

Boston Harbor Educators Conference 2012

Celebrating 20 Years of Discovery New England's National Marine Sanctuary-- Stellwagen Bank 1992-2012

Saturday,
September 29, 2012
UMass/Boston
McCormack Hall

Keynote Speakers:
Deborah Cramer, author
Greg Skomal, shark expert

Special presentations and
educational workshops
focusing on
Stellwagen Bank
National Marine
Sanctuary resources
and research

K-12 Content Areas:

Art
Design
Photography
Language Arts
Archaeology
Geography
Maps/Navigation
Government
History
Biology
Chemistry
Earth Science
Geology
Meteorology
Marine Science
Physics
Engineering
Technology
Math



Sponsors:

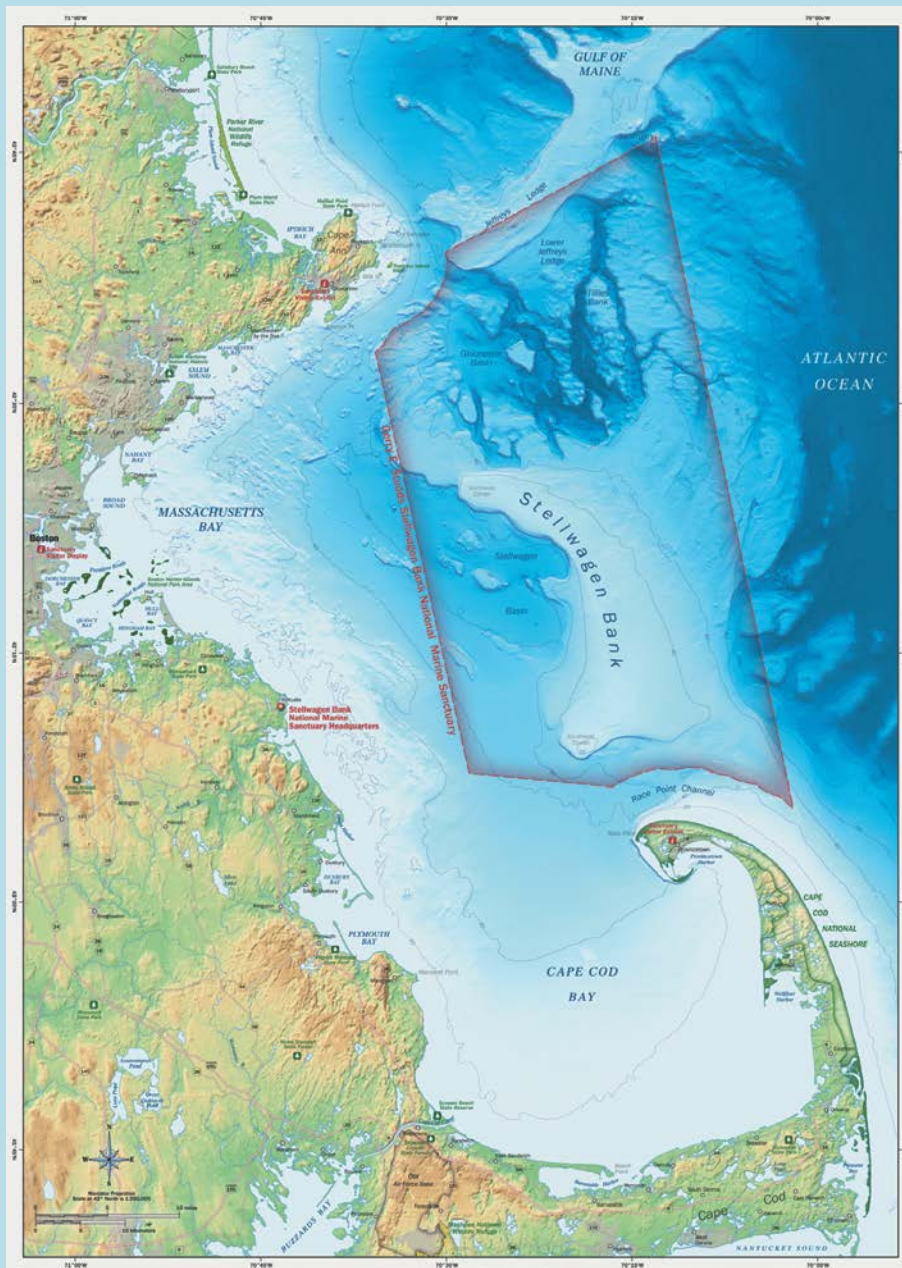
Massachusetts Marine Educators
UMass/Boston - Marine Operations
UMass/Boston - Urban Harbors Institute
Massachusetts Water Resources Authority
Boston Harbor Islands National Park Area
Stellwagen Bank National Marine Sanctuary

New England's Only National Marine Sanctuary Celebrates 20 Years

2012 marks the 20th anniversary of Gerry E. Studds Stellwagen Bank National Marine Sanctuary, New England's only such marine protected area was designated by Congress as part of the Reauthorization of the National Marine Sanctuaries Act and signed into law by President George H.W. Bush on November 4, 1992. In 1996, Congress amended the sanctuary's name to honor retiring Congressman Gerry Studds of the MA-10th District, who played a major role in creating the sanctuary. Initially based in Plymouth, MA, the sanctuary's administrative offices moved to its present location in Scituate, MA in 1999.

Over the past 20 years, sanctuary efforts have been instrumental in moving the Boston shipping lanes to protect endangered great whales, linking with Caribbean island nations through sister sanctuary agreements to protect a shared population of humpback whales, successfully nominating historic shipwrecks to the National Register of Historic Places, revealing changes to biodiversity on the seafloor due to human factors, and informing the general public about the rich resources of the sanctuary through museum exhibits, publications and electronic media.

For more information about Stellwagen Bank National Marine Sanctuary and its research, education and resource protection programs, visit the sanctuary website at <http://stellwagen.noaa.gov>.



Sanctuary Specifications

Gerry E. Studds Stellwagen Bank National Marine Sanctuary encompasses 638 square nautical miles (842 square miles) of open ocean, stretching between Cape Ann to the north and Cape Cod to the south.


The sanctuary seafloor consists of a diverse array of habitats, which provide shelter for at least 575 known species.

The area is considered one of the world's top 10 whale watching sites, due to the active feeding displays of several whale species, particularly humpbacks and finbacks, during the summer months. The sanctuary region also attracts North Atlantic right whales, one of the most critically endangered marine mammals in the world.

Stellwagen Bank has also been listed as an Important Bird Area through Mass Audubon and BirdLife International.

The sanctuary's location at the mouth of Massachusetts Bay puts it at the crossroads for four centuries of maritime commerce. The stories of this ship traffic provide insights into our nation's history. The shipwrecks that dot the sanctuary seafloor provide windows into our maritime past.

