

MARINE PROTECTED AREAS

Understanding Marine Protected Areas

By Anne Smrcina, Education and Outreach Coordinator, Stellwagen Bank National Marine Sanctuary
(adapted from NOS Ocean Facts and MPA Center websites)

Although we hear it used on a regular basis, many people do not fully understand what the term “marine protected area” (MPA) truly means. The term often provokes hot debates among various ocean users and advocates, with various definitions and criteria espoused. Some people interpret MPAs to mean areas closed to all human activities, while others interpret them as special areas set aside for recreation (e.g., national parks) or to sustain commercial use (e.g., fishery management areas). These are just a few examples of the many types of MPAs.

In reality, “marine protected area” is a term that encompasses a variety of conservation and management methods in the United States. If you have been fishing in central California, diving near a shipwreck in the Florida Keys, camping in Acadia, snorkeling in the Virgin Islands, or hiking along the Olympic Coast, you were probably one of thousands of visitors to an MPA.

The National Ocean Services’ “Ocean Facts” web page offers a concise definition:

“Marine protected areas (MPAs)” are defined by Executive Order 13158 as “any area of the marine environment that has been reserved by Federal, State, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein.”

MPAs in the U.S. come in a variety of forms and are established and managed by all levels of government. There are marine sanctuaries, estuarine research reserves, ocean parks, and marine wildlife refuges. Each of these sites differ. MPAs may be established to protect ecosystems, preserve cultural resources such as shipwrecks and archaeological sites, or sustain fisheries production.

[Examples in Massachusetts’ coastal and offshore waters include: Stellwagen Bank National Marine Sanctuary at the mouth of Massachusetts Bay, Waquoit Bay National Estuarine Research Reserve along the Falmouth/Mashpee coast, Cape Cod National Seashore, Mashpee National Wildlife Refuge, Monomoy National Wildlife Refuge, Nomans Land Island National Wildlife Refuge and Parker River National Wildlife Refuge, as well as three fishing gear restricted areas – Lydonia Canyon, Oceanographer Canyon and Veatch Canyon. The new Northeast Canyons and Seamounts Marine National Monument is an MPA. There are also 40

continued on page 8

• INSIDE THIS ISSUE •

Understanding Marine Protected Areas	1	From the Editors Desk	6
MME Calendar	2	Award Time	7
MPA Classification System	3	Nominations: 2017-2018 Election	9
President’s Message	4	Marine Science in the News	12
MME Annual Meeting	5	Classroom Activities	15
		HS Marine Science Symposia	16

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2017 MME Spring Calendar

Check the [website](http://www.ma-marine-ed.org) and
 F&J for details

MARCH 9, 2017
**High School Marine Science
 Symposium**
 Northeastern University
 Information in this issue

MARCH 15, 2017
**High School Marine Science
 Symposium**
 Salem State University
 Information in this issue

APRIL 8, 2017
**Woods Hole Conference and
 Annual Meeting**

MAY 10, 2017
MME Board Meeting
 South Shore Natural
 Science Center
 Host Chris Jacobs
cjacobs@ssymca.org

All MME Members are invited to
 Board Meetings.
 Let the host know if you are coming.

User's Guide to the MPA Classification System

Source: [National Marine Protected Areas](#)

The MPA Classification System can be applied to a single MPA site, or to individual management zones established within a larger MPA site. In a zoned MPA, each zone is classified independently based on its own characteristics and attributes. The overall MPA site then reflects the aggregate characteristics of its component management zones. Four of the five classification characteristics require unique, site-specific selections for the associated attribute options. One (Conservation Focus) allows multiple attribute selections in recognition of the complexity and variety of MPA applications. MPA examples are presented here for illustrative purposes only and may not always correspond to specific local sites.

The MPA Classification System uses five key functional characteristics to describe any MPA. Taken together, these characteristics influence the site's effects on local ecosystems and human users, and thus its role in contributing to the conservation of healthy marine ecosystems. Among these five site characteristics, the first two – the site's Conservation Focus and its Level of Protection – reflect many of the issues of greatest interest to stakeholders in local, regional, and national MPA dialogues.

Conservation Focus

Most MPAs have legally established goals, conservation objectives, and intended purpose(s). Common examples include MPAs created to conserve biodiversity in support of research and education; to protect benthic habitat in order to recover over-fished stocks; and to protect and interpret shipwrecks for maritime education. These descriptors of an MPA are reflected in the site's Conservation Focus, which represents the characteristics of the area that the MPA was established to conserve. The Conservation Focus, in turn, influences many fundamental

aspects of the site, including its design, location, size, scale, management strategies and potential contribution to surrounding ecosystems. U.S. MPAs generally address one or more of these areas of Conservation Focus:

Natural Heritage: MPAs or zones established and managed wholly or in part to sustain, conserve, restore, and understand the protected area's natural biodiversity, populations, communities, habitats, and ecosystems; the ecological and physical processes upon which they depend; and, the ecological services, human uses and values they provide to this and future generations. *Examples: Natural Heritage MPAs include most national marine sanctuaries, national parks, national wildlife refuges, and many state MPAs.*

