NEWSWAVE

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

Winter 2014

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Secretary Sally Jewell tours snowy backcountry in Mt. Rainier National Park with the park's Chief of Natural Resources, Roger Andrascik and other NPS and USGS scientists to learn firsthand about climate change impacts in the Pacific Northwest. Photo credit: NPS.

Interior Launches $100 Million Hurricane Sandy Competitive Grant Program

Funding to Strengthen Coastal Wetlands, Natural Areas, Protection Against Future Storms

On October 29, the one-year anniversary of Hurricane Sandy, Secretary of the Interior Sally Jewell launched a $100-million Hurricane Sandy Coastal Resiliency Competitive Grant Program to fund science-based solutions to restore natural areas along the Atlantic Coast, helping to deliver on the

See Sandy Grants page 24

Secretary Jewell Leads Climate Change Discussion

Scientists discuss impacts on natural resources, National Parks, and Tribal communities

On February 4, Secretary Jewell sought out the latest research on climate change in the Pacific Northwest. Jewell convened a roundtable discussion with leading scientists and stakeholders from around the region at the University of Washington. She highlighted Interior's role in the President's Climate Action Plan to reduce carbon pollution, move the economy toward cleaner energy sources and prepare communities for the impacts of climate change.

"Even as the nation takes new steps to cut carbon pollution, the Presi-

See Climate Change page 4

For the first time in five years, Lake Superior has remained frozen enough to allow visitors to make the icy trek to the Apostle Islands National Lakeshore's sea caves. Record crowds have been visiting. See related story page 8. Photo credit: Ann Tihansky, USGS.

See Apostle Islands page 8

Visit us online:
www.doi.gov/pmb/ocean/index.cfm

For more information contact:
Terry Holman, Coordinator
DOI Ocean and Coastal Activities,
1849 C Street, NW, Mail Stop 3530
Washington, D.C. 20240,
Telephone: 202-208-1944,

Terry_Holman@ios.doi.gov

Are you interested in contributing to NEWSWAVE?

Please contact Ann Tihansky with any questions, comments or to receive *NEWSWAVE* via email. *Ann_Tihansky@ios.doi.gov*

Contributors:
Ann Tihansky, Editor, DOI
Nicole Bransome, DOI
Liza Johnson, DOI
Greg Boland, BOEM
Leanne Bullin, BOEM
John Romero, BOEM
Tommy Beaudreau, BOEM
Marjorie Weisskohl, BOEM
Zandy Hillis-Starr, NPS
Robert Krumenaker, NPS
Julia Mason, NPS
Ana Zangroniz, NPS
Ann Bell, USFWS
Bill O'Brian, USFWS
Margaret Engesser, USFWS
Valerie Fellows, USFWS
Katie Niemi, USFWS
Greg Thompson, USFWS
Sandy Baldwin, USGS
Betsy Boynton, USGS
Kiza Gates, USGS
Helen Gibbons, USGS
Sharon Gilbert, USGS
Robert A. Hainly, USGS
Cheryl Hapke, USGS
Harry Jenter, USGS
Jeffrey H. List, USGS,
Kristin Ludwig, USGS
Christian Quintero, USGS
Jim Reid, USGS,
Michelle Reynolds, USGS
Lisa Robbins, USGS
William C. Schwab, USGS
Curt Storlazzi, USGS
Eric Strom, USGS
John C. Warner, USGS
Jay Austin, University of Minnesota-Duluth
Lesanna Lahner, Seattle Aquarium
FEMA,
NOAA,
National Aquarium
U.S. Department of Defense
Douglas Feltman, filmmaker
Larry Martin, LGL Ecological Research Associates
Ardi Story, photographer
Kenneth Wilsey, FEMA

Keep up with Interior's Ocean, Coasts and Great Lakes News via Facebook

www.facebook.com/USInterioroceanscoastsgreatlakes

Keep up with **Ocean, Coasts and Great Lakes Activities** on our own Facebook page. Launched in October 2013, our Facebook presence continues to grow and is a great way to keep up with Interior's Ocean, Coastal and Great Lakes activities across the Department and with our interagency partners. Here are some examples of recently shared stories. Vist and 'like' us today!

Above-Secretary Jewell joined community members on March 11th to celebrate President Obama's designation of the Point Arena-Stornetta Public Lands as part of the California Coastal National Monument. Photo credit: BLM.

Above-Wisdom, a Laysan albatross who is at least 63 years old, raises her newest chick on Midway Atoll National Wildlife Refuge within the Papahānaumokuākea Marine National Monument. Photo credit: Ann Bell, USFWS.

Below-On February 15, 2014 more than 10,000 people visited the Apostle Islands National Lakeshore's sea caves. Filmmaker Douglas R. Feltman and photographer Ardi Story captured images and created a unique time-lapse video of the record-setting crowds exploring these resources. Shared with permission.

Virtual visit to the Apostle Islands Sea Caves via video:
vimeo.com/87638069

Loss of Coastal Wetlands Continues

The United States is losing wetlands in coastal watersheds at a significant rate, according to a new report released on November 21, 2013 by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration.

Notable wetland losses were recorded along the Gulf Coast (257,150 acres) and accounted for 71 percent of the total estimated loss during the study period. The Atlantic Coast lost 111,960 acres and the Pacific Coast 5,220 acres. The watersheds of the Great Lakes region experienced a net gain in wetland area of an estimated 13,610 acres.

"Wetlands are important to our nation's heritage, economy and wildlife – especially when it comes to coastal communities," said Interior Secretary Jewell. "When a study shows that an area four times the size of Miami is disappearing every year, it underscores the importance of strengthening our collective efforts to improve wetlands management, to reduce losses and to ensure coastal infrastructure and resources are protected."

Several federal agencies are collaborating to better understand how wetlands are affected by land use practices and other factors and incorporating wetlands protection into policy. These efforts have been incorporated into activities under the National Ocean Policy Implementation Plan (National Ocean Council 2013), which describes the specific actions federal agencies will take to address key challenges and promote stewardship of coastal resources.

The Edwin B Forsythe National Wildlife Refuge in New Jersey provides critical coastal habitat for migratory birds. Photo credit: USFWS.

Why Wetlands Matter

Wetlands provide a multitude of ecological, economic and social benefits. They provide habitat for fish, wildlife and a variety of plants. Wetlands are nurseries for many saltwater and freshwater fishes and shellfish of commercial and recreational importance.

Wetlands are also important landscape features because they hold and slowly release flood water and snow melt, recharge groundwater, recycle nutrients, and provide recreation and wildlife viewing opportunities for millions of people.

The Edwin B Forsythe National Wildlife Refuge in New Jersey protects more than 47,000 acres of southern New Jersey coastal habitats which is actively managed for migratory birds. The refuge's location in one of the Atlantic Flyway's most active flight paths makes it an important link in seasonal bird migration. Its value for the protection of water birds and their habitat continues to increase as people develop the New Jersey shore for our own use.

www.fws.gov/refuge/edwin_b_forsythe/

See this issue's Surfing Bison on page 28 to learn more about our Nation's significant wetlands.

For more information about U.S. Wetlands including maps and a wetland mapper tool, visit: *www.fws.gov/wetlands/*

"Coastal wetlands are also vitally important to native fish and wildlife species," said U.S. Fish and Wildlife Service Director Dan Ashe. "While they comprise less than 10 percent of the nation's land area, they support 75 percent of our migratory birds, nearly 80 percent of fish and shellfish, and almost half of our threatened and endangered species. We can't sustain native wildlife for future generations without protecting and restoring the coastal wetlands that support them."

Press release and report is available on-line: *www.fws.gov/news/ShowNews.cfm?ID=7B8CB057-90CD-5C03-6EA2F94520ED3BF1*

Climate Change continued from page 1

dent's Climate Action Plan directs that we must also prepare for and adapt to the impacts of a changing climate that are already being felt across the country," said Secretary Jewell. "Today's discussion underscores not only the importance of the scientific research that Interior scientists and our academic partners are performing, but also the need for our land managers and surrounding communities to be prepared for the serious risks that climate change poses in the Pacific Northwest."

Secretary Jewell witnessed firsthand some of these impacts during a visit to Mount Rainier National Park. National Park Service and U.S. Geological Survey (USGS) scientists and rangers demonstrated the impacts of receding glaciers and changing climate on the park's rivers, infrastructure, visitor access and recreation opportunities.

During the roundtable discussion, scientists from USGS and the University of Washington reported that in the Pacific Northwest, reduced snowpack, increased flooding in the coastal zone, and threats to forests all could have far-reaching ecological and socioeconomic consequences. *www.doi.gov/news/pressreleases/on-heels-of-president-obamas-state-of-the-union-address-secretary-jewell-leads-roundtable-with-scientists-on-climate-change-impacts-to-the-pacific-northwest.cfm*

Crowds hike across frozen Lake Superior to visit sea caves. Photo credit: NPS.

Climate Change Trends Observed in the Great Lakes Region

By Ann Tihansky (USGS) and Robert Krumenaker (NPS)

Signage at the Apostle Islands National Lakeshore's Visitor Center in Bayfield, WI, highlights key aspects of climate change that are affecting the Park's resources. Photo credit: Ann Tihansky, USGS.

The Northern Midwest, including the upper Great Lakes region, has warmed by almost 4°F (2°C) in the 20th century. Snow cover in the northern hemisphere has declined about 5% since 1975.

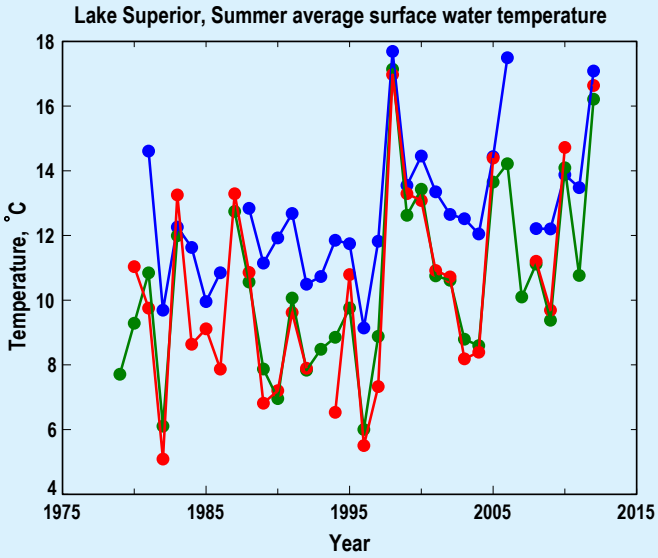
Ice is forming later and melting earlier on lakes and streams in the Great Lakes region with two-thirds of the winters between 1988 and 2003 in the Midwest with temperatures above the long-term average. Winters are getting shorter, the last spring frost is earlier and the first autumn frost is later.

Summer water temperatures are increasing for Lakes Michigan, Huron and Superior with Superior's summer surface water temperatures showing a 4.5° F (2.5°C) increased since 1980, with the timing of summer overturn now two weeks earlier than expected in 1980. Overturn occurs when the lake reaches a uniform temperature and the water completely mixes from top to bottom.

Based on some climate model predictions, summer temperatures in the Great Lakes region are projected to rise by at least 5.4°F (3°C) by mid-century, and as much as 19.8°F (11°C) by 2100. Projected temperature changes vary depending on the model and scenario, however all projections indicate warming for the region. Extreme weather events such as heat waves, droughts, tornadoes, and thunderstorms may also become more frequent.

NPS Superintendent Bob Krumenaker said, "The winter of 2013-14 has been remarkable. We have had abundant ice and more public interest in the Apostle Islands National Lakeshore sea caves than we could have ever imagined. But the reality is that this opportunity is rare and getting rarer due to climate change, which is probably as much responsible for the worldwide interest as is the beauty of the ice formations." *See related story page 8.*

www.nps.gov/apis/naturescience/upload/Understanding-the-Science-of-Climate-Change-Impacts-to-the-Great-Lakes.pdf



Annual summer average water surface temperatures taken in eastern (red), central (green), and western (blue) parts of Lake Superior show overall increasing trends. Graphic credit: Jay Austin, University of Minnesota-Duluth.