Boston Harbor Educators Conference 2012



Celebrating 20 Years of Discovery
New England's National Marine Sanctuary-- Stellwagen Bank
1992-2012

Saturday, September 29, 2012
 UMass/Boston, McCormack Hall

- 8:00-8:45 Registration – Coffee/Pastries
- 8:45-9:00 *Welcome* -- Anne Smrcina, SBNMS education coordinator
- 9:00-9:30 **Morning Keynote:** *An Ocean of Wonder: An Author's View of the Ocean and our Sanctuary*
 Deborah Cramer, author of Smithsonian Ocean and Great Waters: An Atlantic Passage
- 9:45-10:15 **Stellwagen Sanctuary Overview:** *20 Years of Sanctuary Research – and whale tagging too.*
 Craig MacDonald, Ph.D., SBNMS superintendent
- 10:30-11:15 **Research Strands: 1st Presentation**
- 11:30-12:15 **Research Strands: 2nd Presentation**
- 12:30-1:30 **Lunch** with Exhibits & Display of Winners from the MME Student Art Contest
- 1:30-2:15 **Afternoon Keynote:** *From the Jaws of the Great White to the Jaws of the Basking Shark: Studying Sharks in Local Waters* – Greg Skomal, Ph.D., senior fisheries biologist, Mass. Division of Marine Fisheries
- 2:30-3:30 **Education Workshop 1** (see next page and detailed descriptions on pages 6-10)
- 3:45-4:45 **Education Workshop 2**
- 2:30-4:45* *Alternate to Workshops – Video Theater*
- 5:00-6:00 **Reception & showing of *Ocean Frontiers* video (excerpt)**

RESEARCH STRANDS – Morning Presentations

WATER CURRENTS AND SEAFLOOR HABITATS

1. *Water Movement Around Stellwagen Bank and Beyond: Current Studies Assisted by Students and Fishermen* – James Manning, Oceanographer, NOAA Fisheries
2. *Studying Sediments, Habitats and Biodiversity: Seafloor Mapping, HabCam and SHRMP* – Ben Cowie-Haskell, Deputy Superintendent, SBNMS

ANIMAL STUDIES: WHALES AND SEABIRDS

1. *Sounds in the Sanctuary: Listening for Whales and Fish* – Sofie Van Parijs, Biologist, NOAA Fisheries
2. *Studying Seabirds in the Sanctuary: Citizen Science and Avian Research* – Anne-Marie Runfola, Volunteer Coordinator, SBNMS

UNDERSTANDING OUR PAST

1. *Captain John Smith, Centuries of Fishing Data and the Gulf of Maine Cod Project: Understanding the History of Sanctuary Fish Populations* – Karen Alexander, Research Fellow, UMass/Amherst & UNH Gulf of Maine Cod Project
2. *Discovering and Documenting Sanctuary Shipwrecks: Windows into our Maritime History* – Matthew Lawrence, Maritime Archaeologist, SBNMS

AFTERNOON EDUCATION WORKSHOPS

Workshop 1: The Art and Science of Nature Journaling for Marine Environments

Grade Level: 6-8 9-10

Subject Areas: English, Language Arts, Art, Science, Biology

Workshop 2: Birds of a Feather: Adaptations to Ocean Living in Pelagic Seabirds

Grade Level: 3-5, 6-8

Subject Areas: Science, Biology, Math, Geography

Workshop 3: Drops in the Bucket: Water Quality Testing for Middle and High School Students

Grade Level: 6-8; 9-12

Subject Areas: Chemistry, Math, Language Arts

Workshop 4: Expedition to the Seafloor: A Mock Shipwreck Mapping Exercise

Grade Level: grade 6-8

Subject Areas: History, Archaeology, Geography

Workshop 5: Global Change and the Ocean: Warming Waters, Rising Seas and Ocean Acidification

Grade Level: 6-8, 9-12

Subject Areas: Science, Biology, Chemistry

Workshop 6: Humans and Whales: A Comparative Study of Mammalian Body Systems

Grade Level: 6-8

Subject Areas: Science, Language Arts, Math, Geography

Workshop 7: Inspiring Art and Interdisciplinary Learning: *Limulus* and other Sanctuary Species as Muses and Models

Grade Level: K-2, 3-5, 6-8, 9-12

Subject Areas: Art, Science, Biology, Language Arts

Workshop 8: The Ocean's a Stage: Learning About Marine Animal Disentanglement through Games, Theater and Mounds of Plastic

Grade Level: K-2; 3-5

Subject Areas: Science, Language Arts, Art, Music

Workshop 9: A Picture is Worth a Thousand Words: Understanding Humpback Whale Life Histories, Population Biology and Human-caused Threats through Photography.

Grade Level: 6-8, 9-12

Subject Areas: Science, Math

Workshop 10: Robots in the Sanctuary: Building a Remotely Operated Vehicle

Grade Level: 6-8, 9-12

Subject Areas: Engineering, Technology, Physics, Marine Sciences

Workshop 11: Saving Whales: Teaching Fundamental Marine Conservation Concepts in Grade School Classrooms.

Grade Level: K-2; 3-5

Subject Areas: Science, Math, Technology

Workshop 12: Solving Word Problems, Digging into Data, Discovering Our Past

Grade Level: 6-8, 9-12

Subject Areas: Math, Language Arts, History, Science, Biology

Workshop 13: Tracking New England's Coastal Currents with Student-built, Fishermen-deployed and Satellite-tracked drifters

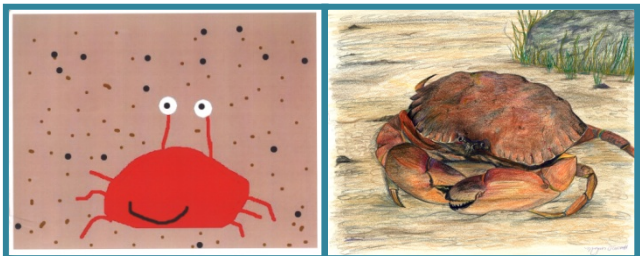
Grade Level: 6-8 9-10

Subject Areas: Physics, Marine Science, Technology, Engineering

Workshop 14: Writing Books for Children; Children Writing Books about Sanctuary Species

Grade Level: K-2, 3-5, 6-8

Subject Areas: Language Arts, Art, Science



Selecting Your Workshops:

Participants will have the opportunity to attend two workshops in the afternoon. We are asking pre-registrants to select their top three choices. We will try to accommodate everyone's preferences. Attendees who register at the door may not be able to participate in their preferred workshops if they are filled in advance. Due to research or resource conservation demands, some of our workshop leaders may have scheduling conflicts. We will try to substitute a similar workshop if this situation arises.

