cells are spaced at regular intervals along south-to-north profiles that are ordered from west to east. The USGS acquires bare-earth elevation source data through the USGS 3D Elevation Program (3DEP) and resamples the data to several National Map DEM products for the United States and territories. DEMs are logically seamless terrain surfaces in their respective areas of coverage and are produced from the highest quality elevation data held by the USGS. Learn more: [https://www.usgs.gov/faqs/what-are-digital-elevation-models-dem?qt-news\\_science\\_products=0#qt-news\\_science\\_products](https://www.usgs.gov/faqs/what-are-digital-elevation-models-dem?qt-news_science_products=0#qt-news_science_products)



DEMs for elevation at North Core Banks in Cape Lookout National Seashore before (November 12, 2019) and after (August 4, 2020) Hurricane Isaias. The bottom image shows the elevation-difference map between the two DEMs (red=loss; green=gain). Image credit: Jin-Si Over, USGS

“Our ground observations support the image assessment. The production of the image assessment was quicker than our ability to get out there and look at it on the ground. It helped us focus on impacted areas. And, it can help dictate how and where we access

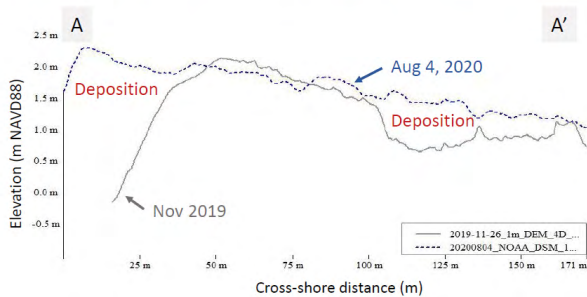
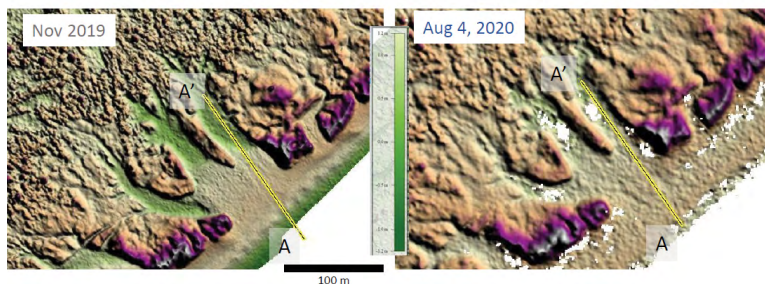
the island. This is great work,” said Jeff West, the superintendent at Cape Lookout National Seashore.

The change analysis performed by the USGS RSCC team determined that Hurricane Isaias showed some beach recovery with sand overwash deposited in channels previously eroded by Hurricane Dorian and also at some beaches on North Core Banks.

The USGS is dedicated to providing prompt, actionable data and analysis to meet stakeholder needs such as the NPS and NOAA. Building and maintaining productive partnerships are key in effectively serving U.S. coastal communities.

Learn more about related research and efforts: [https://www.usgs.gov/natural-hazards/coastal-marine-hazards-and-resources/science/coastal-change-hazards?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/natural-hazards/coastal-marine-hazards-and-resources/science/coastal-change-hazards?qt-science_center_objects=0#qt-science_center_objects)

Learn about RSCC: [https://www.usgs.gov/centers/pcmsc/science/remote-sensing-coastal-change?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/pcmsc/science/remote-sensing-coastal-change?qt-science_center_objects=0#qt-science_center_objects)



A detail of one of the washover deposits accumulating in a gully formed by Hurricane Dorian and a cross-section showing beach accumulation on the beach and at the distal end of the washover deposit. Image credit: Jin-Si Over, USGS



## Potential Landslides and Tsunami Hazards in Glacier Bay, Alaska

By Lisa Wald, Jeffrey Coe, Robert Schmitt, and Erin Bessette-Kirton (USGS)

Glacier Bay National Park and Preserve (GBNPP) is a popular destination for cruise ships and passenger boats. A typical tour of the Bay traverses the entire length of the Bay to the glacier calving viewpoints in the Johns Hopkins and Tarr Inlets. However, in 2018 the NPS recognized that the combination of recent deglaciation, relatively frequent earthquakes, steep rocky slopes, and narrow inlets create conditions in Glacier Bay that can potentially generate large tsunami waves. These conditions could pose threats to ships and boats nearby as well as possible risks to GBNPP visitors,

In recent years, there has been a spate of large landslides in GBNPP that corresponded to record-breaking warm temperatures in Alaska. USGS landslide scientists published a 2019 report in the NPS “Alaska Park Science” series, providing an initial assessment of areas where landslides could enter the water of Glacier Bay and generate tsunamis.

Bathymetry data used during the research revealed a previously hidden landslide at the junction of Johns Hopkins and Tarr inlets that appears to have occurred sometime after 1892. It originated above land, but most of the deposit is underwater. It is the largest known landslide within GBNPP.

Based on this initial investigation, USGS scientists recommended more fieldwork to determine geologic conditions that control landslide occurrence and size, systematic monitoring of steep slopes to detect slow movements or deformations that could possibly provide warning of landslide events, and tsunami modeling to determine the boat size that could be threatened by landslide-generated waves. There is clearly more work to be done to understand the risk posed by these natural hazards.