Sea-Level Rise, Storms and Tsunamis

Science to Support Threatened Pacific Island Communities

By Ann Tihansky (USGS) and Curt Storlazzi (USGS)

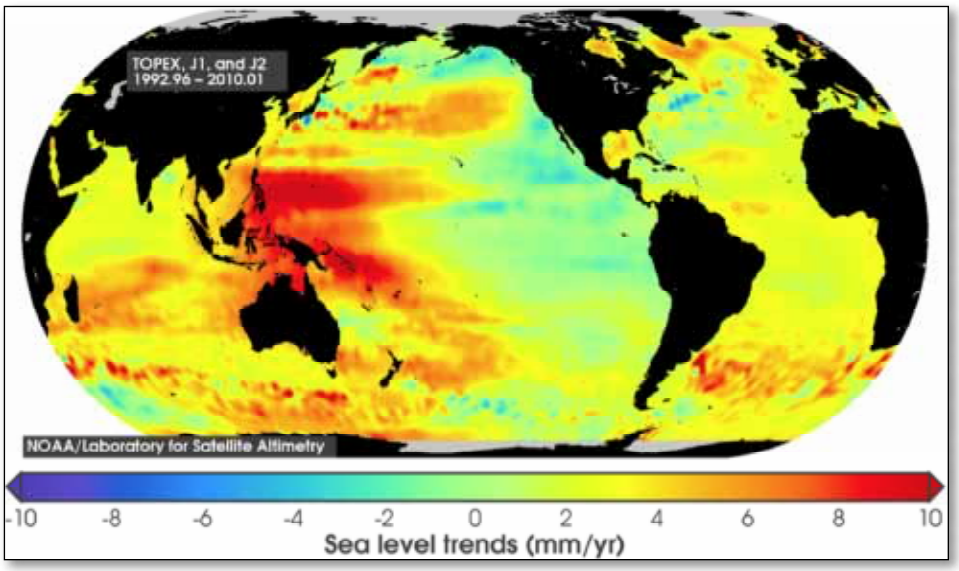
Some of the highest rates of recent sea-level rise are occurring in the western tropical Pacific Ocean where many of the world's low-lying carbonate atoll islands have supported human populations and strong island cultures over the past several thousand years. With maximum elevations of less than four meters above present sea level, the amount of land and water available for human habitation, water and food sources, and ecosystems is already limited. These cultures and resources are increasingly vulnerable to storms, tsunamis, and marine inundation from sea-level rise.

March 2014, Marshall Islands declares State of Emergency

On March 5, 2014--The President of the Republic of the Marshall Islands signed a Proclamation declaring a State of Emergency due to potential health, environmental, and social and economic hardship resulting from recent high waves which inundated parts of Majuro, the Capital, as well as other communities in the outer islands, including Arno and Mili.

In 2011, two previous inundation events on the low-lying Northwestern Hawaiian Islands in the Papahānaumokuākea Marine National Monument underscored the potential for elevated water levels to damage infrastructure and affect terrestrial ecosystems. Analyses published in April 2013, forecast that many of the low-lying carbonate atoll islands will begin to experience more frequent marine flooding that will destroy the islands' limited freshwater resources and make them increasingly uninhabitable much sooner in the future than previously thought.

At left- A large wave a batters the south shore of Laysan Island, threatening coastal species and associated environment. Photo credit: Michelle Reynolds, USGS. At right- Low-lying atoll islands are inundated by high tides and large surf, with saltwater overwash contaminating freshwater supplies at a wellfield at Roi Namur Island, Kwajalein Atoll, Dec. 2008. Photo credit: Department of Defense, Dec. 18, 2008.



Observed trends in sea level between 1993 and 2010. Note the high rates (5-10 mm/year) in the western Pacific Ocean where numerous US-managed atolls are located. Satellite observations and tide gauge records show that sea level is rising globally at a rate almost double the Intergovernmental Panel for Climate Change's 2007 report, and up to half an order of magnitude greater in the central and western Pacific Ocean Recent estimates, that include rise due to thermal expansion and glacial ice melting, suggest sea level will exceed 1.0 m, and may reach 2.0 m, above 2000 levels by the end of the 21st century. Image credit: NOAA.

USGS research is being used to support an array of Interior responsibilities to understand vulnerability of potable water supplies, agricultural assets, and many municipal and military installations as well as to forecast likely impacts that will help prioritize management strategies, research needs, and restoration efforts. Through work with DOI (USFWS refuges, monuments and islands under the Office of Insular Affairs), DOD and State and territorial agencies, USGS science will also be critical to developing climate-change adaptation plans for U.S.- and U.S.-Affiliated Pacific Islands and their associated resources.

www.usgs.gov/newsroom/article.asp?ID=3558#.UyJDCz_vbIY

King Tides:

A term used to describe annual maximum tidal levels. The 'perigean spring tides' occur when the Earth, Moon and Sun are aligned at perigee and perihelion, resulting in the largest tidal range (both highest high tides and lowest tides) seen over the course of a year.

Weather and ocean conditions can further influence the actual maximum water levels on the low-lying islands throughout the Pacific. When ocean storms and large wave events coincide with these maximum tidal heights, seawater can be driven further inland, with saltwater inundation lasting days. These events threaten many small island communities by destroying freshwater drinking supplies, agricultural crops, municipal facilities and military installations as well as critical habitat for many Pacific Island species.
See related story page 5.

Oblique aerial photo of Roi-Namur Island on Kwajalein Atoll shows the inundation of US Army-Kwajalein Atoll (USAKA) maintenance facilities due to the December 18, 2008 wave-driven inundation event. This overwash salinated the island's freshwater lens, making it unsuitable for human consumption. Photo credit: Department of Defense, December 19, 2008.

SCUBA Diving Research Internship at NPS

By Nicole Bransome (DOI) and Julia Mason (NPS)

The National Park Service (NPS) manages over 3.5 million acres of submerged land and coastlines. To manage these resources, NPS has the oldest non-military diving program in the federal government. With support from the *Our World-Underwater Scholarship Society* and the NPS Submerged Cultural Resources Center, the NPS offers a SCUBA Research Internship, a unique opportunity for undergraduates to work with scientists, archaeologists, and underwater photographers, learn more about the NPS dive program and support management of the Nation's submerged resources. Since 1980, NPS SCUBA Research Interns have contributed to inventories and evaluations of submerged heritage resources that help NPS manage them unimpaired for future generations.

During her four-month research internship, Mason visited nine National Parks, made 118 dives, learned 25 different survey methods and traveled 32,000 miles to NPS units in the U.S.Virgin Islands, Florida, Hawaii, American Samoa, California, Oregon, and the Regional NPS Office in Denver, Colo.

While Mason focused her projects on her academic interests of coral reef ecology and marine conservation, the internship gave her firshand experience collecting scientific data and contributing to preserving historically important underwater resources. She culled invasive lionfish, monitored sea turtle nests, tagged Monk seal pups, made zooplankton tows, and monitored water quality with the USGS. She used magnetometry surveys to locate shipwrecks and conducted routine maintenance dives of the USS Arizona and USS Utah at Pearl Harbor, HI. Finally, she visited NPS headquarters in Washington, D.C. to observe NPS ocean policymaking. This research scholarship provides a unique training opportunity for the next generation of conservation stewards for Interior's workforce. Learn more: *www.owuscholarship.org/internships*

NPS Submerged Resource Center: *www.nps.gov/submerged/*

NPS research intern Julia Mason gives the universal 'OK' sign during a dive at Biscayne National Park. Photo credit: Ana Zangroniz, NPS.

Read Mason's final report: *www.owuscholarship.org/sites/default/files/mason_nps_final_report_reduced.pdf*

Mason's Blog: Thoughts and images from the experience: *www.owuscholarship.org/blog/?cat=18*

Offshore wind turbines are a key component of the nation's offshore renewable energy strategy. Photo credit: Shutterstock.

First Offshore Wind Project Proposed for West Coast

On February 5, Secretary Jewell joined Governor John Kitzhaber and Bureau of Ocean Energy Management (BOEM) Director Tommy P. Beaudreau to announce an important step forward for the first offshore wind project proposed for federal waters off the West Coast.

BOEM has given the green light for Principle Power, Inc. to submit for review a formal plan to build a 30- megawatt pilot project using floating wind turbine technology offshore Coos Bay, Oregon. The announcement follows on President Obama's State of the Union address where he laid out actions to move the economy toward clean energy sources, reduce carbon pollution and create jobs.

"Today's announcement is consistent with President Obama's commitment to take actions that will create jobs and develop clean, domestic energy that powers our economy," said Jewell. "This pioneering project would demonstrate floating wind turbine technology capable of tapping the rich wind energy resources in deep waters offshore Oregon. As we look to broaden our nation's energy portfolio, the innovative technology and its future application hold great promise along the West Coast and Hawaii."

Jewell, Kitzhaber and Beaudreau convened a roundtable meeting with stakeholders in Oregon, underscoring federal and state commitments to work collaboratively with interested parties – including commercial fisheries – to evaluate the project and its potential impacts. The meeting builds upon dialogues held through the BOEM-Oregon Renewable Energy Task Force, a group of federal, state, local and tribal governmental partners that has been working since 2011 to promote strong consultation on Outer Continental Shelf renewable energy development projects. Press release: *www.doi.gov/news/pressreleases/secretary-jewell-announces-key-step-forward-for-offshore-wind-project-in-oregon.cfm*

Tethys: Public Knowledge Base for Offshore Energy Development

mhk.pnl.gov/wiki/index.php/Tethys_Home

John Romero (BOEM)

Tethys is a data and information sharing platform developed by Pacific Northwest National Laboratory to support the Department of Energy's Wind and Water Power Program. This publicly accessible knowledge base and portal was developed primarily to support understanding of the environmental effects of marine hydrokinetic and offshore wind technology. Tethys is available for researchers around the world and was designed for users to interact with and annotate data as well as engage and collaborate with others through a blog component.

Tethys hosts several resources from BOEM including:
The Environmental Studies Program Information System: *www.data.boem.gov/homepg/data_center/other/espis/espisfront.asp*
The Multi-Purpose Marine Cadastre: *www.marinecadastre.gov/default.aspx*

It also provides access to the Energy Department's National Renewable Energy Laboratory's (NREL) Wind-Wildlife Impacts Literature Database (WILD) *https://wild.nrel.gov/*

WILD is a searchable bibliographic database that houses records of documents that focus on the impacts to wildlife resulting from the development of wind power technologies. The scope of wind power topics covered in the database includes: small wind turbines, offshore wind, electrical infrastructure, marine energy, and telecommunication towers. The document types included in the collection consist of: journal articles, environmental impact studies, conference papers, books, and theses and dissertations, and has access to some full-text articles when available. The collection is also international in scope, and has a user-friendly browsing function to search by region. The intent of this collection is to serve the research needs of a variety of user types. For additional information about WILD, please contact the NREL Library at *nwtc.library@nrel.gov.*

Top left: Record crowds visit Apostle Islands National Lakeshore. Photo credit: NPS.

Ice sculptures that form when temperatures go below freezing are an added attraction to the sea caves during the winter season. Photo credits: Ann Tihansky, USGS.

Rare Ice Conditions Draw Record Crowds

By Ann Tihansky (USGS)

"For the first time in five years, we have been able to open the access route across frozen Lake Superior so that visitors can hike to the Apostle Islands National Lakeshore's sea caves," said NPS Park Superintendent Bob Krumenaker.

"In the summer you have to access the caves by boat, which is a popular destination for kayakers. However, conditions can become very dangerous when heavy wind and waves develop. So with the help from partners, including the University of Wisconsin, Wisconsin Coastal Management, Sea Grant, and the Friends of the Apostle Islands, we installed a real time wave monitoring system that includes a webcam that lets us monitor real-time conditions so boaters can make informed decisions before they launch." The webcam was installed in 2011 and takes hourly pictures that are available online but also at a Park kiosk installed at the nearby Meyers Beach launch site so paddlers can see conditions in these remote areas without having to depend on cell phone and internet access.

