



Leila Hatch (top) and Jenni Stanley, Photos: NOAA

Photo: Anne Smrcina, NOAA/SBNMS

Listening to the sounds of the sea

Looking somewhat like a children's playground apparatus or the skeleton of a heavy-duty camping tent, the acoustic lander (pictured above) was pulled up from its sanctuary seafloor station in mid-November. Find out more about the "lander" and research into sound in the ocean, including work in New England's only national marine sanctuary, on page 2.

Tune in to an ocean noise Reddit

Three NOAA scientists, including two with connections to the sanctuary, answered questions about ocean noise during a December 8 Reddit Science "Ask Us Anything" session. Reddit has been described as a giant internet forum. Learn how to access session answers on page 2.

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Sanctuary scientists answer questions about ocean noise in Reddit session

On December 8, three NOAA scientists answered dozens of questions during an online session about ocean noise, with questions ranging from “What are the noisiest things?” to comparisons of noise in air vs. under water. Questioners were curious about the effects of noise on various types of animals and if there are any effective methods to reduce noise levels in the ocean.

The “Ask Us Anything” Reddit Science session experts were Dr. Leila Hatch, the sanctuary’s marine ecologist, Dr. Jason Gedamke, manager of the Ocean Acoustics Program with NOAA Fisheries’ Office of Science and Technology, and Dr. Jenni Stanley, a postdoctoral researcher working at the sanctuary and with the Northeast Fisheries Science Center.

Reddit is an online forum with millions of users where technical experts answer questions from the public about their areas of interest. Questions are answered in real-time and then archived for future reference. To access the NOAA ocean noise Reddit, go to https://www.reddit.com/r/science/comments/5h6skp/science_ama_series_hi_were_noaa_scientists_leila/

In their opening statement, the scientists wrote, “Sound is an important part of marine ecosystems. Sound provides crucial information to many marine organisms, like the location and quality of potential habitat, the presence of predators or prey species, and the whereabouts of mates and offspring. Because sound can carry up to thousands of kilometers with little disruption, sound is one of the most reliable cues in the ocean; in contrast, light and turbidity can muddle visual and olfactory cues.”

Over the last century, increasing human activity within the ocean has resulted in heightened levels of noise. This increasing amount of noise from anthropogenic (human made) sources is a growing concern. Scientific research suggests that anthropogenic noise reduces opportunities for animals to hear sounds used for navigation, to find food and mates, and to avoid predators. Increased background noise can affect communication, can alter behavior, and can cause physical injury.

NOAA is working to understand [<http://cetsound.noaa.gov>] long-term changes in noise levels, both anthropogenic and natural noise. The Reddit session gave NOAA scientists an opportunity to discuss what is known and what NOAA is doing to address this threat in national marine sanctuaries and elsewhere in the ocean.

If you are interested in learning more about ocean noise, check out these additional NOAA online resources:

- [Underwater Noise and Marine Life](#)
- [NOAA Ocean Noise Strategy Roadmap](#)
- [Noise - Sanctuary Sentinel Site Program](#)
- [A Noisy Ocean: Q&A with Dr. Leila Hatch](#)
- [Ocean Noise \(audio podcast with Dr. Leila Hatch\)](#)
- [Understanding Sanctuary Soundscapes: A Q&A with Carol Bernthal and Sarah Fangman](#)
- [Ocean Noise: Can You Hear Me Now?](#)
- [Soundcheck: Ocean Noise](#)
- [Marine Life Depends on Sound: Earth is Blue video](#)



