



News from Gerry E. Studts
Stellwagen Bank National
Marine Sanctuary

Spring
2008

Special Edition

Stellwagen Banknotes

Draft Management Plan Review

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Credit: WONE and SBMMS
Photo taken under NOAA Fisheries
Permit #981-1707-0



Feeding humpback whales in the Stellwagen Bank sanctuary.

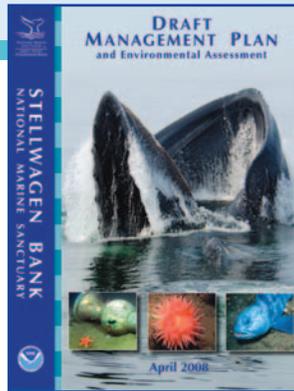
Become Involved!

Submit your comments on the Draft Management Plan, see page 2.

Obtain Your Copy of the Management Plan

The public is invited to visit our Web site at <http://stellwagen.noaa.gov> to view and download the complete Draft Management Plan and Environmental Assessment. Interested individuals may request electronic versions of the plan on CD by contacting the sanctuary offices by phone at 781-545-8026, by fax at 781-545-8036, by email at sbplan@noaa.gov or by mail at SBNMS, 175 Edward Foster Road, Scituate, MA 02066.

Printed copies of the draft management plan will be sent to public libraries, academic institutions, sanctuary education and research partners, and government offices in the sanctuary region. Visit our Web site for a complete listing of those locations.



STELLWAGEN
BANKNOTES
2008



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We welcome your comments on the Draft Management Plan. Here's how:

E-mail: sbplan@noaa.gov

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National Marine Sanctuary
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Public Meetings:

Various locations throughout New England during June 2008. See Calendar on page 32.

Written comments will be accepted at all meetings. Due to time constraints, oral comments must be limited to three minutes per individual.

Comments accepted through
(postmarked by) Monday, August 4, 2008.

Sanctuary Mission

To conserve, protect and enhance the biological diversity, ecological integrity and cultural legacy of the sanctuary while facilitating compatible uses.

Sanctuary Staff

Craig MacDonald, Ph.D.	Sanctuary Superintendent
Benjamin Cowie-Haskell	Assistant Superintendent
Alan Collette	Program Support Specialist
Ruthetta Halbower	Office Assistant
Leila Hatch, Ph.D.	Ocean Noise Specialist
Matthew Lawrence	Maritime Archaeologist
Deborah Marx	Maritime Archaeologist
Just Moller	Science and IT Specialist
Anne Smrcina	Education Coordinator
Elizabeth Stokes	Administrative Assistant
Michael Thompson	GIS/Web Specialist
David Waldrip	Operations Coordinator
Bob Wallace	Research Vessel Captain
Nathalie Ward, Ph.D.	External Affairs Coordinator
David Wiley, Ph.D.	Research Coordinator

Vision Statement

The sanctuary vision is the best possible future status for the site. This statement was developed by the Advisory Council and derived from public comments to the sanctuary and council. By meeting the objectives and successfully implementing the strategies and activities in the management plan, the sanctuary will achieve its mission; mission success will lead to realization of the sanctuary vision.

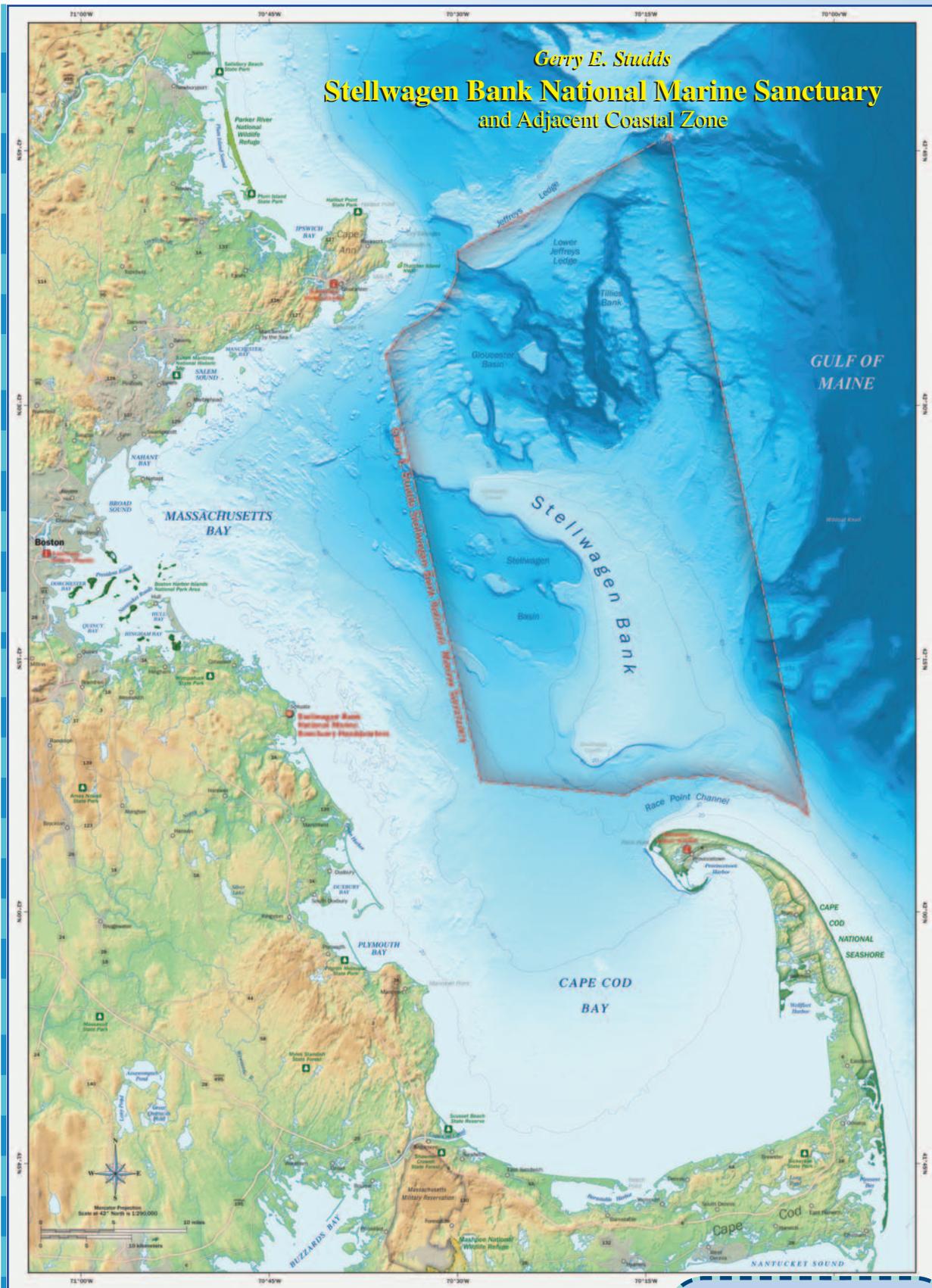
“Stellwagen Bank National Marine Sanctuary is teeming with a great diversity and abundance of marine life supported by diverse, healthy habitats in clean ocean waters. The ecological integrity of the sanctuary is protected and fully restored for current and future generations. Human uses are diverse and compatible with maintaining natural and cultural resources.”

Sanctuary Advisory Council, 2005

Publications

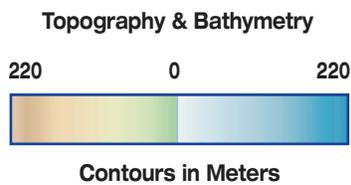
To obtain free copies of the sanctuary publications, *Stellwagen Banknotes* (1-2 times per year) and *Stellwagen Soundings* (summer only), please contact the sanctuary via phone at 781-545-8026, ext. 201, by fax at 781-545-8036 or by e-mail at stellwagen@noaa.gov. If you would prefer to receive the publications electronically, please forward that interest and your e-mail address via any of the previously mentioned avenues. Please let us know if you would like us to forward your contact information on to the sanctuary friends' group Stellwagen Alive and to the national nonprofit National Marine Sanctuary Foundation. The sanctuary protects all personal information and will not distribute contact data outside of NOAA.

Gerry E. Studds
**Stellwagen Bank National Marine Sanctuary
 and Adjacent Coastal Zone**



Map Key

National Marine Sanctuary	Marine Sanctuary Office
National Park	Sanctuary Information
Government Land	Other Park



New Poster
 This map of Stellwagen Bank National Marine Sanctuary and Adjacent Coastal Zone now serves as the centerpiece of the sanctuary's newest poster. Individual copies of the 24" x 36" poster may be obtained from the sanctuary offices in Scituate or at one of our education partners listed on our Web site.

Sanctuary Management 101



A Quick Review on the Management Plan Process

The Office of National Marine Sanctuaries and Public Participation

National marine sanctuaries are areas of the marine environment with special conservation, recreational, ecological, historical, cultural, archaeological or aesthetic qualities. The Office of National Marine Sanctuaries has managed these special areas since passage of Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, now called the National Marine Sanctuaries Act. For more than 35 years, since its creation in 1972, the sanctuary system has engaged the public in helping to create new sanctuaries, develop resource protection strategies, address complex resource management issues and more recently review and update sanctuary management plans.

What is the Draft Management Plan?

The management plan is a road map for sanctuary management that serves to: 1) guide site management

toward achievement of the sanctuary's goals using the best means available; and 2) inform sanctuary constituents, including the general public, about the sanctuary, its regulations, and the management actions it has planned for the next five years. The sanctuary's new draft management plan represents a major revision of the original 1993 management plan under which the sanctuary currently operates.

