NEWSWAVE

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

Summer 2014

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A Red-tailed Tropicbird and chick at Johnston Atoll National Wildlife Refuge. Photo credit: Craig Fischer, USFWS.

Conservation is Critical

Secretary Jewell Shares Vision and Values Realized Through Conservation

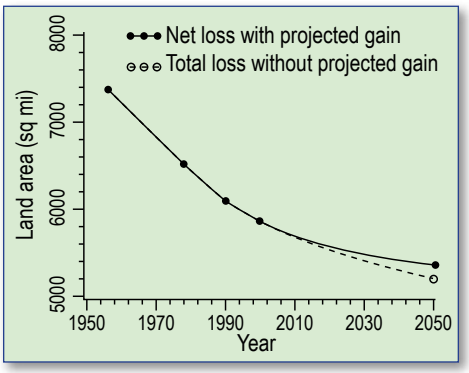
By Ann Tihansky (USGS) and Catherine Puckett (USGS)

On September 3, at the Great Swamp National Wildlife Refuge in New Jersey, Secretary Jewell marked the 50th anniversaries of two visionary pieces of conservation legislation: *The Wilderness Act* and *The Land and Water Conservation Fund Act*. Together, these Acts transformed conservation and outdoor recreation in the United States, eventually protecting more than 109 million acres of pristine landscape while advancing more than 40,000 recreation and conservation projects in communities across the nation.

Two days later, on September 5, Secretary Jewell gave the keynote address for the 24th annual Society of Environmental Journalists Conference in New Orleans. In her remarks she spoke of the importance of the President's Climate

See Conservation page 4

USGS wetlands research ecologist Tom Doyle shows Secretary Sally Jewell a map of Louisiana's land loss during her tour of the area including a cypress swamp in Barataria Preserve and the NPS Jean Lafitte National Historical Park in Louisiana. Photo credit: Catherine Puckett, USGS.



Coastal wetland loss in the Mississippi River delta is occurring at an alarming rate affecting a wide array of resource management concerns. Above is a USGS graph of projected coastal Louisiana land loss from 1956 to 2050. At left, an aerial image shows the flooded delta landscape bisected by canals associated with oil and gas development activities in the Lafourche Parish, LA. Photo credit: Jonathan Henderson, Gulf Restoration Network. Flight provided by SouthWings.

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

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For the birds and bird lovers, this NEWSWAVE issue includes an assortment of bird images and links. See a recent multi-agency report: "State of the birds 2014". Interior is working to address many issues identified in this report. *http://www.doi.gov/news/pressreleases/state-of-the-birds-report-assesses-the-health-of-the-nations-birds.cfm*

Good News for Wood Storks!
This wood stork shades a new chick at Harris Neck National Wildlife Refuge, GA. Photo credit: USFWS.
See related story p. 20.

Above– This Sandhill crane and baby, known as a colt, are migratory birds that benefit from many coastal restoration programs. Photo credit USFWS.

See related story p. 10.

The Pacific Islands are home to many migrating and seafaring bird species.

Above– All three of the albatross species currently breeding in the North Pacific face windward; from left, the Laysan, the black-footed and the endangered short-tailed mōlī. Photo credit: USFWS. *http://www.fws.gov/refuge/Midway_Atoll/wildlife_and_habitat/Birds_of_Midway.html*

Above– Masked boobies courting at French Frigate Shoals, Hawaiian Islands National Wildlife Refuge, HI. Photo credit: Lindsay Kramer, USFWS.

At left– a group of Ruddy Turnstones gather on the shore line of Howland Island National Wildlife Refuge. Photo Credit: Beth Flint, USFWS.

See related story p. 13.

Proposed Expansion of the Pacific Remote Islands Marine National Monument

On June 17, as part of the State Department's "Our Oceans" conference, the President announced his commitment to new protections for world-class marine areas. The President is committed to the principals of science-based decision making, ecosystem based management, and proactive planning to support sustainable and resilient coastal communities and marine ecosystems. This vision is laid out in our National Ocean Policy, and building on this foundation, the Administration is now looking to expand opportunities for marine conservation. *http://www.whitehouse.gov/sites/default/files/national_ocean_policy_ip_appendix.pdf*

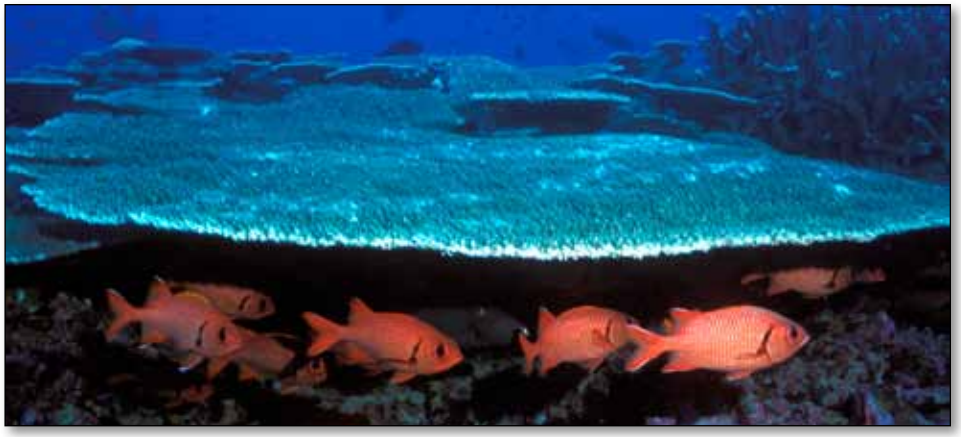


Table coral (*Myripristis Sp.*) protects a school of big eye black bar soldier fish from predators. Baker Island National Wildlife Refuge. Photo credit: Jim Maragos, USFWS

Public Town Hall

On August 11th, the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Fish and Wildlife Service hosted a Town Hall in Honolulu, HI, to discuss the expansion of the Pacific Remote Islands Marine National Monument in the south-central Pacific Ocean. Conservation is an important American tradition and legacy. It is increasingly important to preserve marine ecosystems in the face of climate change, ocean acidification, and other threats to ensure that future generations will be able to enjoy our ocean heritage. The U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration are working together to collect public input regarding the expansion of the Pacific Remote Islands Marine National Monument and protections.

The Town Hall meeting was designed to hear input on the following topics:

- Natural resources such as fish and wildlife or ecosystems that may be affected by a potential expansion of protections near the Monument.
- Objects or resources of historic, cultural, and scientific interest that are in this area.
- The specified area needed to allow the proper care and management of objects or resources to be protected.
- Activities in this area that should be taken into consideration when considering an expansion of the existing Monument boundaries.

See related special feature story page 13.

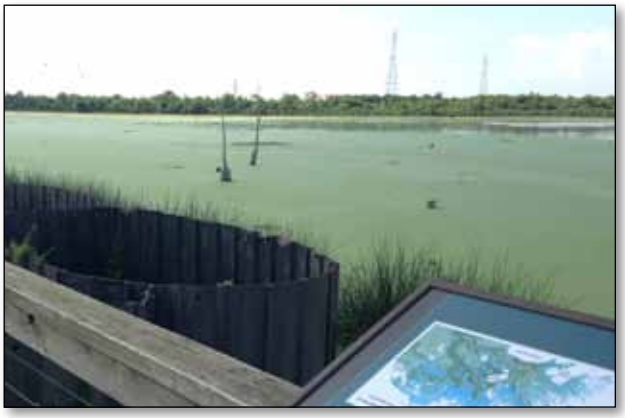
The Presidential Announcement:

Watch the video: *https://www.youtube.com/watch?v=QTLDfGQKxA0*

The President today announced a commitment to use his authority to protect some of our most precious marine landscapes just like he has for our mountains and rivers and forests, the Administration will immediately consider how we might expand protections near the Pacific Remote Islands Marine National Monument in the south-central Pacific Ocean, an area which contains some of the most pristine tropical marine environments in the world. These tropical coral reefs and associated marine ecosystems are also among the most vulnerable areas to the impacts of climate change and ocean acidification. Before making decisions about the geographic scope and details of future marine protections, we will consider the input of fishermen, scientists, conservation experts, elected officials, and other stakeholders. The President is also calling on other world leaders to join him in this effort to ensure that the world's most valuable ocean ecosystems remain productive and pristine for our children and grandchildren.

This area contains some of the most pristine tropical marine environments in the world. The existing monument was established in 2008 by President George W. Bush and encompasses the ocean out to about 50 miles from the shores of seven national wildlife refuges – all of them of small, uninhabited U.S. territories.

They include Howland, Baker and Jarvis Islands; Johnston Atoll, Wake Island and Palmyra Atoll; and Kingman Reef.



In the 1960's the open water wetland (at right) used to look like the cypress forest (shown at left). The remnant stumps of the now dead cypress trees are still standing. The conversion of freshwater cypress swamps (such as those in the Atchafalaya River basin on the left) to open saltwater (an area known as the "Wetland Triangle" southeast of New Orleans shown on the right) is one of the major impacts of sea-level rise. Restoration work in this area includes blocking saltwater input and and replanting cypress trees and other freshwater wetland plants. Photo credit: Ann Tihansky, USGS.

Conservation continued from page 1

Action Plan and the economic costs of inaction as the theme for the conference was "Risk and Resilience." Jewell also called for full and permanent funding of the Land and Water Conservation Fund, which doesn't use taxpayer money but rather is largely paid for from royalties from oil and gas operations in water owned by all Americans.

Jewell said, "We are in the forever business-- tasked with long-term thoughtful care and management of the natural resources of this country along with upholding trust and treaty obligations to our Nation's first people, American Indians and Alaska Natives."

The Secretary extended her thanks to Interior employees, "who are doing a very effective job balancing these responsibilities and ensuring safe and responsible energy development with a fair return for taxpayers." She also extended thanks to the journalists, acknowledging their important work: "We can't tell a story like you can tell a story. It's what you do." She challenged them to cover topics that could help address important priorities and issues for our nation. You can listen to her remarks here: *http://www.sej.org/sites/default/files/webform/140905-SEJ-Jewell-L.mp3*

While in the Gulf region, the Secretary visited one of the world's hotspots of vulnerability to climate change and sea-level rise – the Mississippi River Delta. She toured key sites with reporters and scientists and staff from the NPS, USGS and BOEM to see the causes and consequences of climate change impacts on coastal environments, including the loss of land and changes in coastal vegetation in Louisiana.

Secretary Jewell heard firsthand from U.S. Geological Survey scientists about the complex and diverse impacts climate change has on the Mississippi Delta and how sea level rise contributes to coastal land loss here and in other large deltas around the world. She also met with project scientists who are doing the science to help restore coastal wetlands, to address climate change and sea-level rise, and other coastal issues. The researchers also addressed steps that have been taken or are being taken to increase the resilience of coastal ecosystems and communities. The hands-on tour visited Jean Lafitte National Historic Park, the Barataria Preserve and Lake Salvador.