See related story on page 32

Learn more: <https://www.usgs.gov/natural-hazards/landslide-hazards/science/potential-landslide-paths>



Margerie Glacier is an icy highlight of Glacier Bay National Park and Preserve in Alaska and a primary destination for visitors on sailboats, kayaks, tourboats and cruise ships. The glacier's ice face towers 250 feet high above the waterline, with another 100 feet below the water's surface. Photo by Sara L. Tolwin ([www.sharetheexperience.org](http://www.sharetheexperience.org)) at Glacier Bay National Park and Preserve

[and-implications-tsunami-hazards?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/science-center/objects=0#qt-science-center_objects)

Read more: <https://www.nps.gov/gbba/planyourvisit/landslides-and-giant-waves.htm>

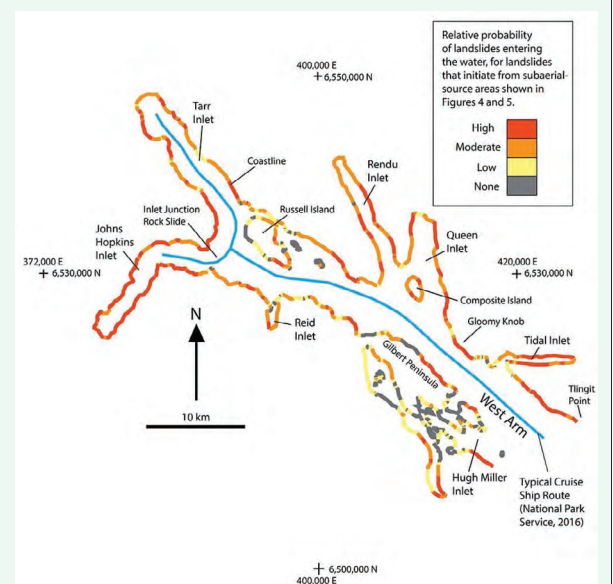
### Online Tool for Landslide Risks

In October 2019, the USGS unveiled a new web-based interactive map that marks an important step toward mapping areas that could be at higher risk for future landslides. In collaboration with State geological surveys and other Federal agencies, the USGS has compiled much of the existing landslide data into a searchable, web-based interactive map called the U.S. Landslide Inventory Map.

“Although landslides occur in every State, our understanding of landslide hazards at the national scale is limited because landslide information across the United States is incomplete, varies in quality, accessibility, and extent, and what is known is not collected in a central location,” said Jonathan Godt, USGS program coordinator for Landslide Hazards.

Until now, no Federal agency has taken on the monumental task of systematically cataloging landslide occurrence across the United States. Existing digital data on landslide occurrence are held by a range of Federal, State, and local government agencies, and no central point of access has previously been available.

Learn more: <https://www.usgs.gov/news/landslide-risks-highlighted-new-online-tool>



Map of Glacier Bay showing the relative probability of landslides entering the water along the coastline of the West Arm. Map credit: USGS

## Coastal Change Happens!

### USGS Introduces a National Approach to Coastal Change Hazards Science

By Drew LaPointe, John Haines, and Ann Tihansky (USGS)

The importance of our Nation's coasts is indisputable. Our coasts are crucial to the livelihoods of millions of Americans (40 percent live in coastal counties), serve as critical habitats for many species, offer protection from storms, and are places for adventure and tranquility. No matter how calm and peaceful our coasts may sometimes seem, they are changing constantly, sometimes substantially, which can present challenges for planning and reducing risk. Therefore, our citizens need the best-available information and tools to inform decisions to reduce societal risk, protect natural resources, and

develop smart infrastructure within a changing landscape.

From relaxing sandy beaches and barrier islands, ecologically productive marshes, and magnificent rocky coasts and cliffs to tropical islands fringed by coral reefs and permafrost coasts where ice holds the sediments together, each coastline is unique and faces different elements of coastal change. The USGS Coastal Change Hazards (CCH) research uses a variety of approaches to better understand changes across the range of coastal environments.

The CCH activities focus on coordinating research and delivering data and tools needed to respond to coastal change hazards. Together, these data and tools describe our

coastlines, how the coast can change through time, and the potential hazards associated with these changes. Although CCH is advancing this research and forecasting, a key aspect is to work directly with stakeholders to ensure that science products are usable by communities so they can better understand, identify, and prepare for coastal hazards and can take action in reducing risks posed by them.

Coastal change is inevitable, but coastal management decisions that are guided by USGS CCH science and tools can help our society reduce risk and losses. Through the focused efforts on coastal change hazards and growing connections to other areas of USGS expertise and capabilities, we are fulfilling the vision of a Nation that prospers by using scientific knowledge to prepare for, mitigate, and respond to threats posed by our dynamic coasts. Through this collaborative effort across the USGS, CCH is providing reliable and trusted science to protect the lives, property, and economic prosperity of our Nation's coasts.