NOAA records soundscapes for key locations in our nation’s waters

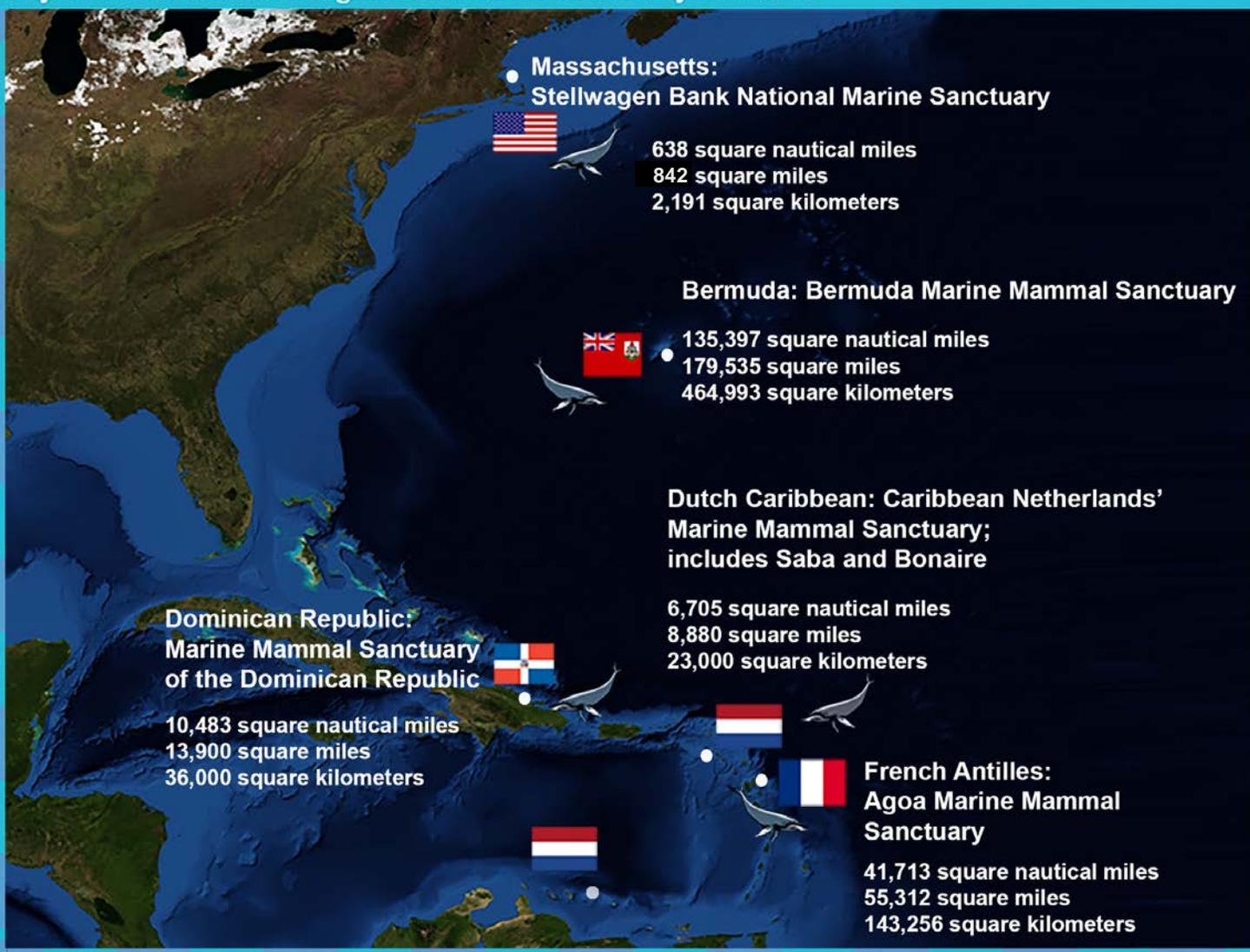
NOAA is attempting to get a picture of the ocean around our nation – a picture “drawn” in sound. Just as landscape paintings and photos illustrate the diversity of landforms, tracking changes over time while also allowing comparisons between different regions, the new soundscapes are defining the levels of natural and anthropomorphic sound. By using the same type of equipment (acoustic “landers”) at each recording station, the scientists will be better able to compare results from site to site and evaluate changing conditions.

The hydrophone-equipped landers record low-frequency passive acoustic sound for about 90 days per session before researchers must replace the batteries and data storage units. The Noise Recording Station Project is a three-year effort.

The 11 stations range from a relatively shallow installation at Stellwagen Bank National Marine Sanctuary to deep Pacific Ocean sites. Three of the 11 stations are within national marine sanctuaries (Stellwagen Bank, Olympic Coast and Cordell Bank). NOAA’s Pacific Marine Environmental Laboratory is leading the project, with assistance from the sanctuaries, all NOAA Fisheries Science Centers, and the National Park Service.