USGS scientist Jacoby Carter, provided technical information for reporters during a tour of Atchafalaya River Basin, one of many field trips along the Louisiana coast offered as part of the Society of Environmental Journalists conference in New Orleans. Scientists from the USGS, USFWS and NPS participated as speakers and technical experts on resource issues on several of the tours. Photo credit: Ann Tihansky, USGS.

Interior Making Strides Toward Implementing the President's Climate Action Plan

By Jonathan Steele (DOI)

On November 1, 2013, the White House issued Executive Order 13653 – Preparing the United States for the Impacts of Climate Change. The Executive Order, which directs federal agencies to ramp up climate change adaptation planning, is a major part of the President's Climate Action Plan and is perhaps the most significant national-level climate adaptation directive to date.

In the 2000s, DOI and its bureaus began to develop adaptation policies and plans for action recognizing the potential impacts of climate change to their missions. The USFWS began climate planning documents for the National Wildlife Refuge System in 2008.

An Interior Secretarial Order in 2009 directed bureaus to begin considering climate change in long-term planning activities. It also established the Department's Climate Science Centers and Landscape Conservation Cooperatives.

In 2012, DOI issued its formal climate adaptation policy, which is part of the Departmental Manual (523 DM 1). Executive Order 13653 builds on these previous planning efforts and helps provide higher-level direction and coordination – not only for DOI – but for the entire federal government.

DOI bureaus and offices have made substantial progress in climate change planning and adaptation, which is demonstrated in the 2014 DOI Climate Change Adaptation Plan. The Department and bureaus are continuing to develop more guidance and procedures for including climate considerations into many aspects of agency planning throughout the remainder of this year and beyond. Climate adaptation planning at DOI will be an iterative process as we continue to learn more about climate impacts and modify our plans in response. DOI's adaptation plan, which is expected to be released this fall, will provide more information about departmental and bureau efforts to address climate change.

The mission of the DOI Climate Science Centers is to provide natural and cultural resource managers with the tools and information they need to develop and execute management strategies that address the impacts of climate change on a broad range of natural and cultural resources. The Climate Science Centers (CSCs) provide scientific information, tools, and techniques that land, water, wildlife, and cultural resource managers and other interested parties can apply to anticipate, monitor, and adapt to climate change impacts. *http://www.doi.gov/csc/index.cfm*

Walrus cows and yearlings on ice. Recently published research shows historic decline in Pacific Walrus population. As sea ice thins and retreats farther north, walrus may face greater challenges as they rely on sea ice for resting between food foraging trips. *http://www.usgs.gov/newsroom/article.asp?ID=3993#.VBJWJfldUaA*
Photo credit: Joel Garlich-Miller, USFWS.

Executive Order 13653 initiated several key climate adaptation planning activities, including:

- First, agencies are to update their climate adaptation plans to include more details about activities to assess and address climate vulnerabilities.
- Second, establish an interagency working group to develop priority climate resilience actions for natural resources. DOI co-chairs the working group, which will likely release its report during the fall of 2014.
- Third, establish a working group focused on making federal climate science information available to the public on *data.gov*.
- Finally, establish a State, Local and Tribal Leaders Task Force to provide recommendations to agencies on actions that would improve the nation's climate resilience. This high-level Climate Preparedness and Resilience Council, which consists of Deputy Secretaries or agency equivalents, oversees the activities under the Executive Order.

Sharing MPA Expertise at Coral Triangle Regional Exchange

By Patricia Bickley (DOI)

Experts from marine protected areas within the U.S. Department of Interior (DOI) joined forty representatives of Coral Triangle Initiative member countries and partner organizations in a workshop to improve the management of marine protected areas (MPAs) within the Coral Triangle Marine Protected Areas System (CTMPAS).

Held in Mactan, Cebu, Philippines July 14-18, 2014. The workshop included working sessions, intensive discussions and a field trip to nearby Olango Island, where several long-standing, locally-managed marine reserves offered participants some lessons on management effectiveness and revenue generation. A learning exercise was conducted at the field site, using the Philippines' MPA Management Effectiveness Assessment Tool, to trigger ideas for developing management plans.

An important outcome from the workshop, participants worked together to develop 'roadmaps' that will serve as management plans for marine protected areas in the Coral Triangle region. The roadmaps include specific actions to be taken to improve marine protected area management at the country level and align practices at each site with the regional CTMPAS that was launched in May, 2014 in Indonesia. Government and non-governmental agencies will implement these plans from 2014 to 2020 in all of the Coral Triangle countries: Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste.

Interior's International Technical Assistance Program supported the Coral Triangle Center as one of the lead organizers of the workshop in collaboration with the Philippine Department of Environment and Natural Resources' Biodiversity Management Bureau, USAID Regional Development Mission for Asia, The Nature Conservancy, the National Oceanic and Atmospheric Administration, and the Coral Triangle Initiative Interim Regional Secretariat.

By improving management of protected areas in the Coral Triangle Region, the countries aim to protect threatened marine resources in key biodiversity sites and sustain fish stocks to ensure food security in coastal areas.

DOI's U.S. Virgin Islands (USVI) representatives, Zandy Hillis-Starr (Buck Island Reef National Monument) and Migdalia Roach (St. Croix East End Marine Park) served as marine protected area resource experts and provided input to roadmap development by sharing experiences and lessons learned from the USVI. They discussed the importance of assessing baseline conditions for evaluating management effectiveness with detailed information about management planning processes and specific resource responsibilities for managing the MPAs of the USVI.

Lessons from the USVI stressed the socio-economic aspect of getting the message out to stakeholders about the importance of MPAs. Public engagement activities during plan development and implementation is essential and can include monthly meetings with local environment agencies and educational outreach such as eco-camps, which are critical to engaging young people in becoming resource stewards.

Participants and resource experts pose for a photo at the closing ceremony of the 5th Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security's Marine Protected Area Regional Exchange in Cebu, Philippines on July 18, 2014. Photo Credit: Biodiversity Management Bureau DENR Philippines.

Concerns over Climate Change in the Arctic

By Randal Bowman (DOI)

The Department of the Interior manages an estimated 98.6 percent of all Federal land and over 62 percent of all land in the U.S. Arctic. The U.S. Arctic, as defined in the Arctic Research and Policy Act, includes, "… all U.S. territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas including the Arctic Ocean and the Beaufort, Bering, Chukchi Seas and the Aleutian Island chain." Much of this is very remote and presents unique management challenges.

The Arctic is warming much faster than temperate latitudes with rapidly changing conditions occurring along with increased economic and social expectations for the region. Managing and adapting to climate change is an important issue for the Department and climate change impacts in the Arctic are posing a number of significant concerns. The major potential problems include loss of sea ice cover, melting permafrost and coastal erosion. Loss of sea ice cover translates into other impacts such as use of new areas for shipping activity, reduced habitat for ice-dependent species, and increased coastal erosion which threatens villages and facilities. It may also have profound effects on weather patterns, ecosystem function, and other unpredictable responses.

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

At right–
The area shaded green is the focus for U.S. Arctic management activities. Management challenges call for a coordinated effort at landscape scales and include multiple social dimension considerations.
Image credit: Scenarios Network for Alaska and Arctic Planning, Univ. of Alaska, Fairbanks.

INTEGRATED ARCTIC MANAGEMENT

The Interior Department led an interagency team with the White House Office of Science and Technology Policy and NOAA in proposing an Integrated Arctic Management approach to address management decision-making in light of these on-going changes. This report, "Managing for the Future in a Rapidly Changing Arctic – A Report to the President," is available on-line:

This approach is now in the process of being implemented to address the following concerns:

SHIPPING

With diminished sea ice in the Arctic, there are two primary Arctic shipping routes that offer significant savings in time and fuel costs for shipping traffic between Asia and Europe. The Northwest Passage, a long-sought goal of many explorers, runs between Canada and Greenland, along the northern coast of Canada and Alaska and then through the Bering Strait and into the Pacific Ocean. At this time it is not considered readily available to shipping. However, the Northern Sea Route, running from Norway along the northern coast of Russia, is active and the number of vessels using this route is rapidly increasing.

See Arctic page 8

Arctic continued from page 7

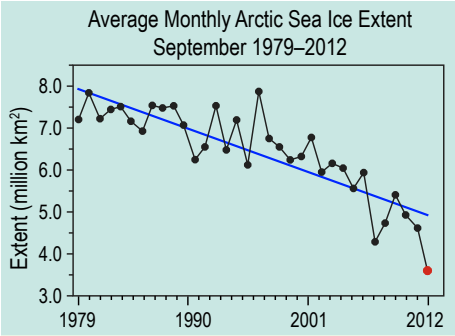
However, there is little infrastructure and navigational information to support safe shipping operations and emergency support for this increased shipping activity-- particularly in the areas near the Northwest Passage and the Bering Strait, which is used by both routes.

Most Arctic waters are poorly charted – in some cases, Capt. Cook's charts from expeditions in the 1700's are the best available. Arctic weather forecasts are far less accurate than the rest of the U.S. and good for only two days ahead. As a result, there are significant risks of groundings or collisions, possibly resulting in releases of hazardous substances or fuel. Much of the U.S. Arctic coastline is managed by BLM, FWS or NPS, placing our lands at risk from any such releases. For more information, see Committee on Marine Transportation System "U.S. Arctic Marine Transportation System Report" at *http://www.cmts.gov*

The closest permanent U.S. Coast Guard Air Station is more than 900 miles away at Kodiak, AK. There are no harbors where vessels can avoid storms in northern Alaska. The closest port for vessels (including the USCG) to refuel is 1,000 miles away from the northern coast in Dutch Harbor, Aleutian Islands. In addition, there are few airfields and no through-roads other than the Dalton Highway that connects the North Slope oil fields to Fairbanks, AK in U.S. Arctic. Travel times operating between these areas can range from days to weeks depending on weather.

COASTAL EROSION

Coastal Erosion is a relatively new problem in the Arctic. Previously,



The total extent of minimum annual sea ice coverage throughout the entire Arctic has been trending lower during the period for which satellite data have been available. Image credit: National Snow and Ice Data Center.

the land and shoreline areas were frozen permafrost and coastal waters were generally ice-covered during spring and fall storms, which protected the shorelines from erosive wave action. Both conditions are changing. Over 85% of the 213 Alaska Native villages along the coast are now affected regularly by floods or erosion. In some villages, such as in Shismaref, Mavalina and Newtok, the eroding shorelines have claimed building structures, and they are looking to relocate. Countless archeological and cultural sites are washing away without ever being examined.