Read more: <http://ow.ly/Zv9950BJX5j>



The U.S. Army Corps of Engineers restores the coastline of St. Augustine Beach, FL, for protection and recreational use. Photo credit: Mark Bias, USACE

#### Coastal Change Hazards within a 21st Century Vision

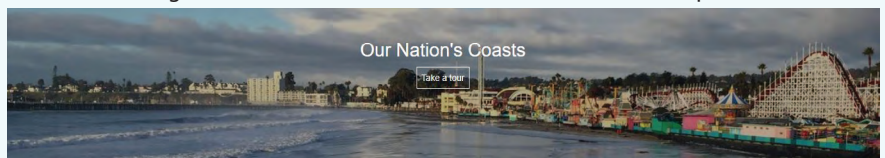
The USGS has a long history of advancing Earth science and identifying opportunities to integrate across disciplines to address complex societal problems.

"Coastal change hazards science is a prime example of this legacy. The CCH works to bring together research, applications and communications to effectively deliver useful information and tools directly to those who need it to help minimize natural hazard risks along our Nation's coastlines," said USGS Natural Hazards Mission Area Associate Director David Applegate. The USGS works with other Federal agencies, such as NOAA and the U.S. Army Corps of Engineers, to advance our Nation's hazard science and deliver information. "These collaborations are beneficial for advancing both research and public safety. For example, by integrating the USGS CCH coastal change models with NOAA's wave and surge forecasts, we are able to provide emergency managers and coastal communities with more robust information to prepare for advancing storms."

#### Explore Coastal Hazards through Interactive Stories

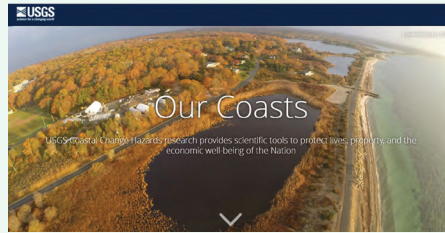
CCH has developed a series of educational, interactive geonarratives that take you on a journey across our Nation's coastlines to learn about coastal change in various environments, to become familiar with the hazards posed by these changes, and to understand how USGS science and tools can help coastal communities mitigate these risks and prepare for future change. You can explore how barrier islands and shorelines move over time or how we forecast coastal change, learn how coral reefs make a difference in coastal protection, or interact with our tools for visualizing coastal storm impacts on the California coast.

Explore all these geonarratives: [https://www.usgs.gov/center-news/our-nation-s-coasts-take-a-tour?qt-news\\_science\\_products=5#qt-news\\_science\\_products](https://www.usgs.gov/center-news/our-nation-s-coasts-take-a-tour?qt-news_science_products=5#qt-news_science_products)



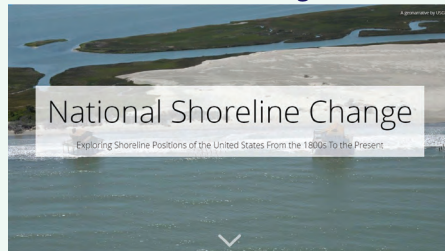


## Our Nation's Coasts



<https://wim.usgs.gov/geonarrative/cch-ourcoasts/>

## National Shoreline Change



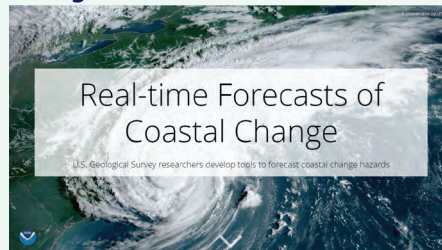
<https://usgs.maps.arcgis.com/apps/Cascade/index.html?appid=301969676f9945a1873dfdcdfe1c890>

## Coastal Storms



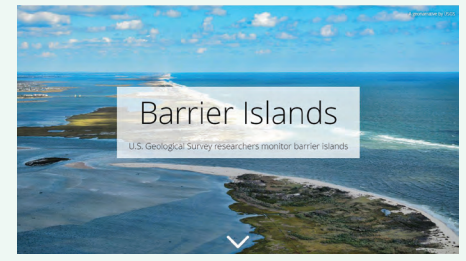
<https://usgs.maps.arcgis.com/apps/Cascade/index.html?appid=4ce74734f4d2470299e831c11bfd1d6>

## Real-Time Forecasts of Coastal Change



<https://usgs.maps.arcgis.com/apps/Cascade/index.html?appid=e1dd6abdd79d4887a4b7e4bf422db43c>

## Barrier Islands



<https://usgs.maps.arcgis.com/apps/Cascade/index.html?appid=c33ecf46cf1d4ad0a6c6d95a7a87589f>

## The Role of U.S. Coral Reefs in Coastal Protection



<https://usgs.maps.arcgis.com/apps/Cascade/index.html?appid=e6d00dcfb0794292844d348a39f13096>

## Scientists Map Tectonic Structure Below the Seafloor of Puerto Rico

By Heather Dewar (USGS)

A sequence of earthquakes starting in December 2019, including a magnitude 6.4 quake on January 7, 2020 startled residents of southern Puerto Rico. Aftershocks are expected to continue for years.