CONFERENCE SPEAKERS

Morning Keynote: Deborah Cramer

Background: Deborah Cramer lives with her family at the edge of a salt marsh in Gloucester, Mass., where she awaits the return of the alewives into tidal creeks each spring, and writes about science, nature, and the environment. She was awarded the science writing fellowship at the Dibner Institute for the History of Science and Technology at MIT in 2005-2006, and is currently a visiting scholar at MIT's Earth System Initiative. She has written two books, *Great Waters: An Atlantic Passage* (W.W. Norton 2001) and *Smithsonian Ocean: Our Water Our World* (2008), a companion book to the permanent Sant Ocean Hall at the National Museum of Natural History, our nation's most heavily visited museum. She has lectured about her writing and the sea on both sides of the Atlantic, at science and maritime museums, at major environmental and teachers' organizations, and at undergraduate and graduate schools in oceanography and journalism. She has been a member of the Sanctuary Advisory Committee for many years.

Presentation: Deborah Cramer notes that Pulitzer prize-winning Harvard biologist E.O. Wilson wrote: "It has often been proposed that the ultimate human future lies in space. It has become clear instead that the strange world really holding our future, now and forever, is the ocean." In her talk, she will discuss the meaning of the sea in our lives, some of the many ways all life, including ours, depends on the sea, and why having a marine protected area, like Stellwagen Bank National Marine Sanctuary, in our front yard, matters. Her presentation will include a collection of some of the world's finest photography from her book *Smithsonian Ocean: Our Water Our World*.



Sanctuary Overview: Craig MacDonald, Ph.D.

Background: Craig MacDonald is Superintendent of the Stellwagen Bank National Marine Sanctuary (2000-present) which is headquartered in Scituate, Massachusetts. In that capacity, he oversees sanctuary policies and planning, facilities management, and diverse projects including biodiversity conservation, marine mammal research, seafloor habitat studies, use assessments and maritime archaeology. These projects variously use large and small oceanographic vessels, science divers and an array of remote sensing technologies including robots, sonar and acoustic devices. In his previous position, Dr. MacDonald was the Ocean Resources Development Manager for the State of Hawaii (1985-2000) and during much of that time also was an Adjunct Professor of Ocean Policy at the University of Hawaii. He holds graduate degrees in oceanography and marine biology, has done postdoctoral work in fisheries science, and is a certified public administrator. He has worked extensively throughout Asia and the Pacific Islands on diverse projects involving the integration of ocean resources management and development.

Presentation: Craig MacDonald has served as sanctuary superintendent for more than half of the sanctuary's history. In his presentation he will provide an overview of the wide range of scientific programs that have been undertaken in the sanctuary over the past two decades, including humpback whale behaviors, masking of right whale sounds, seafloor mapping and shipwreck investigations. Many of the scientific findings have resulted in national and international recognition, making Stellwagen Bank's research program a leader in the sanctuary system.



Afternoon Keynote: Greg Skomal, Ph.D.

Background: You've seen him on television's *Shark Week*, swimming in a steel cage with great whites nearby. He's the man interviewed on the news when sharks are spotted off Mass. shores. He has a degree in marine biology, is the author of *The Shark Handbook* and is a senior fisheries biologist with the Massachusetts Division of Marine Fisheries. Dr. Skomal has been the guiding force in efforts to tag white sharks off Cape Cod and basking sharks in the sanctuary and elsewhere along the coast. In addition to local species of sharks, he has studied these fascinating animals from the Arctic Circle to the Central Pacific. He is an adjunct professor at the University of Massachusetts School for Marine Science and Technology in New Bedford and has been a technical expert for many documentary films and television programs over the past two decades.

Presentation: Ever before *Jaws* hit the big screen, sharks have attracted attention. But in the 37 years since the movie's premiere, sharks have acquired a fearful mystique. Greg Skomal's mission is to set the record straight and provide answers to questions about these animals' prey, ranges, characteristics and behaviors. In an interview with the Boston Globe he noted, "Seeing *Jaws* when I was 14 had the opposite effect on me than it had on most people. It drew me into the water rather than pushed me out. My curiosity about these animals was piqued." His recent work has involved tagging sharks to understand where they are going over time. Most of the attention has been on his great white missions, but Dr. Skomal has also pursued basking sharks, the largest sharks in this region, measuring up to 30 feet in length (but with minuscule teeth and a benign diet of plankton). He will discuss the recent rise in shark sightings, his on-going projects and the possible future of sharks in Massachusetts waters.



WORKSHOP DESCRIPTIONS

Workshop 1: The Art and Science of Nature Journaling for Marine Environments

Workshop Presenter: Peter C. Stone, Artist and Author (including recently released "Waltzes with Giants")

Grade Level: 6-8 9-10

Subject Areas: English, Language Arts, Art, Science, Biology

Materials Needed: Unlined Journals (Ring-bound sketchbooks); black pens

Background: Stellwagen Bank National Marine Sanctuary has been called one of the world's top 10 places to go whale watching and the birthplace of East Coast whale watching. Many schools use a trip to this site as a popular field trip in the fall or spring. As one of only 13 national marine sanctuaries across the nation, Stellwagen Bank has been recognized as an area of special national significance by Congress. The area has been a popular fishing ground for more than 400 years. The area is an ideal setting for study and inspiration. When personal visits are not possible, numerous images and videos available on the internet from the sanctuary and educational partner institutions, and museum/aquarium exhibits can provide an opportunity to explore a wild ocean place near our urban world. Peter C. Stone, a critically acclaimed artist, children's author (including the recently published "Waltzes with Giants," a provocative portrait of the endangered right whale) and biologist brings his interdisciplinary talents to this conference workshop.

Workshop Description: Journaling is a life skill that nurtures better attention, inner calm, and reflection. It also encompasses critical skills for Science, Math, Art, and Language Arts, including observation, intuition, inference, expression, and systems thinking. Through this workshop, participants will learn practices of journaling for daily living, in and out of the classroom. Working with objects related to Stellwagen Bank National Marine Sanctuary and other local marine environments, participants will explore drawing fundamentals, the mythology of symbols and living systems, dynamics of observation, visual learning strategies, objectivity/subjectivity, and journaling with expression. Nature STEM/STREAM (Science, Technology, Reading, English, Art, and Mathematics) models will help students develop ways to add information and impact to their work. Through drawing, writing, and scientific observation in nature journaling, participants will develop new awareness, delight, and connections with the natural world.

Workshop 2: Birds of a Feather: Adaptations to Ocean Living in Pelagic Seabirds

Workshop Presenter: Anne-Marine Runfola, Volunteer Program Coordinator, Stellwagen Bank National Marine Sanctuary

Grade Level: 3-5, 6-8

Subject Areas: Science, Biology, Math, Geography

Background: Stellwagen Bank National Marine Sanctuary, famous for its whales and fish, is also an important bird area. In fact, it's an Important Bird Area (with capital letters) according to Massachusetts Audubon, which is the regional association to nominate such places. Pelagic and coastal seabirds that visit the sanctuary include year-round residents and long-distance travelers that may fly tens of thousands of miles in a year. The sanctuary has worked with Mass Audubon over the past two decades to sponsor Christmas Bird Counts. Starting in 2012, the two organizations partnered to develop a Seabird Steward program to better understand the species that visit the sanctuary during each of the four seasons and to monitor changes over time. In developing this citizen science project, the sanctuary has developed educational programs for new participants to identify these avian sanctuary species.