ECOSYSTEM DISTURBANCE

Climate change and warming impacts species through disconnects in timing of migratory species and the peak availability of their food supplies and alterations to habitat conditions. It leads to a grim prognosis for the future of ice-based and related species, such as polar bears, walrus and seals. The shorter winters, melting permafrost, loss of iced-over rivers and other changes are disrupting subsistence hunting and fishing patterns. Meteorological changes altering snowstorms to ice storms can cause massive caribou die-offs, further disrupting the availability of subsistence resources and natural patterns.

Read the report to learn more about the Department's involvement with the Arctic Council and more detailed information on climate change impacts to fish, wildlife and plants; the impacts of such rapid changes on Federal and State land and resource management programs and practices. *http://www.interior.gov/news/upload/ArcticReport-03April2013PMsm.pdf*

Red-throated loon in Alaska Maritime National Wildlife Refuuge.. Photo credit: Dave Menke, USFWS.

Special Focus on Loons

USGS Alaska Science Center scientists are authors of four new publications regarding the biology of Yellow-billed, Pacific, and Red-throated loons in Alaska. The new publications are part of a special issue of the journal *Waterbirds* that is focused on "Loon Research and Conservation in North America." Loons forage primarily on fish and rely upon easy access to shoreline habitats for nesting and are indicators of tundra and boreal forest lake health. The publications address topics related to climate warming, contaminants, nesting biology, and demography.

http://journalwaterbirds.blogspot.com/2014/05/loon-research-and-conservation-in-north_16.html

Ocean Warming Affecting Florida Reefs

Increased Temperatures Spell Trouble for Corals

A new USGS study shows late-summer water temperatures near the Florida Keys were warmer by nearly 2 degrees Fahrenheit in the last several decades compared to a century earlier.

The new analysis compares water temperatures during two time periods a century apart at two of Florida's historic offshore lighthouses – Fowey Rocks Lighthouse, off Miami, and Carysfort Reef Lighthouse, off Key Largo, Florida. The first period included data from 1879 to 1912, while the second period spanned from 1991 to 2012.

"Our analysis shows that corals in the study areas are now regularly experiencing temperatures above 84 degrees Fahrenheit during July, August and September; average temperatures that were seldom reached 120 years ago," said Ilsa Kuffner, a USGS research marine biologist and the study's lead author.

Coral bleaching is currently underway in the Florida Keys, highlighting the real-time impact that warmer ocean temperatures are having on reefs. Corals can recover from bleaching if the waters cool down within a few weeks, but mortality usually ensues if corals remain bleached longer than a month or two.

The study, "*A century of ocean warming on Florida Keys Coral Reefs: Historic In-Situ Observations*," was recently published in the journal, "Estuaries and Coasts" and is available via open access.

Bleached coral colonies of both hard and soft corals, "bent sea rod" (top), "blade fire coral" (middle), and "brain coral" (bottom) are presently bleaching-losing their symbiotic algae – all over the coral reefs of the Florida Keys due to unusually warm ocean temperatures this summer. Months with waters warmer than 85 degrees Fahrenheit have become more frequent in the last several decades compared to a century ago, stressing and in some cases killing corals when temperatures remain high for too long. Photo credits: Kelsey Roberts, USGS.

http://www.usgs.gov/newsroom/article.asp?ID=3996&from=rss_home#.VBBHCWMXPm5

Nation's Largest Offshore Wind Energy Area Available for Commercial Development

742,000-acre zone off Massachusetts coast more than doubles federal offshore acreage available for utility-scale wind energy projects

As part of President Obama's Climate Action Plan to create American jobs, develop domestic clean energy resources and cut carbon pollution, Secretary Sally Jewell announced a proposed area new area in offshore coastal waters of Massachusetts will nearly double the federal offshore acreage available for commercial-scale wind energy projects.

"Massachusetts is leading the way toward building a clean and sustainable energy future that creates jobs, cuts carbon pollution and develops domestic clean energy resources," said Secretary Jewell. "The sale in Massachusetts will reflect the extensive and productive input from a number of important stakeholders. This includes interests such as commercial fishing, shipping, cultural, historical, environmental, and local communities to minimize conflicts and bring clarity and certainty to potential wind energy developers."

The announcement builds on Interior's work to stand up a sustainable offshore wind program through its 'Smart from the Start' wind energy initiative for the Atlantic Coast.

http://www.interior.gov/news/pressreleases/secretary-jewell-governor-patrick-to-announce-nations-largest-offshore-wind-energy-area-available-for-commercial-development.cfm

Conserving Coastal Resources

USFWS Coastal Program is delivering habitat conservation through partnerships.

By Chris Eng (USFWS)

The U.S.Fish and Wildlife Service's (USFWS) Coastal Program is the Service's primary conservation tool for voluntary, citizen and community-based fish and wildlife habitat restoration and protection activities on public and privately-owned coastal lands.

Coastal habitats are often owned by a mosaic of public and private entities, where implementing landscape conservation requires the ability to work with different types of partners in different types of habitat. The Coastal Program provides technical and financial assistance to landowners and conservation partners for the restoration and protection of coastal habitats throughout the nation and trust territories. The Coastal Program is working to build a strong legacy of wildlife and habitat conservation through strategic habitat conservation and effective partnerships.

Coastal Program staff are located in 24 priority areas, including the Atlantic, Caribbean, Gulf of Mexico, Great Lakes, and the Pacific. Since 1985, the USFWS Coastal Program has worked with other USFWS programs, and many federal, tribal, state, and local agencies, nonprofit organizations, educational institutions, corporations, and private landowners across the country to restore 334,796 acres of wetland, 148,160 acres of upland, and 2,176 miles of stream habitat, and to protect 2,072,381 acres of coastal habitat.

Two examples, one from Alaska and one from the Northern Hawaiian Islands, showcase how the Coastal Program is working with partners to carry out the Service's mission and achieve important gains in conservation of our Nation's coastal resources.

You can read about more examples of how the USFWS Coastal Program is working with diverse partnerships to protect and restore our nation's coastal environments, resources and wildlife. *http://bit.ly/1rZgs1L*

The Coastal Program's work in the Upper Cook Inlet in Alaska will protect vitally important coastal habitat, and benefit anadromous fish, such as the Coho salmon (above). Photo credit: USFWS.

Upper Cook Inlet Habitat Conservation Matanuska-Susitna Borough, Alaska

Strategically balancing the demands for development and conservation is critically important, especially since the Matanuska-Susitna Borough is one of the most populous and rapidly growing regions of Alaska. In addition, the salmon produced in this region support commercial and recreational fishing, over 1,900 local jobs and contributes millions of dollars to the Alaskan economy.

The Coastal Program is working to conserve over 1,350 acres of important wetland and upland habitat, and nearly 10 miles of riparian and stream habitat, in the Upper Cook Inlet, Alaska by partnering with Eklutna Inc. - the largest private landowner in Alaska- and other partners including: Alaska Department of Fish and Game, Great Land Trust, Mat-Su Basin Salmon Habitat Partnership, Mat-Su Borough, National Oceanic and Atmospheric Administration, Native Village of Eklutna, Pacific Coast Joint Venture, U.S. Army Corps of Engineers, and several private landowners.

USFWS provided: technical assistance for prioritizing lands for protection (with special emphasis on native-owned lands); training and assistance to landowners for effective long-term management and restoration practices; financial assistance for land conveyance expenses and was instrumental in gaining landowner support through outreach and education efforts. These efforts protect vitally important coastal habitat, and benefit many anadromous fish and migratory birds like Sandhill cranes. These partnerships were recognized with the Coastal America Partnership Award in 2013.

See Coastal Program Report page 11

Coastal Program continued from page 10

Kure Atoll Restoration and Marine Debris Removal, Northwestern Hawaiian Islands

Marine debris is a growing global pollution problem, affecting 86% of all sea turtle species, 44% of all sea bird species, and 43% of marine mammal species. Both terrestrial and aquatic wildlife are accidentally ingesting or becoming entangled in the refuse, which leads to their death. Working with the Hawaii Department of Land and Natural Resources, the Coastal Program removed marine debris from over 280 acres of coral reefs and beach on Kure Atoll in the Northwestern Hawaiian Islands.

This project restored seabird nesting habitat preparing it for the future translocation of federally endangered Laysan ducks to the atoll habitat. This project has also benefited the federally endangered Hawaiian Monk Seal and sea turtles by removing the threat of marine debris and creating a healthier and safer habitat. Only 20% of marine debris is from commercial fishing, with the remaining 80% from land-based sources. Please recycle and properly dispose of your trash to reduce these impacts and to protect important habitat.

Marine debris is a growing global pollution problem, affecting 86% of all sea turtle species, 44% of all sea bird species, and 43% of marine mammal species. Both terrestrial and aquatic wildlife are accidentally ingesting or becoming entangled in the refuse, which is leading to their deaths. Photo credit: USFWS.

Returns to Investments in Natural Capital

By Eva Vrana (DOI) and Christian Crowley (DOI)

The U.S. Department of the Interior (DOI) is the steward for the Nation's natural resources, managing the public's valuable stock of natural capital. Natural resources can be built up, maintained and used for producing value just as other forms of capital, such as physical or intellectual. These resources provide a flow of goods and services that support the economy, from providing food and water to protecting cities from storms. Maintaining the flow of a broad array of natural resource services requires maintaining the health of the ecosystems in which these resources are embedded.

During the 2014 Capitol Hill Ocean Week in June 2014, Secretary Jewell stated that Americans "ignore the interconnected nature of our land and our ocean…at our own peril."

Interior oversees 35,000 miles of coastline, 85 marine and coastal national parks as well as 182 marine and coastal National Wildlife Refuges. Interior's

Investing in habitat and healthy ecosystems pays dividends for fisheries such as this Chinook salmon catch at Yukon Delta National Wildlife Refuge, AK. Photo credit: USFWS

management activities impact coastal communities, where local economies are often directly dependent on ecosystems supporting food production and tourism. Interior makes resource management decisions following an ecosystem services-based approach. This approach requires considering the impact of decisions on ecosystems and human communities, based on a full accounting of benefits and costs related to potential outcomes. Outcomes include resource productivity, pollution, recreation opportunities, and the risks of natural disasters. Through its resource management activities, Interior has an impact on the Nation's economic viability across a vast array of natural resource goods and services.