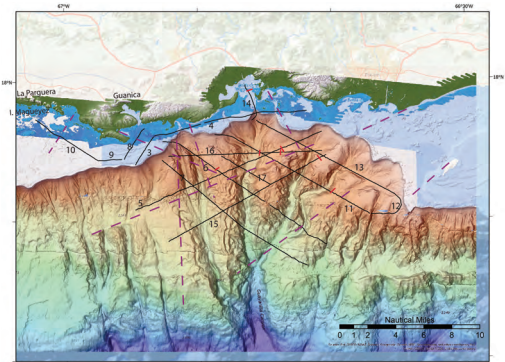
When USGS research geophysicist Uri ten Brink, learned about the Puerto Rico quakes, he quickly launched a seismic research cruise off the island's south coast. As project lead for a marine geohazards project, he and his team have mapped faults off the island's north coast. But the sea floor close to the south coast was largely unexplored.

USGS seismologists were surprised by where the earthquakes occurred. Puerto Rico lies on an active tectonic boundary part of the subduction zone between the Caribbean and North American plates. There is geologic evidence of earthquakes that probably

took place millennia ago but most seismic activity has been on the north side of the island.

The USGS is working to identify and map faults in the region to estimate the location and magnitude of potential earthquakes. With more than 3 million U.S. citizens in Puerto Rico and the USVI, the risk to lives and property from earthquakes and tsunamis is significant. USGS seismic research can help inform better building codes, safer zoning, and public education about earthquake hazards.

“This data will eventually help seismologists develop a clearer picture of tectonic activity in the area,” ten Brink said. “The USGS research findings are being used to improve building codes that will help Puerto Rico better withstand future earthquakes and to better prepare for tsunamis.”



Locations of multichannel seismic reflection profiles off the southern coast of Puerto Rico (in black), are overlain on colored and shaded multibeam bathymetry, Lidar topography (green and white) and near-shore bathymetry (darker blue), and NOAA coastal relief model (light blue and white). Image credit: Uri ten Brink, USGS. High resolution image: <https://www.usgs.gov/news/usgs-scientists-find-seafloor-faults-near-puerto-rico-quake-epicenters>

Learn more: <https://www.usgs.gov/news/usgs-scientists-find-seafloor-faults-near-puerto-rico-quake-epicenters>



## Mapping Geohazards in the Cascadia Subduction Zone

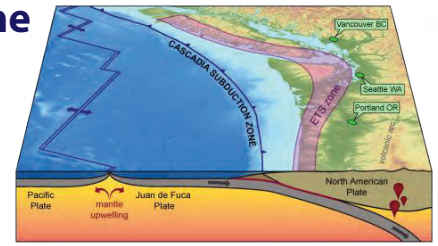
By Janet Watt, Jenna Hill, Nathan Miller, and Ann Tihansky (USGS)

Starting in 2018, USGS, BOEM, and NOAA have been working together with several academic (University of Washington, University of Hawai'i, Humboldt State University, Scripps Institution of Oceanography, Oregon State University) and private (Monterey Bay Aquarium Research Institute, Ocean Exploration Trust) scientists along the Northwest Pacific Coast to integrate geologic sampling and geophysical mapping to better assess earthquake, landslide, and tsunami hazards along the Pacific Northwest coastline.

This region, also known as Cascadia, extends over 500 million square miles from northern California north into Canada's British Columbia and includes Washington, Oregon, and parts of Idaho, Montana, and southeast Alaska. The iconic volcanoes of the inland Cascade Range create a stunning backdrop for the rugged Cascadia coastline, which includes steep, forested coastal cliffs, rocky headlands,

and detached seawalls scattered among sandy beaches littered with smooth stones and giant beach logs. The area is rich with marine wildlife and a vibrant coastal tourism industry built around maritime activities. The natural resources sustain millions of dollars in commercial fishing and aquaculture annually. The economic importance of the region and, as the travel and transportation gateway to the Pacific and Asia, is also quite extensive.

Cascadia is part of the Earth's famous "Ring of Fire," created by subduction zone processes as Earth's tectonic plates collide and move past each other. The grand landscape reflects its geologic origins. Volcanoes and earthquakes are characteristic features, with large-scale tectonic movements that create some of Earth's largest earthquakes. These tectonic processes also generate tsunamis and landslides that can substantially alter the landscape, threaten human lives, and destroy



The Cascadia Subduction Zone, located in the U.S. Pacific Northwest and southwestern British Columbia has hosted magnitude  $\geq 8.0$  megathrust earthquakes in the geologic past; a future earthquake is imminent, and the potential impacts could cripple the region. Subduction zone earthquakes represent some of the most devastating natural hazards on Earth. Image credit: USGS

infrastructure. Much of the evidence of this activity can be observed through marine geologic mapping in the offshore areas.