Cultural Heritage: MPAs or zones established and managed wholly or in part to protect and understand the legacy of physical evidence and intangible attributes of a group or society which is inherited and maintained in the present and bestowed for the benefit of future generations. *Examples: Cultural Heritage MPAs include some national marine sanctuaries, national and state parks, and national historic monuments.*

Sustainable Production: MPAs or zones established and managed wholly or in part with the explicit purpose of supporting the continued extraction of renewable living resources (such as fish, shellfish, plants, birds, or mammals) that live within the MPA, or that are exploited elsewhere but depend upon the protected area's habitat for essential aspects of their ecology or life history (feeding, spawning, mating, or nursery grounds). *Examples: Sustainable Production MPAs include some national wildlife refuges and many federal and state fisheries areas, including those established to recover over-fished stocks, protect by-catch species, or protect essential fish habitats.*

Level of Protection

MPAs in the U.S. vary widely in the level and type of legal protections afforded to the site's natural and cultural resources and ecological processes. Any MPA, or management zone within a larger MPA, can be characterized by one of the following six levels of protection, which will directly influence its effects on the environment and human uses.

Uniform Multiple-Use: MPAs or zones with a consistent level of protection, allowable activities or restrictions

continued on page 10



Image taken under NOAA Fisheries permit #14245

Photo credit: Ari Friedlander



President's Message



Greetings Everyone,

As the winter draws to a close so does my role as MME President. During the past two years I have been honored to serve the organization in this capacity and look forward to moving into the role of past-president and MME representative to the NMEA. During the years I have been in the president and president-elect positions we have developed and put into action a Strategic Plan for the organization. This plan led to increasing our avenues of communication to the membership and improving the financial stability of the organization.

We developed a partnership with Northeastern University for a second High School Marine Science Symposium, enabling us to offer one session on the North Shore and another in Boston. The team that had been organizing the Marine High School Science Symposium at UMass Dartmouth took a break as the locations shifted to the Boston area and the North Shore for the last few years. I want to thank Margaret Brumsted and her committee for all the years they dedicated to the HSMSS held at UMass Dartmouth and for developing the model now being implemented by Carole McCauley and Val Perini. The MME Annual Meeting moved to the Quissett Campus at WHOI, providing us with a larger space and enabling us to offer more hands-on workshops during the afternoon to enhance the morning scientific presentations. The Art Contest has continued to expand and Anne Smrcina has developed a workshop that can accompany

the art display as it travels throughout Massachusetts and Rhode Island.

This Spring we have an exciting Annual Meeting planned for Saturday, April 8 so save the date. *Revealing Our Ocean's Secrets and Bringing Them Into the Classroom* features WHOI faculty members Dr. Kara Dodge and Kenneth Kostel as keynote speakers. Workshops include building ocean drifters, using buoy data in the classroom, combining art and marine science, and a tour of WHOI's Mass Spectrometer Laboratories as well as other offerings. The MME Awards are presented during the annual meeting and these awards are described in this issue of *F&J* as well as on the MME website. The deadline for submitting nominations for these awards is March 15th. Please help us in honoring your colleagues by nominating someone for an award.

As I reflect on MME's goals, accomplishments and action plan for this year, I know the organization will continue to thrive. So in a few short months I will be turning over the helm of the organization to incoming President Anne Smrcina, enabling her to continue to strengthen MME as we begin a membership drive and expand events that support our members in marinating STEM education with marine science in our schools and institutions.

See you at the Annual Meeting on April 8!

Sandi



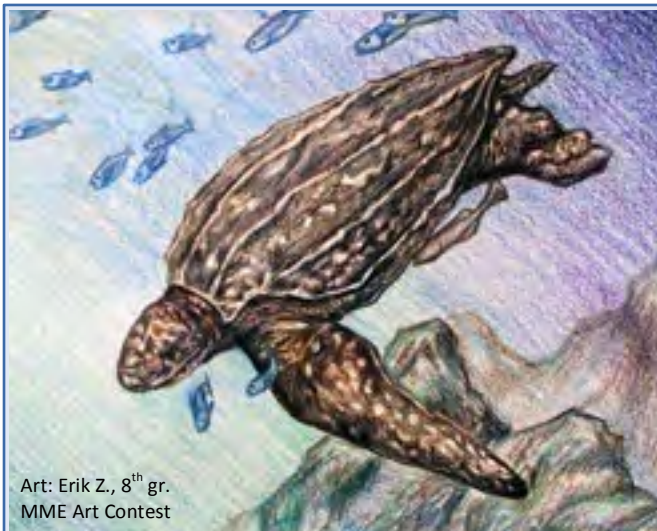
Massachusetts Marine Educators 41st Annual Meeting and Conference