Workshop Description: Participants will be treated to a slide show of local seabirds, with discussion about identification tips, seasonal and age color variations, migration patterns, and seasonal occurrence. The workshop will include hands-on activities that explain seabird adaptations, including beak shape, body and wing design and feeding behaviors. All participants will receive a Stellwagen Bank Sanctuary Seabird Spotting List for their own use during personal on-the-water excursions.

Workshop 3: Drops in the Bucket: Water Quality Testing for Middle and High School Students

Workshop Presenter: Meg Tabacsko, School Education Programs Director, Massachusetts Water Resources Authority

Grade Level: 6-8; 9-12

Subject Areas: Chemistry, Math, Language Arts

Background: In 1992, when Stellwagen Bank National Marine Sanctuary was created, another major environmental effort was underway – the cleanup of Boston Harbor. As part of that project, a nine-mile tunnel was being built to bring treated effluent out into Massachusetts Bay for dispersal. Controversy was great: but detailed models indicated that the wastewater would mix with no problem. A series of inshore and offshore monitoring stations were established, and regular water quality tests demonstrated that Massachusetts Bay water remained unaffected by the effluent. Today, water quality monitoring remains an important tool in providing information about the health and safety of local swimming beaches, important river, estuarine and ocean habitats, and drinking water reservoirs.

Workshop Description: To help bring concepts related to water quality into classrooms, the MWRA developed a field-based water quality testing program providing kits on a loan basis to schools. The kits contain equipment needed for testing temperature, pH, dissolved oxygen (DO), biochemical oxygen demand (BOD), nitrates, total dissolved solids (TDS), turbidity, and total coliform bacteria. An accompanying manual contains background information, lesson ideas, testing procedures, data collection and reporting forms, suggestions for interpreting the results, and extension activities. The program enables students to learn how to undertake basic water quality tests and techniques, increases student awareness of the importance of water quality, increases student understanding of the factors that contribute to water quality, and leads students to an understanding that each of us has a responsibility for maintaining the quality of our water. Once a teacher completes a workshop, he or she is eligible to borrow kits, at no cost, to use with his or her classes. This will not be a full workshop but will introduce the program and provide instruction on dissolved oxygen (DO) testing using the Winkler method. Each participant will receive a copy of the manual. Only schools located within the MWRA Service Area are allowed to borrow the kits.

Meg.Tabacsko@mwra.state.ma.us

continued on next page

Workshop 4: Expedition to the Seafloor: A Mock Shipwreck Mapping Exercise

Presenters: Matthew Lawrence and Deborah Marx, Maritime Archaeologists, Stellwagen Bank National Marine Sanctuary

Grade Level: grade 6-8

Subject Areas: History, Archaeology, Geography

Background: Did you know that hundreds of vessels have wrecked off the Massachusetts coast and offshore in the Stellwagen Bank National Marine Sanctuary? Since 2002, sanctuary maritime archaeologists have been searching the seafloor to locate and explore these tangible connections to our maritime past. Over the years, some significant sites have been located, explored and documented, including the coastal steamship Portland, the coal schooners Frank A. Palmer and Louise B. Cray that crashed and sank together, and a variety of fishing vessels that illustrate the history of that industry in New England waters. To date, seven ships at six sites have been named to the National Register of Historic Places. Learn about these lost relics by diving into history and trying your hands at mapping a mock shipwreck.

Workshop Description: Participants will learn about the tools and techniques that maritime archaeologists use to map a shipwreck underwater. Participants will use these techniques to document a mock shipwreck that will be sitting on our classroom "seafloor." Physical clues from artifacts will be recorded on data sheets and used to determine the lost vessel's identity. Teachers will be provided with information on how to make their own mock shipwreck to use in the classroom and review the concepts that students will take away from the exercise.

Workshop 5: Global Change and the Ocean: Warming Waters, Rising Seas and Ocean Acidification

Presenter: Annette Brickley, Education Manager, Ocean Explorium of New Bedford

Grade Level: 6-8, 9-12

Subject Areas: Science, Biology, Chemistry

Background: In the development of NOAA's regional global change plan, Stellwagen Bank National Marine Sanctuary has suggested that the site be considered a sentinel site for monitoring, due to the historic value of the area's natural resources, the concentration of scientific studies and its proximity to research institutions. Changing seawater temperatures, rising seas and ocean acidification may have significant effects on local animal populations and human uses of the region. Some early studies indicate that there may already be changes to the ecosystem.

Workshop Description: How are we connected to changes in ocean temperature, sea level, and pH and how are they connected to each other? In this workshop, we will learn about these relationships due to global climate change and sample from some of the many curriculum resources available for the classroom. Participants will be eligible to receive a complimentary copy of "Acid Test" from NRDC.

Workshop 6: Humans and Whales: A Comparative Study of Mammalian Body Systems

Workshop Presenter: Peter Trull, Naturalist, Author and ScienceTeacher, Cape Cod Lighthouse Charter School

Grade Level: 6-8

Subject Areas: Science, Language Arts, Math, Geography

Background: The humpback whales of Stellwagen Bank may appear more fish-like than human, but according to our system of classification we are closer than you think. As we begin to learn more about these massive mammals, we are finding additional points of similarity – as well as differences. The Cape Cod Lighthouse Charter School, in partnership with Stellwagen Bank National Marine Sanctuary, is developing a middle school curriculum that uses the humpback whale as a central theme to tie lesson plans on classification, habitat, predator-prey relationships, and, particularly, mammalian body systems, including digestive, circulatory, and muscular-skeletal systems. The project is being undertaken through the assistance of a National Marine Science Teachers Toyota Tapestry Grant.

Workshop Description: The new curriculum incorporates middle school grade appropriate reading comprehension units, classroom activities, and evaluation tools, along with student-produced supplementary videos. Although targeted for seventh grade science classes, and featuring units on classification and animal populations, the curriculum provides an ideal reinforcement for previously studied human biology units. In this workshop, participants will sample units from the curriculum that will be undergoing beta testing this spring. Teachers who are interested in field testing the material in their classroom are encouraged to attend. All materials, when completed, will be web published and available free of charge. The workshop will also provide guidance on using the curriculum to supplement whale watch field trips into the sanctuary.