*See related story, page 27.*

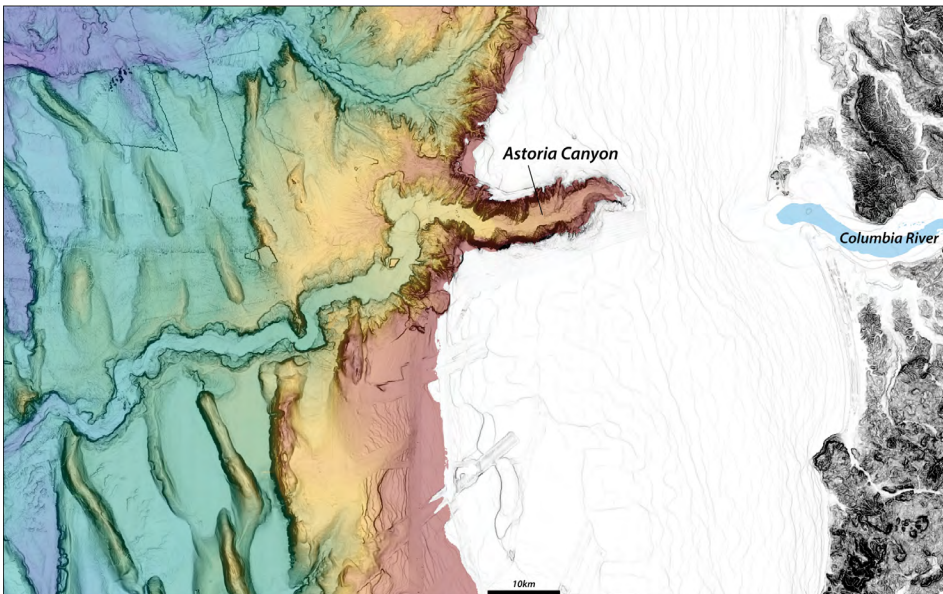
The offshore geologic research and mapping is foundational to understanding how to manage resources and improve public safety. This research is focused along major themes of understanding earthquake recurrence by looking at sedimentary records, evidence of recent seafloor deformation, features that could generate tsunamis, and deep marine seeps and fluids that may support unique ecosystems. Together, the analyses are used to assess earthquake, tsunami, and landslide hazards, evaluate the risks they pose to society, and develop products that enhance situational awareness throughout the Cascadia region.

Explore more: [https://www.usgs.gov/centers/pcmsc/science/cascadia-subduction-zone-marine-geohazards?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](https://www.usgs.gov/centers/pcmsc/science/cascadia-subduction-zone-marine-geohazards?qt-science_center_objects=0#qt-science_center_objects)

Read more about the risks in subduction zones: <https://doi.org/10.3133/fs20173024>

Learn more: <https://earthquake.usgs.gov/data/crust/cascadia.php>

Explore Pacific Coast and Puget Sound Hydrographic Survey Projects 2018: <https://www.arcgis.com/apps/MapJournal/index.html?appid=ed81e11854549b08fe9f327a26d40e3>



Multibeam bathymetry shown in the spectrum from red (shallower) to blue (deeper) for depths greater than 200 m across the head of Astoria Canyon. The land and continental shelf are shown in grayscale slope shading where darker colors represent steeper slopes. The modern Columbia River is far right. In 2019, geophysical surveys using Chirp subbottom and Sparker multichannel seismic surveys were conducted in conjunction with an instrumented tripod deployment. This work is a partnership with University of Washington scientists to understand sediment gravity flows and sources of turbidity currents associated with earthquake shaking. Data sources: USGS/NOAA OCS, Ocean Exploration Trust, NCEI. Map credit: Jenna Hill, USGS



## Coastal Change Mapping and Research in Alaska

By Ann E. Gibbs and Li H. Erikson (USGS)

Alaska has the longest coastline in the Nation. Alaska's 66,000 miles of Arctic and sub-Arctic shorelines and coastal ecosystems are geologically complex and diverse. They include glacial fjords, 52 active volcanoes, a delta that is 12 times larger than the Mississippi Delta, inlets, bays, parks, and refuges. These coasts have a long history as places of subsistence, indigenous culture, and economic opportunity for many Alaskans. They are also known for their hazardous weather and challenging ocean conditions and constitute a tremendous strategic, economic, and ecological resource to the Nation.

Accurate and contemporary mapping of Alaska's coastal and nearshore regions is critical to informed use of these vast resources, to maritime domain awareness, to safeguarding the health and security of coastal communities, and to strengthening the Blue Economy.

In June 2020, the State of Alaska, the Alaska Ocean Observing System, and the Alaska Mapping Executive Committee (AMEC), co-chaired by NOAA and the USGS, and includes many other Federal agencies, published a report to support the November 2019 Presidential Memorandum that directed Federal agencies to develop a strategy to map the Alaskan coastline. Read the strategy: <https://iocm.noaa.gov/about/documents/strategic-plans/alaska-mapping-strategy-june2020.pdf>

Additionally, a consortium of Federal agencies, the Alaska Ocean Observing System (AOOS), and the State of Alaska are participating on the AMEC's Coastal Mapping Technical Subcommittee (CMTS) to develop the plan to map coastal Alaska.

The CMTS includes representatives from Federal and State agencies with responsibilities and jurisdictional authority in Alaskan coastal areas. The

CMTS has met to review goals and objectives and to develop a strategy to guide and track Alaska coastal mapping efforts.

Here, we highlight three ongoing projects that fulfill part of our national strategy of advancing scientific understanding and providing information needed for managing and operating within Alaska's diverse and remote coastal environments. These projects are also focused on bringing Alaska coastal mapping products and data into other ongoing nationwide efforts to ensure that comparable and consistent data and tools are available across the Nation. The USGS, BOEM, and NOAA are currently collaborating with the State of Alaska, the Universities of Alaska Anchorage (UAA) and Fairbanks (UAF), the AOOS, and Axiom Data Science to map and expand our understanding of coastal change processes and hazards along Alaska's enormous remote shoreline.