Revealing our Ocean's Secrets and bringing them into the classroom

Saturday, April 8, 2017

8:30am – 4:15pm

Quissett Campus at Woods Hole Oceanographic Institution



Art: Erik Z., 8th gr.
MME Art Contest

KEYNOTE SPEAKERS

Insights into Leatherback Behavior using Tags, Cameras and Robots

Dr. Kara Dodge, Postdoctoral Investigator,
Biology Dept., Woods Hole Oceanographic
Institution

Hands Across the Water: Introducing Students to Science at Sea

Kenneth Kostel, web writer/editor, Woods
Hole Oceanographic Institution

SCHEDULE

- 8:30 am Registration in Clark Bldg, 5th Fl.
- 9:00 am Welcome and Opening Remarks
- 9:15 am Keynote Lectures
- 12:00 pm Business Meeting, Awards, Lunch
- 1:30 pm Workshop 1
- 3:00 pm Workshop 2
- 4:15 pm Reception at Sea Education Association

Check website for workshop titles.

REGISTRATION

Early Bird, Regular and Student registrations include a one-year MME membership, lunch, social reception, and all conference activities. Check the website for descriptions of workshops. Register on arrival Saturday for your preferred sessions.

Early Bird Registration \$90 before March 25, 2017

Regular Registration: \$95 after March 25, 2017

Walk-In Registration: \$100 (*lunch not guaranteed*)

Full Time Student: \$55

Life Member: \$55

Conference questions? Contact: Anne Smrcina
anne.smrcina@noaa.gov or 781-546-6007

Register online: <https://massmarineeducators.wufoo.com/forms/m15x0641tpx1o8/>

www.ma-marine-ed.org



From the Editor's Desk

March and April are two of the busiest months of the MME calendar. Locally, we have two High School Marine Science Symposia scheduled, one in Boston and one in Salem. If past years are an indication, between 500 and 600 students will participate in these events. If you have not done so yet, register your students NOW. These events are very popular, and they do fill up. Complete information and registration forms are found at our website. <http://ma-marine-ed.org/mmeevents/high-school-marine-science-symposium/>.

Very soon after, is the 41st Annual Meeting and Conference on April 8 at the Woods Hole Oceanographic Institution. The title this year is Revealing our Ocean's Secrets and bringing them into the classroom. The main speakers are Dr. Kara Dodge, and Kenneth Kostel from the Woods Hole Staff. Details are found in this issue, and at <http://ma-marine-ed.org/mmeevents/whoi-conference/>. Registration link is at the bottom of page 5. After lunch, two workshop sessions are planned. The workshop topics include:

- NOAA Office of Exploration — Why we explore? How we explore?
- CSI - Chemistry Seabird Investigation (ingested plastics and its effects on seabirds)
- New Mass Spec Lab Tour (CSI workshop participants get priority)
- The Educational Whale Watch — making your ocean safari a learning experience
- STEM to STREAM — bringing art, reading and writing into the STEM curriculum
- Exploring the World of Sea Turtles

- Using Real-time Data from the Gulf of Maine (NERACOOS buoys)
- Getting the Salmon Upstream (NMFS)

Be sure to sign up for workshops when you arrive on Saturday morning, as they have limited space and will fill quickly. Elections for the 2017-2019 seasons will take place at the conference and the annual awards will be presented. This is always a very popular event for our members.

Between these events, The National Science Teachers Conference will be held in the Los Angeles Convention Center. Over 10,000 teachers from across the country are expected at this event.

The theme of this issue of *F&J* is Marine Protected Areas. This is an intriguing topic and one that we rarely think of, although it is of vital importance to the ocean's health. The ocean is a major contributor to the total Earth's health.

An update from the Winter Issue of *F&J*. Due to an error by the editor, I neglected to credit the seaweed photos used in Gil Newton's article. I wish to apologize to Chris Dumas whose pictures were used in that issue. Great pictures Chris.

As all of these events occur, I will sit back for a bit as work begins on the summer issue of *Flotsam and Jetsam*. That issue will be posted on the MME website on June 18 and will feature some of the lighthouses of New England. I look forward to seeing you at Woods Hole.

Howard Dimmick
Editor

OCEAN LITERACY PRINCIPLE 5:

The ocean supports a great diversity of life and ecosystems.



Ocean biology provides many unique examples of life cycles, adaptations, and important relationships among organisms (symbiosis, predator-prey dynamics, and energy transfer) that do not occur on land.

The ocean provides a vast living space with diverse and unique ecosystems from the surface through the water column and down to, and below, the sea floor. Most of the living space on Earth is in the ocean.

AWARD TIME

Massachusetts Marine Educators has a number of awards given out annually to recognize excellence in Marine Education in Massachusetts. If you would like to nominate someone for one of the below awards, please fill out the MME award nomination form and send it to Lydia Breen at lebreen212@gmail.com by March 15, 2017.