The draft management plan contains information about the sanctuary's environment and resources, staffing and administration, regulations and boundaries, priority management issues and actions proposed to address them, and performance measures. It is supported by a draft environmental assessment or draft environmental impact statement, which may contain detailed environmental, cultural and socioeconomic information on the greater sanctuary region. Based on comments received during the public comment period on these drafts, the Office of National Marine Sanctuaries will develop the final management plan.

Global view map of the national marine sanctuaries and marine national monument showing satellite-derived vegetation, snow/ice, and ocean bathymetry data. Map source: NASA.

Why is the Sanctuary's Management Plan Being Reviewed?

The Office of National Marine Sanctuaries is required to review sanctuary management plans to:

- Evaluate substantive progress toward implementing the management plan and goals;
- Evaluate the effectiveness of site specific management techniques and strategies;
- Determine necessary revisions to the management plan and regulations;
- Prioritize management objectives;
- Meet requirements of the National Marine Sanctuaries Act.

Since the sanctuary's 1992 designation, significant innovations in science, technology, and marine resource management techniques have been made, while challenging new resource management issues have emerged. In addition to updating the sanctuary's now obsolete 1993 management plan, the process provides a vehicle for the national program to integrate new tools and practices into site management.

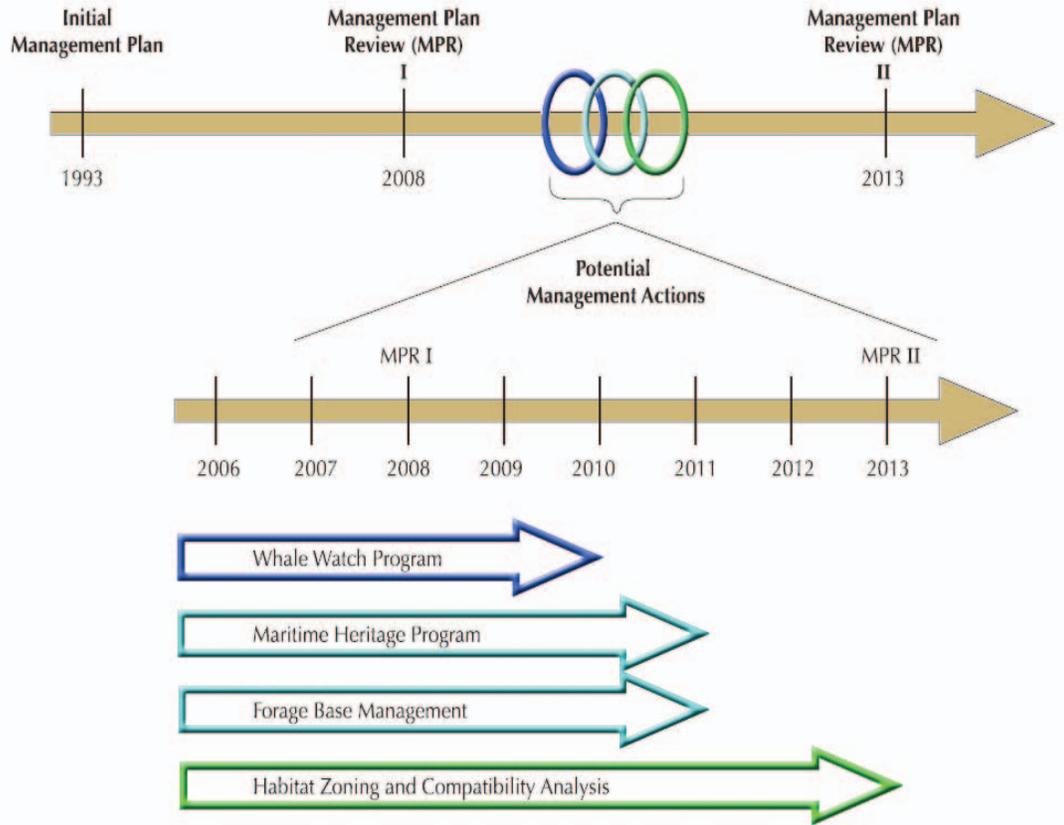
Management Plan Review Process

Introducing the Management Plan

When Congress designated Stellwagen Bank National Marine Sanctuary in 1992, it did so to recognize the nationally significant conservation and aesthetic qualities of the site. Congress directed that the sanctuary be managed to maintain the habitats and ecological services of the natural assemblage of living resources of the area, as well as its maritime heritage resources. To that end, an initial management plan was developed and published in 1993.

But sanctuary management is not intended to be static, and, in its reauthorizations of the National Marine Sanctuaries Act, Congress has also mandated that sanctuaries periodically update their plans to incorporate the best available information. The Stellwagen Bank sanctuary now approaches the closing stages of its first management plan review with the release of a draft management plan.

The Stellwagen Bank sanctuary management plan review process is, in essence, an exploration and rediscovery of the sanctuary. It is a journey across earlier decades of scientific monitoring and analysis, leading to the directed research and evaluation of the moment. It draws upon a foundation of over 670 source documents, most of which are peer-reviewed scientific papers published in reputable professional journals. It is a quest for facts and findings, culminating in the up-to-date synthesis and characterization of the resources and human uses of the sanctuary today. It is a public collaboration of immense proportion, involving comments from over 20,000 concerned citizens, more than 300 individuals participating in scoping meetings, and over 200 people serving on issue-driven working groups. The entire process was coordinated with,



This illustration shows the proposed management continuum for the Stellwagen Bank sanctuary.

and reviewed by, the 45 members and alternates on the Stellwagen Bank Sanctuary Advisory Council holding appointments during 2002-2006 and offering representation from Connecticut to Maine.

“The management plan review process is... a public collaboration of immense proportion, involving comments from over 20,000 concerned citizens.”

This draft management plan serves as a non-regulatory policy framework for addressing the issues facing the Stellwagen Bank sanctuary over the next five years. It lays the foundation for restoring and protecting the sanctuary’s ecosystem. It details the human pressures that threaten the qualities and resources of the sanctuary. It recommends actions

that should be taken now, and some that should be considered in the near future, for restoring and protecting this special place.

At this time, NOAA is not proposing any regulations or changes to the Stellwagen Bank sanctuary designation document. However, several regulatory initiatives that derive from the strategies presented in the draft management plan ultimately could be considered for action prior to the next management plan review nominally scheduled for 2013. These include management of whale watching, maritime heritage resources management, preventing local depletion of key forage species, and instituting requirements for habitat zoning and compatibility analysis. These initiatives may necessitate that the designation document be amended.

Resource Conditions

Resource Conditions

This resource conditions summary table indicates the need for management actions that address the degraded conditions of key habitats and resources in the sanctuary. Over half of all categories (10 of 17) had fair through poor ratings, with eight of ten relating to habitat or living marine resources. The general trend for habitat and living resources appears to be static and in need of improvements, an indication that pressures on living resources are high, requiring targeted management efforts. The status of seafloor communities and habitats in the sanctuary remains problematic. Monitoring programs for water quality and a number of other concerns (e.g., environmental contaminants, invasive species) need to be sufficiently addressed as well. The physical integrity of historic shipwrecks requires protection from human use, particularly from fishing gear impacts.

Status:	Good	Good/Fair	Fair	Fair/Poor	Poor	Undetermined
Trends:	▲	—	▼	±	N/A	
	Conditions appear to be improving toward one of the higher categories.					
	Conditions do not appear to be changing.					
	Conditions appear to be declining toward one of the lower categories.					
	Undetermined trend.					
	Question not applicable.					

Living Resources

There are well over 575 known species in the sanctuary, but this list is largely incomplete. While we recognize familiar large animal species that call the sanctuary home, such as whales, turtles, fish and birds, we still know little about many of these animals' life cycles. Other groups of species are even less well understood.

- The number of invertebrates, including pelagic (open ocean) and benthic (seafloor) species, remains to be adequately counted. Exploration of the living landscapes that carpet the seafloor, such as anemone forests, sponge gardens, hydroid meadows, and worm tube beds, reveals previously unknown distribution patterns and interesting predator-prey relationships.
- The fields of study that look at life at the smallest scales – viruses, bacteria, and single-celled protozoa – are only in their infancy in the sanctuary.
- Sanctuary water column and seafloor habitats sustain over 80 species of fish.
- The sanctuary area provides important feeding and nursery grounds for 22 marine mammal species, including endangered humpback, fin and sei whales and the critically endangered North Atlantic right whale.
- The area supports foraging activity by 34 species of seabirds, dominated by gulls, storm petrels, gannets, auks (alcids), sea ducks and shearwaters.
- Four species of endangered or threatened sea turtles are known to frequent the area.
- The sanctuary is a hotspot for prey abundance, which is what ultimately attracts the whales, sustains the fish, seabirds and other wildlife, and supports the economic viability of most current uses in the sanctuary. Key prey species include sand lance, herring and planktonic copepods. Sand lance numbers in the sanctuary are the highest and most concentrated anywhere in the southern Gulf of Maine and the sanctuary is in an area of high relative abundance of herring.