The webcam has become an invaluable asset for monitoring Lake Superior ice conditions as well. "Safety is our primary concern when it comes to public access to the sea caves," said Krumenaker. In the winter, depending on wind and waves across greater Lake Superior, what looks like stable ice along the lakeshore, can quickly break up, creating hazardous conditions for visiting hikers. Park staff has been able to use these pictures along with weather forecasts and ice thickness sampling to help ensure that the park only opens the ice for public access when conditions are low risk. The park characterizes ice as low, medium, or high risk, but avoids ever describing over-ice travel as 'safe.'

"Generally, this year has been cold enough that the ice has remained fairly stable and we have welcomed record-setting crowds, more than 80,000 people as of March 1, 2014," said Krumenaker.

As winters become warmer in the Great Lakes region, the opportunity to visit the unique wintery beauty of the frozen landscape, with the sea caves and the frozen waterfalls is becoming less frequent. However, when conditions permit, these features are very popular and as this season has proven, they bring great economic value to the community. "Our responsibility is to

maintain these resources and make sure the public can access them safely and in a sustainable manner. Our community partners have been extremely helpful in working with us to support the large crowds," Krumenaker said. "It's been amazing – people are discovering that winter adventure can be beautiful and inspiring and within their reach if they are properly prepared."
The caves officially closed March 17, but you can still monitor lake conditions through the webcam: *wavesatseacaves.cee.wisc.edu/wave_pics.html*

First of Urban Wildlife Refuge Partnerships Designated in Masonville Cove, Baltimore, Maryland

By Ann Tihansky (USGS) and Bill O'Brian (USFWS)

In a major effort to connect city dwellers to nature, the National Wildlife Refuge System has created an Urban Wildlife Refuge Initiative and is establishing eight pilot urban wildlife refuge partnerships, with two more urban wildlife refuge partnership designations to be announced by 2015.

With 80 percent of the U.S. population currently residing in urban communities, the U.S. Fish and Wildlife Service recognizes the need to nurture a new conservation constituency, and promote strategies to engage these audiences in meaningful, collaborative ways that build sustainable, broad- based support for the mission.

Several of the new urban refuges are located in important coastal areas that will allow the USFWS to work with key community organizations that have been active in coastal wildlife conservation to help accomplish the goal of expanding the nation's conservation constituency.

Students from the "Aquarium on Wheels' youth program at the National Aquarium install new plantings as part of the first Masonville Cove Field Day, June 2013. Photo credit: National Aquarium.

Young anglers enjoy the new dock at Masonville Cove. Photo credit: National Aquarium.

For example, one of the eight Urban Wildlife Refuge Partnerships designated by the USFWS on September 26, 2013, is Masonville Cove along the Patapsco River in Chesapeake Bay. A thriving community once flourished at Masonville Cove near Baltimore, Md, but in the mid-1900s, new railroad tracks separated the area from river access and it became forgotten, full of dangerous trash, debris and invasive plants. In 2007 the Maryland Port Authority (MPA) explored ways to mitigate impacts from constructing the Dredge Material Containment facility in Masonville. Through their "Dredged Material Management Program", MPA began working with partners to use the material dredged from shipping channels to restore wildlife, create recreation areas, and provide environmental education opportunities. Placing dredged material in Masonville has triggered a variety of projects that balance the impact on the river.

The MPA has been working with the local community to restore the natural environment at Masonville Cove; to establish an environmen-

See Urban Refuges page 23

New Urban Watershed Partnerships

These partnerships are part of "an urban refuge initiative that defines excellence in the USFWS existing urban refuges, establishes the framework for creating new urban refuge partnerships and implements a refuge presence in 10 demographically and geographically varied cities across America by 2015."

The pilot partnerships are:

- **New Haven Urban Wildlife Refuge Partnership, Connecticut**
- **2-Forest Preserves of Cook County Urban Wildlife Refuge Partnership, Illinois**
- **Albuquerque Urban Wildlife Refuge Partnership, New Mexico**
- **Houston Urban Wildlife Refuge Partnership, Texas**
- **Providence Parks Urban Wildlife Refuge Partnership, Rhode Island**
- **Masonville Cove Urban Wildlife Refuge, Maryland**
- **Lake Sammamish Urban Wildlife Refuge Partnership, Washington**
- **L.A. River Rover Urban Wildlife Refuge Partnership, California**

www.fws.gov/refuges/vision/urbanwildliferefugeinitiative.html

www.AmericasWildlife.org

Modernizing Maps for the Coastal Barrier Resources System

Supporting Coastal Resilience and Sustainability following Hurricane Sandy

By Margaret Engesser (USFWS) and Katie Niemi (USFWS)

The Secretary of the Interior announced on October 24, 2013, $162 million in federal funding for 45 projects to protect Atlantic Coast communities from future storms. This included a $5 million project to modernize the maps of the John H. Chafee Coastal Barrier Resources System (CBRS) for eight states most affected by Hurricane Sandy: Connecticut, Delaware, Maryland, Massachusetts, New Jersey, New York, Rhode Island, and Virginia. This project will help increase the resiliency and capacity of coastal habitats and infrastructure to withstand future storms and reduce the amount of damage caused by such storms. The CBRS was established in 1982 with the passage of the Coastal Barrier Resources Act (CBRA) for areas along the Atlantic, Gulf of Mexico, Great Lakes, U.S. Virgin Islands, and Puerto Rico coasts. The CBRA designated relatively undeveloped coastal barriers ineligible for most new federal expenditures that encourage development, including federal flood insurance.

The 3.1 million acres within the CBRS are delineated on a set of maps maintained by the Department of the Interior, through the U.S. Fish and Wildlife Service (USFWS). Most of the existing CBRS maps were created more than 20 years ago and are technologically outdated, difficult to use, and in some cases contain errors

Maps are prepared by the USFWS to depict the boundaries of the Coastal Barrier Resource System. Photo Credit: Katie Niemi, USFWS.

that adversely affect property owners. The funding for this project will enable the Service to modernize the maps for about 370 CBRS units within the Hurricane Sandy affected states. This project will make significant progress towards fulfilling a Congressional mandate to modernize the entire set of CBRS maps.

Comprehensively revising the CBRS maps will enhance coastal resiliency and sustainability following Hurricane Sandy by improving federal agency compliance with CBRA and by adding other vulnerable coastal areas that qualify as undeveloped coastal barriers to the CBRS. This effort will also correct mapping errors that negatively affect property owners and provide more accurate and accessible CBRS data for planning coastal infrastructure projects, habitat conservation efforts and flood risk mitigation measures.

The USFWS plans to prepare comprehensively revised draft maps for the eight states by 2017. However, USFWS recommended changes to the CBRS (including proposed removals and proposed additions) will only become effective once the revised maps are enacted into law by Congress.

For more information on CBRA, visit: *www.fws.gov/CBRA*

Learn more about the 45 restoration and research projects to protect Atlantic Coast communities from future storms:

www.doi.gov/news/pressreleases/secretary-jewell-announces-162-million-for-45-projects-to-protect-atlantic-coast-communities-from-future-storms.cfm

Aerial view of Mantoloking, NJ showing coastal barrier island community and homes damaged by Hurricane Sandy. Photo Credit: Greg Thompson, USFWS.

The Endangered Species Act Turns 40

By Valerie Fellows (USFWS) and Nicole Bransome (DOI)

For 40 years, the Endangered Species Act (ESA) has been credited as the world's most powerful wildlife conservation law. President Nixon signed the ESA into law on December 28, 1973. In passing the bipartisan ESA in 1973, our Congress made a commitment to our children and grandchildren to be good stewards of our Nation's diverse array of plants and animals. Today, the ESA protects more than 1480 U.S. species and 620 foreign species.

> *"What I love about ESA is this--it offers optimism and hope. Hope for the underdogs. It is the last barrier to extinction, and represents our collective commitment to protect our nation's wildlife for the future."*
>
> USFWS Director
> Dan Ashe

"The ESA is a gift to the nation – an expression of our desire to conserve biodiversity, then health of the habitat and our willingness to work for it. For 40 years, it's been a symbol of the U.S. commitment and leadership in conservation," said USFWS Director Dan Ashe.

The ESA is designed to protect, among other things, the habitat and ecosystems wildlife rely on. The ESA has prevented the extinction of 99 percent of the species it protects. For example, the ESA allowed the U.S. to bring back the only wild migratory flock of whooping cranes from 15 individual birds to 250 today.

"A manatee swims close to the surface of the water at Crystal River National Wildlife Refuge which was established in 1983 specifically for the protection of the endangered West Indian Manatee". Photo credit: Jim Reid, USGS.

The West Indian manatee is a marine species protected by the U.S. Fish and Wildlife Service both under the Endangered Species Act and the Marine Mammal Protection Act. The most pressing human-related threat to manatees is injury and death from collisions with watercraft. Between 2000 and 2013, 1,152 manatees were killed by watercraft with an annual average of 82. *myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/*

Another important threat is loss of reliable warm water habitats that allow manatees to survive the cold in winter. Manatee conservation and recovery involves many partners from government and industry, as well as many citizens. Numerous manatee speed zones have been established in the bays, rivers, and other waterways of Florida to reduce the number of collisions

See Endangered page 12

Protecting Endangered Marine Species

The USFWS and NOAA, through the National Marine Fisheries Service, Office of Protected Resources, are the two federal agencies responsible for implementing the Endangered Species Act.

While the National Marine Fisheries Service has authority for most marine species, the USFWS has authority for 9 species or subspecies of marine mammals that are ESA threatened, endangered, or candidate species. These include the polar bear, Pacific walrus, one distinct population segment of northern sea otter, the southern sea otter, marine otter, three species of manatees, and the dugong. USFWS also has jurisdiction over certain anadromous fishes (including Atlantic salmon, and some sturgeon species) and multiple species of water birds.

Endangered continued from page 11

with boats. In addition, seven Federal manatee sanctuaries have been established at Crystal River National Wildlife Refuge and one additional one was just proposed for Kings Bay, which has warm water springs that host the largest natural concentration of manatees in the entire state of Florida. Great strides have been made in the protection and recovery of the West Indian manatee. It is certainly no longer "on the brink of extinction." However, there is much left to be done to secure its future.

The Fall issue of *Fish and Wildlife News* highlights ESA history, milestones, and success stories from around the nation.
www.fws.gov/home/feature/2013/pdf/News_fall_web.pdf

Implementing ESA: *www.fws.gov/endangered/ESA40/index.html*

www.nmfs.noaa.gov/pr/species/

What is the difference?

Endangered species—in danger of extinction throughout all or a significant portion of its range

Threatened species –likely to become an endangered species within the foreseeable future.

Extinction --is the complete disappearance of a species from the earth. The moment of extinction is generally considered to be the death of the last individual of the species, although the capacity to breed and recover may have been lost before this point.

Extirpation --is the complete disappearance (elimination) of a species from a given region, island, or area.

Source: USFWS and USGS

"Window in the Waves"

New Documentary Tells Story of Flower Garden Banks

By Marjorie Weisskohl (BOEM)

The film first aired on March 20. Stream it on-line here: *beta.lpb.org/index.php?/site/programs2/window_in_the_waves/window_in_the_waves*

Top-Large coral head and fish within the monitoring area at the East Flower Garden Bank. Above- A BOEM scientific diver photographs coral as part of the long-term monitoring program. Photo credits: Greg Boland, BOEM.

On the North American continental shelf, just 110 miles southeast of Galveston, Texas, are the continent's northernmost coral reef communities known as the East and West Flower Garden Banks (FGBs). The television documentary "Window in the Waves" tells the story of this coral wonderland, with interviews with renowned oceanographer Dr. Sylvia Earle, and BOEM senior scientist for coral reef ecology, Gregory Boland. Both individuals have been long associated with the ocean research that has supported the management of these special resources. These unique areas are the largest topographic features on the continental shelf in the northern Gulf of Mexico. They host a thriving expanse of coral covering more than 680 (East) and 100 (West) acres respectively. They sit in 330-500 feet of water and crest in 60 feet of water. They are home to at least 20 species of reef-building coral, and provide habitat for fish, lobster, urchins, sponges and other types of marine life.