MME Award Categories

MME Annual Award of Distinction

This very special award is given in recognition of outstanding contributions and dedication to Massachusetts Marine Educators as an organization and to the field of marine science. This award recognizes an individual who demonstrated a commitment to marine education that is evidenced by accomplishments in his/her community, school, business, or region.

MME Marine Educator Award

This award is given for outstanding effort and distinguished performance in the teaching of marine science. This award recognizes an individual's ability to foster interest, appreciation, and love of the marine environment in the classroom setting.

Nap J. Buonaparte Service Award

The Nap J. Buonaparte Award is given in appreciation for outstanding and enthusiastic contributions to the Massachusetts Marine Educators. This award recognizes an individual who has provided outstanding assistance and support to the organization.

Joseph Balsama Service Award

This award recognizes an individual who has provided assistance and support to MME with special emphasis on service for the Boston Harbor Educator's Conference.

MME Certificates of Appreciation

This certificate is presented for dedicated service and commitment to the advancement of marine science. It recognizes an individual or group's commitment to promoting the mission of the Massachusetts Marine Educators.

Understanding Marine Protected Areas

continued from page 1



The sinking of the Pendleton

Photo credit: US Coast Guard

shipwreck sites listed under the state's Board of Underwater Archaeological Resources.]

In the U.S., MPAs span a range of habitats, including the open ocean, coastal areas, inter-tidal zones, estuaries, and the Great Lakes. They also vary widely in purpose, legal authorities, agencies, management approaches, level of protection, and restrictions on human uses."

Here are some interesting (and impressive) facts, about marine protected areas in the United States, courtesy of the website for the National MPA Center:

- There are more than 1,200 marine protected areas in U.S. waters.
- Approx. 3.2 million square kilometers (26%) of U.S. marine waters are protected in some kind of MPA focused on biodiversity, ecosystem protection and/or cultural heritage. U.S. marine waters cover over 12 million square kilometers. This includes federal and state waters, tidal bays, estuaries and the Great Lakes. For comparison, U.S. marine waters are 1.4 times bigger than the U.S. land area, and about 14% of U.S. land is protected.

- Of the entire MPA system, 97% is in federal waters and 3% is in state and coastal waters.
- Papahānaumokuākea Marine National Monument is the largest no-take MPA in the United States. In August 2016, it was expanded from 360,000 to 1.5 million square kilometers – making it one of the largest protected area – on land or sea – in the world.

The National MPA Center was established in 2000 to connect and strengthen MPA programs across the country and around the world. The Center provides information and tools to support effective MPA management for all federal, state, territorial and local MPAs. The Center supports the MPA Federal Advisory Committee, made up of diverse ocean stakeholders who advise NOAA and the Department of the Interior on MPA issues. The MPA Center also leads international collaborations for the Office of National Marine Sanctuaries.

For anyone interested in discovering what MPAs they might have visited or to explore the range of sites around the system, the MPA Center has created a Marine Protected Areas Inventory with an interactive data viewer.



Sherman's Lagoon cartoon by Jim Toomey

Maine Protected Areas Website

The MPA Center website contains a wide range of support materials, including a Marine Protected Areas Ocean Literacy fact sheet and other fact sheets and reports. There is a link to an edition of *Current: The Journal of Marine Education* that focuses on MPAs. The MPA Center website also offers a set of lesson plans based upon a marine protected areas-themed Sherman's Lagoon© cartoon by cartoonist Jim Toomey. Lessons include a shipwreck survey at Thunder Bay National Marine Sanctuary, an activity focused on public participation in the support of eligible sites for inclusion in the system, and a study of sustainable production of blue crabs in Chesapeake Bay.

The MPA Center publishes a full-color magazine online (updated January 2017) named *Conserving Our Oceans One Place at a Time* (<http://marineprotectedareas.noaa.gov/pdf/publications/conserving-our-oceans-one-place-at-a-time-sept-2016.pdf>). The latest issue has articles about Stellwagen Bank National Marine Sanctuary's research into underwater whale feeding behaviors and a national program to study ocean sound, including a unit at Stellwagen Bank. Other articles explore the Pacific Monuments, MPAs in the Gulf of Mexico, and cultural connections between Hawaii and Rapa Nui (Easter Island).

Want to keep up with the MPA Center? Subscribe to the newsletter here: <http://marineprotectedareas.noaa.gov> 📧

About the Author



Anne Smrcina is the Education Coordinator at Stellwagen Bank National Marine Sanctuary. Ann received her BS in Biology and Communications from Cornell University, a Masters in Journalism from Boston University and an MEd in Education from the University of Massachusetts Boston. Anne is a member of the MME board and the incoming president of the organization.

Nominations for 2017-2018 Election

Below you will find the Nominations for MME officers and board members for the coming two years. Four officers and eleven board positions are open this year. For the board there are seven two-year openings and four one-year openings. The one-year openings are due to board members running for an officer position or to members leaving the board before their term is completed.

Voting on the slate of officers will take place at the Annual Meeting at Woods Hole in April.