#	Questions/Resources	Rating	Basis for Judgment
Water			
1	Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality?	—	Numerous contaminants at low levels.
2	What is the eutrophic condition of sanctuary waters and how is it changing?	—	Specific aspects of on-going monitoring, as explained in text, with references.
3	Do sanctuary waters pose risks to human health?	—	Specific aspects of on-going monitoring, as explained in text, with references.
4	What are the levels of human activities that may influence water quality and how are they changing?	—	Vessel discharges. MWRA outfall.
Habitat			
5	What is the abundance and distribution of major habitat types and how are they changing?	—	Alteration of microhabitat due to bottom dragging & dredging.
6	What is the condition of biologically-structured habitats and how is it changing?	—	Fishing gear impacts.
7	What are the contaminant concentrations in sanctuary habitats and how are they changing?	—	Limited monitoring results.
8	What are the levels of human activities that may influence habitat quality and how are they changing?	▼	Fishing gear impacts, shipping.
Living Resources			
9	What is the status of biodiversity and how is it changing?	—	Long-term changes in fish diversity.
10	What is the status of environmentally sustainable fishing and how is it changing?	—	Published and unpublished literature on regional and local groundfish populations.
11	What is the status of non-indigenous species and how is it changing?	▼	Recent invasives discovered.
12	What is the status of key species and how is it changing?	▲	Cod (keystone species).
13	What is the condition or health of key species and how is it changing?	—	Whale strikes & entanglements.
14	What are the levels of human activities that may influence living resource quality and how are they changing?	—	Stable levels of activity.
Maritime Archaeological Resources			
15	What is the integrity of known maritime archaeological resources and how is it changing?	▼	Fishing gear impacts.
16	Do known maritime archaeological resources pose an environmental hazard and is this threat changing?	—	Lack of hazardous cargo.
17	What are the levels of human activities that may influence maritime archaeological resource quality and how are they changing?	▼	Fishing gear impacts.

Key Findings

Stellwagen Bank: A Rich and Complex Marine Protected Area

Stellwagen Bank National Marine Sanctuary was designated for a multitude of reasons, not the least of which was its long history of human use and its high natural productivity and resource diversity. The historic exploitation of the whales and fish on Stellwagen Bank and vicinity helped forge a cultural tradition that is difficult to perpetuate today as a result of overfishing, habitat destruction and rapid transformation of the regions economy. The modern appreciation for these resources requires that they be protected for their intrinsic value, multiple ecosystem services, and recreational and ecotourism importance, while facilitating uses (including fish and seafood production) that are environmentally sustainable and compatible with the widely recognized need and congressional mandate for resource protection.

During development of the draft management plan, a number of important facts about sanctuary resources and uses have been compiled.

- Fishing – especially commercial fishing – impacts and pressures every resource state in the sanctuary. On an annual basis, virtually every square kilometer of the sanctuary is physically disturbed by fishing, and fishing has removed almost all of the big old-growth individuals among biologically important fish populations, reshaping biological communities and habitats in the process.
- Commercial fishing lands 17 – 18.4 million pounds of fish and crustaceans from the sanctuary each year on average (1996-2005), yet discards approximately 23% of the total catch as by-catch (based on 2002/2003 estimates).
- Of the total New England landings, the part of the catch from the sanctuary amounts to 1.9% to 2.8%.
- Fishing removes 3,200 metric tons of herring from the sanctuary each year on average, an amount suffi-

Credit: SBMMS



Fishing has a significant impact on sanctuary resources.

Credit: SBMMS



Vessels in the sanctuary may affect whale behavior and present collision threats.

cient to potentially deplete the forage base for whales and other sanctuary wildlife.

- The area in and around the sanctuary has the highest use of fixed gear vessels anywhere along the eastern seaboard of the U.S., and the sanctuary area has the highest number of reported whale entanglements in the Gulf of Maine (41% of all entanglements).
- Fishing gear fouls 11 of 18 known historic shipwreck sites in the sanctuary, which also display evidence of damage by gear impacts.

“Over half of all resource condition categories (10 of 17) evaluated for the sanctuary had fair through poor ratings.”

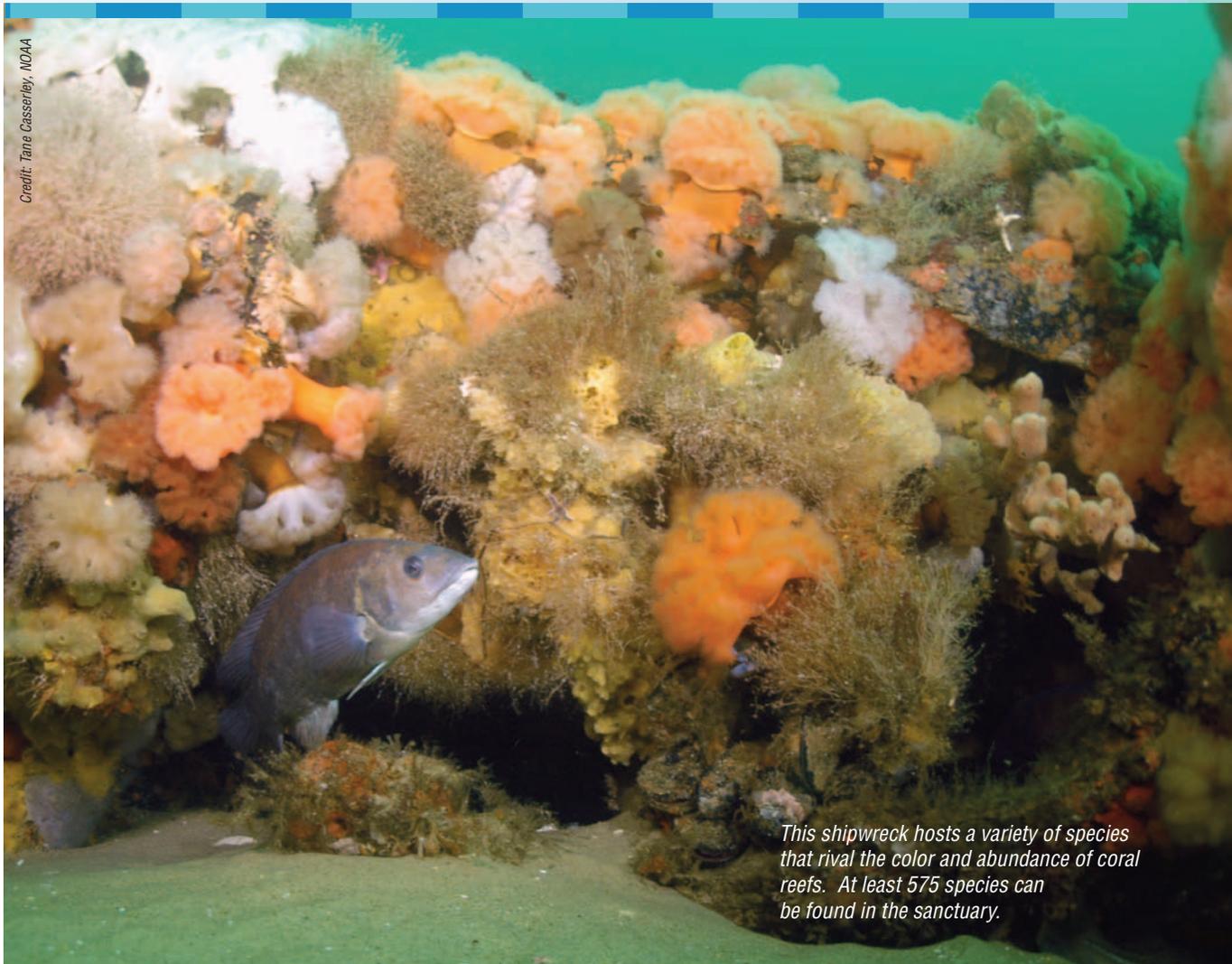
- The sanctuary receives more commercial shipping traffic than any other location within U.S. jurisdiction in the Gulf of Maine. Approximately

10% of the vessel-whale collisions recorded worldwide occur in the sanctuary area.

- The annual mean and maximum operating speeds of whale watch boats in the sanctuary doubled between 1980 -1987 and 1998-2004, as did their annual rate of whale strikes.
- The overall level of noncompliance with regional whale watch guidelines, based on the distance traveled by the whale watch boats, was 78%.
- The sanctuary seems prone to biological invasion by exotic species, based on factors associated with chronic habitat disturbance by fishing and proximity to extensive commercial shipping traffic.

- Stellwagen Bank and its vicinity is one of the top ten premiere places in the world to watch whales, according to reports from USA Today and the World Wildlife Fund. *Offshore Magazine's* readers ranked Stellwagen Bank first in the category Wildlife Watching Sites and third for Recreational Fishing.

Biodiversity Conservation



This shipwreck hosts a variety of species that rival the color and abundance of coral reefs. At least 575 species can be found in the sanctuary.

Biodiversity Conservation

The environmental condition of the sanctuary is subject to major alterations that are largely due to the effects of human activities. The basic diversity of marine life and the patterns and processes that control the distribution and abundance of marine organisms in the sanctuary is still not well understood. Yet, conserving this biological diversity is central to the implementation of ecosystem-based sanctuary management, an evolving approach that stresses the management of the entire sanctuary ecosystem, including all biological communities, habitats and species populations, together with all compatible uses. This draft management plan is based on the concept of managing marine resources for biodiversity conservation.

Biological diversity or “biodiversity” is defined by the United Nations as

the variety of life on earth; the variability of all living things at all levels of examination. It is inclusive of the millions of plants, animals and microbes; the genes they contain; and the ecosystems they build into the living environment.

The ocean is the cradle of biological diversity, and micro-organisms represent over 50% of the biomass of the sea. Some micro-organisms produce their own food using sunlight, while others are predators. The ocean also contains larger multicellular plants and animals. Unlike the land and freshwater realms, the ocean contains representatives of all major types of animals (phyla) on earth, from sponges to chordates (the phylum in which mammals are included).

The ability to accurately evaluate the scale and consequences of changes in the sanctuary’s resource states (and subsequent impacts on human society) is challenged by inadequate

knowledge of historic baselines (abundance and diversity) for comparison with conditions today. However, new technologies and conceptual advances permit us to implement novel research approaches that seek to reveal fuller understanding of the sanctuary’s ecological structure and the diversity and function of its biological communities.

Comprehending the great importance of marine biodiversity, and thereby gaining insights to interpret, explain and maintain ecological complexity, is the basis for marine resource management in the Stellwagen Bank sanctuary.