Investing in natural capital has both economic and ecological benefits. As found in the 2014 report Restoration Returns: Contribution of Partners for Fish and Wildlife Coastal Restoration Projects to Local Communities, healthy coastlines serve to ensure sustainable food resources by protecting against soil erosion, controlling of pests and benefiting pollinators. Wetlands

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Plan To Enhance Hunting, Fishing

Refuge Update: http://www.fws.gov/refuges/refugeupdate/pdfs/refUp_MayJune_2014.pdf

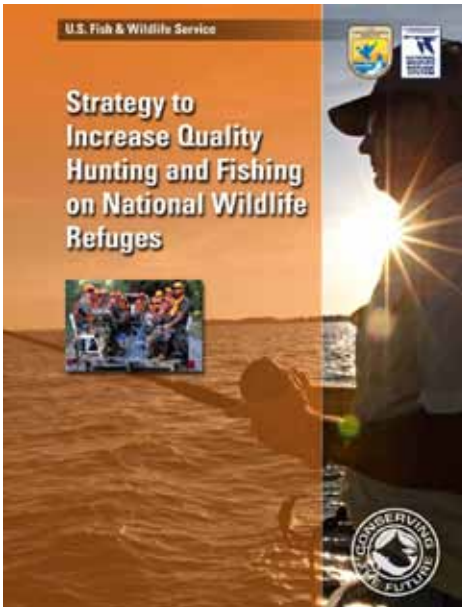
Hunting and fishing have a rich tradition in the United States – one that will become richer still as the Conserving the Future Hunting and Fishing strategic plan is implemented.

The plan was finalized in March 2014 in response to the Conserving the Future Recommendation 17, which called on the U.S. Fish and Wildlife Service and state and fish wildlife agencies to work cooperatively to increase quality hunting and fishing opportunities on national wildlife refuges.

The 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation found that more than 90 million Americans 16 or older – 38 percent of the U.S. population – participated in outdoor recreation. Hunters and anglers spent about $90 billion in 2011 in pursuit of their sports.

"The best relationships come from investment of time and energy with our partners," reads the plan. Among the plan's dozen action items are:

- **Creation of outdoor skills centers across the Refuge System to recruit new outdoor enthusiasts.**
- **Continuance of established fish stocking programs on refuges and consideration of new stocking programs where possible and safe.**
- **Emphasis on developing new or improved opportunities for hunting and fishing whenever refuge comprehensive conservation plans are updated.**
- **Enhanced use of Web and social media to give refuge visitors easy access to information about recreation opportunities.**



The completed hunting and fishing strategy is available on-line: *http://1.usa.gov/1g5geNS*

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provide clean air and water by filtering and absorbing potentially harmful excess nutrients and pollutants. Coastal wetlands can serve as storm surge protectors, a sustainable buffer from wind and waves generated by storms and hurricanes. This natural buffer can absorb and hold excess amounts of floodwater, reducing the intensity of flood potential in certain landscapes. Wetlands also serve as a vital link in the life cycle of many fish and shellfish species, providing food supply, shelter and nursery grounds, in turn supporting the fisheries, recreation and tourism that many coastal communities depend on.

The Coastal Program, *(See related story p. 10*) works at the community level to restore and protect economically and ecologically important coastlines. Nationwide, in FY 2011, Coastal Program spending totaled $2.8 million, with project partners contributing $16.4 million, leveraging nearly $7 for every dollar the Coastal Program invested. This combined spending resulted in an economic stimulus of $35.6 million, supporting 473 jobs. Every dollar the Coastal Program invested in a project had an ultimate return of nearly $13 in economic impacts.

A report from Oxfam America and the Center for American Progress found that well designed coastal restoration projects can be highly cost-effective. The Oxfam report also found that on average, every dollar invested in coastal restoration returned over fifteen dollars in net economic benefits, including protection from storm surges; sequestration of carbon and other pollutants; habitat creation for commercially and recreationally important fish species; and restoration of the open space and wildlife resources that support recreation, tourism, and local culture.

The three Federally-funded projects:

- **Restored salt marsh in San Francisco Bay, California, where the USFWS is participating in the largest tidal marsh restoration in the West.**
- **Created an artificial "vertical" oyster reef in Mobile Bay, AL., to stabilize shorelines in an estuary that supports important species of fish and birds.**
- **Restored oyster reef and seagrass in Virginia's Seaside Bays, reversing the declines in some of the planet's most imperiled marine habitats.**

Natural solutions to planning issues, like using coastal wetlands to protect developed areas, represent a wise investment of public funds. Enhancing natural capital can benefit a wide range of stakeholders.

Explore the Pacific Remote Islands Monument and Refuges

By Ann Tihansky (USGS) and Randal Bowman (DOI)

Blacktip sharks cruise Palmyra Atoll National Wildlife Refuge. The fully structured inverted food web at Palmyra is reflected in the proportion of apex predators to fish biomass which is greater than at any other coral reef ecosystem in the world. This offers scientists an opportunity to advance present understanding of ecosystem dynamics. Palmyra Atoll is the only area currently accessible to the public with a valid USFWS access permit and personal transportation to the Refuge. Photo credit: Susan White, USFWS.

Far away and isolated, the Pacific Remote Islands Marine National Monument (PRIMNM) includes seven atolls and islands and their surrounding submerged lands and waters out 50 nautical miles scattered across the Pacific Ocean. The PRIMNM extends from the mean low water lines of Kingman Reef, Baker, Howland, and Jarvis Islands, and Palmyra, Wake and Johnston Atolls and represents some of the last frontiers for exploration and havens for wildlife in the world. The PRIMNM with its U.S. National Wildlife Refuges (which cover the emergent lands and extend out 12 miles on each atoll or island) enhances the network of conservation lands and waters across the U.S. within the National Wildlife Refuge System.

Together, they contain the most widespread collection of protected areas under a single nation's jurisdiction on Earth and give home to globally-significant coral reef, oceanic, and seabird resources. The PRIMNM hosts unique and unparalleled natural resources and are home to hundreds of ecologically important marine and terrestrial species, including many that are threatened, endangered or yet to be discovered.

USFWS works with partners to conduct important conservation work in the PRIMNM. Recent examples include: restoring essential seabird nesting habitat by eradicating non-native rats at

See PRIMNM page 14

See map: *http://www.fws.gov/uploadedFiles/Region_1/NWRS/Zone_1/Pacific_Remote_Islands_Marine_National_Monument/Sections/Maps/MNMs-NWRs-EEZmap(D.Hoy)14-012-1.pdf*

An aerial view of the Kingman Reef National Wildlife Refuge. Photo credit: Susan White, USFWS.

A former lighthouse on Baker Island, now day beacon, was constructed just before World War II and sustained damage during the Japanese attack in December 1942. Photo Credit: Bill Mowitt, USFWS

At left– One of the large Pisonia trees on Palmyra Atoll National Wildlife Refuge. The Palmyra atoll has one of the best remaining examples of a forest dominated by *Pisonia grandis* --a species of flowering tree in the Bougainvillea family, found in the Pacific region. This forest type has been lost or severely degraded over much of its range due to increased human population and development. Photo credit: USFWS.

At right– A red-footed booby peers out of the foliage at Palmyra Atoll National Wildlife Refuge. Palmyra supports 11 nesting seabird species, including the third-largest Red-footed Booby colony in the world. Photo credit: Laura Beauregard, USFWS.

PRIMNM continued from page 13

Palmyra Refuge and one species of rat at Wake, controlling (with the goal of eradicating) invasive Yellow Crazy Ants at Johnston Atoll, restoring coral reef habitats at Palmyra and Kingman Reef Refuges—including the removal of shipwrecks that were degrading the health of those reefs *(see related story p. 16)*, and facilitating the work of scientists in the Palmyra Atoll Research Consortium with The Nature Conservancy.

Inventory and monitoring activity of seabird colonies, coral reefs, and reef fish also occurs every two to three years throughout the PRIMNM including the harder-to-access refuges at Howland, Baker and Jarvis Islands as a collaborative effort between NOAA and USFWS. NOAA research vessels currently provide the only platform for the agencies' scientific experts to access these remote areas.

Learn more: *http://www.fws.gov/refuge/pacific_remote_islands_marine_national_monument/*

See PRIMNM page 15

Aerial view of a fishing vessel stranded on Kingman Reef NWR in 2008. Photo credit: Jim E. Maragos, USFWS.
See related story p. 16.

Brown boobies atop pier posts at Johnston Atoll NWR. Photo credit: Lindsey Hayes, USFWS.

Giant clams– species severely depleted throughout their historic range - are found in high densities at both Palmyra Atoll and Kingman reef. Photo credit: Amanda Pollock, USFWS.

Above– A school of manini at Kingman Reef National Wildlife refuge.

Below– A Green turtle cruises over thickets of coral in Palmyra Atoll National Wildlife Refuge. Photo credits: Kydd Pollock.

Above– Table corals are found throughout the Palmyra Atoll National Wildlife Refuge. Photo credit: Kydd Pollock.

Below– Baker Island National Wildlife Refuge supports thriving reefs. Photo credit: USFWS.

Removing Shipwrecks, Restoring Coral Reefs

By Megan Nagel (USFWS)

In the far reaches of the Pacific Ocean lie some of America's most ecologically complex national wildlife refuges. Habitat restoration is a vital part of managing them.

Located in the Pacific Remote Islands Marine National Monument, 1,000 miles south of Honolulu, Palmyra Atoll and Kingman Reef National Wildlife Refuges recently removed nearly one million pounds of shipwreck material.

The shipwrecks' iron was fueling the growth of invasive organisms – corallimorph at Palmyra Atoll Refuge and filamentous green algae at Kingman Reef Refuge – that smothered once-healthy, diverse coral. This shift is known as black reef – a phenomenon in which a reef with high coral diversity transforms into a brown or black reef dominated by one invasive species. With the shipwreck material removed, the next steps are to halt the progression of black reef and remove the corallimorph and filamentous algae at the former wreck sites.

"In the coral reef community we often hear about the devastating effects of a phase shift away from a diverse ecosystem to one dominated by a single species. This restoration effort has the chance to document a 'reverse phase shift,' where a degraded reef is transformed back into an area of high species diversity, and a thriving and healthy ecosystem," says Palmyra Atoll and Kingman Reef Refuges manager Amanda Pollock.

Once the invasive species are removed, the nearby healthy corals, algae and benthic organisms can repopulate and reclaim the former black reef site. Palmyra Atoll Refuge studies have shown this repopulation can begin as soon as three weeks after invasive species removal.

Removing part of the F/V *Hui Feng No. 1* shipwreck at Palmyra Atoll NWR. Photo Credit: Amanda Pollock, USFWS. *See related story p. 13.*

Before the wrecks' removal, scientists from USFWS, Scripps Institution of Oceanography, USGS, University of Hawaii, NOAA and elsewhere surveyed the shipwreck areas to obtain a baseline status of the reef. The reefs will continue to be monitored for recovery and the repopulation of key coral and algae species.

The F/V *Hui Feng No. 1* lying on her side after grounding on the reef at Palmyra Atoll National Wildlife Refuge in 2012. Photo credit: Susan White, USFWS.