OFFICERS: 2017-2019

President Elect Gil Newton
Sandwich Public Schools

Secretary Kara Mahoney Robinson
New England Aquarium

Treasurer Lydia Breen
retired teacher

Assistant Treasurer Linda McIntosh
Museum Institute for
Teaching Science

BOARD: 2017-2019 (7) 2017-2018 (4 filling vacancies)

Margaret Brumsted, Retired Educator
Howard Dimmick, Retired Educator
Matt Freedman, Marine Science
Educator
Will Goldenheim, Dexter Southfield
Regional
Erin Hobbs, Newburyport
High School
Jesse Mechling, Center for
Coastal Studies

Valarie Perini, Northeastern Marine
Science Center
Don Pinkerton, Revere High School
Nate Rycroft, Westwood High School
Corrine Steever, New England
Aquarium
Kathy Zagzebski, National Marine
Life Center

Continuing Officers and Board Members – No votes for these positions

Officers: 2017-2019

Anne Smrcina, Incoming President, NOAA Stellwagen
Bank National Marine Sanctuary
Sandi Ryack-Bell, Past President, Museum Institute for
Teaching Science

Board: 2016-2018

Thomas Consi, MIT Sea Grant
Benjamin Hardin, Sea Education Association
Chris Jacobs, South Shore Natural Science Center
Joel Rubin, Stoughton High School

MPA Classification

continued from page 3



Photo credit: Anne Smrcina

throughout the protected area. Extractive uses may be restricted for natural or cultural resources. *Examples: Uniform multiple-use MPAs are among the most common types in the U.S., and include many sanctuaries, national and state parks, and cultural resource MPAs.*

Zoned Multiple-Use: MPAs that allow some extractive activities throughout the entire site, but that use marine zoning to allocate specific uses to compatible places or times in order to reduce user conflicts and adverse impacts. *Examples: Zoned multiple-use MPAs are increasingly common in U.S. waters, including some marine sanctuaries, national parks, national wildlife refuges, and state MPAs.*

Zoned Multiple-Use With No-Take Area(s): Multiple-use MPAs that contain at least one legally established management zone in which all resource extraction is prohibited. *Examples: Zoned no-take MPAs are emerging gradually in U.S. waters, primarily in some national marine sanctuaries and national parks.*

No-Take: MPAs or zones that allow human access and even some potentially harmful uses, but that totally prohibit the extraction or significant destruction of natural and cultural resources. This includes Papahānuamokuākea Marine National Monument, which allows very limited subsistence fishing activities by Native Hawaiians by permit. *Examples: No-take MPAs are relatively rare in the U.S., occurring mainly in state MPAs, in some federal areas closed for either fisheries management or the protection of endangered species, or as small special use (research) zones within larger multiple-use MPAs. Also called marine reserves or ecological reserves.*

No Impact: MPAs or zones that allow human access, but that prohibit all activities that could harm the site's resources or disrupt the ecological and cultural services they provide. Examples of activities typically prohibited in no-impact MPAs include resource extraction of any kind (fishing, collecting, or mining); discharge of pollutants; disposal or installation of materials; and alteration or disturbance of submerged cultural resources, biological assemblages, ecological interactions, physiochemical environmental features, protected habitats, or the natural processes that support them.

Examples: No-impact MPAs are rare in U.S. waters, occurring mainly as small isolated MPAs or in small research-only zones within larger multiple-use MPAs. Other commonly used terms include fully protected marine (or ecological) reserves.

No Access: MPAs or zones that restrict all human access to the area in order to prevent potential ecological disturbance, unless specifically permitted for designated special uses such as research, monitoring or restoration. *Examples: No-access MPAs are extremely rare in the U.S., occurring mainly as small research-only zones within larger multiple-use MPAs. Other commonly used terms for no access MPAs include wilderness areas or marine preserves.*

Permanence of Protection

Not all MPAs are permanently protected. Many sites differ in how long their protections remain in effect, which may in turn profoundly affect their ultimate effects on ecosystems and users.

Permanent: MPAs or zones whose legal authorities provide some level of protection to the site in perpetuity for future generations, unless reversed by unanticipated future legislation or regulatory actions. *Examples: Permanent*



Photo credit: National Park Service

MPAs include most national marine sanctuaries and all national parks.

Conditional: MPAs or zones that have the potential, and often the expectation, to persist administratively over time, but whose legal authority has a finite duration and must be actively renewed or ratified based on periodic governmental reviews of performance. *Examples: Conditional MPAs include some national marine sanctuaries with ‘sunset clauses’ applying to portions of the MPA in state waters.*

Temporary: MPAs that are designed to address relatively short-term conservation and/or management needs by protecting a specific habitat or species for a finite duration, with no expectation or specific mechanism for renewal. *Examples: Temporary MPAs include some fisheries closures focusing on rapidly recovering species (e.g. scallops).*

Constancy of Protection

Not all MPAs provide year-round protection to the protected habitat and resources. Three degrees of constancy throughout the year are seen among U.S. MPAs.