By consistently monitoring the soundscapes, researchers can assess changes. Is the area becoming noisier? Are there more or less biological sounds? Is there a dramatic shift in the type and number of species present? The project may provide answers for these important questions and many other aspects of the underwater world.

Beyond Borders: Stellwagen Bank Sister Sanctuary Network



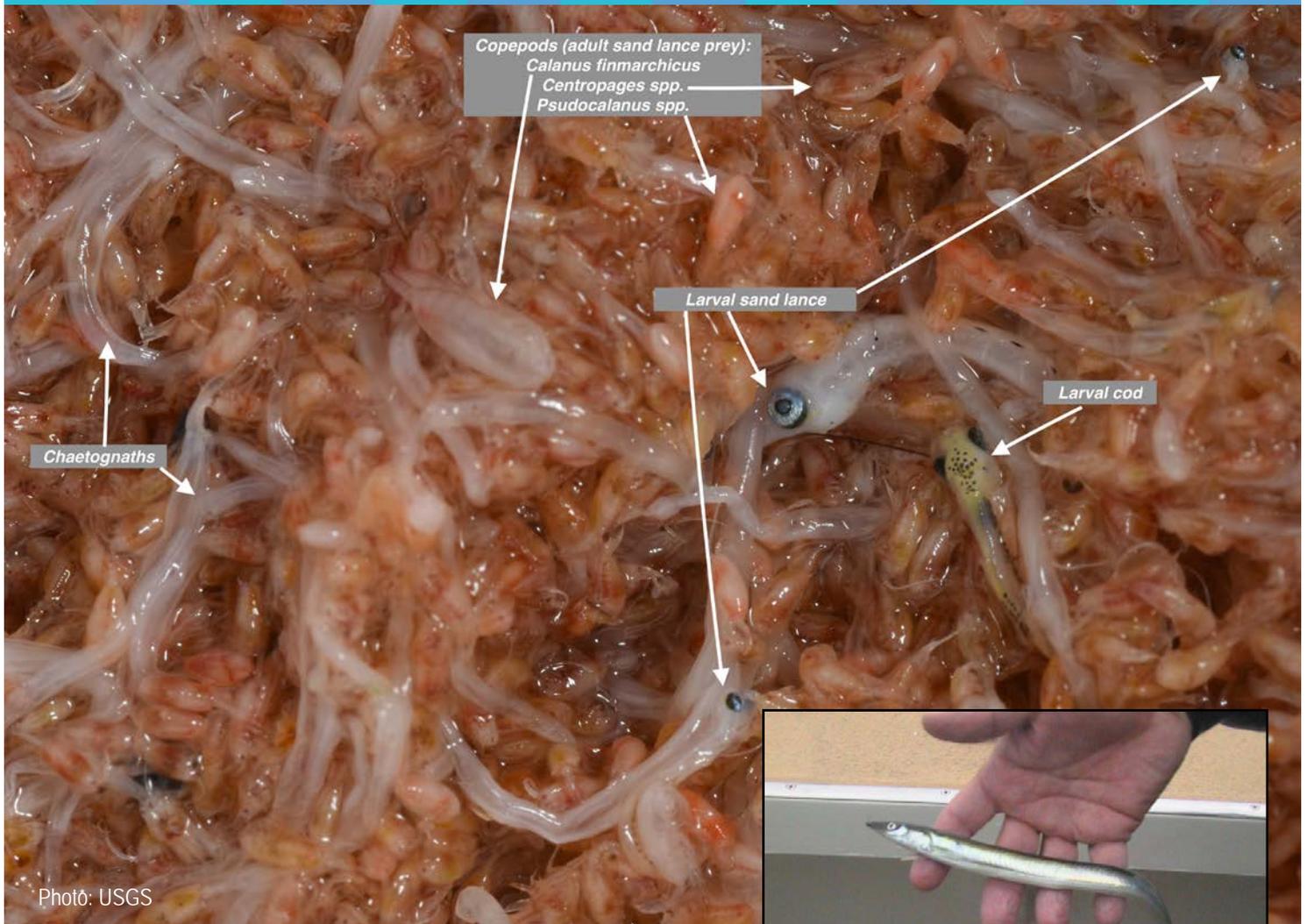
Sister Sanctuary network expands with the addition of the Dutch Caribbean

The Sister Sanctuary network has grown by almost 7,000 square nautical miles with the addition of the Caribbean Netherlands' Marine Mammal Sanctuary off the islands of St. Eustatius, Bonaire and Saba.