The complicated shipwreck removal project required the marine salvage expertise of Global Diving and Salvage of Seattle and Curtin Maritime of Long Beach, CA. It also required help from the Advisory Council on Historic Preservation, U.S. Army Corps of Engineers, Coast Guard, Environmental Protection Agency, NOAA and The Nature Conservancy. "These atolls, islands and coral reefs face a mounting list of threats, including a warming ocean, ocean acidification, illegal fishing and marine debris," says Pollock. "By focusing on habitat restoration and removing the wrecks and invasive species, the Service is giving these reefs the best chance to recover to a healthy state where they can continue to adapt to future global climate and oceanographic changes."

http://www.fws.gov/refuges/RefugeUpdate/MayJun_2014%20HTML/removing_shipwrecks.html

See more images: *https://www.flickr.com/photos/usfwspacific/sets/72157640266391895*

New Tide Gage/Weather Station Supports Mashpee Wampanoag Tribe

Provides data for improved resource management and emergency preparedness

By Monique Fordham (USGS) and Richard Verdi (USGS)

On July 11, 2014, representatives from the USGS, the Mashpee Wampanoag Tribe, and the town of Mashpee, Massachusetts, met at the site of a newly installed tide gage/weather station at Mashpee Neck Landing on Popponesset Bay to participate in a demonstration of the new gage's construction and functionality.

The tide gage/weather station was installed and activated on June 17 by the Massachusetts Office of the USGS New England Water Science Center and reports seven different parameters in near real-time: water level, rainfall, wind speed, wind direction, barometric pressure, relative humidity, and temperature.

George "Chuckie" Green, Assistant Director for the Tribe's Department of Natural Resources, said, "accurate tidal data in the vicinity of the Tribe's Popponesset Bay Restoration Project will finally give us a record of tide and storm surge to assist the Tribe in protection of our shellfish farm, coastline, wild resources and to prepare for the next major storm event. Being able to monitor and record temperature, wind, humidity, precipitation, rain fall and barometric pressure will also support the Tribe's Emergency Preparation Team efforts to establish a record of future storm events for planning purposes."

Viewing tide gage data on-line via the USGS National Water Information System Web Interface (NWISWeb). Left to right: Andy Waite, Hydrologist, USGS; Trish Keli'inui, Councilwoman, Mashpee Wampanoag Tribe; Quan Tobey, Director, Department of Natural Resources, Mashpee Wampanoag Tribe; George "Chuckie" Green, Assistant Director, Department of Natural Resources, Mashpee Wampanoag Tribe; Richard York, Shellfish Constable, Town of Mashpee, Massachusetts; Monique Fordham, USGS National Tribal Liaison; Richard Verdi, Supervisory Hydrologist, USGS. Photo credit: Christina Stringer, U.S. Forest Service.

Richard Verdi (USGS), at left, shows Trish Keli'inui (Councilwoman, Mashpee Wampanoag Tribe) and Quan Tobey (Director, Department of Natural Resources, Mashpee Wampanoag Tribe) how data are collected and transmitted from the gaging station via the satellite antenna. Photo credit: Monique Fordham, USGS.

These data are recorded in 15-minute intervals and transmitted to the NOAA-Geostationary Operational Environmental Satellite (GOES) *http://www.ospo.noaa.gov/Operations/GOES/* every hour. Once transmitted, the data are automatically uploaded to the web in a matter of minutes.

USGS real-time data are available: *http://waterdata.usgs.gov/ma/nwis/*

This collaboration between the USGS and the Mashpee Wampanoag Tribe was made possible by Department of the Interior (DOI) Hurricane Sandy supplemental funds. *http://soundwaves.usgs.gov/2013/12/research.html*

Glacier Bay's Whale Beneath Mount Fairweather

by Christine Gabriele (NPS)

In June 2014, Alaska's Glacier Bay National Park celebrated the grand opening of an exhibit of "Snow" the largest humpback whale skeleton on display in the United States.

Pregnant at age 45, Snow's life was cut short in 2001when she tried to cross the path of a cruise ship leaving Glacier Bay. In life, Snow was valuable to researchers for what she taught them about humpback whales. This spectacular exhibit transforms Snow's death into an opportunity to inspire Glacier Bay visitors to learn more about whales and their challenges in the marine environment.

Glacier Bay is a popular Alaska tourist destination where most visitors see the park while aboard vessels. The Park has some of the world's most stringent requirements to minimize the risk of whale-vessel collisions. It is also a place with an increasing whale population and narrow passageways that can leave little leeway for whales and vessels to avoid each other. Snow's untimely death has been a driving force behind the Park's growing efforts to maintain a line of communications with ship operators about whale collision avoidance.

Tail fluke photo of "Snow", also known as "#68" in the Southeast Alaska Whale Fluke Catalog. The markings on a humpback whale tail are as unique as a fingerprint, enabling researchers to track whale life histories. Snow was one of the first humpback whales identified with this method, which is now used by researchers studying whales, dolphins and other animals around the world. Photo credit: Christina Gabriele, courtesy of J. Straley Investigations.

A team of whale bone articulation experts from Whales and Nails, LLC (from left: Dan DenDanto (owner), Courtney Vashro, Lindsey Nielsen and Phinn Onens) stand with Snow's skeleton. At 45 ½ feet in length, it is the largest humpback whale on display in the United States. The skull and mandibles alone weigh over 1,300 pounds. The skeleton exhibit was funded, in part, from a legal settlement fund held by the National Park Foundation. Photo credit: NPS.

The skeleton is a work of art, magnificent for its sheer size and the graceful pose that suggests that the whale is in motion. The exhibit is housed in a rustic, open-sided outdoor pavilion at Bartlett Cove. Cleaning and preparing the bones took over 1,000 hours of work by Park staff and community volunteers, followed by the expert attentions of a professional whale articulator. Whales and Nails, LLC did the final cleaning and preparation of the bones, including repairing Snow's damaged skull and fabricating replacements for missing bones. There are 161 bones in all, which weigh over 3,700 pounds, not including the steel and other structural elements which now hold the skeleton together.

Snow's recorded history in Glacier Bay began in 1975, when re-

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In July 2001, a necropsy team led by veterinarian Frances Gulland determined that the cause of Snow's death was blunt trauma including a skull fracture. Several months after the necropsy, the entire skeleton was collected. Photo credit: NPS.

The grand opening of the whale skeleton exhibit included a spirit ceremony conducted by Huna Tlingit people who returned to their Glacier Bay homeland to give Snow a Tlingit name, "Tsalxáan Tayée Yaay," which translates as "Whale Beneath Mount Fairweather." Photo credit: NPS.

Whale continued from page 18

searcher Charles Jurasz first photographed her unique tail markings, and spanned decades of sightings in Alaska and Hawaii. Many facts that we now take for granted about humpback whale migration, behavior, lifespan and reproduction in the North Pacific were based on observations of Snow's life and behavior.

One of Snow's most important scientific contributions was to resolve a long-standing controversy about the lifespan of humpback whales. Counts of the growth-layers in her earplugs, collected after death, confirmed that humpbacks can live as long as 96 years, but typically live about 60 years. They also revealed that Snow was born around 1957, when commercial whaling was still occurring in the North Pacific. In today's Southeast Alaska humpback whale population, there are several whales with sighting histories that span over 40 years.

Whale-vessel collisions are an issue of increasing concern in the world's oceans. Balancing public demand for access to the majestic beauty of Glacier Bay's wild mountains, glaciers and wildlife with the Park's mission to preserve the place for future generations is a continual challenge. Successful management requires consistent and careful application of rigorous research to management decisions that affect Park resources, including whales.

Soaking whale bones in the ocean for several months helped to clean them. Photo credit: NPS.

First Marine Hydrokinetic Research Lease Offshore Oregon Coast

Milestone cleared to explore new frontier of wave energy offshore Oregon

On June 19, the Bureau of Ocean Energy Management (BOEM) announced it has taken an important step toward issuing a research lease for a facility to test utility-scale wave energy devices in federal waters off Oregon. The non-competitive lease would be for the offshore area where the Northwest National Marine Renewable Energy Center at Oregon State University (Center) would site the hydrokinetic energy research project.

The Center proposes to design, build and operate the Pacific Marine Energy Center. The Center is one of three national research groups supported by the Department of Energy to facilitate the development of marine renewable energy technology with research, education and outreach.

The project is designed to support up to 20 megawatts of electricity generation which would be transmitted to the mainland grid via a subsea cable.

"Wave energy off the West Coast has incredible potential," said BOEM Acting Director Walter Cruickshank. "Today, we have reached an important step in the leasing process for the nation's first grid-connected facility in Federal waters to test commercial-scale wave energy devices."

http://www.boem.gov/press06192014/

Wood stork at Pelican Island National Wildlife Refuge. Photo credit: USGS.

Conservation Success for Wood Storks

Thirty Year Recovery Effort Has Brought Bird Back from Brink of Extinction

On June 26, 2014 the USFWS upgraded the status for wood storks from endangered to threatened under the Endangered Species Act (ESA), reflecting a highly successful conservation and recovery effort spanning three decades.

Secretary Sally Jewell made the announcement at the Harris Neck National Wildlife Refuge, GA.

"The down-listing of the wood stork from endangered to threatened demonstrates how the Endangered Species Act can be an effective tool to protect and recover imperiled wildlife from the brink of extinction." "Through important conservation partnerships, the U.S. Fish and Wildlife Service is working to rebuild a healthy wetland ecosystem, which, in turn, is helping restore the wood stork's habitat, double its population since its original listing and keep the bird moving in the right direction toward recovery," said Jewell.
http://www.fws.gov/news/ShowNews.cfm?ID=D8AEC082-A7E9-C4CA-C6375DE1198A72B1

Advancing Ocean and Coastal Data Sharing Capabilities

USGS Scientist Receives 2014 DeSouza Award

Dr. Richard Signell of the USGS has been awarded the 2014 Russell L. DeSouza Award by the Unidata Users Committee. The DeSouza Award honors "individuals whose energy, expertise, and active involvement enable the Unidata Program to better serve the geosciences."

Signell, a research oceanographer at the USGS, has been a tireless proponent of Unidata software tools for more than twenty years. In 1992 he co-authored a paper titled "NetCDF: A Public-Domain-Software Solution to Data-Access Problems for Numerical Modelers" for a conference of the American Society of Civil Engineers. Dr. Robert Hetland of Texas A&M University, who nominated Signell for the award, says "I believe that the general adoption of netCDF as the standard way to store numerical ocean model information is due to Rich's early efforts to promote netCDF."

Dr. Signell has been instrumental in implementing Unidata technologies in the U.S. Integrated Ocean Observing System (US-IOOS). *See related story p. 27.*

John Haines, USGS Coastal and Marine Geology Program Coordinator said, "Our effectiveness as a research organization, and the impact our data and products have, depends increasingly on the integration of data, models, and knowledge from diverse sources. Rich has been tireless in his efforts to promote standards and tools, and a community mindset, that ensure

Rich Signell, USGS research Oceanographer. Photo credit: USGS.

everyone has effective access to research, observations and modeling. The USGS has supported Rich's involvement with IOOS to advance his vision across agencies and partners and this recognition is more than deserved."