Year-Round: MPAs or zones that provide constant protection to the site throughout the year. *Examples: Year-round MPAs include all marine sanctuaries, national parks, refuges, monuments, and some fisheries sites.*

Seasonal: MPAs or zones that protect specific habitats and resources, but only during fixed seasons or periods when human uses may disrupt ecologically sensitive seasonal processes such as spawning, breeding, or feeding aggregations. *Examples: Seasonal MPAs include some fisheries and endangered species closures around sensitive habitats.*

Rotating: MPAs that cycle serially and predictably among a set of fixed geographic areas in order to meet short-term conservation or management goals (such as local stock replenishment followed by renewed

exploitation of recovered populations). *Examples: Rotating MPAs are still rare in the U.S. They include some dynamic fisheries closures created for the purpose of serially recovering a suite of localized population to harvestable levels.*

Scale of Protection

MPAs in the U.S. vary widely in the ecological scale of the protection they provide. MPA conservation targets range from entire ecosystems and their associated biophysical processes, to focal habitats, species, or other resources deemed to be of economic or ecological importance. The ecological scale of a site’s conservation target generally reflects its underlying legal authorities and, in turn, strongly influences the area’s design, siting, management approach, and likely effects.

Activity

How would you classify these areas along the Massachusetts coast and in more offshore waters? Look up each of the sites to understand their natural and/or cultural importance. Check the MPA inventory interactive data viewer to see if MPA experts agree with your classification. Some of these sites are listed as MPAs in the inventory; some of these locations are considered “eligible.”

Cape Cod National Seashore

Cashes Ledge

Georges Bank

Great South Channel

Nomans Land Island National Wildlife Refuge

Oceanographer Canyon

Pendleton (shipwreck) Exempt Site

Stellwagen Bank National Marine Sanctuary

Vineyard Sound Lightship

Waquoit Bay National Estuarine Research Reserve

Western Gulf of Maine Closure Area

Ecosystem: MPAs or zones whose legal authorities and management measures are intended to protect all of the components and processes of the ecosystem within its boundaries. *Examples: Ecosystem-scale MPAs include most marine sanctuaries, national parks and national monuments.*

Focal Resource: MPAs or zones whose legal authorities and management measures specifically target a particular habitat, species complex, or single resource (either natural or cultural). *Examples: Focal-resource MPAs include many fisheries and cultural resource sites, including some national wildlife refuges and marine sanctuaries.* 📌

Data on Blue Whales off California Helps Protect Their Distant Relatives

Research identifies blue whale habitat in the Northern Indian Ocean

Scientists know a great deal about blue whales off California, where the endangered species has been studied for decades.

But they know far less about blue whales in the Northern Indian Ocean, where ships strike and kill some of the largest animals on Earth.

Now a research team has found a way to translate their knowledge of blue whales off California and in the eastern tropical Pacific Ocean to the other side of the world, revealing those areas of the Northern Indian Ocean where whales are likely to be encountered. The team of scientists from NOAA Fisheries and the Sri Lankan Blue Whale Project published the findings in the journal *Diversity and Distributions*.

The Scientific Committee of the International Whaling Commission included the results of the study when assessing a shift in busy shipping lanes off the south coast of Sri Lanka that will reduce the danger to whales in an important feeding area.

“Small changes in shipping routes can be a very effective way to address a serious conservation issue with minimal inconvenience to the shipping industry, but rely on a good understanding of the relationship between whale distribution and habitat,” said Russell Leaper, a member of the Scientific Committee. “This study makes an important contribution towards that understanding.”

To meet requirements of the U.S. Marine Mammal Protection Act,



Credit: NOAA Fisheries/Southwest Fisheries Science Center
James W. Gilpatrick, Jr. and Morgan S. Lynn

This is a blue whale photographed during a survey of marine mammals in the eastern Pacific Ocean conducted by the Marine Mammal and Turtle Division at NOAA Fisheries' Southwest Fisheries Science Center.

NOAA Fisheries regularly conducts marine mammal and ecosystem assessment surveys. Surveys off the U.S. West Coast and in the eastern tropical Pacific have shown that the upwelling of deep ocean water rich in nutrients supports dense patches of krill that blue whales feed on. This information has proven critical in addressing the emerging problem of ships striking blue whales, and has informed the management of ship traffic to and from the busy ports of Los Angeles and Long Beach to mitigate this problem.

“We are fortunate in the United States to have some of the best marine mammal data sets in the world,” said Jessica Redfern, a research scientist at NOAA Fisheries Southwest Fisheries Science Center in La Jolla, Calif., and lead author of the new study. “It was exciting to explore how we could use these data sets to aid conservation efforts in parts of the world where few data exist.”