### National Assessment of Shoreline Change on the Coast of Alaska

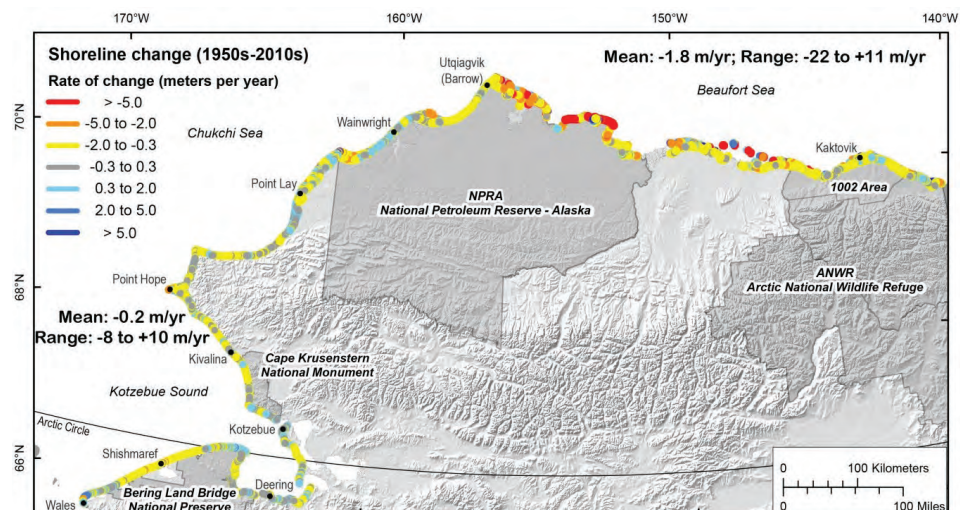
The USGS National Assessment of Shoreline Change and Alaska Coastal Processes and Hazards projects quantify rates and patterns of Alaskan shoreline change. By understanding the causal relation between shoreline change and sediment movement with

forcings such as coastal storms and atmospheric conditions, the USGS can develop better models for understanding long-term vulnerability from coastal hazards and help coastal managers and communities plan for a changing climate. Initial assessments are complete for the coast north of the Bering Strait to the United States-Canadian border. The next phase of analysis extends the study area south to the Yukon-Kuskokwim Delta. Updated shoreline change rates will be calculated as new shoreline datasets are available.

### Alaska Coastal Processes and Hazards

The current warming trend across the Arctic and Alaska is bringing dramatic reductions in sea ice extent, permafrost thaw, and changing climatic and oceanographic patterns. Coastal impacts resulting from these changes are multidimensional and include rapid coastal erosion that threatens village and facility infrastructure, ecosystem stability, and critical cultural and social networks and needs. Parallel to the negative effects are new and emerging opportunities related to increasing accessibility and economic opportunities that also need to be addressed in planning and development strategies. This project is focused on identifying hazards, to quantify risk, and to evaluate effects

*See Alaska page 30*



Color-coded shoreline change rates and key geographic locations on the north coast of Alaska. Image credit: USGS

Alaska continued from page 29

of past, present, and future coastal processes on infrastructure, biology, and people along the Alaskan coast, including the Arctic. The methods integrate field studies and numerical modeling for better characterizing of future flood hazards, bluff recession, and barrier island morphodynamics.

**Wave and Hydrodynamic Observations and Modeling in the Nearshore Beaufort Sea**

BOEM requires environmental information about the effects that present-day and future sea-ice and atmospheric conditions will have during the expected timeframe of the offshore Liberty Development Project (about 2020–50) on the northern shore of Alaska. Renewed interest in near-shore oil exploration and production in the central Beaufort Sea requires advanced understanding of the dynamic physical conditions in this coastal region. The USGS is developing a coupled wave-hydrodynamic-sediment transport model to produce a 40-year hindcast (1979–2019) and projection (2020–49) of waves, storm surge, and sediment transport potentials within Foggy Island Bay and the greater Stefansson Sound. A coordinated field effort was completed in 2019 and historical observational data were compiled to better characterize the system and support model calibration and validation.

**Learn More**

Arctic Ocean climate change: <https://www.usgs.gov/natural-hazards/coastal-marine-hazards-and-resources/science/climate-change-us-arctic-ocean-margins>

Arctic coasts climate impacts: <https://www.usgs.gov/centers/pcmsc/science/climate-impacts-arctic-coasts>

Coastal change hazards: <https://www.usgs.gov/natural-hazards/coastal-marine-hazards-and-resources/science/national-assessment-coastal-change>

Foggy Island Bay and Stefansson Sound study: <https://aocs.org/foggy/>

**Blue Economy**

Learn more about how much value our oceans bring to different economies, from local communities to global markets. These include sectors related to seafood production, tourism and recreation, ocean exploration, marine transportation, and coastal resilience.