A primer on marine biodiversity and community ecology is included in Chapter III: Sanctuary Setting (Biodiversity Conservation) of the Draft Management Plan.

Guide to Sanctuary Action Plans

Guide to Sanctuary Action Plans

Action plans, rather than being theme- or program-driven, revolve around specific issues in Stellwagen Bank National Marine Sanctuary. For example, there is no general action plan labeled “marine mammal,” but there are specific plans to minimize behavioral disturbance of marine mammals and to reduce entanglement of marine mammals.

Action plans are a collection of strategies sharing common management objectives. The plans provide an organized structure and process for implementing these strategies over the next five years, including a description of the types of activities that might be undertaken and any requirements needed for implementation of these activities. The success of each action plan will be evaluated through a set of performance measures.

The action plans are divided into four groupings: Capacity Building, Ecosystem Protection, Marine Mammal Protection, and Maritime Heritage Management.

Capacity Building

Capacity building refers to the development of increased organizational capabilities achieved through infrastructure improvements, leveraged partnerships and improved inter-jurisdictional cooperation, as well as expanded volunteerism and supplemental external funding support. It includes the revision of decision-making processes and adoption of new protocols to better implement policies and procedures. The four action plans in this grouping are:

1. Administrative Capacity and Infrastructure
2. Interagency Cooperation
3. Compatibility Determination
4. Public Outreach and Education

Ecosystem Protection

The National Marine Sanctuaries Act mandates that the primary objective of sanctuary management is resource protection. Ecosystem protection in the sanctuary requires the preservation and/or enhancement of biological diversity and habitat diversity, as well as care for the associated physical environment. The



Art: Joline Purnan

Muddy basin communities, such as pictured in this painting, may be highly susceptible to seafloor disturbance

sanctuary’s challenge is to restore and maintain the ecological integrity of the site in the face of human-induced impacts and environmental uncertainty, such as lack of data and changes due to global warming, while facilitating compatible use. The three action plans in this grouping are:

1. Ecosystem-Based Sanctuary Management
2. Ecosystem Alteration
3. Water Quality

Marine Mammal Protection

The marine mammals of the sanctuary have significant ecological, aesthetic and economic value to the communities of New England. Some 17 different species have been observed in these waters. For many of the species, some of which are listed as endangered, waters of the sanctuary serve as primary habitat for critical activities that include feeding and nursing. The extensive commercial and recreational vessel traffic in the sanctuary can threaten to disturb the animals’ behaviors or lead to possible collisions. Various forms of fish-

ing gear have been identified as entanglement risks. The three action plans in this grouping are:

1. Marine Mammal Behavioral Disturbance
2. Marine Mammal Vessel Strike
3. Marine Mammal Entanglement

Maritime Heritage Management

The sanctuary sits at the mouth of Massachusetts Bay – a gateway to numerous ports that line the Massachusetts coast. These centers of New England maritime activity have histories that extend back 400 years or more, to the founding of the colonies and the birth of a fishing industry in the New World. But ocean-going travel has its inherent risks, and the sanctuary region has not been immune to these sorts of calamities. Shipwrecks and submerged archaeological sites in the sanctuary are tangible connections to New England’s history and serve as fragile, and nonrenewable, gateways to our past. There is a single action plan in this grouping at this time:

1. Maritime Heritage

Administrative Capacity and

Administrative Capacity Action Plan

During the first week of September 2007, 77-year-old Richard Wheeler, the “Auk Man,” paddled his sea kayak – from Provincetown to Scituate to Boston and then Gloucester – a total of 77 miles. Unlike his 1991 trip from Newfoundland to Cape Cod tracking the migration route of the extinct great auk and raising awareness about the state of the Atlantic cod and commercial fishing, this voyage was to raise awareness of a place – Stellwagen Bank National Marine Sanctuary. Wheeler’s kayak expedition was the first sponsored event of a newly created nonprofit organization, Stellwagen Alive, Friends of the National Marine Sanctuary. The establishment of such a volunteer organization helps meet one of the major objectives of the Administrative Capacity and Infrastructure Action Plan.

There is still much work that needs to be done before the friends group can accomplish its stated mission of providing supplemental programmatic support to the sanctuary. In addition, activities under the other two objectives of this plan are being addressed systematically.

Recently, new positions have been added to the sanctuary staff, including a facilities coordinator and a first mate for our research vessels, the R/V *Gannet* (a 28-foot power boat) and the R/V *Auk* (a 50-foot catamaran), which was added to the NOAA fleet in summer 2006. Despite the additions to staff and vessels, there is critical need for other expertise – in enforcement, in science and monitoring, and in education and outreach. The future development of a volun-



Richard Wheeler paddles along the Massachusetts coast during the September Aukathon.

Credit: SBNMS



Divers surface after a shipwreck investigation.

Credit: SBNMS

teer corps may help to assuage some of the pressing demands for sanctuary representation at local and regional events, and to assist in day-to-day operations. Expansion of the volunteer dive team and support for international exchanges, including liaison with our sister sanctuary in the Dominican Republic, are also listed as important activities for sanctuary attention.



Credit: NOAA

NOAA's 50-foot, aluminum hulled research vessel Auk departs Scituate Harbor on a science cruise.



Wheeler enters Boston Harbor during the Aukathon.

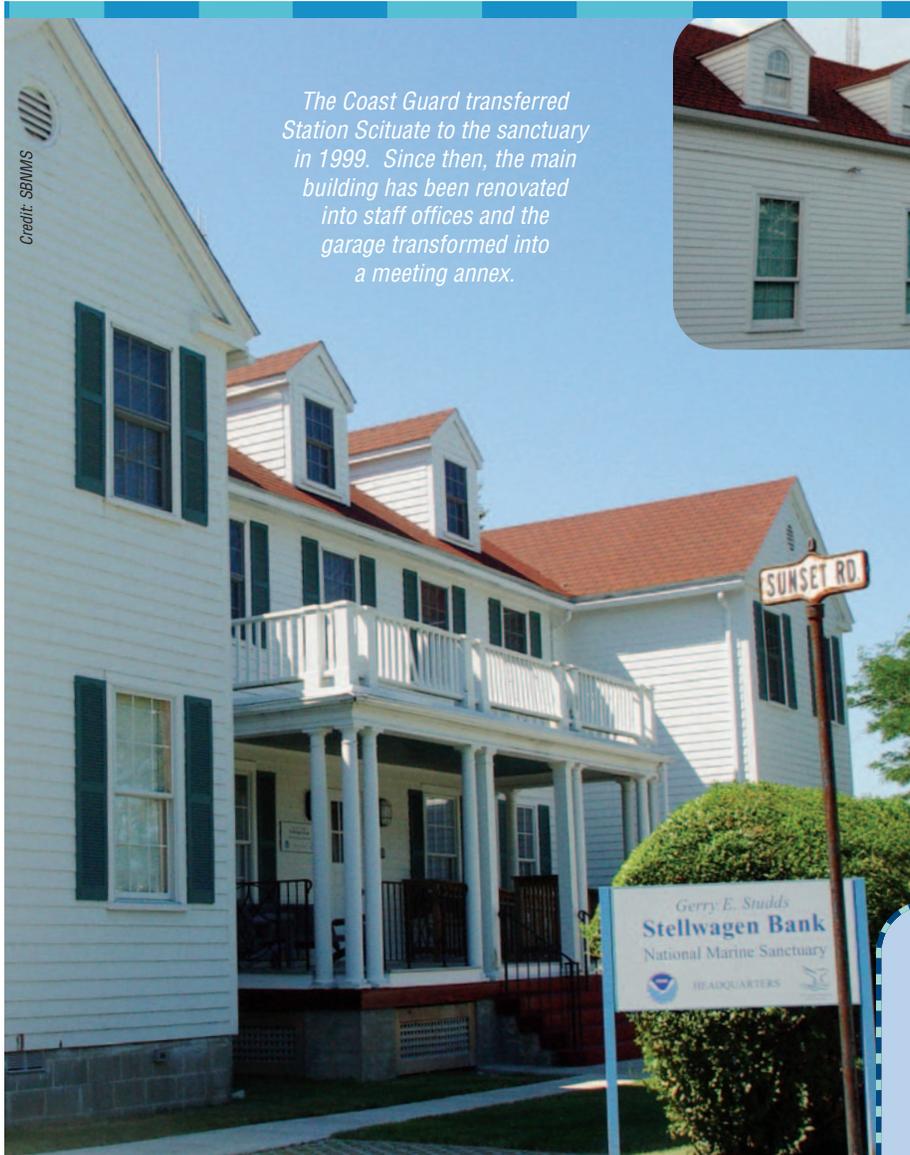
Credit: SBNMS



Credit: MassGIS

Sanctuary facilities include the red-roofed main buildings (at right) and the boathouse (at left) as seen in this 2001 photo.

Infrastructure Action Plan



The Coast Guard transferred Station Scituate to the sanctuary in 1999. Since then, the main building has been renovated into staff offices and the garage transformed into a meeting annex.



During the 2003-2004 period, the sanctuary's main headquarters building and meeting annex (formerly a multi-car garage) were completely renovated, incorporating a state-of-the-art geothermal heating and cooling system. Under this action plan, the next phase in site redevelopment should include the development of a marine operations center in the present boathouse, with wet and dry laboratories, dive locker, equipment storage, work areas, and bunk room.

Goal

The goal of the Administrative Capacity and Infrastructure Action Plan is to ensure that the administrative, operational and financial capacities of the sanctuary are adequate to effectively implement the vision, mission, goals and objectives of the sanctuary.

Administrative Capacity and Infrastructure

Objective

ADMIN. 1 Strengthen Site Staffing and Program Support Capabilities

Strategy

- 1.1 Integrate staff capabilities with program needs.
- 1.2 Hire additional staff and streamline organizational structure.
- 1.3 Enhance operation of the sanctuary advisory council.