Workshop 7: Inspiring Art and Interdisciplinary Learning: Limulus and other Sanctuary Species as Muses and Models

Presenters: Arlene Mollo, Artist and Professor of Art Education, UMass Dartmouth and Anne Smrcina, Education Coordinator, Stellwagen Bank National Marine Sanctuary

Grade Level: K-2, 3-5, 6-8, 9-12

Subject Areas: Art, Science, Biology, Language Arts

Background: The Horseshoe Crab (*Limulus polyphemus*), a nearly 400 million-year old marine chelicerate arthropod, is both a neolithic relic and a contemporary bio-medical wonder! In many cultures this warrior crab, related to spiders and scorpions, has been a source of inspiration to legions of artists, scientists, poets and inventors. It is also a sanctuary species, although not commonly seen on the open ocean seafloor, but more commonly along the shore. Many other marine species found in our ocean backyard have served to inspire, enthrall, intellectually stimulate and challenge. An education goal of Stellwagen Bank National Marine Sanctuary is to bring a greater awareness of local marine species to students by engaging them in a variety of educational pursuits, including an annual art contest sponsored by Massachusetts Marine Educators that easily lends itself to use in interdisciplinary education units.

continued on next page

Workshop Description: In this hands-on, interdisciplinary art and science workshop, participants will view dynamic visual images of numerous limuli on a Cape Cod beach, post-hurricane, showing how they generated novel creations. In addition, a collection of amazing underwater images of sanctuary species will be shown. The workshop includes an interactive, hands-on activity to understand how observation and invention, especially when using art media, can help learners approach deeper visual awareness and understanding. Participants will be shown how to directly connect art and science in a most enjoyable way – first, by conveying what is “real and seen” and secondly, by exploring ways to expand that imagery toward what is “unseen and imagined”. Educators can employ this same process to promote innovative thinking across the curriculum as well as to encourage colleagues to cross and connect the disciplinary realms of science, art, language, literature and poetry. The 2013 marine art contest will also be announced at this time.

Workshop 8: The Ocean’s a Stage: Learning About Marine Animal Disentanglement through Games, Theater and Mounds of Plastic

Workshop Presenter: Jesse Mechling, Education Director, Provincetown Center for Coastal Studies and Jody O’Neil, Writer/Director of *Ibis*

Grade Level: K-2; 3-5

Subject Areas: Science, Language Arts, Art, Music

Background: In 1984 a young humpback whale named Ibis became entangled in a gill net in Gloucester, yet was able to swim through what is now Stellwagen Bank National Marine Sanctuary to Provincetown Harbor where it was successfully disentangled by a team from the Provincetown Center for Coastal Studies (PCCS) on Thanksgiving Day. That special day marked the beginning of marine animal disentanglement in New England and the world. Now, 28 years later, PCCS is among a handful of organizations around the world that disentangle large marine animals, such as whales and turtles. PCCS education has developed a number of programs to educate school children and general audiences about the problem of marine animal entanglement. Two years ago, PCCS worked with a local playwright to develop a children’s theater production based on the story of Ibis to educate audiences and stimulate discussions about whale disentanglement.

Workshop Description: This workshop provides a review of various educational tools available to educate children and adults about marine animal entanglement, including games, theater and a life-sized inflatable whale. Participants will explore the use of theater as a means of synthesizing scientific information through the use of language, music and art. Life-sized models provide a means of exploring relationships, mathematical and biological concepts, and historical information within the “belly of the beast.” (Both the play and whale model are traveling programs from PCCS.) Additional simple hands-on activities can be adapted for use in classroom settings.

Workshop 9: A Picture is Worth a Thousand Words: Understanding Humpback Whale Life Histories, Population Biology and Human-caused Threats through Photography.

Workshop Presenter: Regina Asmutis-Silvia, Senior Scientist, Whale and Dolphin Conservation Society

Grade Level: 6-8, 9-12

Subject Areas: Science, Math

Background: Stellwagen Bank National Marine Sanctuary is home to a population of humpback whales that has been studied more extensively than any other whales in the world. Through photographic identification we know their family histories, calving rates, behaviors, where these whales migrate to breed and the threats they face on a daily basis. We have learned there is a 70 percent site-fidelity rate for calves meaning they return to the Gulf of Maine feeding area where their mothers first brought them. We have also discovered areas off the mid-Atlantic east coast where juvenile humpbacks overwinter and feed, rather than migrate to the Caribbean. While the technology has advanced from black-and-white film to digital imagery, the technique of identifying whales through photography remains as pertinent now as it did nearly 30 years ago.

Workshop Description: Participants in this workshop will learn how to identify individual humpback whales based on fluke markings, dorsal fin scars and other identifying features and learn how this catalog information can be analyzed to assess life history, health, and environmental threats. Activities use of observation, classification and calculation skills. Participants will identify whales photographed in the sanctuary this past summer and will look for important conservation clues, such as entanglement and propeller scars.

Workshop 10: Robots in the Sanctuary: Building a Remotely Operated Vehicle

Presenter: Mary Kay Taylor, Education Director, Maritime Gloucester

Grade Level: 6-8, 9-12

Subject Areas: Engineering, Technology, Physics, Marine Sciences

Background: Much of Stellwagen Bank National Marine Sanctuary is deeper than 120 feet, the maximum depth for traditional scuba diving. Research in these waters requires tools that allow scientists to photograph, video, and sample seafloor habitats and species, as well as explore for cultural resources, such as shipwrecks. To that end, the sanctuary uses remotely operated vehicles on a regular basis. The Sea Perch is a remotely operated underwater vehicle, or ROV, made from PVC pipe and other inexpensive, easily available materials. MIT Sea Grant has been training educators from across the United States and around the world in Sea Perch construction and use since 2003. Other schools participate in the annual international ROV competition, which challenges students to design original ROVs that can accomplish particular underwater tasks.

Workshop Description: Maritime Gloucester has been using the Sea Perch to provide hands-on learning experiences for Cape Ann students and to encourage further studies in robotics, engineering, and marine sciences. In addition to working with a variety of Sea Perch models and building materials, participants will be introduced to MIT Sea Grant’s Sea Perch Sensor Suite project manual for high school students. These sensors record temperature, light, and depth data. This workshop provides an introduction to the Sea Perch program and will allow teachers to study sample ROVs. Information about Marine Advanced Technology Engineering Center’s (MATE) annual ROV competition will also be available.