The Dutch Caribbean "Yarari" sanctuary joins sanctuaries off the Dominican Republic, the French Antilles and Bermuda as partners in the Sister Sanctuary program started by Stellwagen Bank National Marine Sanctuary. From 638 square nautical miles of humpback whale protection off Massachusetts, the joint effort now encompasses 194,936 square nautical miles along the animal's North Atlantic migratory route.

The effort to protect the almost 1,000 individual humpback whales that feed at Stellwagen Bank and elsewhere in the Gulf of Maine began in 2007 with the first sister sanctuary agreement with the Dominican Republic. The goal was to help protect the whales when they left the sanctuary and migrated to Caribbean breeding grounds. The Sister Sanctuary Program has become part of an international global vision of marine mammal protected areas worldwide and is supported by the United Nations Environment Programme's Specially Protected Areas and Wildlife's Marine Mammal Action Plan for the Wider Caribbean Region.

"With education, conservation and science exchanges, this marine mammal protected areas network is the first such international partnership in the world protecting one of the ocean's most iconic and beloved species throughout its migratory range," said Dr. Nathalie Ward, the Sister Sanctuary coordinator. "As additional sites join, this chain of sister sanctuaries will help to ensure a safer future for the North Atlantic population of humpback whales – our international citizens."



Digging into the lives of sand lance

It's a small fish, but one that holds a significant role in Stellwagen Bank National Marine Sanctuary as a key forage species. The silvery northern sand lance, a relative to the inshore American sand lance, masses in large schools often targeted by massive humpback whales using bubble clouds and bubble nets to corral their prey. When not venturing into the water column, the sand lance will bury itself in the sandy seafloor. It appears that humpbacks have learned how to chase these oil-rich treats out of their hiding places with sound and sand-scuffing actions.

In an effort to learn more about this important link in the sanctuary food web, research coordinator Dave Wiley and staff from the U.S. Geological Survey, Woods Hole Oceanographic Institution, Boston University and the University of Connecticut, have been undertaking systematic cruises to study the fish's life cycle.

Recent results showed that the fish spawned in late November-early December. While using a plankton net (right) during a recent cruise, the researchers were able to collect large numbers of larval sand lance, indicating a successful spawning season. University of Connecticut students and staff are attempting to raise sand lance to study the effects of climate change, such as increasing water temperatures and levels of acidity, on the growth and health of this ecologically valuable species.



Read the April 12 sand lance cruise update on page 9.



Clockwise from top:
Sand lance jump to escape a feeding lunge by an adult humpback whale. Photo: SBNMS, taken under NOAA Fisheries permit #605-1904.

A sooty shearwater takes off with a sand lance in its mouth. Photo: SBNMS.

A sand lance tries to escape from a Cory's shearwater. Photo: Peter Flood.

Common terns pick up sand lance from sanctuary waters and carry them to their nests on shore. Photo by Rob McDonald.

Yum Yum!!! Sand lance – an oceanic dining delight

Humpback whales love sand lance (researchers believe mothers teach their calves how to catch them here at Stellwagen Bank). Fin and minke whales find them a nutritious treat, too. Dolphins, tuna, bluefish, and goosefish gulp them from below while shearwaters, gulls, terns, alcids gannets and other seabirds chase them from above. Maybe that's why the poor, picked-on sand lance hides, not just its head but its whole body, in the sand. It's a little fish with a very big role as a premier prey fish in the Stellwagen Bank food web.

Citizen scientists count sanctuary seabirds



An Iceland gull flew over the research vessel. Photo: Peter Flood

Participants in the combined Stellwagen Sanctuary Seabird Stewards (S4) winter cruise and 2016 National Audubon Christmas Bird Count set off on the morning of December 20. Nine volunteers, including expert birders and nature photographers, led by the sanctuary's volunteer programs coordinator Anne-Marie Runfola, took to the ocean for this annual sanctuary event.