In addition to his involvement in and promotion of various Unidata projects, Dr. Signell has been active in promoting the use of standardized web services, helping organizations throughout the geoscience community install servers that aggregate and make their data Climate and Forecast (CF) metadata compliant with standards and standards-based tools. He has been the USGS representative to the Unidata Users Committee since 2009.

The 2014 DeSouza Award was presented to Dr. Signell during the Unidata Users Committee's Fall meeting September 15-16, 2014. As part of the award ceremony, Signell presented a talk titled,"Ocean, Atmosphere & Climate Model Assessment for Everyone."
Read more: *http://www.unidata.ucar.edu/blog_content/posts/2014/20140904_desouza.html*

What's All the Fuss About Scientific Integrity?

By Alan Thornhill (USGS) and Richard Coleman (USGS)

Scientific and scholarly information considered in Departmental decision making must be robust, of the highest quality, and the result of rigorous scientific and scholarly processes. Most importantly, it must be trustworthy. Leadership has a role to ensuring that.

One of the most important values in science is integrity. It is the foundation of all scientific work. Without integrity, you lose credibility with your colleagues and the community; your results become meaningless. When you lose credibility, your value as a scientist is diminished. Think of credibility as the currency of science. Anything that undermines credibility undermines value.

So how do you get a credible scientist and a credible agency? To help visualize some of these factors and better explain to others exactly what we mean by scientific integrity, the pyramid graphic at right illustrates the foundations from bottom to top of eight prerequisites for scientists (and agencies) to be considered credible and reputable, and the importance of scientific integrity.

Scientific Integrity is maintained when all of the building blocks are solid and uncompromised. A transgression in any of elements of these building blocks could undermine the credibility of the individual scientists involved and potentially damage the reputation of the entire bureau or agency.

Integrity does not stop there. Users and communicators of science and those who manage science and make decisions based on the data and results must also uphold the highest standards of honesty and integrity. Everyone involved with scientific work must perform their duties with the utmost regard for the actual and perceived integrity of their work. It's the right thing to do.

Department Scientific Integrity Policy:

In response to a Presidential Memorandum on Scientific Integrity (March 2009), the Department established its policy on Scientific and Scholarly Integrity, 305 Departmental Manual 3, in February, 2011. *http://www.doi.gov/scientificintegrity/index.cfm*

This policy affirms the Department's commitment to scientific integrity and makes the expectations very clear for all employees.

Loss of Scientific Integrity occurs when there is a significant departure from the accepted standards, values, and practices of the relevant scientific community. Loss of integrity can happen with or without intent—the former can result in administrative action, as in misconduct.

Scientific Misconduct is fabrication, falsification, or plagiarism in proposing, performing, or reviewing scientific activities, or in the products or reporting of the results of these activities, or in the use of scientific information for decision making, policy formulation, or preparation of materials for public information activities.

This policy applies to all Interior employees, political appointees, contractors, cooperators, partners, permittees, leasees , grantees, and volunteers when they engage in, supervise, manage, use, or communicate scientific and scholarly activities.

The policy created Scientific Integrity Officers (SIO) for each of the bureaus and a lead Department SIO. These collateral duty officers

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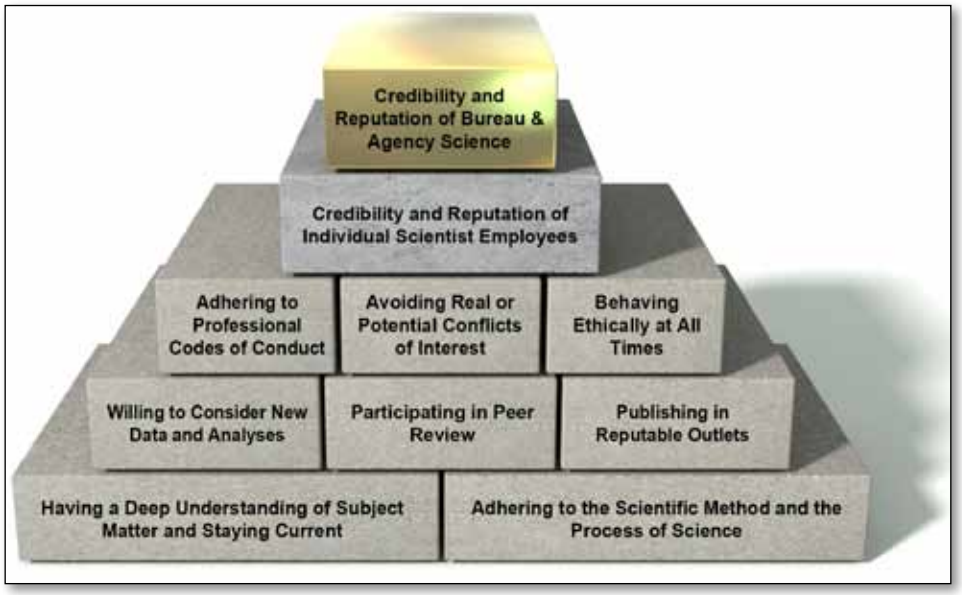


Scientific integrity is built on a solid foundation described in the "Code of Conduct" for all employees. The Code of Conduct includes "I will" statements, listed in sections for those performing science, those relating science to others, and managers/decision makers supervising scientists and relying on science in their decisions. Image credit: Betsy Boynton, USGS.

Integrity continued from page 21

are the primary point of contact for scientific integrity concerns. They serve as ombudsmen in resolving concerns as well as leading the reviews of allegations and determining if there was a loss of scientific integrity or scientific misconduct. Sometimes they convene a panel of subject-matter experts, a Scientific Integrity Review Panel, to consider key elements of an allegation. If misconduct or a loss of scientific integrity is found, then management determines appropriate actions.

Policy revisions: The proposed revised Departmental policy describes the role of the SIO in resolving informal complaints, strengthens the language assuring whistleblower protection for those who lodge a scientific integrity allegation or who take part in an investigation, and clarifies intent, application, and metrics for a finding.

Learn more:

http://www.ucsusa.org/scientific_integrity/

http://www.ucsusa.org/scientific_integrity/solutions/agency-specific_solutions/federal-agency-si-policies.html

Bald eagles are making a comeback in the Channel Islands, CA. *http://www.nps.gov/chis/parknews/bald-eagle-2014.htm* Photo credit: Katherine Whitmore, USFWS.

U.S. Department of Interior's Code of Scientific and Scholarly Conduct

A. DOI Employees, Volunteers, and Outside Parties.

(1) I will act in the interest of the advancement of science and scholarship for sound decision making, by contributing or using the most appropriate, best available, high quality scientific data and information to inform the mission of the Department.

(2) I will communicate the results of scientific activities clearly, honestly, objectively, thoroughly, accurately, and in a timely manner.

(3) I will be responsible for the resources entrusted to me, including equipment, funds, my time, and the employees I supervise.

(4) I will adhere to the laws and policies related to

(i) the protection of natural and cultural resources,

(ii) the conduct of research on animals and human subjects.

(5) I will not knowingly participate in a particular matter that causes a conflict of interest for myself or others.

(6) I will not intentionally hinder the scientific activities of others or engage in scientific misconduct.

(7) I will clearly differentiate among facts, personal opinions, assumptions, hypotheses, and professional judgment in reporting the results of scientific activities and characterizing associated definable uncertainties, in using those results for decision making, and in carrying out public information activities.

(8) I will protect, to the fullest extent allowed by law and policy, the confidential and proprietary information provided to the Department by individuals, communities, and entities whose interests and resources are studied or affected by scientific activities.

(9) I will be responsible for the quality of the data I use or create and the integrity of the conclusions, interpretations, and applications I make. I will adhere to appropriate quality assurance and quality control standards, and not withhold information that might not support the conclusions, interpretations, and applications I make.

(10) I will be diligent in creating, using, preserving, documenting, and maintaining scientific collections, records, methodologies, information, and data in accordance with federal and Departmental policy and procedures.

B. Individuals Engaged in Scientific Activities. In addition to 3.7A above, for all Employees, Volunteers, and Outside Parties who engage in scientific activities:

(1) I will place quality and objectivity of scientific activities and reporting of results ahead of personal gain or allegiance to individuals or organizations.

(2) I will maintain scientific integrity and will not engage in fabrication, falsification, or plagiarism in proposing, performing, reviewing, or reporting scientific activities and products of these activities.

(3) I will fully disclose the scientific methodologies used, all relevant data and information, and the procedures for identifying and excluding faulty data except where protected by law.

(4) I will adhere to appropriate professional and organizational standards for authoring and responsibly publishing the results of scientific activities and will respect the intellectual property rights of others.

(5) I will welcome constructive criticism of my scientific activities and will be responsive to their peer review.

(6) I will provide constructive, objective, and professionally valid peer review of the work of others, free of any personal or professional jealousy, disputes, competition, non-scientific disagreement, or conflict of interest resulting from financial interests or personal or business relationships. I will substantiate comments that I make with the same care with which I report my own work.

C. Decision Makers. In addition, for all decision makers:

(1) I will do my best to support the scientific activities of others and will not engage in dishonesty, fraud, misrepresentation, coercive manipulation, censorship, or other misconduct that alters the content, veracity, or meaning or that may affect the planning, conduct, reporting, or use of scientific activities.

(2) I will offer respectful, constructive, and objective review of scientific activities of employees I supervise and will encourage their obtaining appropriate peer reviews of their work. I will respect the intellectual property rights of others and will substantiate comments that I make about their work with the same care with which I carry out and report the results of my own activities.

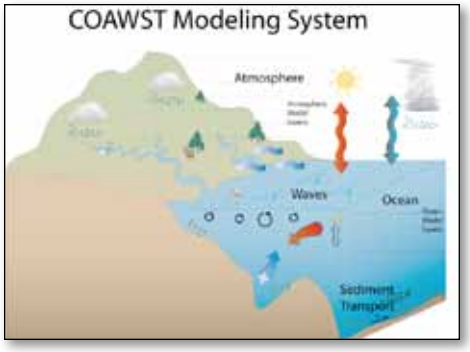
(3) I will adhere to appropriate standards for reporting, documenting and applying results of scientific activities used in decision making and ensure public access to those results in accordance with Departmental policy and established laws.