The research developed computer models of blue whale habitat off the U.S. West Coast and in the eastern tropical Pacific, including upwelling and underwater topography that affects areas of krill concentration. The models then identified similar upwelling and feeding regions in the Northern Indian Ocean that are also likely to be important habitat for the endangered species.

“The Sri Lankan Blue Whale Project has spear-headed efforts to draw attention to and mitigate the risk of ships striking blue whales in Sri Lankan waters. To best protect this species in this data-limited region, it is essential to adapt approaches developed in other parts of the world. Our collaboration achieves just that,” said Asha de Vos, founder of the Sri Lankan Blue Whale Project and a coauthor on the study.

The Northern Indian Ocean and its inhabitants have not been surveyed to the same extent as the eastern Pacific Ocean, and much of the information about whale distributions comes from Soviet whaling several decades ago. However, the model results matched up well with the limited information available, the scientists reported.

Blue Whales


continued

The model suggests that the distribution of blue whales in the Northern Indian Ocean may shift seasonally, following their food as monsoon climate patterns alter the most productive habitat. The scientists concluded that research and monitoring is critical in the areas identified as blue whale habitat in the Northern Indian Ocean because many of these areas overlap with some of the busiest shipping routes in the world.

“Marine mammals face threats from human activities in most of the world’s oceans, but we lack the data needed to address these threats in many areas,” Redfern said. “The data collected aboard our surveys allow us to predict species habitat in other parts of the world. Understanding species habitat allows us to address conservation problems that are often unexpected and critical to maintaining healthy populations.”

Materials provided by NOAA Fisheries West Coast Region. Note: Content may be edited for style and length.

Journal Reference

Jessica V. Redfern, Thomas J. Moore, Paul C. Fiedler, Asha de Vos, Robert L. Brownell, Karin A. Forney, Elizabeth A. Becker, Lisa T. Ballance. Predicting cetacean distributions in data-poor marine ecosystems. *Diversity and Distributions*, 2017; DOI: 10.1111/ddi.12537 



Climate change in your county: Plan ahead with a new NOAA tool

Wednesday, July 27, 2016

Residents, communities and businesses now have easy access to climate projections, through a few easy keystrokes, for every county in the contiguous United States.

NOAA’s newly updated Climate Explorer offers downloadable maps, graphs, and data tables of observed and projected temperature, precipitation and related climate variables dating back to 1950 and out to 2100.

Built to accompany the U.S. Climate Resilience Toolkit (<https://toolkit.climate.gov>), the Climate Explorer [<http://toolkit.climate.gov/climate-explorer2/>] helps community leaders, business owners, municipal planners, and utility and resource managers understand how environmental conditions may change over the next several decades.

Climate Explorer

The Climate Explorer web-based tool allows the public, media and stakeholders to create maps and graphics to help understand how climate is expected to change in the future, down to the county level. (NOAA)

Climate Explorer projections are based on two global climate model scenarios that describe how the abundance of heat-trapping gases in Earth’s atmosphere may change through 2100. The tool provides projections for parameters such as changes in the number of days over 95 degrees F, number of days with heavy rain, and heating and cooling degree days.

“The Climate Explorer is designed to help users visualize how climate conditions may change over the coming decades,” said David Herring, communication and education program


manager at NOAA’s Climate Program Office. “Projections of how much and how fast change is happening is crucial to help communities prepare and become more resilient.”

Additional enhancements to the Climate Resilience Toolkit include:

- Redesigned interface that is simpler and works better on mobile devices;
- New “Reports” section with state and municipal climate vulnerability assessments, adaptation plans, and scientific reports; and
- Revised “Steps to Resilience” guide and spreadsheet, which communities and businesses can use to confront climate vulnerabilities and implement a plan to build resilience.

“We updated the Climate Explorer in response to requests from communities and businesses across the nation for downscaled climate projections to help them manage their climate-related risks and opportunities,” said Fred Lipschultz, the toolkit’s climate projections team leader, based at the U.S. Global Change Research Program.

The U.S. Climate Resilience Toolkit and Climate Explorer are managed by NOAA’s Climate Program Office, and hosted by NOAA’s National Centers for Environmental Information. The tool was built by NOAA, U.S. Geological Survey, Bureau of Reclamation, Environmental Protection Agency, and NASA, with guidance by the U.S. Global Change Research Program, and President Obama’s Climate Action Plan.

For more information, please contact Monica Allen, public affairs for NOAA Research, at 301-734-1123 or by email at monica.allen@noaa.gov 

New Arrival at *the National Aquarium*

Honeycomb cowfish are native to the western Atlantic Ocean. These fish can be found from New Jersey to Bermuda, and south to Brazil. They can also be found throughout the Caribbean, but are seemingly absent from the Gulf of Mexico.



Picture courtesy of The National Aquarium

The honeycomb cowfish is a reef dwelling fish with hexagonal scales covering most of its body. Growing to about 10 inches, this fish feeds on invertebrates including shrimp, tunicates, and sponges.

Even though these fish inhabit a wide region, they are fairly shy and difficult to spot.