Workshop 11: Saving Whales: Teaching Fundamental Marine Conservation Concepts in Grade School Classrooms

Workshop Presenters: Sofie Van Parijs, Grace Simpkins, & Genevieve Davis, Biologists, NOAA Fisheries Northeast Fisheries Science Center

Grade Level: K-2; 3-5

Subject Areas: Science, Math, Technology

Background: The sea isn't so silent, and whale researchers are discovering many new facets of the ocean environment at Stellwagen Bank sanctuary. Whales sing and grunt; fish chatter; ships grind and roar; sonars ping; lightning snaps. NOAA Fisheries' Protected Species Branch has been an active participant in local research along with sanctuary scientists and others in projects relating to key marine mammal topics. In addition to their at-sea studies, branch scientists at the Northeast Fisheries Science Center have received a three-year grant to conduct educational outreach efforts regarding this research, including hands-on activities, presentations, and projects on marine mammals with K-12 classrooms, undergraduate students, and the aquarium public. The programs use state-of-the-art technologies, such as the MimioTeach (an interactive white board), to engage audiences and reinforce concepts. The group has successfully created a new interactive "Sounds of the Sea" exhibit at the Woods Hole Science Aquarium, focusing on sanctuary-based research that has become a popular hit with the aquarium's 75,000 annual visitors (<http://www.nefsc.noaa.gov/psb/acoustics/psbAcousticsKiosk.html>).

Workshop Description: Participants in this workshop will receive lesson plans designed to teach elementary-school aged children about important issues regarding the conservation and management of marine mammals. Topics focus on the threats facing marine mammals within Stellwagen Bank National Marine Sanctuary, including high noise levels, disruption of communication, collisions with ships, and disturbance of normal behaviors. Participants will be asked for feedback, and to collaborate on how these lessons could be incorporated into the grade school curriculum. All of the lessons offered in the workshop will be available online as an open source educational resource.

Workshop 12: Solving Word Problems, Digging into Data, Discovering Our Past

Workshop Presenter: Karen Alexander, Research Fellow, UMass/Amherst and University of New Hampshire, Gulf of Maine Cod Project

Grade Level: 6-8, 9-12

Subject Areas: Math, Language Arts, History, Science, Biology

Background: Today, as resource managers seek to restore populations of endangered, threatened and/or commercially important marine species, they need to know what healthy populations look like and what characterizes healthy marine ecosystems. A recent study by the Gulf of Maine Cod Project [part of the Census of Marine Life's History of Marine Animal Populations (HMAP)] provided fascinating findings about animal abundance in the Stellwagen Bank region over past centuries. Researchers dug into data troves from old journals and ship logs, fishing records, diaries and even maps found in government offices and research libraries for information about fisheries. Results showed significant change in the fish caught, as well as changes in the fisheries and the coastal communities that benefited from fishing. These data show connections between ecological and economic health that derive from the experiences of fishermen. The use of historical data can inform present-day marine resources management by showing us the benefits of healthy fish stocks and biologically diverse marine ecosystems.

Workshop Description: Participants will practice solving and creating word problems using data from the Stellwagen Bank Historic Marine Animal Population study, modeling work that was done at the University of New Hampshire. A number of sources for this type of historic marine resource data will be reviewed and guidance provided on how teachers and students can retrieve additional data on their own. Discussion will include brainstorming how historical material can be used in various content areas, including math, science and language arts classes. Participants interested in assisting the development of classroom activities and other curricular materials using historic data for K-12 and adult education classes are encouraged to attend.

Workshop 13: Tracking New England's Coastal Currents with Student-built, Fishermen-deployed and Satellite-tracked Drifters

Workshop Presenter: Jim Manning, Oceanographer, NOAA Fisheries Northeast Fisheries Science Center

Grade Level: 6-8 9-10

Subject Areas: Physics, Marine Science, Technology

Background: An understanding of ocean currents is critical for many reasons, ranging from understanding the transport of eggs and larvae for fisheries management, following the spread of oil spills for cleanup purposes, and calculating the position of ships and individuals lost at sea. In Stellwagen Bank National Marine Sanctuary, recent drifter studies have shown prevailing currents that may be serving as a distinct transport mechanism for fish and invertebrate larvae out to Georges Bank. Over the past several years, students have built hundreds of "drifters" to help scientist track transport pathways along the entire New England coast. The archive of drifter data now has approximately a half million kilometers of tracks to provide statistics on the flow fields. In addition to building and constructing the units, students learn how to follow the path of their drifter on the web after it has been deployed. The eco-friendly drifters are typically deployed by local fishermen in the coastal currents and the sanctuary's research vessel joining the deployment team this year. Most of the drifters travel well offshore to eventually get entrained in the Gulf Stream.

Workshop Description: Teachers will first hear the history and background for the project including the motivation and various applications of "drifters". Some of the highlights of nearly a thousand different tracks are presented in the form of animations. Finally, teachers will learn the basic steps in constructing a drifter from materials available at their local hardware and lumber yard with additional instruction on how to follow the tracks in the classroom, download data, and develop lesson plans.

continued on next page

Workshop 14: Writing Books for Children; Children Writing Books about Sanctuary Species