BOEM and its predecessor agencies have been studying the FGBs since 1975, and began continuous annual monitoring in 1988. It is one of BOEM's longest running studies of corals and marine life. The FGBs became a National Ma-

See Flower Gardens page 13

Flower Gardens continued from page 12

rine Sanctuary in 1992, and at that time NOAA began co-funding the monitoring with BOEM.

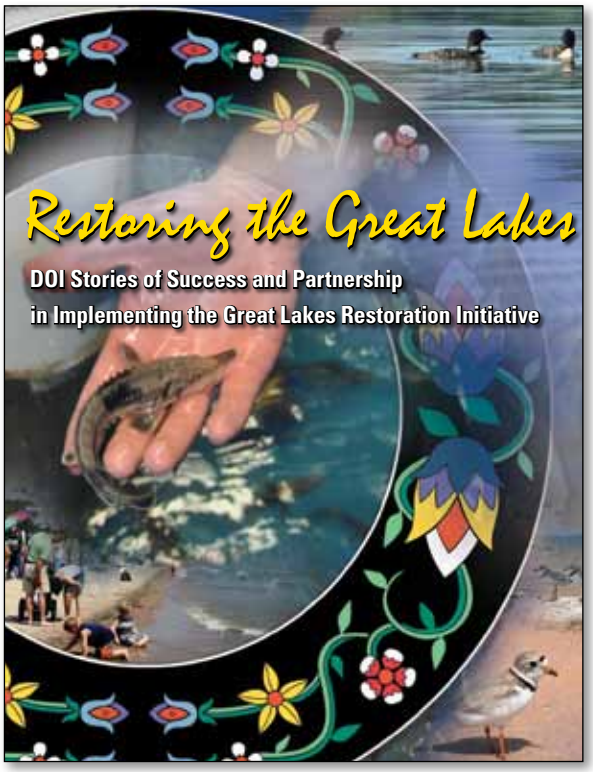
BOEM expects to continue long-term monitoring with the NOAA Marine Sanctuaries program to detect any subtle, chronic effects from natural and man-induced activities that could potentially endanger community integrity. Monitoring is also evaluating coral health and growth, possible signs of ocean acidification, coral bleaching related to warming waters and climate change, and general water quality.

BOEM's rationale for studying the FGBs has remained constant over nearly four decades: to monitor the environmental health of the FGBs, which are surrounded by offshore oil and gas operations. With 25 years of annual monitoring, the purpose of the current study is to validate and sustain BOEM's contention that its lease stipulations provide effective mitigation of impacts to the offshore environment in general and to these sensitive and unique biological features. The latest research indicates that the FGBs are stable with no significant changes since monitoring began.

BOEM plans to publish its report on the current study in mid-2014. The most recent report, including research up to 2010, is available here: *www.data.boem.gov/PI/PDFImages/ESPIS/5/5345.pdf*

The Bureau's Flower Garden Banks research collection is available here: *www.boem.gov/Flower-Garden-Banks/*

Visit BOEM's Environmental Studies Program on-line: *www.boem.gov/studies/*

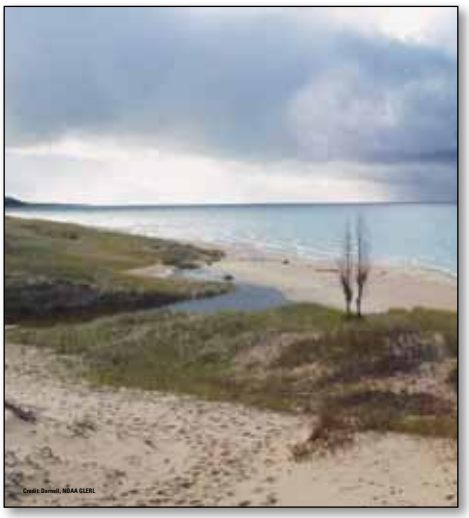


The new Department report is available on-line: *pubs.usgs.gov/unnumbered/70048731/report.pdf*

Great Lakes Success Stories

As the steward of many of the spectacular and ecologically significant places that comprise the Great Lakes basin, the Department of the Interior is committed to achieving a healthy Great Lakes ecosystem. The report, "Restoring the Great Lakes: DOI Stories of Success and Partnership in Implementing the Great Lakes Restoration Initiative," shares stories about some of the ways Interior works in concert with our partners for effective, lasting restoration of the Great Lakes region. Through work with peers in academia, we are advancing the understanding of sensitive, rare, threatened, and endangered species; improving fisheries management practices; and helping mitigate the effects of pollution, invasive species and climate change. By collaborating with the Great Lakes Tribes, Interior is restoring fisheries, wetlands, wild rice, waterfowl, and other resources important to the culture and life of tribal communities.

Learn how Interior contributes to the Great Lakes Restoration Initiative through work addressing avian botulism, understanding mercury cycling, controlling asian carp and non-native mussels populations, and restoring sturgeon habitat.



Vistas like these are a common sight across the Great Lakes region. Read about environmental challenges facing the region and how Interior is working with partners to address them. Photo cedits: DOI.

Mysterious Sea Star Deaths along Pacific Coast

Millions of sea stars on the west coast, from Alaska to Southern California, have recently been dying from unknown causes

The USGS National Wildlife Health Center is collaborating with scientists from multiple entities to learn more about this sea star mortality event, coordinate a response, conduct necropsies, and uncover the cause.

Scientists are compiling mortality reports from the public, monitoring designated sites along the Pacific coast, collecting specimens for diagnostic necropsy, and conducting diagnostic microbiology and genetic sequencing to determine if infectious or toxic agents are involved.

The event, which began in June 2013, is affecting various sea star species in wild and captive populations; the two species affected most are *Pisaster ochraceus* (purple sea star or ochre starfish) and *Pycnopodia helianthoides* (sunflower sea star).

Entire populations have been decimated in Puget Sound and the Salish Sea (Washington and Vancouver) and along the California coast. The most commonly reported clinical sign is small white lesions on the arms of the starfish that quickly progress into large extensive lesions encompassing the arm and disc, causing the animal to lose limbs and eventually disintegrate within a few days. Dense aggregations of sea stars may die in a matter of weeks.

A common sight in the intertidal zone along rocky Pacific Ocean shorelines, healthy sea stars graze on mussel populations and other invertebrates as seen here at Laguna Beach, CA. If sea stars are removed from the intertidal ecosystem through disease or some other mechanism, the mussel population has the potential to dramatically increase, which could significantly alter rocky intertidal community structure. Photo credit: Ann Tihansky, USGS.

Scientists have been monitoring these intertidal ecosystems for decades. To date, no underlying cause(s) of these mass mortalities have been identified. In previous outbreaks, bacterial and viral agents, as well as environmental toxins and contaminants were suggested as underlying causes, but they were not confirmed. The 2013 outbreak appears more severe than previous outbreaks, killing up to 95 percent of some populations and affecting a much larger geographic area along the west coast.

The sea star, *Pisaster ochraceus,* is considered a top predator in the rocky intertidal zone and has long been referred to as a keystone species as its diet includes mussels, barnacles, snails, limpets, and mollusks. In the subtidal zone, *Pycnopodia helianthoides* is a major predator of numerous species, spanning many phyla. Declines in its population will likely have far-reaching impacts.

For further information on sea star wasting syndrome, please visit: The Pacific Rocky Intertidal Monitoring Program (within UC Santa Cruz): *www.eeb.ucsc.edu/pacificrockyintertidal/data-products/sea-star-wasting/index.html*

To report or request assistance for wildlife mortality events or health issues, please visit: *www.nwhc.usgs.gov/mortality_events/reporting.jsp*

Whitish areas on this diseased *Pycnopodia helianthoides* (sunflower sea star) are lesions that result in the detachment of arms from the central disc. Photo credit: Dr. Lesanna Lahner, Seattle Aquarium.

Knauss Marine Policy Fellows Visit with Interior Leadership

By Nicole Bransome (DOI)

On November 25, 2013, Interior ocean leadership invited the 2013 class of Knauss Sea Grant fellows to visit and learn about Interior's role in ocean, coastal and Great Lakes activities.

Nicole Bransome (2013 Knauss fellow with Interior's Office of Policy Analysis) presented her fellow class with an overview of Interior's Departmental-level ocean and coastal activities and various Bureau responsibilities. Following the presentation, a panel of Interior leaders and ocean experts shared their diverse career backgrounds and engaged with fellows in an informal and candid discussion. The panel included Dan Ashe (Director of the U.S. Fish and Wildlife Service and 1982 Knauss fellow), Eileen Sobeck (former Acting Assistant Secretary of Insular Affairs) and scientific leadership from Interior's various bureaus including Dr. John Haines (USGS), Dr. Rodney Cluck (BOEM) and Dr. Bert Frost (NPS) who all shared their personal experiences and career paths. They discussed Interior manages potentially conflicting mandates, conservation ethics, and strategies for maintaining science and long-term monitoring programs, and effects of the recent government shutdown.

In 2013 Interior hosted three fellows (Policy Analysis & FWS) and will host two in 2014 (in the USFWS and BSEE). For information about the Knauss fellowship: *seagrant.noaa.gov/FundingFellowships/KnaussFellowship*

Interior leaders share their perspectives and experience with 2013 Knauss fellows. From left to right: John Haines, Program Coordinator, Coastal and Marine Geology Program, USGS; Rodney Cluck, Chief, Division of Environmental Sciences, BOEM; Eileen Sobeck, former Acting Assistant Secretary for Insular Affairs; Dan Ashe, Director, USFWS (Knauss'82); and Bert Frost, Associate Director, Natural Resource Stewardship and Science, NPS. Photo Credit: Ann Tihansky, USGS.

2013 Knauss fellows who attended Interior's meeting with Interior Ocean leadership included representatives from Interior, NOAA, US Army Corps of Engineers and the Oceanographer of the Navy. Photo credit: Ann Tihansky, USGS.

Refuge Webcams

Webcams operating across the country help you stay connected with wildlife. Thanks to important USFWS partners and 'Friends' organizations, we all have the opportunity to visit unique and often remote wildlife areas. Refuge webcams:

- Friends of Deer Flat National Wildlife Refuge, ID
- Osprey cam at Edwin B. Forsythe National Wildlife Refuge, NJ
- Ocean's Reach Osprey Cam "Ding" Darling National Wildlife Society, FL
- Project Puffin Web Cam at Seal Island National Wildlife Refuge, ME
- Farallon National Wildlife Refuge, CA

Puffins at the Maine Coastal Islands National Wildlife Refuge. Photo credit: USFWS.