ADMIN. 2 Maintain and Further Develop Site Infrastructure

- 2.1 Maintain and acquire vessels as necessary.
- 2.2 Work with NMSP headquarters to develop and implement a sanctuary long-range facilities plan that prioritizes partnering opportunities with the town of Scituate, Mass.
- 2.3 Maintain a database for sanctuary permitting.
- 2.4 Maintain and enhance a sanctuary diving program.
- 2.5 Develop an effective enforcement program.

ADMIN. 3 Develop a Sanctuary Volunteer Program that Leverages Sanctuary Programs and Increases Site Visibility

- 3.1 Develop a sanctuary volunteer program.
- 3.2 Maintain and expand sanctuary volunteer diver corps activities.
- 3.3 Develop and support international exchanges of volunteers between this sanctuary and other marine protected areas.

Interagency Cooperation

Interagency Cooperation Action Plan

The shift of the Boston shipping lanes, which went into effect July 1, 2007, was the work of a coordinated partnership of the sanctuary, NOAA Fisheries and the U.S. Coast Guard. By working with these other federal agencies, the sanctuary was able to bring its research findings and management proposals before key audiences and build support for an important whale protection measure.

Although there are many agencies with jurisdiction in federal waters, authorities are often activity- or species-specific. In some cases authorities overlap, with several groups charged with similar roles; in other cases authorities are not inclusive enough, creating holes in the regulatory framework. The 842 square miles of the sanctuary and its natural and cultural resources fall under the

jurisdiction of several agencies whose statutes complement the intent and purpose of the National Marine Sanctuaries Act. Integration of the roles and duties of each agency with sanctuary authorities often requires frequent communication and, in some cases, mechanisms of coordination. In the area of fisheries management, the sanctuary works with NOAA Fisheries Northeast Regional Office and the New England Fisheries Management Council, along with NOAA Fisheries Northeast Fisheries Science Center. The continued use of the Massachusetts Bay Disposal Site under the jurisdiction of the U.S. Army Corps of Engineers and the nine-mile long sewage outfall pipe operated by the Massachusetts Water Resources Authority and permitted by the U.S. Environmental Agency, both present areas of concern. Enforcement, or more importantly the frequency of enforcement,

is a critical issue in the sanctuary and regional waters. At the present time, the sanctuary has no dedicated enforcement agents, although the NOAA Office of Law Enforcement has designated a special agent as liaison to the sanctuary for enforcement issues, and the U.S. Coast Guard has stepped up patrols that include the sanctuary area.

Goal

The goal of the Interagency Cooperation Action Plan is to foster and facilitate cooperation and coordination of planning and management actions in support of partnering state and federal agency missions, when consistent with the National Marine Sanctuaries Act and bearing on sanctuary resources. The sanctuary will communicate its purpose and findings to these agencies and seek opportunities to share information, resources and expertise with them.

Interagency Cooperation

Objective

IC. 1 Facilitate Cooperation and Coordination Between Agencies

Strategy

- 1.1 Initiate discussions regarding a Memorandum of Understanding between the sanctuary and NOAA Fisheries Service to facilitate cooperation and coordination.
- 1.2 Coordinate proposed activities with NOAA Fisheries Service's Northeast Regional Office.
- 1.3 Facilitate cooperative research and outreach between the sanctuary and NOAA's Northeast Fisheries Science Center.
- 1.4 Evaluate the Memorandum of Agreement between the U.S. Army Corps of Engineers and NOAA Fisheries Service for commenting on proposed activities occurring at the Massachusetts Bay Disposal Site

IC. 2 Establish Mechanisms for Improved Information Sharing Between Agencies

- 2.1 Provide information via the Web on the responsibilities and activities of multiple agencies with roles pertinent to the sanctuary.
- 2.2 Provide regular updates to the U.S. Coast Guard Area Contingency Plans.
- 2.3 Establish a mechanism for informal consultation with the EPA, New England Fisheries Management Council, Mass. Water Resources Authority, Mass. Dept. of Environmental Protection, and Mass. Coastal Zone Management Office on water quality issues.
- 2.4 Update and continue to implement the sanctuary cooperative enforcement program.
- 2.5 Support continued meetings of the advisory council's interagency cooperation working group.
- 2.6 Participate in the Gulf of Maine Council and other regional initiatives.
- 2.7 Participate on relevant advisory panels of the New England Fisheries Management Council.
- 2.8 Depict sanctuary boundaries in Fishery Management Plans and related documents.

Compatibility Determination



Credit: Regina Asmus-Silva

The sanctuary on a summer day can be a busy place, with whales, whale watchers, recreational boaters and fishermen all jockeying for space.

Compatibility Determination Action Plan

Are lobster fishing and gill net fishing compatible with whale conservation programs? Is diving compatible with shipwreck preservation? Is trawling compatible with seafloor habitat protection? What about feeding whales and ships transiting to Massachusetts ports – can they co-exist in sanctuary waters? These are the kinds of issues that must be addressed in a sanctuary compatibility analysis. The results will be of critical importance to sanctuary decision-making and the development of potential regulations and legislation.

The Compatibility Determination Action Plan recommends a process for

determining what constitutes a compatible use of sanctuary resources. The National Marine Sanctuaries Act directs the National Marine Sanctuary system to facilitate uses that are compatible with the primary mandate of resource protection, but is silent on how compatibility should be determined. This action plan describes a framework for developing a sanctuary compatibility analysis but does not determine the appropriateness of any specific sanctuary use, current or potential.

Under this action plan, the sanctuary and the Office of National Marine Sanctuaries will evaluate the application of a Sanctuary Compatibility Analysis Process and determine its usefulness

as a decision-making tool. This objective approach incorporates the best available scientific information, allows for stakeholder involvement and should be easy to understand and apply. Such an analysis defines the roles of stakeholders and managers, defines the decision-making process and addresses current and new uses, as well as the scale of use and the cumulative impacts of multiple uses. The process can be refined by regularly incorporating updated monitoring information and data about changing environmental conditions and evolving uses of sanctuary resources.



Historic shipwrecks have been impacted by human uses, including fishing.

Credit: SBMMS



Credit: NURC-UConn

Commercially-valuable fish species, like this redfish, are part of a complex sanctuary ecosystem.

Goal

The goal of the Compatibility Determination Action Plan is to develop a framework to assess and evaluate whether existing or proposed human uses are compatible with the sanctuary's primary objective of resource protection.

Compatibility Determination

Objective

CD. 1 Develop a Framework for Sanctuary Compatibility Determination

Strategy

- 1.1 Demonstrate the application of a Sanctuary Compatibility Analysis Process.
- 1.2 Refine the Sanctuary Compatibility Analysis Process by incorporating results of ongoing sanctuary monitoring.

Public Outreach and Education

Public Outreach and Education Action Plan

“Megapclicks” made headlines this past summer. A story about humpback whale research in the sanctuary attracted media attention around the world, after a report was printed in the Royal Society’s science journal *Biology Letters*. Based on data collected during tagging studies, a sanctuary-led research team found that humpback whales use clicks and buzzing sounds during nighttime feeding, sounds that in the past were only associated with toothed whales using echolocation. The term “megapclicks” was based on the type of sound and the scientific name for humpback whale (*Megaptera novaengliae*).

Over the past year the sanctuary gained further media attention with press releases featuring the successful addition of the *Paul Palmer* shipwreck to the National Register of Historic Places, the initiation of a joint project with a local fisherman to remove marine debris from the sanctuary, the release of the sanctuary’s Condition Report, and the coordination of two speaker series – one on sanctuary projects and one on right whale issues. The action plan proposes various strategies for expanding and optimizing the media outreach program.



Credit: SBNMMS



Credit: LARC

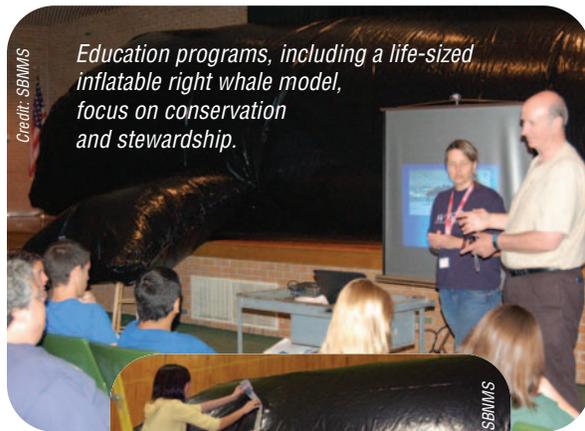
Sanctuary shipwreck expeditions became the subjects of several television shows, including specials on the Science Channel and History Channel. The *Paul Palmer* (left), now a shipwreck in the sanctuary, was the subject of a recent press release.

In the area of education, the sanctuary was the subject of this fall’s Boston Harbor Educator Conference, in which talks and workshops focused on sanctuary resources and research. The fall issue of the Massachusetts Marine Educators’ newsletter *Flotsam & Jetsam* had a sanctuary theme too, while the National Science Teachers

graduate, and adult, is covered in this action plan.

Association accepted a sanctuary-partnered oceanography workshop for the massive (20,000+ participants) annual conference that was held this spring. Students from two area schools assisted sanctuary staff in constructing inflatable life-sized right whale models for use in conservation programs presented at schools and other public venues. Education at various levels, including K-12, undergraduate and

graduate, and adult, is covered in this action plan. The sanctuary, the only such site in the northeast, is often asked to partner with various organizations seeking environmental and marine education grants that require or look favorably upon a federal partner. One of the strategies of the action plan is to develop a set of criteria to strategically and fairly rate project proponents and maximize sanctuary education efforts. Working with key user groups, such as whale watch naturalists and divers, also allows the sanctuary to expand its visibility while encouraging stewardship in diverse communities.