New Approaches for Storm Forecasting

Combining models for a more robust way of understanding storms and their impacts

By John Warner (USGS)

The USGS Coastal and Marine Geology Program recently sponsored training for nearly 90 scientists from over 15 countries to learn about a new modeling system designed to improve our ability to predict storms and their impacts. The system, called Coupled-Ocean-Atmosphere-Wave-Sediment Transport (COAWST) Modeling System, couples together several open-source modeling components that have been tailored to investigate processes of the atmosphere, ocean, waves, and coastal environment. The modeling system is currently uses the Model Coupling Toolkit (MCT) to integrate the Regional Ocean Modeling System (ROMS), the Weather Research and Forecasting Model (WRF), the Simulating Waves Nearshore (SWAN) Model, the Community Sediment Transport Modeling Systems (CSTMS), and a Sea Ice model. All of these components are open-source codes that have individual model developers and user communities. USGS is a vital member of the communities involved in developing many of these components individually, and has been working to integrate all of these models into a unified system. *http://woodshole.er.usgs.gov/operations/modeling/COAWST/index.html*



Conceptual framework of the COAWST modeling system showing interactions of the ocean, atmosphere, waves, and sediment transport processes. Image credit: USGS and Univ. of Maryland's Integration and Application Network.

USGS held the training workshop on the campus of the Woods Hole Oceanographic Institution August 25-28, 2014. It was also available via Webex Many of the main developers from the models were onsite and provided overviews of their specific model component. The workshop was held so that scientists and model developers could gain insight into each component and learn how to configure and run the fully coupled COAWST system. Users provided presentations of their applications to enhance feedback across this community. The training was a great success and fostered collaboration across a diverse scientific community.

The COAWST coupled system is a novel approach that allows the models to resolve many more complex interactions which are not simulated if the models are run separately.

Because the coupled system allows for communications between models as the fields develop, the feedback from one model can directly impact the other components. This allows scientists to study storm events in more detail. For example, an analysis of the strong northeaster storm Nor'Ida in 2009 identified that feedback of the ocean waves to the atmosphere actually tended to reduce the strength of the winds. The results from the coupled system matched observational data more closely. In contrast, simulations of Hurricane Isabel in 2003 and Hurricane Ivan 2004 showed that the feedback of the ocean sea surface temperature played a stronger role in the development of the storm intensity than the surface waves. During the workshop, the group used a COAWST test case that simulated Hurricane Sandy 2012 to simulate the storm and different interaction processes to investigate their importance to the storm dynamics.

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Attendees at the COAWST Training held at the Woods Hole Oceanographic Institution campus in August 2014. Photo credit: Xiaowen Li.

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:

Gulf of Maine
Terry Holman (DOI), Susan Russell-Robinson (USGS)
(U.S.,Canada)
http://www.gulfofmaine.org/2/
The Gulf of Maine Council celebrated its 25th Anniversary in Halifax, Nova Scotia June 17 & 18. It included a special session at Coastal Zone Canada, "Voices of the Gulf of Maine," to better understand and learn more about this unique cross-border area. Heather Breeze, Fisheries and Oceans Canada and Susan Russell-Robinson, USGS/DOI co-chaired the session that discussed the importance of collaboration to sustain the Gulf of Maine's natural heritage and its use by communities and industries.

The Council also recognized the achievements of 17 outstanding individuals and organizations from Canada and the U.S. at a special awards ceremony. The Honorable Randy Delorey, Nova Scotia, Minister of the Environment and U.S. Consul General Richard Riley presented the awards, including the Distinguished Service Award to Susan Russell-Robinson-USGS Associate Program Coordinator for Coastal and Marine Geology. Susan has served as "a strong mentor to many members of the Council's working group past and present." She most lately supported the development of a number of special products with Environment Canada, Fisheries and Oceans Canada, and EPA, including 25 geocache sites around the Gulf of Maine that offer a new opportunity to explore the Gulf of Maine region. Terry Holman, DOI Councilor to GOMC, also participated. *http://www.gulfofmaine.org/2/wp-content/uploads/2014/06/GOMC-2014-Awards-Winners-Detail.pdf*

Mid-Atlantic
Bob LaBelle (BOEM)
Leanne Bullin (BOEM)
(Maryland, New York, New Jersey, Delaware, Virginia)
midatlanticocean.org
Maureen A. Bornholdt from BOEM retired from Federal service at the end of August. On September 2, Bob LaBelle, the senior advisor to the BOEM Director, assumed the role of Federal Co-Lead for the Mid-Atlantic RPB (MidA RPB). The Shinnecock Indian Nation announced during the in-person MidA RPB meeting in May that Kelsey Leonard is now serving as the Tribal Co-Lead.

The RPB has formed internal workgroups to gather the information it needs to make decisions about the nature and content of additional products and processes at its next in-person meeting, planned for early 2015. These workgroups are focusing on: a regional ocean assessment; regional ocean action plan options; ocean data portal; and geographic coordination. Discussions are also underway on a plan to further engage stakeholders. Public input on The Mid-Atlantic Regional Ocean Planning Stakeholder Engagement Strategy Draft Outline is helping to inform

Susan Russell-Robinson (USGS) (left) is presented with the Distinguished Service Award by the Honorable Randy Delorey, Nova Scotia, Minister of the Environment at the Gulf Of Maine Council's 25th Anniversary award ceremony.

development of that plan and hold a public webinar and public listening sessions this fall to obtain public comments. In the fall, the draft documents will be posted on the website for public review, along with details about the webinar and public listening sessions.
The RPB is also forming an inter-jurisdictional coordination workgroup to identify specific processes and mechanisms for how RPB member

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institutions can better coordinate, leverage resources, and make better decisions in the context of existing mandates and authorities. See the Plan, updates and status: *http://www.boem.gov/Mid-Atlantic-Regional-Planning-Body/?utm_source=Updates+from+MidA+RPB+&utm_campaign=mida+rpb+updates&utm_medium=email*

West Coast

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

On July 24, 2014, interested West Coast tribal representatives and all relevant federal agencies participated in a webinar to review the outcomes from the draft West Coast Regional Planning Body Tribal Engagement Assessment and discuss options for moving forward with West Coast marine planning. As Federal Co-Lead of the future Regional Planning Body, NOAA worked with Triangle Associates to assess tribal interests, expectations, and recommended approaches for West Coast marine planning and a Regional Planning Body. In late 2013/early 2014, Triangle Associates and NOAA representatives met with all interested West Coast tribes and tribal entities (28 total) to gather feedback and ideas, and their assessment findings were reviewed in the July 24 webinar. As a next step, all marine planning partners from tribal, state and federal governments will convene by teleconference for the first time in September.

South Atlantic

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

Northeast

Bob LaBelle (BOEM)
Leanne Bullin (BOEM)
(Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut)
http://northeastoceancouncil.org/

After receiving input from the public, the Northeast Regional Planning Body approved goals and objectives for the region's ocean plan. The Framework for Ocean Planning in the Northeastern United States specifies these goals and objectives along with actions, outcomes, tasks, and timelines.
http://neoceanplanning.org/

Caribbean

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

Pacific Islands

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

Crested Auklet, Kiska Island, Alaska. Photo credit: USFWS.

Gulf of Mexico

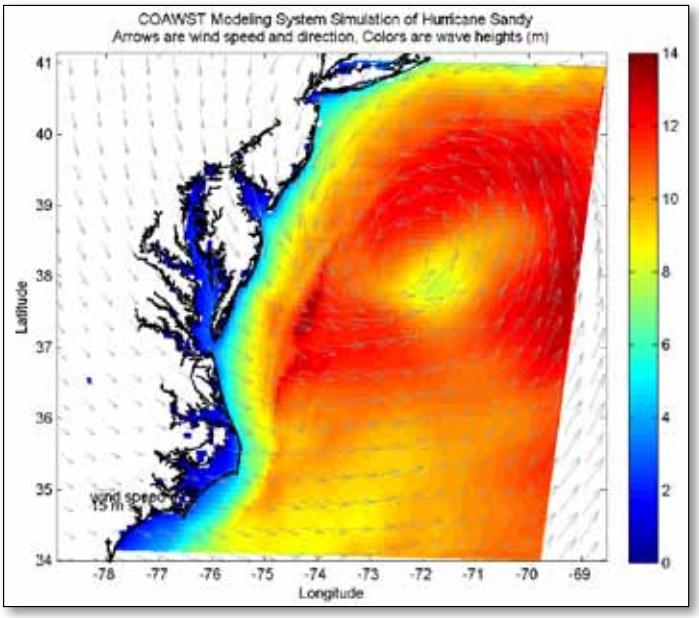
Linda Walker (USFWS)
(Alabama, Florida, Louisiana, Mississippi, Texas)
www.gulfofmexicoalliance.org

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)



COAWST continued from page 23

Many forecast models do not include the effects of all these processes coupled together. This is often due to time constraints to allow a model to run multiple scenarios for the forecast. However, in some cases the interactions can be significant enough to produce a more accurate prediction of the event. The COAWST system can help scientists investigate which processes are significant for a particular storm. In the end, a strong component of field observations, understanding the geophysical framework of the system, and numerical modeling simulations can help to gain a more thorough understanding of earth system processes and evolution of our coastal system.

COAWST coupled model scenario of wave heights and wind speed for Hurricane Sandy along the U.S. Atlantic coast used as a test case for the training workshop. Heights in meters, arrows, wind speed (meters per second). Image credit: USGS.

This Woman ROCKS!

By Christy Catanzaro (USGS)

Many people spend years trying to find their "dream job," but USGS Marine Geologist, Dr. Laura Brothers, is one of the lucky few who has already found hers.

Brothers has always been interested in science, but it wasn't until a college-level introductory geology class that she realized her calling. "I always took a lot of science classes in high school," she said. "I was originally studying sociology, but I took a geology class and it was so much more fun. So then I changed my major to geology and rounded it out with physics courses."

After completing her undergraduate degree in geology from West Virginia University, Brothers went on to the University of Maine to receive dual Masters Degrees in Oceanography and Marine Policy, as well as a Ph.D. in Geology. "I'm a marine geologist with interests in seafloor mapping, coastal and shelf dynamics/evolution, seabed fluid escape, sediment transport, and marine spatial mapping," she said.

Brothers (center) works with USGS Geophysicist Wayne Baldwin (at left), discussing survey coverage in the data processing van during the Delmarva research cruise in July 2014. Photo credit: Seth Ackerman, USGS.

USGS Geologist Laura Brothers, during a research cruise offshore of Assateague Island in June 2014. Photo credit: Alex Nichols, USGS.

While it may seem that geologists are out in the field exploring new areas and collecting data all the time, Brothers says that's not the always the case. "My typical day involves reviewing articles, interpreting data, and writing. There's also a fair amount of administration associated with research--budgets, progress reports, etc.," she said. "When I'm lucky, I get to go into the field and collect data."

Lucky for Brothers, her most recent research mission included many of her marine interests. This past summer, she co-led a crew of eight USGS scientists and engineers on a 40-day seafloor mapping mission along the Delmarva coast to collect data to better understand coastal change, especially after Hurricane Sandy. "Hurricane Sandy's impact on the Delmarva Peninsula made this the perfect time to propose a geophysical study that could address scientific questions and improve coastal zone management," Brothers said.