- National Conservation Training Center in Shepherdstown, WV Bald Eagle Web Cam
- Friends of Blackwater National Wildlife Refuge Web Cam
- Live Murre Cam

Visit: *www.fws.gov/refuges/about/webcams.html*

Science Support for Hurricane Sandy Rebuilding Task Force

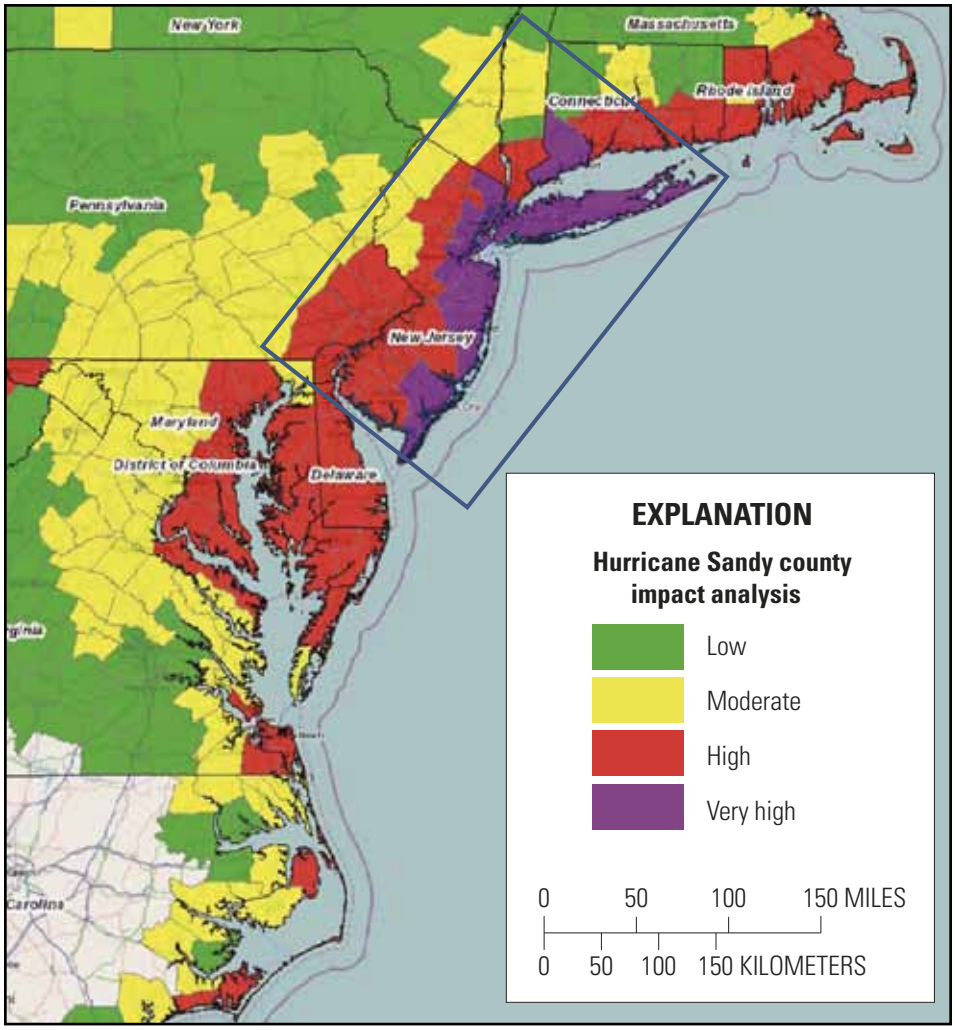
Interior's Strategic Sciences Group

By Kiza Gates (USGS)

During events such as the Deepwater Horizon oil spill and Hurricane Sandy, the Department of the Interior (DOI) has had significant responsibilities to protect people and resources and engage in emergency response, recovery, and restoration efforts. While much of DOI science during crisis is necessarily tactical– solving immediate engineering or resource management problems, evaluating specific options for response, or assessing damage - these recent events have highlighted the additional need for a strategic approach to science during crisis.

The DOI Strategic Sciences Group (SSG) is a new entity established to deliver strategic science during crisis– preparing for crises, analyzing long-term consequences and implications for policy, and developing interventions that can accelerate recovery and restoration.

The SSG provides the DOI with the capacity to rapidly assemble teams of scientists to construct interdisciplinary scenarios of environmental crises affecting DOI resources and to provide results to DOI leadership as usable knowledge. The SSG was deployed to support the Department's role on the federal Hurricane Sandy Rebuilding Task Force. The SSG assembled a team of experts – Operational Group Sandy – to develop scenarios during a week-long session. The scenarios included interventions that could improve regional resilience to future major storms and results were used to inform the selection of projects to be funded by Hurricane Sandy supplemental funds. This work is documented in a new report:



The FEMA Impact Analysis Map was a critical tool in aiding the Strategic Science Group's work with DOI leadership to define the spatial scope of Sandy scenarios. The SSG scenarios focus on the most highly impacted regions, extending from approximately Montauk Point, NY to Cape May, NY (rectangle). Map credit: FEMA.

"Operational Group Sandy Technical Progress Report"
coastal.er.usgs.gov/hazard-events/sandy/pubs/sandy-tech-progress-report.html

First formed as the DOI Strategic Sciences Working Group (SSWG) during the Deepwater Horizon oil spill, the group was a temporary interdisciplinary entity including scientists from Federal, academic, and non-governmental organizations. Its purpose was to develop science-based assessments of the long-term effects of the spill on the ecology, economy, and people of the Gulf of Mexico. Its products included a series of scenarios designed to provide information useful to decision makers, resource managers, and others involved in response and recovery.

Interior's previous Secretary Ken Salazar established the SSG by Secretarial Order in January 2012. The SSG reports to the Secretary's

See Strategic Science page 19

Members of the USCRTF and Watershed Partnership Workshop visit an eroding gulley on a private farm on St. Croix. During the field visit they discussed USCRTF partnership roles with USDA and landowners in managing agricultural areas to help address water quality issues and protect the largest island barrier reef system in the Caribbean. Photo credit: Liza Johnson, DOI.

News from the U.S. Coral Reef Task Force

Focus on Caribbean Region

By: Nicole Bransome (DOI), Liza Johnson (DOI) and Ann Tihansky (USGS)

The U.S. Coral Reef Task Force (USCRTF) held its 30th meeting in St. Croix, U.S. Virgin Islands, with a public meeting on Nov. 15, 2013. The meeting brought together stakeholders and partners to address diverse issues affecting the health of coral reefs and the communities that rely on them.

The meeting continued work in the priority areas of watersheds, education and partnerships to achieve common goals for coral reef conservation.

USCRTF Co-Chairs Eileen Sobeck, former Acting Assistant Secretary for Insular Affairs, and Mark Schaefer, Assistant Secretary of NOAA for Oceans and Atmosphere (Conservation and Management), provided remarks along with the Governors from USVI, the Commonwealth of the Northern Mariana Islands, and Guam.

The USCRTF meeting coincided with the first meeting of the newly established Caribbean Regional Planning Body (CRPB) to discuss a process for marine planning activities in the Caribbean. Sherri Fields, Deputy Regional Director Southeast Region of the National Park Service and member of the CRPB, represented DOI at this meeting where they discussed how best to support regional planning priorities. Discussions included identifying data and science gaps needed for management and how data portals and marine plans can further USCRTF coral reef conservation goals.

THE USCRTF Watershed Working Group convened a workshop for watershed coordinators, local and federal agencies, stakeholders and implementers to share successes and lessons learned across USCRTF priority and other watersheds and to identify common support needs from USCRTF members. The workshop brought together representatives from 20 watersheds and remote participants via webinar as they collaborate with local government agencies and non-government organizations to resolve watershed impacts to offshore coral resources. A site visit to an ongoing watershed restoration project gave attendees a firsthand look at how local watershed partnerships are protecting the St. Croix East End Marine Park.

The USCRTF Education and Outreach Working Group presented three sessions to school children and the public covering topics of watershed impacts, climate change and youth involvement through internships. During the public Business Meeting, the USCRTF brought together a panel to discuss sustainable tourism as one way coral reef jurisdictions can address the economic challenges of Caribbean communities. Key strategies, accomplishments, and challenges were shared with other jurisdictions to continue building sustainable tourism efforts.

The USCRTF presented three awards to Interior employees recognizing their contributions to coral reef conservation.

Karen Koltes, Office of Insular Affairs, for unwavering dedication, leadership, passion, and experience as a marine scientist and her outstanding ability to communicate science and global and territorial issues;

See USCRTF page 21

USGS Improves Storm-Response Capabilities

By Harry Jenter (USGS) and Robert A. Hainly (USGS)

Through the Disaster Relief Appropriations Act of 2013, the Department of Interior is supporting the USGS in improving coastal storm response capabilities by increasing the amount and quality of storm-surge, and storm-wave data both collected and made available in conjunction with the landfall of future hurricanes and severe coastal storms. USGS will deploy additional equipment throughout an enhanced network of monitoring sites, and will deliver collected data to forecasters, emergency managers, modelers, and other interests.

A major new addition to the USGS effort is the collection and delivery of wave data to support the improvement of circulation and wave models which are used by forecasters and planning agencies to warn of and predict coastal impacts as a result of the winds and water driven onshore by a storm. Wave forecasts are important not only for their use in direct prediction of damages to natural and man-built features impacted by the waves, but also for characterization of the interactive effects of storm waves on storm surge.

The National Hydrologic Warning Council (NHWC) featured new USGS capabilities and technical information about storm data and emergency response on the cover of their November 2013 newsletter. The NHWC is assisting emergency and environmental management officials by providing expert advice on the use of real-time, high quality hydrologic information from automated remote data systems.

USGS has tools and data for monitoring concentrations of nutrients in watersheds across the Gulf of Mexico. Image credit: USGS. *water.usgs.gov/nawqa/sparrow/mrb/gom/*

Nitrate levels in the Mississippi River Watershed

Although recent declines in nitrate in the Illinois River are promising, increasing nitrate levels at other sites throughout the basin are a continuing cause for concern. Nitrate levels in the Illinois River decreased by 21 percent between 2000 and 2010, marking the first time substantial, multi-year decreases in nitrate have been observed in the Mississippi River Basin since 1980, according to a new USGS study. Unfortunately, similar signs of progress were not widespread. "Nitrate levels continue to increase in the Missouri and Mississippi Rivers, including the Mississippi's outlet to the Gulf of Mexico," said Lori Sprague, USGS research hydrologist. News release: *www.usgs.gov/newsroom/article.asp?ID=3715#.Uyd32T_vbIa*

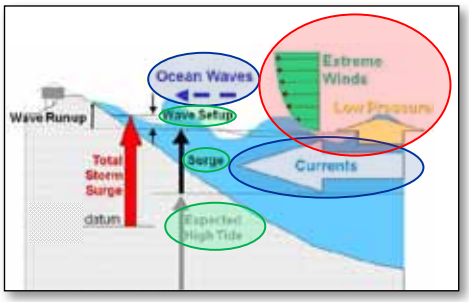
"These results show that solving the problem of the dead zone will not be easy or quick. We will need to work together with our federal and state partners to develop strategies to address nitrate concentrations in both groundwater and surface water," said Lori Caramanian, Department of the Interior Deputy Assistant Secretary for Water and Science.

USGS says nitrates in the water can contribute to a "dead zone" that forms in the northern Gulf of Mexico every summer. The zone, which is characterized by low oxygen levels in the bottom or near-bottom waters, impairs aquatic life. In 2013 the Gulf hypoxic zone encompassed 5,840 square miles, an area the size of Connecticut.

USGS Report: *pubs.usgs.gov/sir/2013/5169/*

Read more about tracking nutrient concentrations in America's estuaries: *water.usgs.gov/nawqa/sparrow/estuary/index.html*

The non-profit organization provides training, guidance, standards, and professional development to the hydrologic warning community membership across the U.S. and around the world with the goal of protecting lives, property, and the environment. *www.hydrologic-warning.org/*



Graphical representation of near-shore responses to a coastal storm. Image source: USGS.

USGS Research to Support Restoration and Recovery from Hurricane Sandy

Compiled by Helen Gibbons (USGS)

More than a year after Hurricane Sandy struck the U.S. east coast on October 29, 2012, the USGS, aided by supplemental funds from the Department of the Interior, is generating critical information to aid the recovery of coastal areas and to help communities become more resilient to future extreme storms. Three examples below highlight some of this work.