The observers counted triple the number of common murrelets (48) and quadruple the number of razorbills (64) compared to last year's winter cruise, but found no northern fulmars or shearwaters. In 2015 the warmer ocean temperatures and abundance of sand lance may have been contributing factors in delaying the long-distance migration of the great shearwaters. Also, observers noted that in late September of 2015 there had been a tremendous influx of what appeared to be juvenile northern fulmars that may have found conditions to their liking.

The team also spotted a number of marine mammals, including humpback whales, common dolphins, harbor porpoises and harbor seals.

Now in its fifth year, the S4 program (along with the almost 30 years of Christmas Bird Counts at Stellwagen Bank), gives sanctuary managers data for comparison and to identify long-term trends.



A juvenile puffin rests on the water's surface. Photo: Peter Flood

A Puffin Surprise

This juvenile Atlantic puffin was one of four of this elusive species observed during the December research trip into the sanctuary. Juvenile puffins have smaller, less colorful beaks than their popular parents. But, post cruise, that number of puffin sightings went up by one, as one of the birder/photographers zoomed in on his photos.

"How often does one take a picture of a puffin in Massachusetts by accident" reports Tim Factor, who made the startling discovery. His enlargement revealed an adult with its signature large orange beak, sitting on the water.

The research team reported the unusual sighting of an adult puffin on Stellwagen Bank to Audubon Society's Project Puffin, which is helping to restore these birds to the Gulf of Maine

Photo: Anne Smrcina, SBNMS



Species observed during the winter bird count

The Stellwagen Sanctuary Seabird Stewards undertake their winter bird count jointly with the Christmas Bird Count of the Audubon Society. Participants observed these species:

Alcids: Atlantic puffin, common murre, razorbill;

Gulls and Terns: Black-legged kittiwake, Bonaparte's gull, glaucous gull, great black-backed gull, herring gull, Iceland gull, laughing gull, lesser black-backed gull, ring-billed gull, Sabine's gull;

Gannets and Cormorants: Northern gannet;

Ducks, Geese and Loons: Canada goose, common eider, common loon, long-tailed duck, red-throated loon;

Jaegers: Pomarine jaeger.

The standardized seasonal effort for the sanctuary has observers count birds from 0-90 degrees from the bow of the vessel out to 300 meters on one side of the vessel, while on the other side birds are counted as far out as observers can see. The Christmas Bird Count participants count all birds as far out as they can see and 360 degrees around the vessel.



(Images this page, top to bottom): Among the most commonly seen birds during the December 20 trip were black-legged kittiwakes (here one twists in flight), northern gannets, common murres and razorbills. Herring gulls (not pictured) topped the list for number of sightings. Photos: Peter Flood



Looking for and learning about whales ... and lots of other stuff, too!

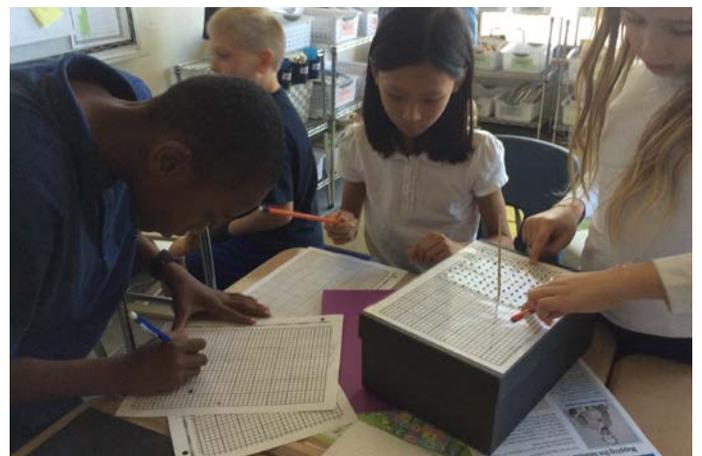


A contagious spirit of adventure swept through the group of 73 students. For many of the students boarding the whale watch vessel, this was their first trip out on the ocean.