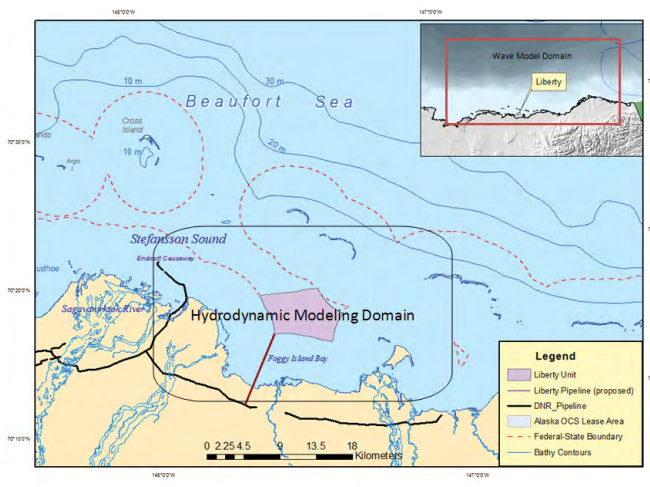
**Learn More**

NOAA fact sheet: <https://www.noaa.gov/sites/default/files/atoms/files/Leadership%20in%20Powering%20the%20American%20Blue%20Economy.pdf>

World Bank infographic: <https://www.worldbank.org/en/news/infographic/2017/06/06/blue-economy>

Department of State announcement: <https://www.state.gov/u-s-announces-1-21-billion-to-support-blue-economy-commitment-strengthens-sustainability-of-ocean-economy-enhances-health-of-planet-and-advances-global-economic-security/>

NOAA press release: <https://www.noaa.gov/media-release/marine-economy-in-2018-grew-faster-than-us-overall>



Map of proposed general location of Liberty Development Project with the study model domain in the Foggy Island Bay and Stefansson Sound area of the Beaufort Sea on the north coast of Alaska. Photo credit: AOOs

**Ways to Reduce Marine Mammal Vulnerability to Shipping**

Although focused primarily on assessing marine mammal vulnerability, the study (See related story on page 31) also lists effective conservation-oriented strategies already in place elsewhere. Such practices include avoiding key habitats, adjusting transit timing during migration periods, minimizing sound disturbance, setting speed limits, and developing methods to help ships detect and avoid animals. The study also cites the use of “Dynamic Spatial Management,” which establishes temporary protective zones, or rolling closures, that change in accordance with peak migration activity.

**Learn More**

Alaska Public Lands: <https://www.nps.gov/anch/index.htm>

Bering Land Bridge National Preserve: <https://www.nps.gov/bela/index.htm>

Cape Krusenstern National Monument: <https://www.nps.gov/cakr/index.htm>

Gates of the Arctic National Park & Preserve: <https://www.nps.gov/gaar/index.htm>



Narwhals, the only tusked whale on earth, are found only in the Arctic Ocean. The study found narwhals to be the most vulnerable of all endemic Arctic marine mammals. Photo credit: Kristin Laidre



## Sea Change, Shipping, and Marine Species

### Studying Arctic Marine Mammals in the Shipping Age

By NPS

As shipping activity increases in the Arctic region, a team of researchers studied how marine mammals, endemic to the Arctic Ocean, will fare in order to address the challenges for managing natural resources on public lands.

After centuries of ice-bound isolation, two shipping routes, the Northwest Passage and the Northern Sea Route, now sit poised to become major shipping lanes, as the Arctic rapidly warms.

Since 1979, September sea ice extent in the Arctic has retreated 14 percent per decade. Current projections are that by the year 2040, the region will experience summers free of sea ice. Planning for large-scale vessel transit through the Arctic is already well underway. Donna Hauser, the principal author of a study says, “these are endemic species that have never seen large numbers of big vessels. We’re right on the precipice of what could be an emerging risk factor.” This is only a first step in addressing issues that are likely to become increasingly important in the Arctic’s rapidly changing ecosystem.

The study, “Vulnerability of Arctic Marine Mammals to Vessel Traffic in the Increasingly Ice-free Northwest Passage and Northern Sea Route,” quantifies the effects of shipping on Arctic marine mammals and identifies those most vulnerable. The study, produced by a team of researchers at the University of Alaska Fairbanks and the University of Washington and funded by the National Aeronautics and Space Administration (NASA) and the Collaborative Alaskan Arctic Studies Program, is the first circum-polar assessment of its kind.

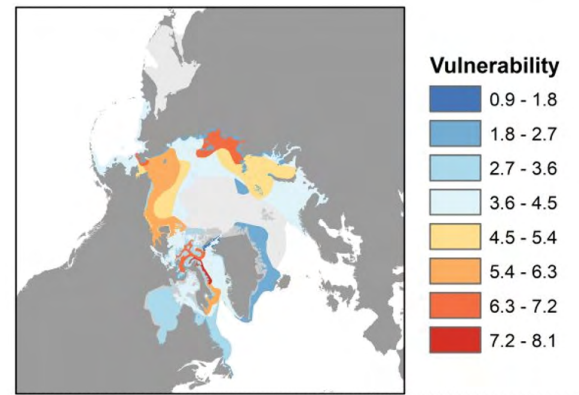
According to the study, “the potential impacts...on endemic Arctic

marine mammal species are unknown despite their critical social and ecological roles in the ecosystem...” Hauser and co-authors Kristin Laidre and Harry Stern hope that the results of this study will invite a proactive approach for developing marine mammal-safe shipping practices while Arctic waters are still relatively calm.