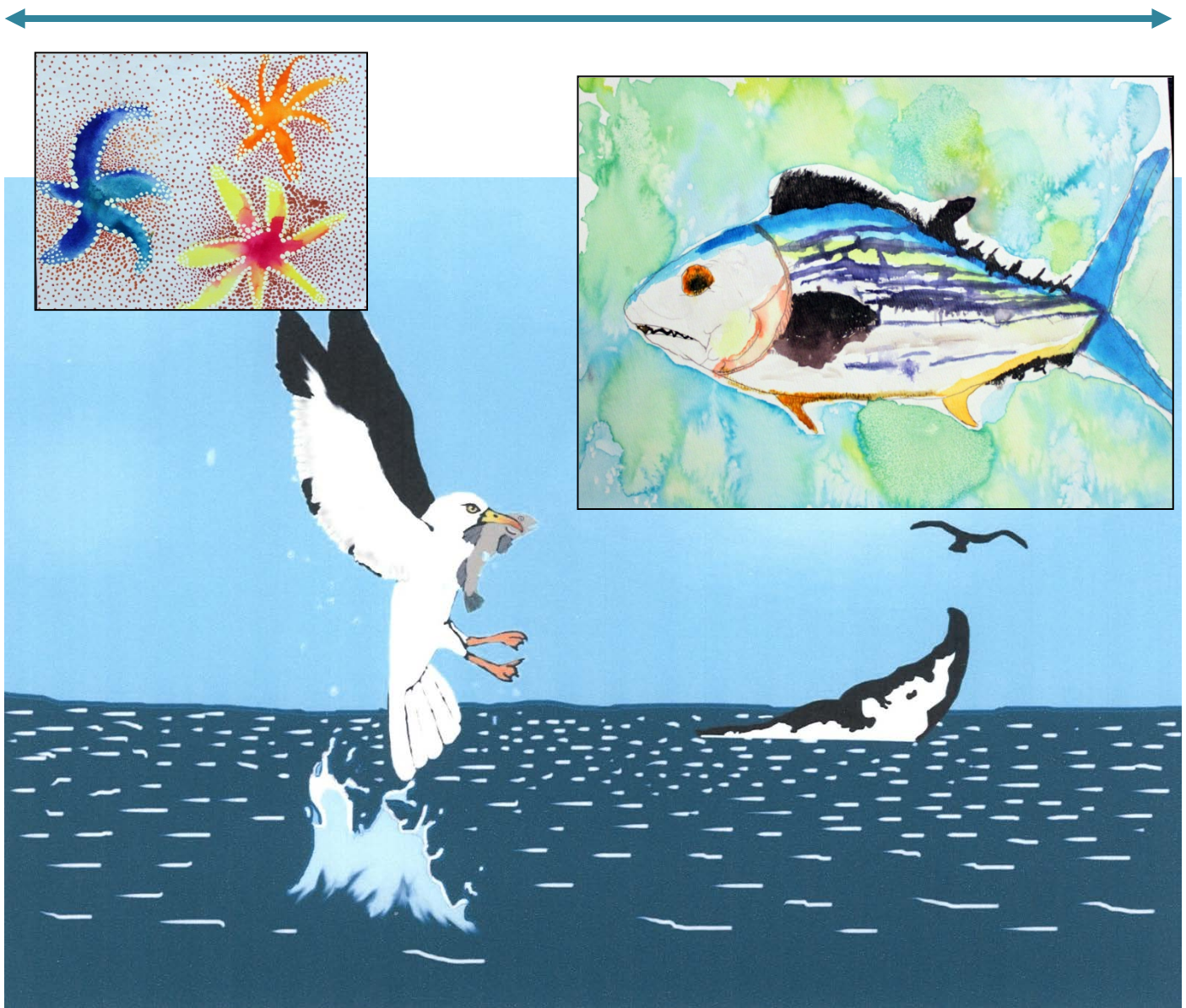
Presenters: Anne Smrcina, Peter Stone

Grade Level: K-2, 3-5, 6-8

Subject Areas: Language Arts, Science, Art

Background: Stellwagen Bank National Marine Sanctuary is New England's national marine sanctuary and it is filled with a great array of special creatures. Many of these animals, such as humpback whales and white sharks, fascinate young children. But other creatures, including crabs, lobsters, seabirds, turtles and fish of all kinds have also attracted attention. The sanctuary region also holds a rich maritime history. Authors have written a wide variety of books, both fiction and non-fiction, on marine topics for young children. The plethora of species in the sanctuary also provides fodder for student writing, where students can think creatively to develop a story about a sanctuary animal or undertake online research to prepare a species biography.

Workshop Description: Several of the presenters have written books about sanctuary species and will relate personal stories about researching and writing marine science topics, preparing and selecting art/photographs for books and the ins and outs of getting published. The workshop will also review a selection of children's literature related to the ocean, with particular reference to books that have connections to our local waters. Participants will also receive tips on setting up a book-writing program in the classroom, with, of course, a focus on their local marine sanctuary as a common theme. [The sanctuary encourages student authors to send their books to the sanctuary, where a selection of the best entries will be web published.]



Conference Organizing Committee: Peg Collins, co-chair; Anne Smrcina, co-chair; Dennis Leigh, facilities coordinator; Russ Bowles; Gail Brookings; Elisabeth Colby; Carl Johnson; Joe LaPointe; Douglas Maitland, Duncan Maitland; Linda McIntosh; Nicole Scola; Meg Tabacsko

Directions to UMass/Boston



Via Public Transportation

Participants who use public transportation will receive reimbursement, providing they pre-register and have a receipt for the day's transit fees.

Subway

[Take the Red Line to JFK/UMass Station.](#) A [free shuttle bus](#) will carry you to the campus. The shuttle bus runs every 20 minutes from 7:40 am to 7:00 pm on Saturdays.

Commuter Rail

Take the commuter rail to the JFK/UMass station from the South Shore on the [Middleboro](#), [Plymouth](#) and [Greenbush](#) lines.

Bus

Kenmore Square stop (service all day): the Number 8 bus; the last one leaves campus at 1 a.m. Forest Hills stop (rush hour only): the Number 16.

Via Automobile

By car from the north

Take Interstate 93 South through Boston to Exit 15 (Columbia Road/JFK Library). Take a left at the end of the ramp onto Columbia Road, and then take your first right in the rotary. Follow the University of Massachusetts signs along Columbia Road and Morrissey Boulevard to the campus.

By car from the south

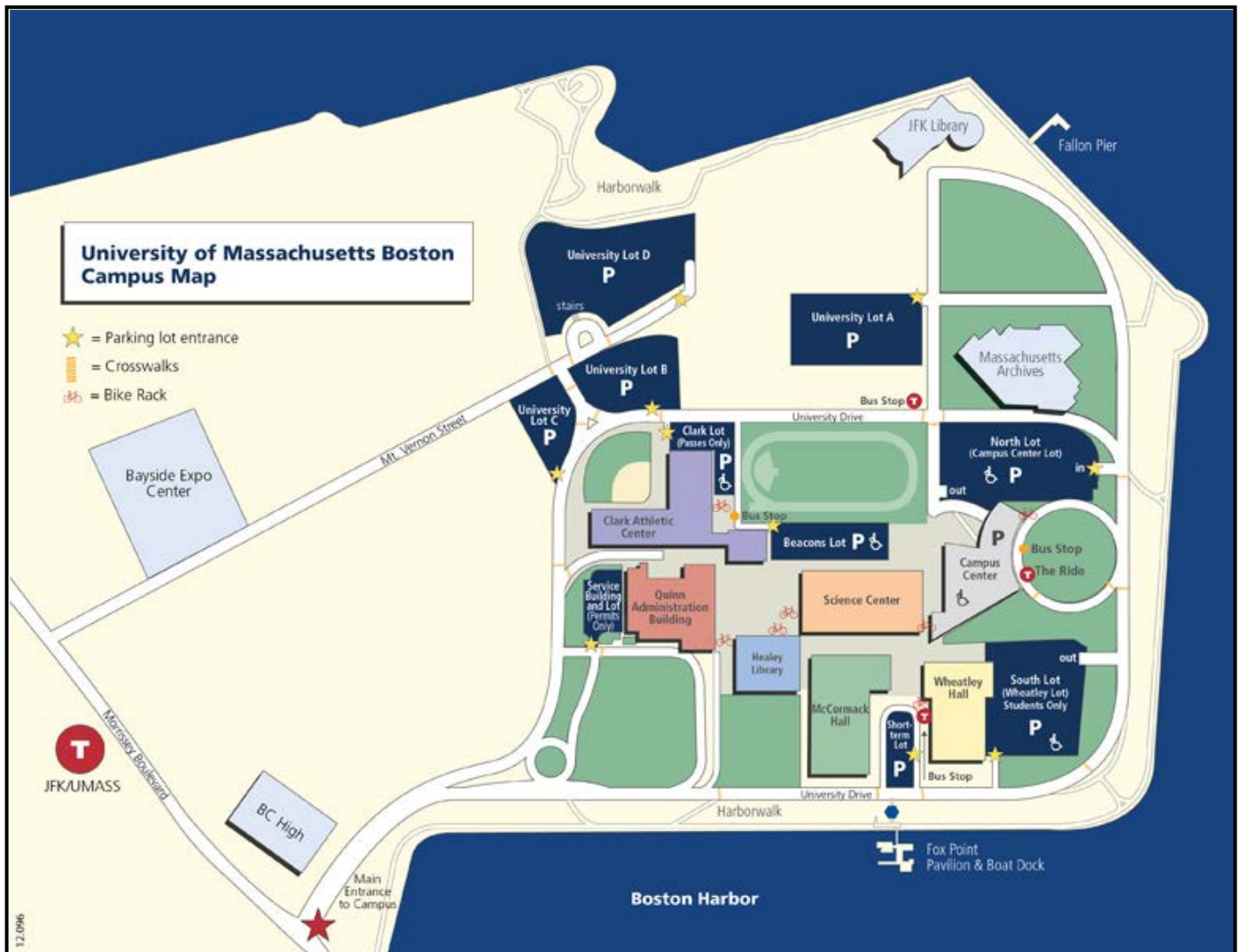
Take Interstate 93 North to exit 14 (Morrissey Boulevard/JFK Library) and follow Morrissey Boulevard north to the campus.