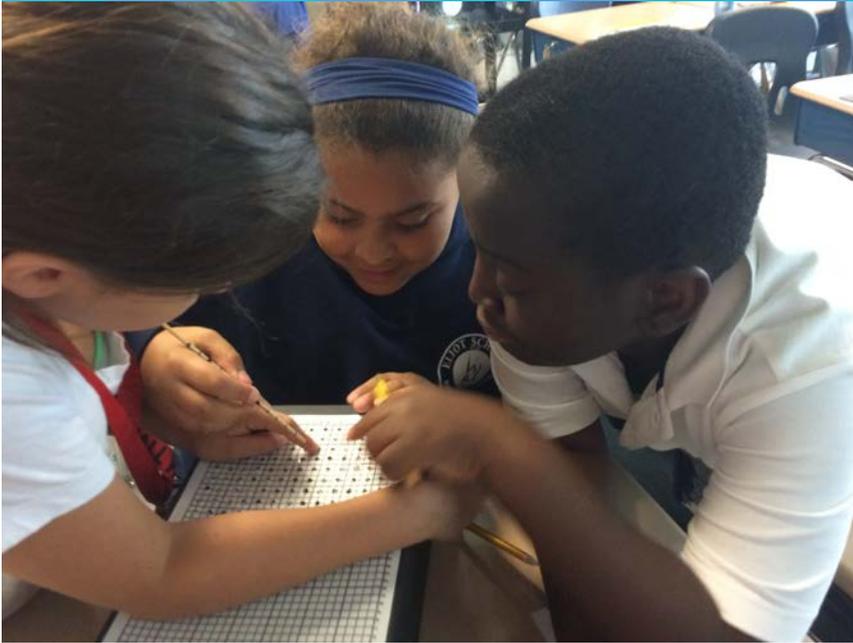
Over the course of three weeks in September, 2016, the entire fourth grade (73 students) from the Eliot Innovation School in Boston learned about whales and other marine creatures in their ocean “backyard.” They found out why Stellwagen Bank is important to whales, and how Henry Stellwagen discovered the bank in 1854. They accessed real-time data about oceanographic conditions and then experienced the sights, smells and feel of the ocean during an at-sea experience during a whale watch. They found out about similarities and differences between whales and humans during a visit by the sanctuary’s life-sized, inflatable humpback whale, and then they saw real humpback and minke whales out in the sanctuary.

Anne Smrcina, sanctuary education coordinator, created the Whale Ambassadors/Educational Whale Watch program through a Diversity and Inclusion Grant from the Office of National Marine Sanctuaries. The second part of the program consists of an informal version of the education components with a whale watch during Latino Conservation Week in cooperation with the Hispanic Access Foundation.

Both the formal and informal education portions of the project provide field-test opportunities for the curricular materials. Ultimately, the complete “Educational Whale Watch” package will be available to the public via the sanctuary’s website.



(Top to bottom) Eliot Innovation School students watch a diving whale during a whale watch; the entire fourth grade poses on the bow of the whale watch vessel; students measure the distance to the “seafloor” in their mystery box during the “soundings” activity. Photos: Anne Smrcina, NOAA



Students learned the principle of sounding to measure seafloor bathymetry with mystery boxes. Each box has a unique seafloor configuration inside. By inserting the sounding line (a thin wooden skewer) through the sea surface (box top with holes), the students can record depth measurements. Once the students have enough data, they can then propose what seafloor features can be found in their mystery boxes.



Stellwagen Bank National Marine Sanctuary Food Web Cards allow students to build food chains and food webs. Each card details the prey and predators for a unique sanctuary species. The cards demonstrate how complicated oceanic food chains and webs can be. Some students increased the length of their chains by incorporating death cards and then continuing the chain with scavengers and/or decomposers. The Food Web Game shows how whales are just one part of a very busy marine ecosystem.

Photos: Anne Smrcina, NOAA



Students accessed real-time data about water temperature, wind speed, wave height, and other variables from the NERACOOS buoy located in the northwestern portion of the sanctuary during week one of the program.



The Whale Ambassadors program included several field experiences, including a visit by the sanctuary's life-sized, inflatable humpback whale (top) to the school's backyard, a whale watch into the sanctuary (middle) and a "treasure hunt" throughout the New England Aquarium to find a variety of sanctuary species (bottom).