Credit: SBNMMS

Education programs, including a life-sized inflatable right whale model, focus on conservation and stewardship.



Credit: SBNMMS



Credit: SBNMMS

The sanctuary supports high school ROV workshops and the annual regional competition.

Public Outreach and Education

Exhibits are also important in bringing sanctuary information to the public. Unfortunately, a decreased budget in 2007 forced the sanctuary to close its popular Provincetown Visitor Exhibit on Commercial Street, although exhibits at the New England Aquarium and the Gloucester Maritime Heritage Center continue to educate large numbers of visitors. Permanent exhibits at museums and aquariums, as well as small traveling exhibits that visit libraries, nature centers and conferences, serve as important links to the public.



Sanctuary exhibits at the Gloucester Maritime Heritage Center (above) and New England Aquarium showcase resources and resource protection issues.

Goal

The goal of the Public Outreach and Education Action Plan is to increase public awareness and understanding of the sanctuary, and encourage responsible stewardship of its resources.

Public Outreach and Education

Objective

POE. 1 Build Capacity for Outreach Programs that Increase Sanctuary Visibility, Awareness and Stewardship

Strategy

- 1.1 Produce public outreach products and programs that best address sanctuary visibility needs.
- 1.2 Develop and implement outreach programs with stakeholder groups to increase sanctuary visibility and promote sanctuary stewardship.
- 1.3 Work with ONMS headquarters to develop and implement a sanctuary long-range facilities plan that prioritizes partnering opportunities with interpretive centers and articulates federal funding needs.
- 1.4 Establish a media outreach program.

POE. 2 Build Capacity for Formal and Informal Education Programs that Support Sanctuary Management Goals

- 2.1 Develop an action plan for establishing education partnerships and identify the types of programs and objectives that would best be achieved.
- 2.2 Support K-12 education programming.
- 2.3 Support undergraduate and graduate education programming.
- 2.4 Support adult education programming.

Ecosystem-Based Management

Ecosystem-Based Sanctuary Management Action Plan

Managing for humpback whale protection in the sanctuary does not necessarily take into account the needs of bluefin tuna, which feed on similar species, nor does it address all issues in right whale conservation. Managing the cod fishery does not necessarily take into account the role that cod play in shaping biological communities within the sanctuary. Managing a marine protected area at the mouth of Massachusetts Bay requires knowledge of the larger Gulf of Maine ecosystem of which it is a part and the interrelationships of its various species and uses.

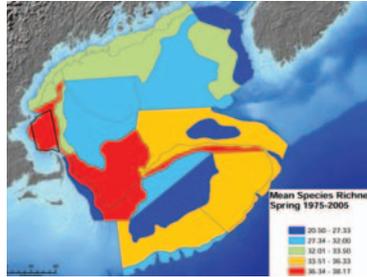
Ecosystem, as defined here, is a set of interrelated biological communities and their associated physical environment. Ecosystem-based management arose in the late 20th century to address the scientific uncertainty inherent in natural systems and the failures of single-species management approaches. This action plan approaches ecosystem-based sanctuary management in two ways.

First, strategies in this plan will involve intensive collaboration with agencies charged with managing components of the ecosystem on a regional scale that overlaps with and goes beyond sanctuary boundaries. Second, other strategies call for intensive research and monitoring within sanctuary boundaries on ecosystem issues of significance to this part of the Gulf of Maine.

Research, monitoring, and the establishment of a science advisory working group and a zoning working group are among the high priority strategies and activities in the action plan. Fully protected marine reserves, a hot topic today, would be considered by the zoning working group in its development of a zoning scheme for the sanctuary.

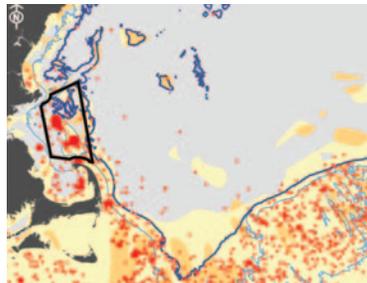
The action plan also lists various research subject areas where work should be continued, supported or initiated, including research to understand the effects of natural disturbance such as internal wave events; development of computer models that afford a predictive capability to better understand sanctuary dynamics and to guide ecosystem-based

sanctuary management; and establishment of programs to monitor and evaluate ecological integrity within the sanctuary.

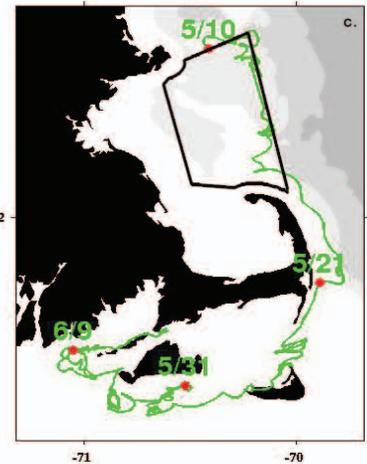
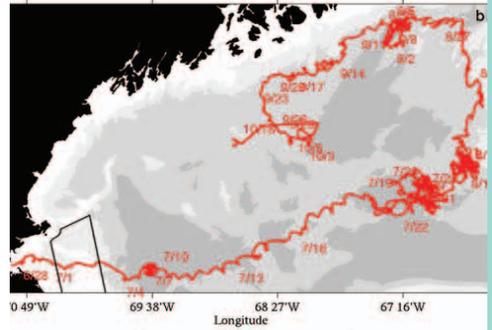


Above: Red indicates highest level of fish species diversity (lower diversity is pictured from yellow to green to blue).

Below: Red dots indicate sand lance abundance, with the greatest concentrations found in the sanctuary.



Working Definition of "Ecological Integrity": The degree to which the system is structurally intact and functionally resilient within the context of historical baselines. Structurally intact means that the native parts of the system are maintained as well as their relationships. Functional resilience is the system's ability to resist changes caused by human or environmental perturbations or, should change occur, to recover over time.



Tracks of drifter buoys reveal connectivity between the sanctuary and (top) the southwest margin of the Gulf of Maine and Georges Bank, (middle) interior Gulf of Maine, and (bottom) the islands south of Cape Cod.



Lobsters are among the many species that inhabit the sanctuary.

Credit: SBMMS

Ecosystem-Based Management

Sand lance are a key prey species. Many seabird species visit the sanctuary to feast on bountiful prey.



Credit: SBMMS

Goal

The goal of the Ecosystem-Based Sanctuary Management Action Plan is to protect the ecological integrity of the sanctuary, which, in turn, contributes to the healthy functioning of the larger Gulf of Maine ecosystem. Effective implementation should consider ecological processes that operate both inside and outside the sanctuary boundaries; recognition of the importance of genetic, species and habitat diversity; and accommodation of human uses within the sanctuary to the extent compatible with the primary goal of resource protection. Ecosystem-based sanctuary management will integrate knowledge of ecological interrelationships with societal values to minimize human impacts to sanctuary resources.



Credit: SBMMS

Ecosystem-Based Sanctuary Management

Objective

EBSM. 1 Establish a Science Review Framework

Strategy

- 1.1 Work with the advisory council to establish a science advisory working group.
- 1.2 Convene a sanctuary science symposium.
- 1.3 Form a science consortium.

EBSM. 2 Establish an Information Management System

- 2.1 Design and implement an information management system.
- 2.2 Design and implement a web portal for public access to databases.

EBSM. 3 Understand Ecosystem Structure and Function

- 3.1 Define and operationalize the term “ecological integrity.”
- 3.2 Develop programs to monitor and evaluate ecological integrity within the sanctuary.
- 3.3 Establish research programs directed at informing ecosystem-based sanctuary management.
- 3.4 Develop models that afford a predictive capability to better understand sanctuary dynamics and to guide ecosystem-based sanctuary management.

EBSM. 4 Protect Ecological Integrity

- 4.1 Continue to convene the zoning working group of the advisory council to: 1) evaluate the adequacy of existing zoning schemes in the sanctuary; 2) address the scientific requirements to meet the goals of ecosystem-based sanctuary management; and, if needed, 3) develop a modified zoning scheme including consideration of fully protected reserves.

EBSM. 5 Evaluate the Need and Feasibility of Modifying the Sanctuary Boundary

- 5.1 Evaluate the need for and feasibility of modifying the sanctuary boundary to be more effective in achieving ecosystem-based sanctuary management.

Ecosystem Alteration

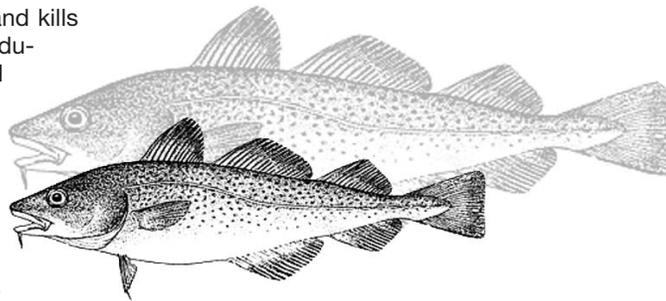
Ecosystem Alteration Action Plan

Research shows that the maximum size of 15 species of fish caught in the sanctuary has shrunk. Large cod were 27% smaller in the year 2000 than in 1963. White hake were 50% smaller, while goosefish and pollock were averaging about a 35% decrease in maximum size. Overall, the average maximum length decrease for all species combined was 20% over the study period. While a more contemporary assessment offers some reason for optimism for a subset of these species, there is still cause for concern. This is just one indication of ecosystem alteration in the sanctuary. The removal of large size classes among these key predatory species can have profound effects on the composition of their associated biological communities, primarily related to size-based shifts in diet.