Using Scenarios to Improve Resilience

By Kristin Ludwig (USGS)

A new report from the U.S. Department of the Interior (DOI) Strategic Sciences Group (SSG) examines Hurricane Sandy's impacts on the New York/New Jersey region and suggests ways to improve resilience to future major storms. *See related story page 16.* The team of experts from government, academic institutions, and non-governmental organizations—Operational Group Sandy—who convened in March 2013, was asked to develop scenarios for the impacts of Sandy and future major storms on the region's ecology, economy, and people. Each scenario describes a cascade of consequences set in motion by Sandy's impacts. Flood damage to buildings and property, for example, led to further effects such as creation of debris, displacement of households, exposure to hazardous materials, business closures, and high cleanup costs, to name just a few. The report projects consequences approximately

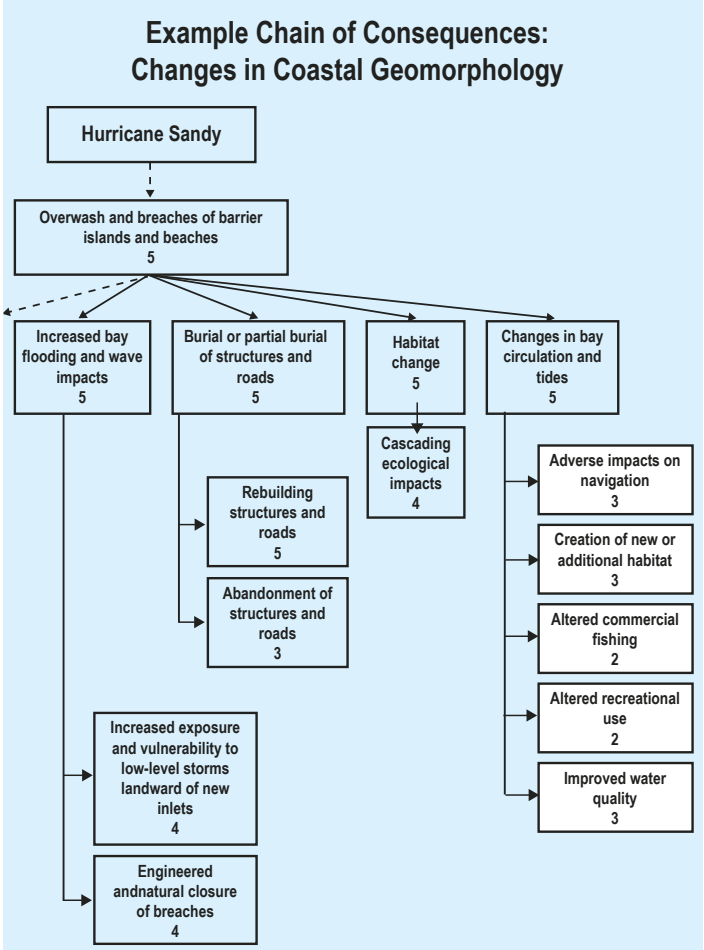
See Sandy Science page 27

View looking east toward Fire Island lighthouse. The extensive flat, sandy areas visible in the photograph are overwash sheets where the dunes were leveled during Hurricane Sandy. Photo credit: Cheryl Hapke, USGS.

Strategic Science continued from page 16

Science Advisor and is co-led by NPS Science Advisor and the USGS Associate Director for Natural Hazards. Only the Secretary can deploy the SSG.

The first two years of the SSG have shown that while events and their location, timing, or intensity may not be easily predicted, the DOI can prepare for the inevitable challenges with strategic science. The SSG is preparing to confront and describe future challenges by building relationships with other agencies, establishing an advisory committee, and developing an expert roster that will help customize crisis science teams. For more information: *www.doi.gov/strategicsciences/index.cfm*



The Strategic Sciences Group scenarios are illustrated as chains of consequences. The example above shows a segment of the cascading consequences of changes in coastal geomorphology. Image credit: DOI.

Communications Awards Recognize Ocean Chemistry Topics

Leading scientists share research, tools and findings with critical audiences

By Ann Tihansky (USGS) Sharon Gilberg (USGS) and Lisa Robbins (USGS)

Understanding Mercury Sources and Cycling

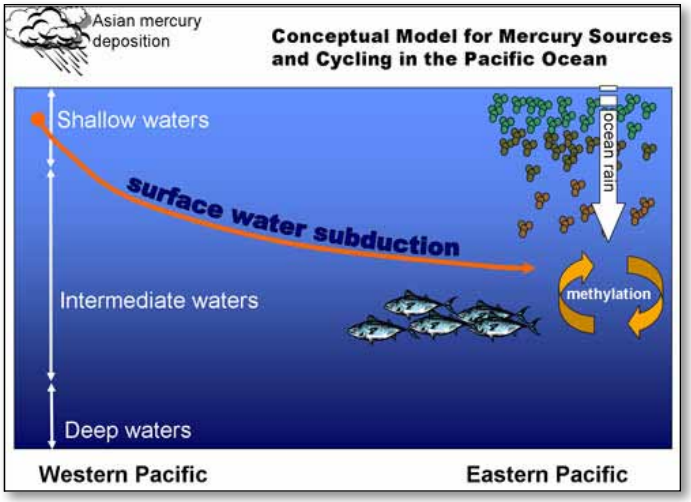
USGS awarded the Communications Shoemaker Lifetime Achievement Award to Research Geochemist David Krabbenhoft for his monumental contributions in effectively communicating the science of mercury and continues diverse work with on-going, multi-agency research on aquatic mercury (*see related story page 13*).

Krabbenhoft has educated an international audience on the deleterious effects of mercury in the environment and was instrumental in crafting a binding international treaty for the United Nations (UN) on reducing man-made mercury emissions. This treaty was signed by 140 nations.

Together with Congress, the media, state and local officials, other Federal agencies, members of the public and international agencies such as the UN, Krabbenhoft's efforts have increased awareness of the dangers of mercury, as well as improved the research in understanding the sources and fates of mercury contamination. In the past 23 years, Dave has authored or coauthored more than 100 papers on mercury in the environment, and in 2006, served as co-chair for the 8th International Conference on Mercury as a Global Pollutant. He helped establish the USGS's Mercury Research Laboratory in 1994.

A conceptual model for mercury sources and cycling in the Pacific Ocean. Learn more about mercury cycling in coastal and marine systems: *wi.water.usgs.gov/mercury/coastal-and-marine-research.html*

Image credit: USGS.



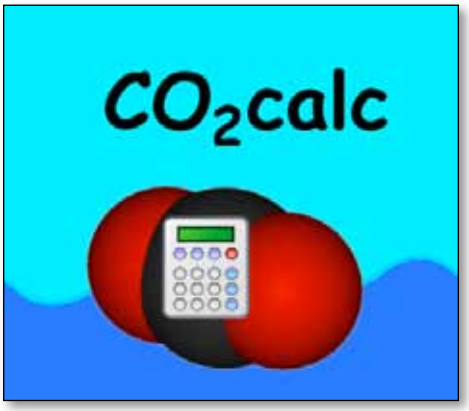
Carbon Chemistry App "CO_2 calc"

USGS also recognized CO_2Calc, a new mobile app, with a USGS Shoemaker communications award. USGS scientist Lisa Robbins and her team developed the app to be used by students, scientists or the citizen scientist to calculate CO_2 parameters in water from a mobile device, streamlining field operations by eliminating the need for bulky computing equipment that was needed in the past.

The tool is just part of the work being done by scientists at the USGS in St. Petersburg as they collaborate with the University of South Florida researching the issue of ocean acidification in the Arctic Ocean.

Ocean acidification is a significant threat to marine life due to the lowering of pH in ocean water due to the uptake of excess carbon dioxide (CO_2) from the atmosphere. As oceanic pH lowers, marine biota, particularly corals and shellfish, have a harder time making their shells. Thinner, more brittle shells could lead to increased predation and lower numbers of individuals.

Since 2010, USGS Scientist Lisa Robbins, and USF colleague Jonathan Wynn have collected over 30,000 water samples during three research cruises in the Arctic Ocean to study ocean acidification in the Canada Basin and the role that sea ice may play in ocean chemistry. Although excess CO_2 is likely the major contributor to ocean acidification in the Arctic Ocean, fresh water from melting ice lowers the buffering capacity of seawater making the two contributors a one-two punch in lowering the pH of the Arctic Ocean. The USGS ocean acidification research team has also focused on educational outreach with a twitter feed **@USGSArctic**, cruise journals, and resources for teachers located on the USGS Ocean Acidification webpages: *www.coastal.er.usgs.gov/ocean-acidification/polar.html.*



The mobile app is available in iTunes and a larger version for use on laptops and desktops is available on the USGS website. *pubs.usgs.gov/of/2010/1280/*

Largest Wetland Restoration East of the Mississippi

Great Dismal Swamp

On December 18, 2013, the Virginia Partners for Fish and Wildlife Program, Great Dismal Swamp National Wildlife Refuge, and North Carolina Dismal Swamp State Park held a formal ceremony celebrating the completion of two large water control structures that restore hydrology to 9,580 acres of Federal and State-owned peat lands that were drained over 60 years ago. The largest known forested wetlands restoration project east of the Mississippi River required seven years of planning and $1.4 million to construct.

Funded by a North American Wetlands Conservation Act grant under the USFWS' Migratory Bird Program, the project restores habitat for over 200 species of migratory birds, helps to control wildfires, and sequesters mercury and atmospheric carbon deposits that are released to the environment from wetland soils drained by more than 150 miles of man-made ditches within the 126,000-acre Great Dismal Swamp.

Many partners collaborated through outstanding contributions that included: engineering design, permitting and NEPA compliance, a long-term monitoring plan, and approvals from the NC State Construction Office, NC Division of Natural Resources, NC Division of Water Quality, NC Division of Coastal Management, and the Governor of NC.

Additional partners included Ducks Unlimited, Christopher Newport University, USGS, NC Wildlife Resources Commission, NC

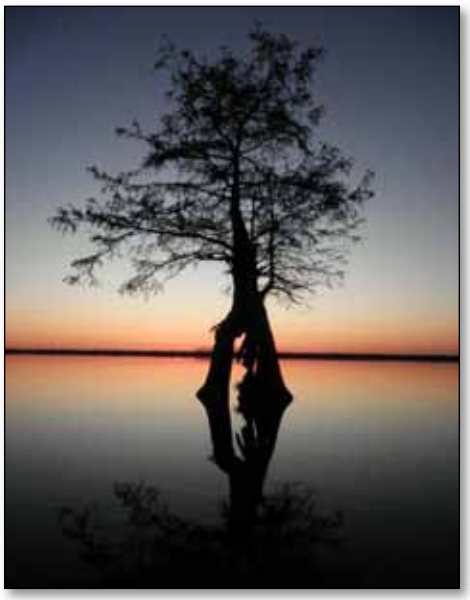
Above- A new water control structure on the South Martha Washington Ditch in the Dismal Swamp State Park. This new weir restored critical hydrologic features within the Great Dismal Swamp.

Below-Lake Drummond at sunset. Photo Credits: USFWS.

Natural Heritage Trust Fund, NC Clean Water Trust Fund, NC Forest Service, and Quality Enterprises, Inc., the contractor for construction of the weirs.

The large scale of this restoration translates into significant human and wildlife benefits for the mid-Atlantic Region. Learn more: *www.fws.gov/fieldnotes/regmap.cfm?arskey=34553*

See related story page 3.



Karen Koltes-Interior's Office of Insular Affairs, (center) is presented with an award from the USCRTF. Former Interior USCRTF co-chair Eileen Sobeck (left), and NPS Superintendent Joel Tutein (right), presented the award. Photo credit: Zandy Hillis-Star, NPS.

USCRTF continued from page 17

Edwin Muniz, USFWS Field Supervisor, Caribbean Ecological Service Office for his invaluable coordination of technical assistance, outreach, and conservation efforts with the USCRTF Guánica-Río Loco Watershed Partnership Initiative site;

Mike Field, USGS Scientist, for outstanding leadership in developing the USGS Coastal and Marine Geology Program's Pacific Coral Reef Project, which focuses efforts on understanding impacts of natural processes and human activities on coral reef health.

The USCRTF also held its annual Washington, D.C. meeting Feb. 18-21, with a public business meeting on Thursday, February 20. USCRTF member, William Aila Jr., announced that Hawai'i would host the fall 2014 USCRTF meeting and will focus on key issues in Hawai'i and the Pacific region.