Volunteer Profile: Judith Allen

It may seem improbable that the registrar of a college in Maine would be volunteering for the sanctuary. But, that's just the case with Judith Allen.

In addition to her regular job as the Associate Director at Allied Whale and Registrar of the College of the Atlantic in Bar Harbor, Maine, Judy serves as the volunteer curator and manager of database operations for the North Atlantic Humpback Whale Catalog. The catalog houses the largest collection of information on photo-identified humpback whales in the world with more than 9,000 entries.

Photo ID uses natural color patterns, fin shapes and other distinctive marks. For humpback whales, the pattern on the underside of the tail usually provides the "fingerprint" or "flukeprint" that distinguishes one animal from another. Judy and other Allied Whale researchers were among the first to use the photo ID technique to study whales, piloting the project with the Gulf of Maine/Stellwagen Bank population.

Humpback whale research in the sanctuary today relies upon this ability to identify individual animals. Maintenance of this database is crucial to the research effort. In addition, since 2014, Judy has assisted the CARIB Tails project of the Sister Sanctuary program, which uses photographs provided by citizen scientists to match whales seen in the Caribbean with known whales from northern feeding grounds to better understand migratory paths.

Judy's work has helped foster international partnerships for the National Marine Sanctuary System and elevated this sanctuary's contributions in the international marine mammal research and protection community. For her nearly 40 years of volunteer work on the North Atlantic Humpback Whale Catalog and for her contributions to the Sister Sanctuary/CARIB Tails program, the National Marine Sanctuary Foundation awarded the 2016 SBNMS Volunteer of the Year Award to Judith Allen.



(Top) Judy Allen fills her work area with humpback tail photos used for identification of individual whales. (Below) Judy helps an Allied Whale team measure a dead juvenile humpback whale during a necropsy. Photos: Allied Whale



April 12 sand lance cruise update and marine mammal sightings

On April 12, Tasia Blough, sanctuary research specialist and Mike Thompson, GIS analyst, led a research trip aboard the NOAA R/V *Auk* investigating the distribution and abundance of larval and adult sand lance in the sanctuary. During plankton net tows deployed across the southern portion of the sanctuary, the researchers collected larval sand lance and copious amounts of copepods. Volunteer observers identified 10 marine mammal species throughout the day: harbor porpoise, harbor and gray seals, common and Atlantic white-sided dolphins, humpback, sei, minke, fin, and North Atlantic right whales. The team called in two critically endangered North Atlantic right whale sightings to the NOAA Fisheries Greater Atlantic Marine Animal Reporting Hotline. That same day, the Center for Coastal Studies aerial survey team photographed a record-breaking 163 North Atlantic right whales in Cape Cod Bay. The sanctuary's sand lance research project is a collaborative effort with Woods Hole Oceanographic Institution, University of Connecticut, and the US Geological Survey.

Ben Haskell serving as Acting Superintendent of sanctuary

After the retirement of Dr. Craig MacDonald, sanctuary superintendent, in December, Ben Haskell has taken on the duties of acting superintendent. Ben came to Stellwagen Bank from Florida Keys National Marine Sanctuary in 2001, where he had served as Research Coordinator and helped create the Tortugas Ecological Reserve. His tasks here have included liaison with NOAA Fisheries, other government agencies and non-governmental organizations, permitting, and facilities development. Earlier in his career Ben received a Sea Grant Fellowship to work at the national marine sanctuaries headquarters in Silver Spring, Maryland, where he was first introduced to this important marine protected areas program.

Applicants sought for advisory council

NOAA's Office of National Marine Sanctuaries is seeking applicants for four vacant primary seats and three vacant alternate seats on the Stellwagen Bank National Marine Sanctuary Advisory Council. Of particular interest in this round of recruitments are the primary and alternate seats for Youth. Students between the ages of 14 and 17 are encouraged to add their voices to council discussions and represent their peers on pressing marine conservation issues. The youth seats are valid for two years or until the student graduates from high school or reaches 18 years of age. The other primary seats are At-Large, Business/Industry, and Conservation. The open alternate seats are for At-Large and Education.