Planning this important mission was quite extensive. Brothers and her team conducted background research to identify if there were knowledge gaps and how they could maximize their research efforts. They met with regional experts and stakeholders, such as The Delaware Geological Survey, Wallops Flight Facility, National Park Service, University of Delaware, and U.S. Army Corps of Engineers to ensure they were making the most of their time at sea.

As a co-lead for the research cruise, her main objectives were to have an exceptional team of scientists (they had over a century worth of combined sea-going experience!), a capable research vessel, updated equipment so they could gather the best data possible, and a survey plan that would help them acquire the data "required to define the regional geologic framework of the Delmarva inner-continental shelf."

Even though the data have yet to be interpreted, Brothers is confident that the work they completed this summer was a huge success. "We're seeing things that no one has seen before. We're collecting information, we're assessing what's out there so people can live better and make better management decisions," she said. "It's a real privilege to be able to pursue your curiosity, particularly in the service for the American people. What we did this summer is going to be used for decades."

Being the only woman aboard a research vessel for 40 days seems like it might be rough, but Brothers felt otherwise. "I had my own cabin, so that was awesome! I'm also looking forward to wearing summer dresses and peep-toe shoes. But other than that, there was no difference among my crew mates and that's perfect."

What's the most important advice Brothers has for young women thinking about pursuing a career

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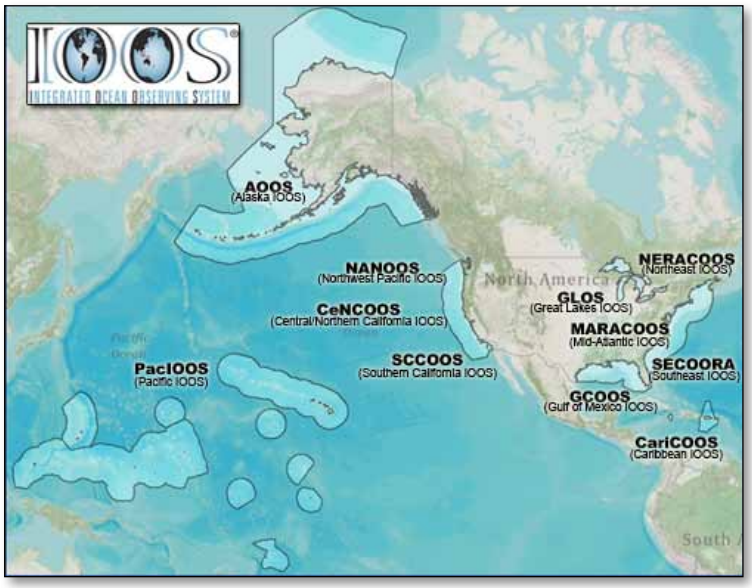
Brothers (center) and USGS Engineer Emile Bergeron (right) on the deck of R/V *Scarlett Isabella* during the Delmarva research cruise in July 2014. Photo credit: Seth Ackerman, USGS.

in science, technology, engineering, and/or math fields, known as STEM, which stands for Science, Technology, Engineering and Math. "Find a mentor," Brothers says. "It goes for anybody going into any field. Finding somebody that can lead you along and show you the ropes makes a big difference. It can be tough to envision yourself in a field, if you don't look like most of the practicing professionals, particularly when you're starting out."

When asked about her ideal job, Brothers had a very quick answer. "Being a government research scientist is the best because you get to do the research. I work with such great people and all of what we do becomes public," she said. "This is my dream job, hands down. I look forward to working here another 30 years."



Through Regional Associations, IOOS serves the nation's coastal communities, including the Great Lakes, the Caribbean and the Pacific Islands and territories. *http://www.ioos.noaa.gov/regional.html*

The U.S. Integrated Ocean Observing System (IOOS)

IOOS is a national system built upon national–regional partnerships to deliver tools, data and information needed to increase understanding of our ocean, coastal, and Great Lakes waters. IOOS partnerships exist between agencies at all levels of government; between governmental and non-governmental organizations, and represent federal, tribal, state and local governments, academic, industrial, and non-profit organizations. IOOS supports decision-makers with information needed to take action to improve safety, enhance the economy, and protect natural resources and infrastructure.

IOOS is working to deliver reliable and timely access to data and information for a range of users concerned with topics that include marine operations, coastal hazards, climate variability and change, and ecosystems, fisheries and water quality. IOOS observing networks monitor biological, physical, and chemical conditions in ocean, coastal and Great Lakes waters as well as across the air-sea interface. This information is provided in real-time and via modeling outputs that are readily available to an array of users in a multiple standardized formats and outputs. *(See related story p. 20)*

U.S. IOOS includes 17 federal agencies and 11 regional associations (RAs) that operate observing systems and programs. Additional partners include a large and growing number of organizations including industry, academia, state, local, and tribal governments, and other federal and non-federal organizations.

Regional Associations across the U.S.:

Regional Partnerships are essential to building and supporting the vision of IOOS by providing increased observations, distinctive knowledge, and critical technological abilities. They develop products to meet regional and local needs and work to implement solutions for national priorities at regional levels.

- **Alaska (AOOS)**
  http://www.aoos.org/
- **Caribbean (CaRA)**
  http://cara.uprm.edu/
- **Central and Northern California (CeNCOOS)**
  http://www.cencoos.org/
- **Gulf of Mexico (GCOOS)**
  http://www.gcoos.org/
- **Great Lakes (GLOS)**
  http://www.glos.us/
- **Mid-Atlantic (MARACOOS)**
  http://maracoos.org/
- **Pacific Northwest (NANOOS)**
  http://www.nanoos.org/
- **Northeast Atlantic (NERACOOS)**
  http://www.neracoos.org/
- **Pacific Islands (PacIOOS)**
  http://oos.soest.hawaii.edu/pacioos/
- **Southern California (SCCOOS)**
  http://www.sccoos.org/
- **Southeast Atlantic (SECOORA)**
  http://secoora.org/

Exploring Caribbean Seamounts

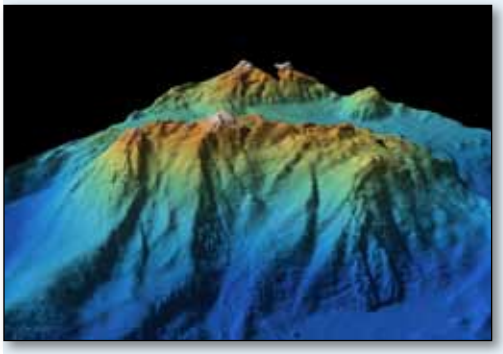
Watch the video interview: *https://www.youtube.com/watch?v=4x4mV0CqakA*

http://fl.biology.usgs.gov/DISCOVRE/

USGS Caribbean Tsunami and Earthquake Hazards Study

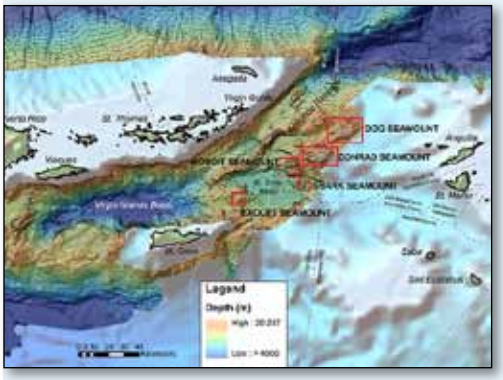
http://woodshole.er.usgs.gov/project-pages/caribbean/

The Surfing Bison



Above- A 3-D image of Noroit Seamount, Image credit: Jason Chaytor, USGS.

Within the Caribbean region, numerous unexplored seamounts punctuate the seafloor holding records of geologic, biologic and oceanographic processes over different time-scales. Seamounts are topographically and oceanographically complex with environmental characteristics that vary greatly and have often been suggested to be biodiversity hotspots, however, the ecology of seamounts is only beginning to be explored in detail.



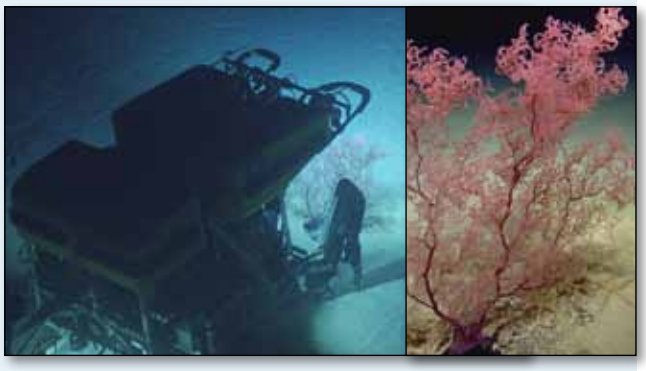
A bathymetric map of the Caribbean region showing seamounts (in red boxes) currently being studied. Image credit: Jason Chaytor, USGS.

Exploring the Caribbean Sea

USGS scientists Amanda Demopoulos and Jason Chaytor are co-chief scientists on a research cruise investigating seamounts in the eastern Caribbean near the British Virgin Islands. They will work aboard the exploration vessel E/V *Nautilus*, owned by the Ocean Exploration Trust, from September 3-14 with fellow USGS and academic scientists and the *Nautilus'* Corps of Exploration. They will also be able to participate with other scientists from shore-based locations via telepresence. This mission represents an in-depth, multidisciplinary exploration of seamount environments that includes enhanced mapping efforts, remotely operated vehicle (ROV) surveys, discrete biological and geological collections, and ecological studies. The data collected will provide unprecedented insight into the geological origin and the ecology and biodiversity of seamount environments.

Each day at sea involves a combination of multibeam mapping and sub-bottom profiling, coupled with ROV operations exploring as many as five seamounts. There are 31 scientists, technicians, and students on the E/V *Nautilus*, helping support this mission.

At left-On board the E/V *Nautilus*, USGS investigators stand in front of the ROV *Hercules* that has been instrumental in obtaining samples and providing video of these remote and unexplored areas of the Caribbean seafloor. Left to right: Jennifer McClain-Counts, Shannon Hoy, Jason Chaytor (co-chief scientist), Jill Bourque, Amanda Demopoulos (co-chief scientist), and Brian Andrews. Photo credit: USGS.



At right– ROV *Hercules* sits on the seafloor, taking images of the slow growing black coral, *Leiopathes sp.* The base is more than 10 cm, so this colony is estimated to be over several hundred years old. Photo credits: Ocean Exploration Trust.

This expedition builds upon a 2013 research cruise with primary objectives of characterizing the geology, geomorphology, and ecology of the seamounts, including deep-sea coral habitats and associated communities and is the only sampling cruise of the two-year NOAA/OER funded project investigating and exploring seamounts in the Anegada Passage, northeastern Caribbean.

This project is sponsored by the NOAA Office of Ocean Exploration and Research and the USGS, in collaboration with several academic institutions.