Fishing also removes and kills a large number of individuals from untargeted species, called by-catch, which are caught and then discarded. This removal of biomass, which can amount to about 23% of total catch in the sanctuary, may also have an effect on the ecological integrity of the sanctuary. Recommendations in the action plan include greater coordination with NOAA Fisheries to further manage bycatch and restore biological communities.

Forage fish, such as sand lance and herring, are key to important fish species, seabirds and whales which frequent the sanctuary. The action plan recommends that NOAA Fisheries consider implementing a permanent ban on the exploitation of sand lance in the sanctuary.

Habitat degradation due to bottom trawling and dredging, especially in sensitive areas such as muddy basins, reduces three-dimensional structure and removes those places where juvenile, and even adult, fish can hide from predators. Research in the sanctuary shows that deep mud basins are fragile and take on the order of 10 years or so to recover from disturbance. Sandy habitats, such as Stellwagen Bank, which are

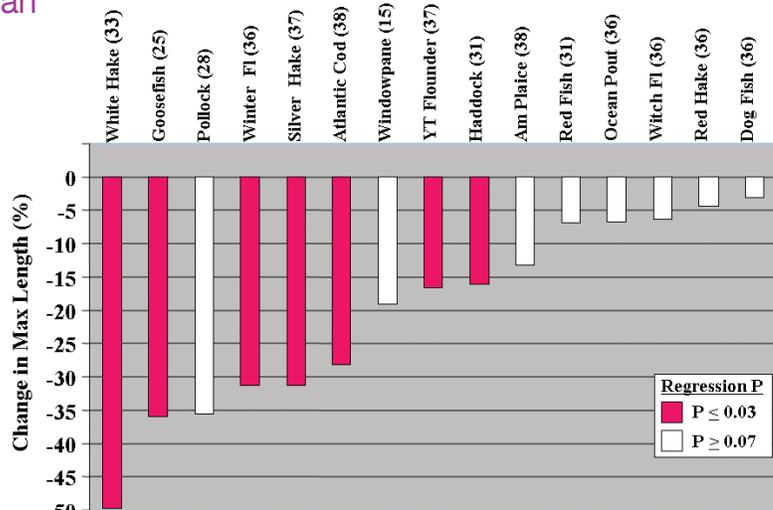


From 1963 to 2000, the maximum length of cod in the sanctuary decreased by 27%. Art: NMFS

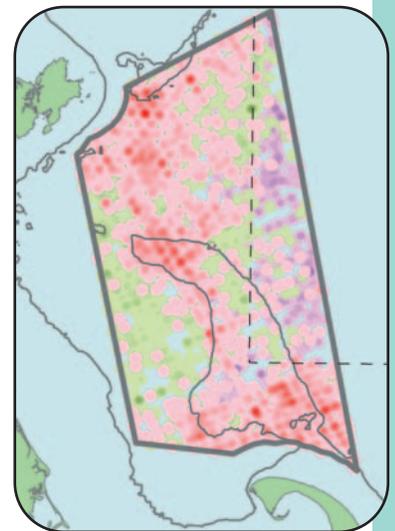
periodically swept by storm events, can recover within months.

Research indicates, depending on the habitat type, that physical disturbance from fishing activity can be more serious than storms. Extensive and chronic exploitation of fish populations could create niche opportunities for biological invasions, particularly when combined with proximity to shipping that can serve as vectors for introduction. This action plan also addresses the issue of laying submarine cables and pipelines.

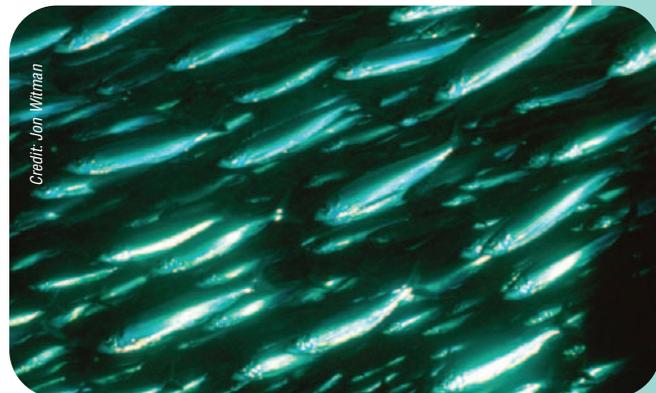
Herring are important prey for larger fish and marine mammals.



The maximum length of 15 ecologically and commercially important fish species in the sanctuary region shrank in size during the 38-year period from 1963-2000. Recent studies show only modest or negligible increases in maximum size.



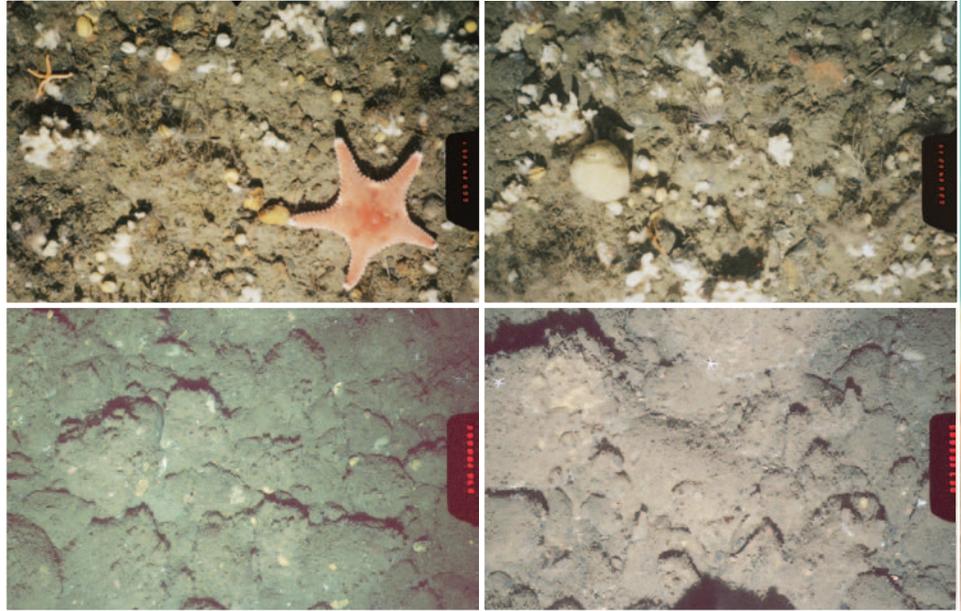
Each year, virtually all of the sanctuary is impacted by fishing gear, including: mobile gear, such as bottom and mid-water trawls and scallop dredges (red); fixed fishing gear, such as lobster traps and sink gillnets (green); and party and charter recreational fishing boats (purple).



Credits: Jon Witman

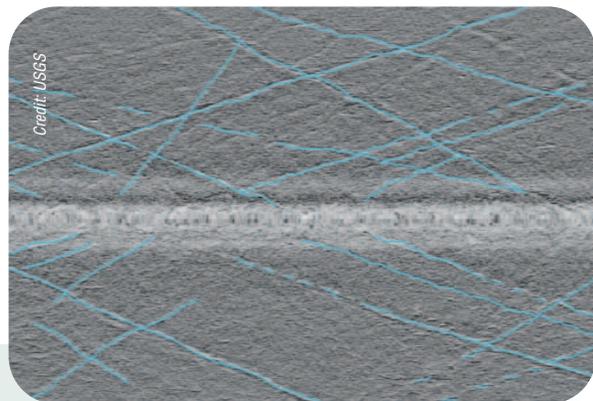
Ecosystem Alteration

Images illustrate differences in community composition and abundance for hard bottom habitats but where fishing is either restricted or allowed. Top images are from sanctuary sampling sites within the Western Gulf of Maine Closure Area where use of bottom tending commercial fishing gear capable of catching demersal fishes is prohibited. After seven years, these hard substrate seafloor areas are still recovering. The two bottom images show sanctuary areas where fishing with commercial gear on the seafloor is permitted. All of these photos were taken at sampling sites located at approximately 65 meters depth during a 2005 monitoring survey. Credit: Courtesy Peter Auster, National Undersea Research Center & Dept of Marine Sciences, UConn



Goal
The goal of the Ecosystem Alteration Action Plan is to reduce or mitigate identifiable impacts on key sanctuary resources due to human activities.

Fishing trawl tracks (blue) leave extensive evidence of disturbance to the sanctuary's muddy Gloucester Basin.



Ecosystem Alteration

Objective

EA. 1 Reduce Ecological Impacts from the Laying of Submarine Cables and Pipelines

EA. 2 Reduce Alteration of Benthic Habitat by Mobile Fishing

EA. 3 Reduce Ecological Impacts of Biomass Removal by Fishing Activity

Strategy

1.1 Establish minimum criteria for special use permit applications for the laying of cables and pipelines.

2.1 Develop a process to establish reference areas that serve as benchmarks for discerning human and natural impacts on habitat alteration.

2.2 Develop a science plan to assess and mitigate benthic habitat alterations.

3.1 Minimize bycatch and discard of all species, in all fisheries (commercial and recreational), by all gear types.

3.2 Determine the effects of biomass removal of targeted species by commercial and recreational fishing on the ecological integrity of the sanctuary.

3.3 Develop a management strategy with NOAA Fisheries and the New England Fisheries Management Council to evaluate and protect an optimal forage base to maintain the ecological integrity of the sanctuary.