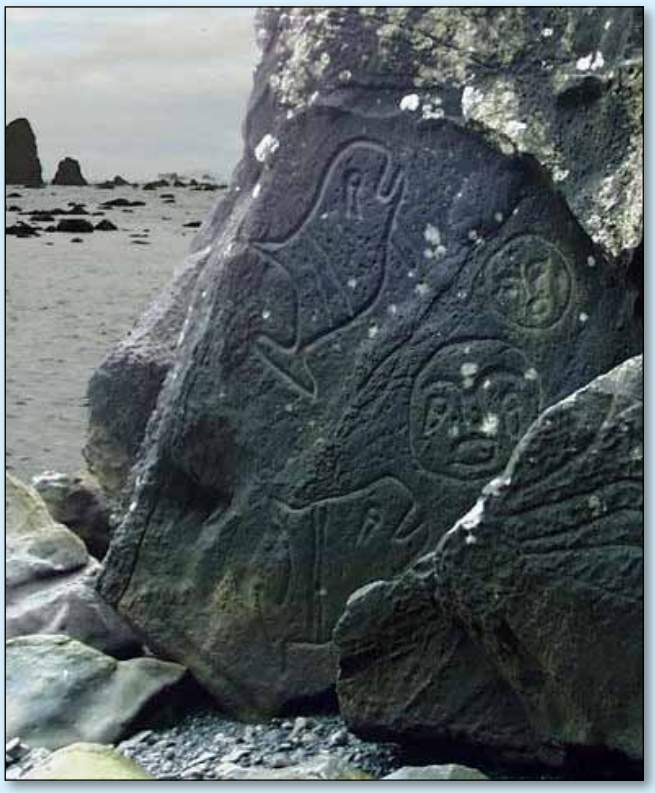
Learn more about the U.S. Coral Reef Task Force: *www.coralreef.gov/*

BOEM Celebrates 40 Years of Ocean Science

By Tommy Beaudreau, BOEM

Now in its 41st year, BOEM's Environmental Studies Program (ESP) continues to develop, fund, and conduct world-class scientific research designed to provide critical information to inform policy decisions regarding energy and mineral development on the Outer Continental Shelf (OCS). Multi-disciplinary research includes marine archaeology, biology, meteorology and air quality, physical oceanography, fates and effects, protected species studies, and social and economic studies. The broad spectrum of research and monitoring undertaken through the ESP contributes to BOEM's mission and long-term U.S. Department of the Interior's (DOI) goals focusing on environmentally sound development of our Nation's energy and mineral resources. The ESP research portfolio addresses a wide variety of environmental concerns and issues, complementing and building upon broader strategic plans that guide DOI-wide policies and support President Obama's National Ocean Policy.

Biological Oceanographer Greg Boland takes a photograph of a coral head using a camera framer at the East Flower Garden Bank in 1978. Using photos such as these, biologists can measure coral growth rates over time (*see related story page 12*) . Photo by Larry Martin, LGL Ecological Research Associates. Read BOEM's Ocean Science on-line: *www.boem.gov/BOEM-Newsroom/Library/Ocean-Science/Ocean-Science.aspx*



Petroglyphs carved into the rocks along the intertidal zone at Olympic National Park hint at the intimate connection between the early human inhabitants of the Pacific Northwest region and their rich maritime culture. The NPS takes you on a tour with marine ecologist Dr. Steve Fradkin as he discusses his work monitoring the health of the rocky intertidal zone at Olympic National Park. **Watch the 14-minute video:** *www.youtube.com/watch?v=bBo7AklxTIs*

Learn more about the ancient people and tribes of the Pacific Northwest region: *www.nps.gov/olym/historyculture/upload/ancient-peoples.pdf*

The ESP was initiated in 1973 to support the OCS oil and gas leasing program. As other energy sources have been added to our Nation's portfolio and technology advanced, the program has evolved to include studies used to support the responsible development of OCS renewable energy. This includes wind energy and the emerging fields of marine hydrokinetic energy (waves, tides, and ocean currents). The ESP also provides information for the use of non-energy mineral resources such as OCS sand for beach restoration and coastal protection. In addition to providing information for National Environmental Policy Act (NEPA) analyses, information collected through the program addresses requirements under the Endangered Species Act, the Marine Mammal Protection Act, the Clean Air Act, the Magnuson-Stevens Fishery Conservation and Management Act, the National Historic Preservation Act, and the Clean Water Act, among other laws.

A hallmark of the program is the effective use of partnerships, which combine and leverage resources with academic institutions, state and federal agencies, tribes, and the private sector. BOEM has consistently been recognized for excellence in partnering, and has earned both the DOI Partners in Conservation Award and the National Oceanographic Partnership Program Excellence Award. *www.boem.gov/Ocean-Science-2013-Apr-May-Jun/*

Urban Refuges continued from page 9

tal education facility at the site; and to secure seed funding for environmental education. One of the first stewardship projects was the opening of the Masonville Cove Environmental Education Center in 2009 followed by the creation of the nature area. Since 2007, the Masonville Cove project has removed or recycled more than 60,000 tons of debris, some of which is said to have originated from the Great Baltimore Fire of 1904. Now it hosts cleaner soil, native trees and shrubs, and wetland plants. The nature area is now open for passive recreational use. People can come to Masonville to walk trails, fish, kayak, canoe, and watch wildlife.

Through the Urban Wildlife Refuge Partnership Initiative, there is more to come. USFWS biologists will provide the Maryland Port Authority with expertise to plan for, enhance and manage the restored habitats and the wildlife that will colonize these new areas.

The Chesapeake Bay Field Office, the Patuxent Research Refuge will also collaborate with the MPA, the Masonville Environmental Education Center and other stakeholders to enhance existing environmental education programs and pursue new ways to bring wildlife education to the students and citizens of the Baltimore area.

The Masonville Cove Nature Area opened in 2012 on the restored MPA site on the Patapsco River. Living Classroom Foundation is leading curriculum development. USFWS is teaming up with the Masonville Cove partners to offer an innovative internship program this summer to Baltimore City youth. Four urban college students will take part in a program where they spend time at USFWS Patuxent Research Refuge, and on Poplar Island doing wildlife management with USFWS Field Office staff as well as doing projects with the National Aquarium and helping with Environmental Education programs with the Living Classrooms Foundation.

Above- Film Fellow Sarah Gulick works in remote areas capturing the sights and sounds of wilderness, such as those at Point Reyes National Seashore. Photo credits: NPS

The 2014 annual Masonville Cove Environmental Education Festival is scheduled for May 21-23rd. What began as the restoration of an abandoned and contaminated area near Baltimore Harbor has grown into a nationally recognized partnership connecting the city's residents to the outdoors. The special area along the Patapsco River is being restored and the neglected urban neighborhood is being reactivated by conservation education and stewardship activities.

Coastal Wilderness Film Fellows

A unique partnership between the National Park Service (NPS) and American University's School of Communications and Center for Environmetal Filmaking created a fellowship program. The select film and media graduate students are focusing on the NPS-wide initiatives to produce a series of three- to five-minute videos focused on landscapes and ideas of the 1964 Wilderness Act.

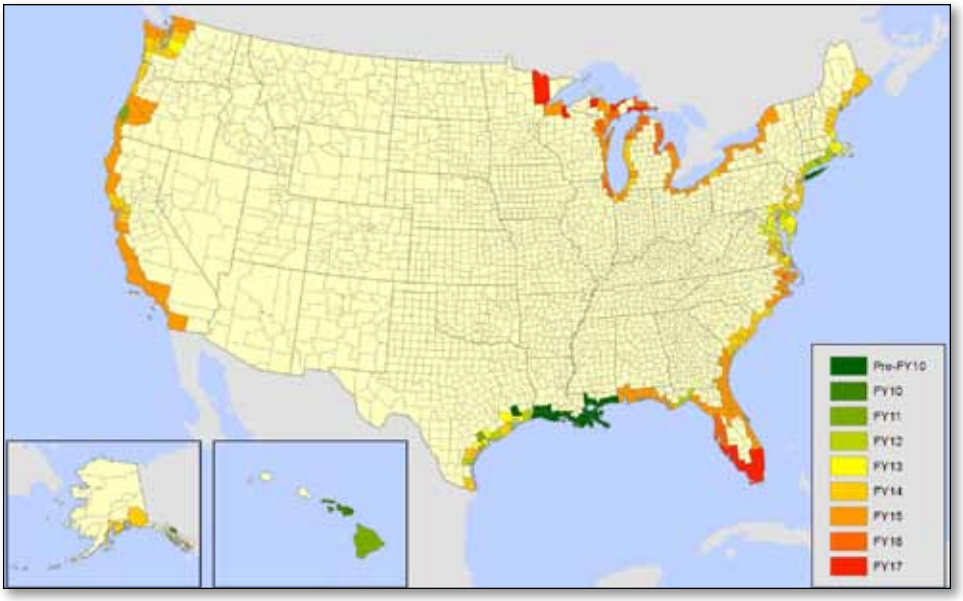
See and hear *America's Wilderness through this video series.* Even if you do not have the opportunity to physically visit, you can take a virtual visit and start connecting to some of our Nation's wild coastal landscapes today!

The stories are hosted through the NPS Wilderness YouTube Channel: *www.youtube.com/user/NPSWilderness*

Coastal videos include:

- ***Wilderness Calling-Point Reyes National Seashore***
www.youtube.com/watch?v=Kg8raNwHjXs
- ***Wilderness Visions- Point Reyes National Seashore***
www.youtube.com/watch?v=nHw5ltH-a7M
- ***Land in Motion- Point Reyes National Seashore***
www.youtube.com/watch?v=fv4l5SCg2iU
- ***The Olympic Wilderness-If Wilderness Could Speak***
www.youtube.com/watch?v=r40Tmvdsg-4

See the NPS *Wilderness* Playlist: *www.youtube.com/playlist?list=PL3C9DE69B31DA326F*



Approximate schedule of preliminary Flood Insurance Rate Maps (FIRMs) for coastal counties as of January 2014. Image credit: FEMA

FEMA's Risk MAP

Status on a critical resource for coastal managers

FEMA's Risk Analysis Division announces 100 percent initiation of coastal flood hazard analysis and mapping studies, also known as Risk MAP. By meeting FEMA's goal of initiating all coastal studies prior to Fiscal Year 2014, the Risk Analysis Division continues to maintain efficiency while providing quality data, increasing awareness, and encouraging mitigation actions.

With some effective coastal Flood Insurance Rate Maps (FIRMs) dating back to the mid-to-late 1970s along with the major changes in National Flood Insurance Program (NFIP) policies and updated methodologies/data since the previous studies, updating FIRMs for coastal communities is a high priority for FEMA.
In addition to the multitude of coastal flood hazard outreach and mitigation challenges, the large amount of studies simultaneously underway makes this effort even more challenging. In the remainder of Fiscal Year 2014, FEMA Regions are currently scheduled to release a total of 76 preliminary FIRMs for counties along U.S. coastlines.
Prior to releasing effective FIRMs (e.g. regulatory flood maps that determine NFIP rates), FEMA shares preliminary FIRMs with communities to show initial results of a flood hazard analysis and mapping study which reflect any changes in flood hazard risk and flood zones. Throughout the Risk MAP process, FEMA engages communities to increase risk awareness, provide assistance, and support mitigation actions. Following the release of the preliminary FIRMs, communities have an appeal period to dispute FEMA's findings by providing additional data or information before the FIRMs become effective. For RiskMAP information in your community, call 1-877-FEMA MAP (1-877-336-2627), email: *FEMAMapSpecialist@riskmapcds.com* or visit: *riskmapprogress.com/*
See related story page 25.

Sandy Grants continued from page 1

Administration's commitment in the Climate Action Plan to make local communities more resilient against future storms.

"By stabilizing marshes and beaches, restoring wetlands, and improving the resilience of coastal areas, we not only create opportunities for people to connect with nature and support jobs through increased outdoor recreation, but we can also provide an effective buffer that protects local communities from powerful storm surges and devastating floods when a storm like Sandy hits," said Jewell. "In cooperation with the National Fish and Wildlife Foundation, this competitive grant program will fund innovative projects by States, local communities, tribes, non-profit organizations and other partners to rebuild, restore, and research these natural areas along the Atlantic Coast."

The funding is part of $162 million Interior has allocated for restoration and resiliency projects under the Hurricane Sandy Supplemental Appropriations Act. Another $45 million will fund assessments, modeling, coastal barrier mapping, and other research to improve the ability to mitigate and reduce the impacts of powerful storms.