By car from the west

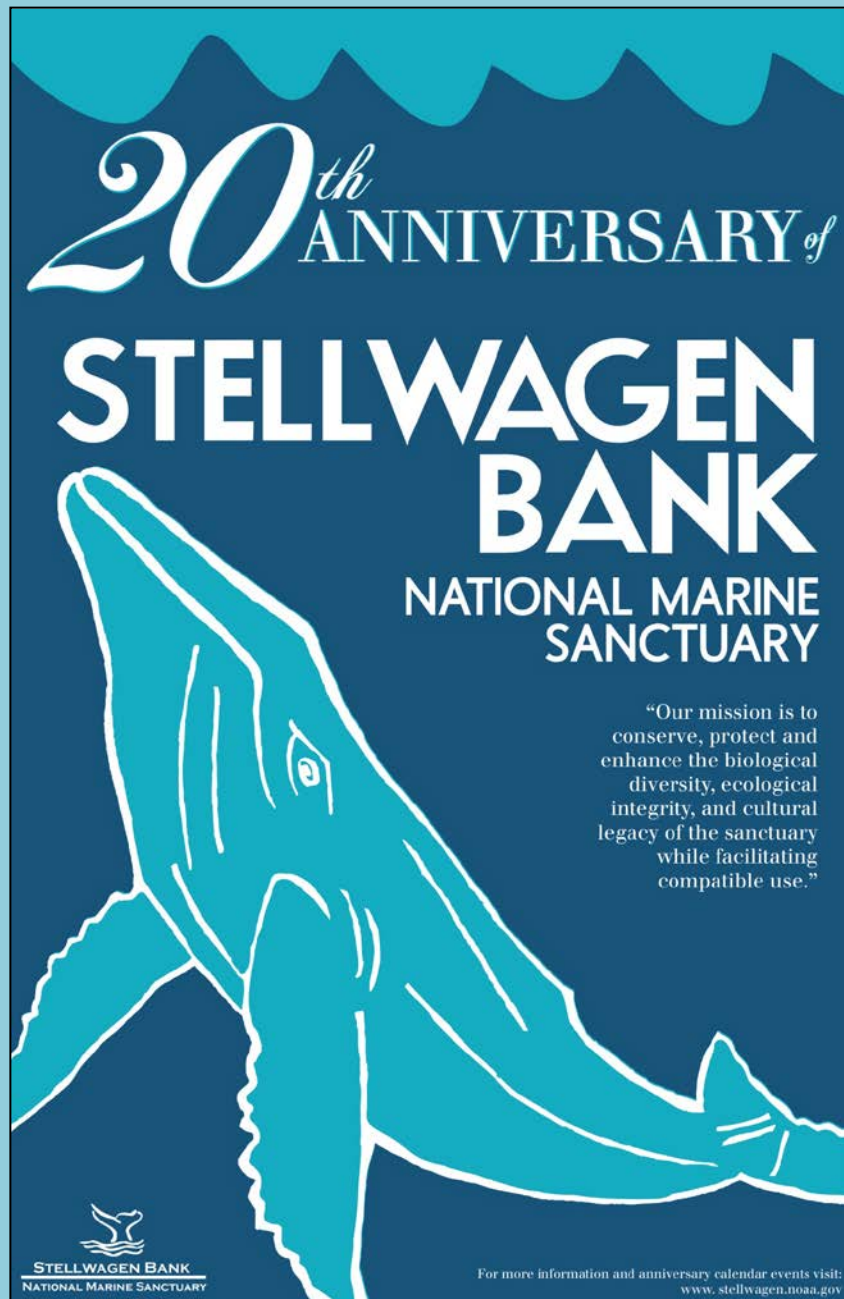
Take the Massachusetts Turnpike (Interstate 90) east to Interstate 93. Take I-93 South one mile to Exit 15 (JFK Library/South Boston/Dorchester). Take a left at the end of the ramp onto Columbia Road, and then take your first right in the rotary. Follow the University of Massachusetts signs along Columbia Road and Morrissey Boulevard to the campus.

Parking fees

\$6 per single use. Participants who pre-register will receive a free parking pass, courtesy of UMass Urban Harbors Institute.



Boston Harbor Educators Conference – September 29, 2012



To register for the Boston Harbor Educators Conference, go to <http://www.massmarineeducators.org> (click on the **Registration Now Open!!** link). Information about fees and discounts can be found there.

Submit your name, address, school, email address, payment method (check, purchase order or credit card through PayPal) and top three (3) workshop choices.

Parking or public transportation costs will be covered by UMass Urban Harbors Institute for participants who pre-register and have valid public transportation receipts.

Art and Photo Credits: Front Cover -- Humpback Whales SBNMS file photo taken under NOAA Fisheries Permit; pg. 2 Map-- NOAA/SBNMS; pg. 4 -- Computer Graphics Crab by Talia D., grade 2, West Elementary School, Plymouth; Jonah Crab by Morgan O'Connell, grade 10, Milton Academy; pg. 5 -- Deborah Cramer courtesy of D. Cramer; Craig MacDonald courtesy of NOAA/SBNMS; Greg Skomal photo by Clarita Berger; pg. 10 -- Sea Stars by Pei Z., grade 1, Shenzhen, China; Bluefin Tuna by Michael J., grade 3, Station Avenue Elementary School, So. Yarmouth; Computer Graphics Sanctuary Scene by Isabelle C., grade 7, Boston Latin School; pg. 11 Map – UMass/Boston; Back Cover – Computer Graphics Sanctuary 20th Anniversary by Alexandra Walker, grade 12, Hingham HS