OCEAN LITERACY PRINCIPLE 6: The ocean and humans are inextricably interconnected.



The ocean affects every human life. It supplies freshwater (most rain comes from the ocean) and nearly all Earth's oxygen. The ocean moderates the Earth's climate, influences our weather, and affects human health.

The ocean is a source of inspiration, recreation, rejuvenation, and discovery. It is also an important element in the heritage of many cultures.

Ocean Science and Technology Class Field Trips To Woods Hole

Zephyr Education Foundation is once again hosting school class field trips in Woods Hole. The program consists of a hands-on 1 1/2 hour scientific cruise on Vineyard Sound, time spent in WHOI's specimen tank room, a tour of one of the scientific docks, and time with our Augmented Reality Coastal Processes Modeling System. Visits to WHOI's Exhibit Center and NOAA's Science Aquarium can also be arranged. Each year over 2000 students come to Woods Hole and participate in our program. See our website www.zephyrmarine.org and/or email Rob at reynolds@zephyrmarine.org



CLASSROOM ACTIVITIES

In each issue of *Flotsam and Jetsam* we try to post a single activity that relates to the featured topic for that issue. This time, rather than copy an activity from another source, we will point you to several activities that have been produced by NOAA and The National Geographic Society.

GRADES 3-5

National Geographic Society has produced **Create a Marine Protected Area** activity for younger students. In this activity students brainstorm and analyze ocean resources and uses. They experiment with designating a MPA along an imaginary coast. In their discussions, they list who uses the oceans, and what they use the oceans for. They also discuss the reasons why some ocean areas need to be protected. This activity is carried out in a full class setting. A computer with Internet access and a projector are needed. The activity is designed for 1-2 classes (1 hour to 1 ½ hours) the activity is found at

<http://www.nationalgeographic.org/activity/create-a-marine-protected-area/>

GRADES 6-8

NOAA National Marine Sanctuaries has produced an Ocean for Life Lesson Plan called **Marine Protected Areas**. Students in this activity work to define an MPA and they describe several types of MPAs. The activity is best used where computers are available for researching the many links supplied in the activity. The activity references the National Science Education Standards, National Geography Standards and Principles 5 and 6 of the Ocean Literacy Standards. In this activity small groups define MPAs, identify types of MPAs, and describe impacts of establishing an MPA. Depending on the depth a teacher wishes to use for the activity it can run from 3-5 classes. The activity is found at the following location:

http://oceanservice.noaa.gov/education/yos/lesson/Grades%205-8/marine_protected_areas.pdf

GRADES 9-12

NOAA Oceanservice has produced an activity called **Protect This**. In this activity students are asked to design a Marine Protected Area. The activity can be completed in one or two classroom periods, and it is designed to be done in small groups or individually. The activity references the National Science Education Standards. Eight potential sites are used to study the species abundance found in each of eight sites. Twelve organisms are presented and the students study each area for its biodiversity using the Shannon-Weaver Information Function formula to determine what the potential is for making the area an MPA. This activity is located at the on the Internet at:

http://oceanservice.noaa.gov/education/classroom/lessons/03_mpa_protect.pdf ↴

2017 High School Marine Science Symposia

The Massachusetts Marine Educators has been hosting the High School Marine Science Symposium since 1984. This event attracts hundreds of high school students and their teachers to come together and learn about research and practice around marine science topics and issues.

This year events will take place:

Thursday, March 9 at Northeastern University in Boston

Wednesday, March 15 at Salem State University in Salem

Both events will feature a series of lightning talks, a keynote lecture, and over a dozen hands-on workshops, all presented by scientists, policy makers, educators, and students working and studying in the field of marine science. The featured keynote lecture will be delivered by WGBH Science Correspondent Dr. Heather Goldstone, at the Boston event, and Stellwagen Bank National Marine Sanctuary Research Coordinator Dr. David Wiley, at the Salem event. Presenting organizations include: The New England Aquarium, The Ocean Genome Legacy, NOAA, UMass Dartmouth, Boston University, Hurricane Island Foundation, MIT Sea Grant, the Seacoast Science Center, Salem Sound Coastwatch, the Center for Coastal Studies, and many more. Hands-on workshops will cover a variety of topics, including: health of seagrass beds, marine conservation art, DNA barcoding, marine mammal bioacoustics, estuary water monitoring, marine debris, marine engineering, underwater archaeology, aquaculture, sustainable seafood, and many more!

The events are co-sponsored by the Northeastern University Marine Science Center with additional support from Salem State University. This year, scholarships will be available to cover admission fees of students from low-income schools/districts. These scholarships are possible thanks to generous donations from the Friends of Lynn and Nahant Beach, the Massachusetts Bays National Estuary Program, the Massachusetts Marine Educators, the Massachusetts Division of Marine Fisheries, Boston SCUBA, East Coast Divers and individuals. ⚓



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<http://ma-marine-ed.org/about/membership>