The investments are consistent with President Obama's Hurricane Sandy Rebuilding Task Force Strategy Report and the Administration's commitment laid out in the Climate Action Plan to build resilience by restoring natural features along shorelines to better protect communities from future storms. *www.doi.gov/news/press-releases/secretary-jewell-launches-100-million-hurricane-sandy-competitive-grant-program.cfm*

Achieving Coastal Resilience Together

*FEMA's **"One-Stop"** website, shares Federal tools and information*

Visit FEMA's Coastal Flood Risk main webpage: *www.fema.gov/coastal-flood-risks-achieving-resilience-together*

FEMA has compiled over 200 coastal tools, resources, and other outreach materials from the Coastal Partners, FEMA headquarters, FEMA Regions, and others to create the comprehensive Coastal Flood Risk Resources.

FEMA initiated the Coastal Partners Group with other Federal agencies: USGS, NOAA, U.S. Army Corps of Engineers, U.S. Fish & Wildlife and EPA, along with key members of FEMA's Risk Analysis Branch, Building Science Branch and FloodSmart.

As part of the Coastal Partners Group meetings and ongoing communication, FEMA collected coastal flood hazard messaging from each partner along with related tools and resources and developed webpages that host information from each Coastal Partner on *FEMA.gov*.

By sharing tools and resources, FEMA and other federal partners aim to maximize participation in coastal flood risk meetings, and foster ongoing communication and collaboration among all Federal agencies.

With new flood hazard analysis, mapping and other coastal studies currently underway in populated areas along the entire U.S. coastline, FEMA is actively pursuing outreach and education efforts to broaden flood risk awareness and understanding in coastal communities. *See related story page 24.*

Find FEMA's specific information about potential coastal hazards by Region:

Atlantic: *www.fema.gov/atlantic-ocean-coastal-information*

Pacific: *www.fema.gov/protecting-homes/pacific-ocean-coastal-information*

Great Lakes: *www.fema.gov/coastal-greatlakes*

Gulf of Mexico: *www.fema.gov/gulf-mexico-coastal-information*

Sign up to receive Coastal Flood Risks emails:

https://public.govdelivery.com/accounts/USDHSFEMA/subscriber/new?topic_id=USDHAFEMA_1011

FEDERAL COASTAL PARTNERS:

Provide science and support services to coastal communities to ensure resource protection, community safety and reduced risk. These webpages are updated regularly. as additional resources and tools are made available:

- *www.fema.gov/protecting-homes/coastal-partner-pages*
- *www.riskmapprogress.com*

Webpages on FEMA.gov include:

- **Coastal Flood Risk Study Process,** *www.fema.gov/protecting-homes/coastal-flood-risk-study-process*
- **Answer Coastal Frequently Asked Questions,** *www.fema.gov/protecting-homes/coastal-frequently-asked-questions*
- **Guidance on Rebuilding After a Coastal Storm,** *www.fema.gov/protecting-homes/rebuilding-after-coastal-storm*
- **Tailored information for all coastal stakeholders,** *www.fema.gov/protecting-homes/coastal-stakeholders*

The neighborhood of Breezy Point, N.Y. rebuilds after Hurricane Sandy destroyed 135 homes. Photo credit: Kenneth Wilsey, FEMA.

Regional News

The National Ocean Policy proposed Federal-State-Tribal partnerships for marine planning at regional levels. DOI leadership supports state-led regional ocean partnerships, as well as Federal-state-tribal partnerships for regional marine planning. Four geographic regions now have operational regional planning bodies: Northeast, Mid-Atlantic, Caribbean and the Pacific Islands.

Three other regions are close to joining the process – the South Atlantic, the Gulf of Mexico and the West Coast

Interior contacts and related links for activities in the nine regions:

Northeast

Bob LaBelle (BOEM)
Leanne Bullin (BOEM)
(Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut)

northeastoceancouncil.org/

OFFSHORE SAND RESOURCES

Representatives from BOEM participated in the Northeast Regional Ocean Council Meeting (NROC) held on March 14 in Portsmouth, NH. The meeting highlighted the Marine Minerals Program within BOEM and included a discussion of offshore sand resource characterization, the leasing process, and the costs of dredging in Federal waters. The New England region is looking at potential alternatives to its current use of upland sources of sand for beach nourishment and coastal restoration projects.

www.boem.gov/Non-Energy-Minerals/Marine-Minerals-Program.aspx

Mid-Atlantic

Maureen Bornholdt (BOEM)
Leanne Bullin (BOEM)
(Maryland, New York, New Jersey, Delaware, Virginia)

midatlanticocean.org

www.boem.gov/Mid-Atlantic-Regional-Planning-Body/

PUBLIC LISTENING SESSIONS

The Mid-Atlantic RPB is holding a series of public listening sessions in five states to provide an overview of the Draft Mid-Atlantic Regional Ocean Planning Framework, and to provide an opportunity for public participants to pose questions and offer comments.

The Draft Framework can be viewed on the website, and is open for public comment through April 15; written public comments are posted on the website. The Draft Framework will be revised and discussed during the next RPB meeting in late spring.

The federal co-lead, Maureen Bornholdt (Manager of BOEM's Office of Renewable Energy Programs), participated in the well-attended sessions in Annapolis, MD on Feb. 24; and in Lewes, DE on Feb. 27 along with other federal, state, and tribal RPB members. Other dates and locations:
Norfolk, VA on March 20;
West Long Branch, NJ on March 27;
Riverhead, NY on April 7.
See: *www.boem.gov/Mid-Atlantic-Regional-Planning-Body/* for additional details about the public listening sessions and the Draft Framework.

Caribbean

Sherri Fields (NPS)
(Puerto Rico, U.S. Virgin Islands)

FIRST OFFICIAL MEETING

The Caribbean Regional Ocean Partnership launched in May 2013. On Nov. 14, the Caribbean Regional Planning Body held its first meeting in St. Croix in conjunction with the U.S. Coral Reef Task Force Meeting which brought diverse regional representatives together for the first time.

Pacific Islands

Richard Hannan (USFWS)
(American Samoa, Commonwealth of Northern Mariana Islands, Guam, Hawaii)

South Atlantic

Eric Strom (USGS)
(North Carolina, South Carolina, Georgia, Florida)
www.southatlanticalliance.org

The Governors' South Atlantic Alliance (GSAA) Technical Teams met in Savannah, Georgia Feb. 25-26 with a focus on coastal resiliency as a potential theme for regional collaboration. They also contributed to an EPA Wetlands Grant proposal. New work plans and communication strategy are available on the GSAA website.

Gulf of Mexico

Linda Walker (USFWS)
(Alabama, Florida, Louisiana, Mississippi, Texas)
www.gulfofmexicoalliance.org

West Coast

Joan Barminski (BOEM)
Ellen Aronson (BOEM)
(California, Washington and Oregon)
www.westcoastoceans.org

See Regional News page 27

Sandy Science continued from page 19

five years into the future, when a hypothetical severe storm called "Hurricane 2018" is imagined to strike the New Jersey coast in mid-August 2018. The authors list potential interventions that could be taken during the next five years to ameliorate the effects of such large storms.

Fire Island Research Web Page

By Cheryl Hapke and Christian Quintero

A new resource about Fire Island, New York, is now at the fingertips of coastal managers, planners, and the public, who will find it useful for understanding and predicting future changes on the island. A new website: *coastal.er.usgs.gov/fire-island/*, details a decade's worth of research focusing on changes to the beaches and dunes of the barrier island and understanding what influences their change. Fire Island is the longest of the barrier islands that lie along the south shore of Long Island, New York. Most of the island is part of Fire Island National Seashore and is a unique and important recreational and ecosystem resource.

USGS scientists deploying instrument tripod to the seafloor. Photo credit: Sandy Baldwin, USGS.

Fire Island was severely affected by Hurricane Sandy in October 2012. This website is one of several planned products to connect people with USGS research related to Hurricane Sandy recovery, restoration, and rebuilding efforts.

Collecting Oceanographic Data Offshore of Fire Island, New York

By John C. Warner, Jeffrey H. List, William C. Schwab, and Cheryl J. Hapke

The USGS Coastal Change Processes Project is conducting a field experiment on the inner continental shelf offshore of Fire Island, New York, to to better understand the processes that cause coastal change and to develop models for forecasting coastal change.

Scientists from the USGS Woods Hole Coastal and Marine Science Center in Woods Hole, Massachusetts, along with scientists from the Woods Hole Oceanographic Institution and the University of South Carolina, deployed oceanographic equipment at nine sites offshore. The equipment consists mainly of tripods deployed on the seafloor that hold instruments to measure surface waves, ocean currents, water levels, salinity, and temperature. Several of the buoys have meteorological sensors to measure wind speed and direction, atmospheric pressure, air temperature, and solar heat fluxes. A specialized buoy at the site located farthest offshore, will telemeter wave data back to the Coastal Data Information Program (CDIP) where it will be available on-line *cdip.ucsd.edu*/. It is anticipated that local mariners, other Federal Agencies, and recreational users will utilize the data in real-time. This buoy is expected to remain on site for several years.

Regional News continued from page 26

Great Lakes
Phyllis Ellin (NPS),
Norman Grannemann (USGS)
Charlie Wooley (USFWS)
(Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin)
www.epa.gov/glnpo/glri/
www.cglg.org/

Alaska/Arctic
Jim Kendall (BOEM)
(Alaska)

BOEM Ocean Science on Exhibit

The Bureau of Ocean Energy Management is an official sponsor of the third *USA Science and Engineering Festival*, taking place April 26-27 in Washington, D.C. The festival is a national grassroots effort to advance STEM education (science, technology, engineering and mathematics) and inspire the next generation of scientists and engineers.

Stop by BOEM's booth, #3537, in the Earth Sciences Pavilion to learn how we are working to "Power Your Future" with ocean energy, and activities related to environmental science, geology and resource evaluation, and offshore renewable energy.
www.usasciencefestival.org/

The Surfing Bison

Interior's Internationally Recognized Wetlands

The RAMSAR Convention--*The Convention on Wetlands of International Importance, especially as Waterfowl Habitat*

www.fws.gov/international/pdf/factsheet-ramsar.pdf

By Nicole Bransome, DOI

The *Convention on Wetlands of International Importance*, known as the *Ramsar Convention*, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use (defined as the conservation and sustainable use of wetlands and their resources, for the benefit of humankind) of wetlands and their resources. The U.S. joined the *Ramsar Convention* in April 1987 and has successfully nominated and received the Ramsar designation for 34 sites. Here we highlight a few Ramsar-designated National Parks and Wildlife Refuges in the U.S. For more information visit: *www.fws.gov/international/pdf/factsheet-ramsar.pdf*

Palmyra Atoll National Wildlife Refuge, U.S. Minor Outlying Islands

About halfway between Hawai'i and American Samoa lies Palmyra Atoll. Palmyra consists of a circular string of about 50 islets nestled among several lagoons and encircled by 15,000 acres of shallow turquoise reefs and deep blue submerged reefs. The Refuge was established in January 2001 by the Secretary of the Interior and includes submerged lands and associated waters out to 12 nautical miles from the atoll. Photo credit: Laura M. Beauregard, USFWS
www.fws.gov/refuge/palmyra_atoll/

Ilzembek Lagoon National Wildlife Refuge, Alaska

Izembek National Wildlife Refuge was established to conserve fish, wildlife, and habitats in their natural diversity and to support migrating populations and to provide the opportunity for continued subsistence uses by local residents, consistent with the purposes previously mentioned; and to ensure necessary water quality and quantity. Photo credits: Kristine Sowl, USFWS
www.fws.gov/alaska/nwr/izembek/index.htm

Everglades National Park, Florida

The largest subtropical wilderness in the United States. Everglades National Park protects an unparalleled landscape that provides important habitat for numerous rare and endangered species like the manatee, American crocodile, and the elusive Florida panther. Photo credits: Everglades National Park.
www.nps.gov/ever/index.htm