Interested candidates can obtain an advisory council application form from the sanctuary website (<http://stellwagen.noaa.gov>) or by contacting Elizabeth.Stokes@noaa.gov via email or by phone at 781-546-6004. Applications are due Wednesday, May 31, 2017

Smrcina elected president of Massachusetts Marine Educators

At the April 8 annual meeting of the Massachusetts Marine Educators, the sanctuary's education and outreach coordinator, Anne Smrcina, was elected president for the 2017-2019 term. Anne has been a member of the association's Board of Directors for more than 25 years, and has served as the director of the MME annual marine art contest during many of those years. She is looking to strengthen the partnership between the marine education association and NOAA and to expand marine and environmental literacy among students and adult audiences.

Runfola receives Silver Sherman Award

Once a year, each member of the NOAA Senior Executive Service gets to award a "Silver Sherman" to an individual who has performed work above his or her normal requirements, achieved a milestone that contributed significantly or critically toward the attainment of a particular program goal, and/or demonstrated leadership toward process improvement of a significant magnitude. Sherman the shark, of Jim Toomey's comic strip "Sherman's Lagoon" was Dr. Kathy Sullivan's inspiration for creating this award.

This year's Silver Sherman was awarded by John Armor, Director of the Office of National Marine Sanctuaries to Stellwagen Bank's Anne-Marie Runfola, who created and significantly expanded a volunteer program for the sanctuary and works tirelessly to involve diverse communities through volunteering and citizen science. Her efforts have leveraged significant external investment in the sanctuary through science and public awareness, including the S4 program. The Stellwagen Sanctuary Seabird Stewards (S4) brings ornithologists and experienced volunteer bird-watchers out into the sanctuary to document the types and numbers of birds on a regular basis, giving the sanctuary a database from which to determine changes over time.

If you come across the sanctuary's new inflatable, life-sized humpback whale, "Salt," you will be viewing (inside and out) another one of Anne-Marie's projects. In addition to being a major force in acquiring the funding for this amazing educational tool, she is actively working with a corps of dedicated volunteers who bring the whale and sanctuary education to venues across the region.



Anne-Marie Runfola proudly displays her Silver Sherman award from the Office of National Marine Sanctuaries. Photo: Ken Kostel

Indie band Guster supports sanctuaries with music PSA

In an effort to raise awareness of the national marine sanctuaries, and Stellwagen Bank in particular, the alternative rock band Guster and its singer/guitarist Adam Gardner starred in a public service announcement that was released in November. The hybrid PSA-music video featured the Guster song "Endlessly," while accompanying commentary encourages the public to protect and appreciate their national marine sanctuaries. A co-producer of the PSA was REVERB, a nonprofit organization dedicated to promoting environmental sustainability to music audiences. REVERB was founded by Gardner and his wife, environmentalist Lauren Sullivan.



Photo: A. Smrcina, SBNMS

The camera rolls as Adam Gardner of the band Guster and the sanctuary's research coordinator Dave Wiley discuss the treasures of Stellwagen Bank National Marine Sanctuary before the New England Aquarium's Stellwagen Bank boulder reef exhibit. The interview is now part of a public service announcement produced by Guster, the non-profit environmental group REVERB and the National Marine Sanctuary Foundation. You can view the PSA at the national marine sanctuaries' Earth Is Blue website. <http://sanctuaries.noaa.gov/earthisblue/wk107-reverb.html>



Close-Up Quiz

Do you know what's pictured in this photo?
Find out on page 4 of this issue.

National Oceanic and Atmospheric Administration
National Ocean Service
Office of National Marine Sanctuaries
Gerry E. Studds Stellwagen Bank National Marine Sanctuary

NATIONAL MARINE SANCTUARY SYSTEM



Scale varies in this perspective. Adapted from National Geographic Maps.

The Office of National Marine Sanctuaries serves as the trustee for a network of underwater parks encompassing more than 600,000 square miles of marine and Great Lakes waters from Washington state to the Florida Keys, and from Lake Huron to American Samoa. The network includes a system of 13 national marine sanctuaries and Papahānaumokuākea and Rose Atoll marine national monuments. For more information on the National Marine Sanctuary System, visit: <http://sanctuaries.noaa.gov>



<http://stellwagen.noaa.gov/>