The team looked at 80 subpopulations of the seven marine mammals found only in the Arctic: beluga (*Delphinapterus leucas*) and bowhead (*Balaena mysticetus*) whales, narwhals (*Monodon monoceros*), ringed (*Pusa hispida*) and bearded (*Erignathus barbatus*) seals, walruses (*Odobenus rosmarus*), and polar bears (*Ursus maritimus*). Each species studied is a key component of the short Arctic food chain and serves as a critical cultural and subsistence resource to coastal indigenous communities. They are also all increasingly susceptible to climate change.

Hauser and her co-authors reviewed hundreds of studies and assigned vulnerability scores to each population based on the combination of sensitivity to vessels and the degree of exposure to sea routes. The research focused on animal activity during the month of September, when ice is at its lowest levels, and shipping is expected to peak.

The study found that 53 percent of the subpopulations spent time in either the Northwest Passage, the Northern Shipping Route, or both, during September. In general, they found whales to be more vulnerable than seals because of their high exposure levels. In the Arctic at large, narwhals were deemed most vulnerable to shipping



This map of the Arctic Ocean and surrounding land masses indicates levels of vulnerability in September for all marine mammals in the study. Note the narrow Bering Strait and Lancaster Sound above Canada have the highest levels of vulnerability. Image credit: Donna Hauser, NPS

partially attributed to their limited geographic range and heavy presence in the high Arctic in September in close proximity to shipping routes. Narwhals’ sensitivity to vessel sounds and innately skittish behavior, which causes them to avoid regions where ships are present, also increased their vulnerability rating.

Finally, the study identified two regions where ship-mammal encounters are particularly likely. The Lancaster Sound in northern Canada and Alaska’s Bering Strait essentially act as geographic bottlenecks, funneling all shipping traffic and marine mammals through narrow passages. Only 53 miles wide in its narrowest point, the Bering Strait provides critical access to Arctic bounty for migrating marine mammals. It is also, however, a key thoroughway for ships accessing the Northern Sea Route and the Northwest Passage. Ships and marine mammals passing through these zones were found to be 2–3 times more likely to come into contact than along any other part of either shipping route.

Learn more: <https://www.nps.gov/articles/studying-arctic-marine-mammals-in-the-shipping-age.htm>

Read the study: <https://www.pnas.org/content/115/29/7617>

## Potential Landslide and Tsunami Hazards in Prince William Sound

<https://www.usgs.gov/center-news/barry-arm-landslide-and-tsunami-hazard>

**USGS radar data and imagery:** <http://ow.ly/JVpl50BbS9e>



In May 2020, a large but slow-moving landslide, was detected in the Barry Arm of Harriman Fjord 28 miles northeast of Whittier, Alaska on Prince William Sound. The large steep slope known as the Barry Arm landslide, has the potential to slide into the water and generate a tsunami that could have devastating local effects on those who live, work, and recreate in the area.

Since public safety is the priority, the USGS and the Alaska Division of Geological and Geophysical Surveys (ADGGS) have been remotely monitoring movement of the large landslide (Landslide A), a smaller landslide (Landslide B), and the northwest-facing slope on the opposite side of Barry Glacier every 24 days using satellite radar images. The rough terrain and remote location limits field-based ground monitoring so remote-sensing imagery (satellite-based synthetic aperture radar) is used to accurately monitor landslide movement. In addition, the NOAA

National Weather Service National Tsunami Warning Center is working to put a tsunami warning system in place.

Analysis of recent satellite imagery has shown renewed movement of the landslide. The USGS measured 8 inches of downslope movement between October 9 and October 24 by comparing earlier interferometric synthetic aperture radar (InSAR) satellite imagery with more recent satellite data. It is the first detectable motion of the landslide since active surveillance began May 26. Previously, between 2009 and 2015, the landslide slid 600 feet downslope.

There is no indication a significant slope failure is imminent, or that one will happen anytime soon. Still, people in the area should be aware of the risk and follow advice from emergency managers to be prepared. An interagency science team of state, federal and other scientists continues to monitor the situation and will update the public.

“We strongly encourage you to take this threat seriously and avoid this part of Prince William Sound,” said ADGGS Director Steve Masterman. Stay off this slope. Rockfall has been observed in this area. Please heed U.S. Coast Guard safety information and remember your natural, early-warning signs for a tsunami may be your best and only alert. “We ask that everyone continue to avoid this part of Prince William Sound. We take this threat seriously and encourage those in the Sound to have a plan in case of tsunami.” See related story page 25

View information from the State of Alaska’s Department of Natural Resources: <http://ow.ly/2IEj50BbS9d>

Read the Press Release: <http://dnr.alaska.gov/commis/pic/releases/11-10-20%20Satellite%20imagery%20shows%20renewed%20movement%20of%20Barry%20Arm%20landslide.pdf>



Aerial view of Barry Arm Fjord and glacier on June 26, 2020, showing outlines of potential landslide areas. Photo credit: Gabe Wolken