Water Quality Action Plan

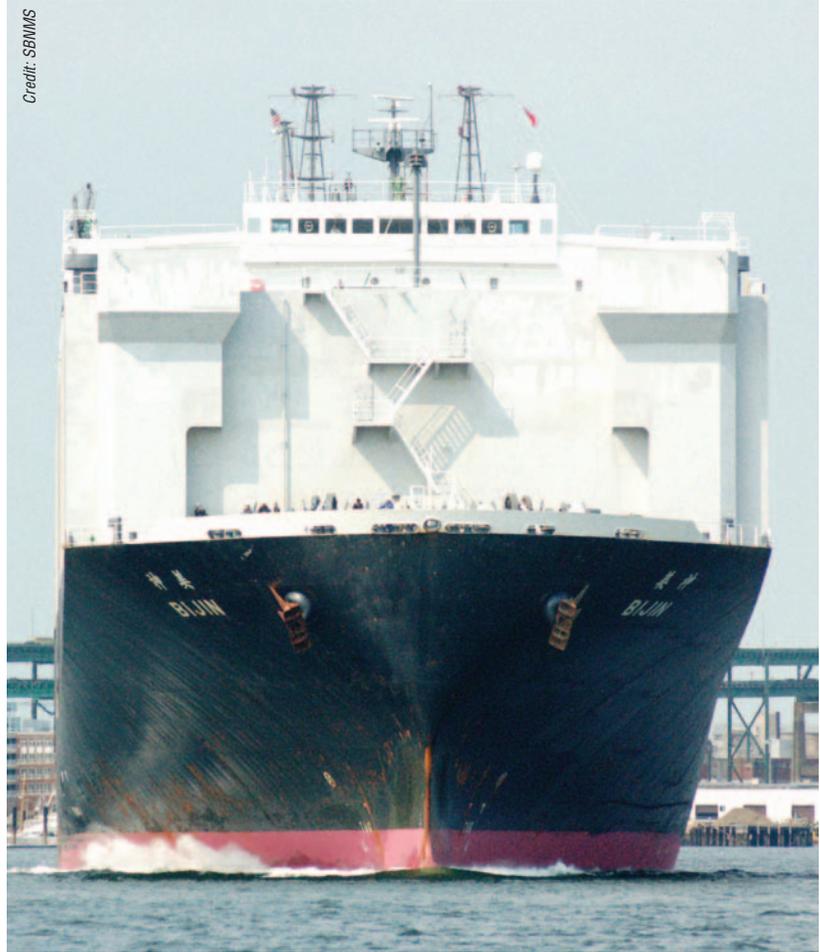
Water Quality Action Plan

In 2000, when the Massachusetts Water Resources Authority received its permit to open the sewage outfall pipe 12 miles west of the sanctuary border, one of the mitigation measures was to develop a water quality monitoring program. Most of the monitoring sites were positioned close to the pipe diffusers, but some stations were located at more distant sites, including five within the sanctuary. During the following year, the sanctuary added four stations to the network. Results to date show no evidence of increased eutrophication or unacceptable contaminant loads in the sanctuary relative to the outfall start-up.

Much of the pollution reaching the sanctuary comes from non-point sources. In addition, the sanctuary is heavily traveled by commercial and recreational vessels and cruise ships that discharge wastes during their voyages.

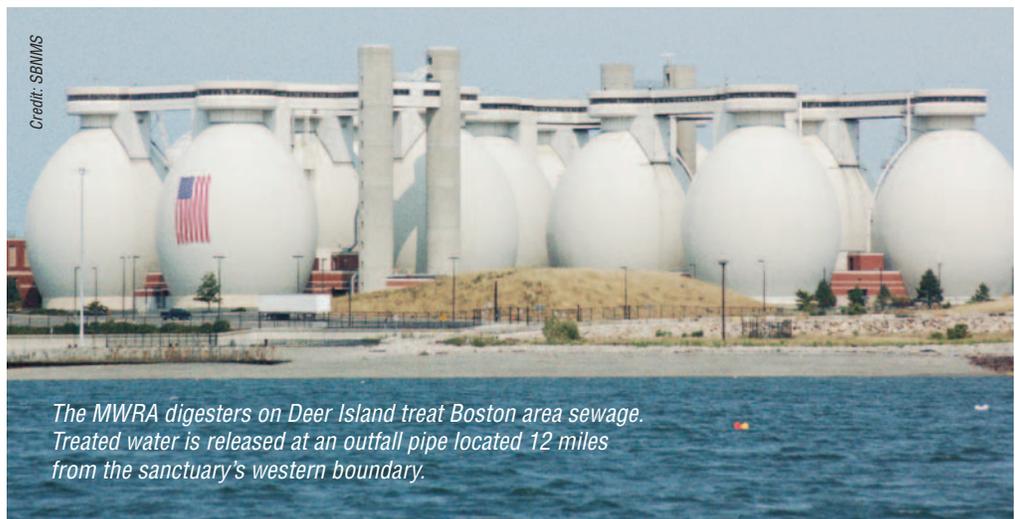
The water quality action plan recommends the development of a monitoring plan as well as the creation of a science and technical working group to provide advice on water quality issues. In addition to understanding the levels of pollutants in the sanctuary, the action plan recommends strategies to reduce waste streams entering sanctuary waters. These strategies include encouraging voluntary no-discharge compliance by vessels, seeking designation of the sanctuary as a No Discharge Area, supporting establishment of pump-out facilities for all ports and harbors that host vessels that visit the sanctuary, and developing “green” boating and cruising outreach and education campaigns.

To reduce the introduction of invasive species, the action plan recommends the development of a memorandum of understanding with cruise lines and the shipping industry pertaining to ballast water exchange guidelines.



Credit: SBNMS

Large ships traveling into and out of the Port of Boston pass through the sanctuary.



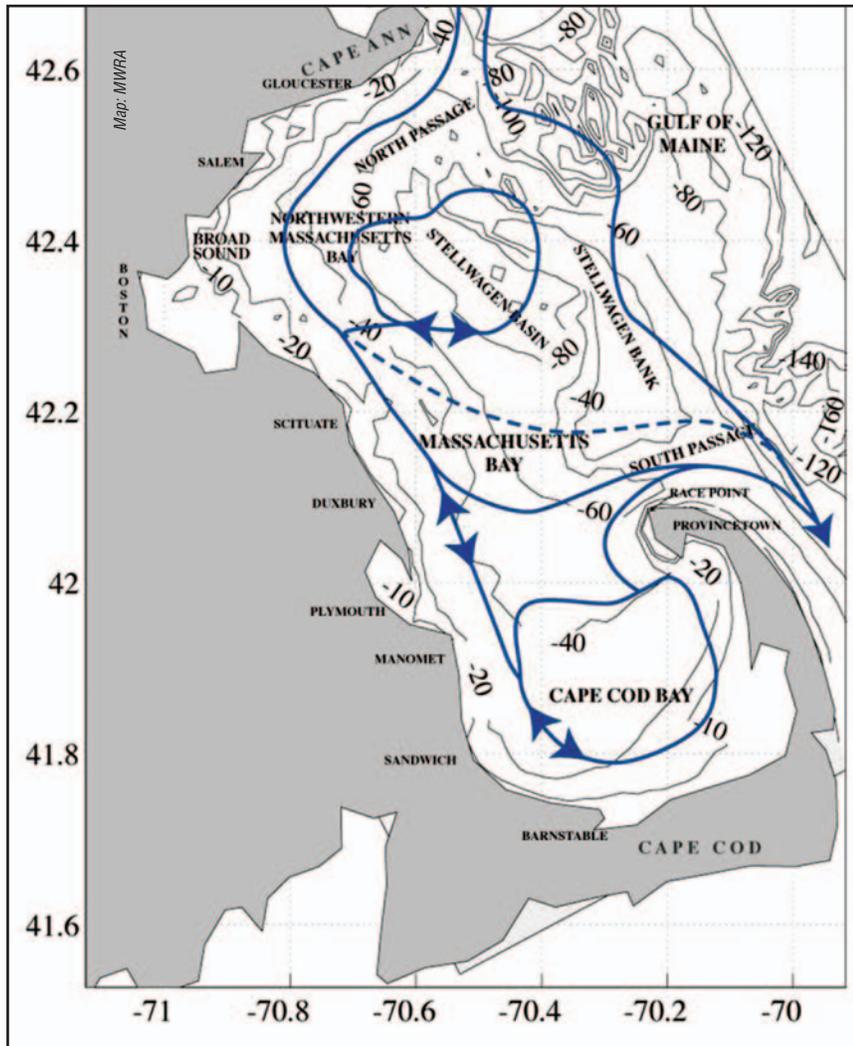
Credit: SBNMS

The MWRA digesters on Deer Island treat Boston area sewage. Treated water is released at an outfall pipe located 12 miles from the sanctuary's western boundary.

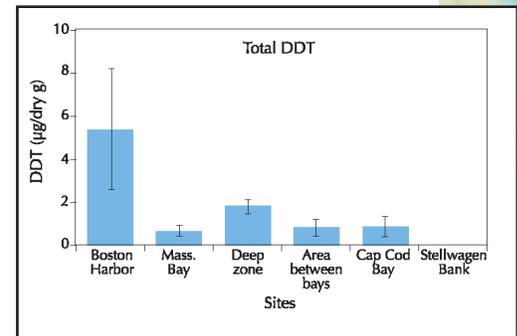
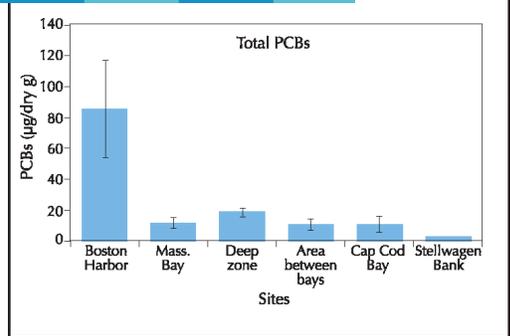
Recently, major oil spills in various locations around the planet have drawn intense interest, including the boat crash into the Oakland Bay Bridge that polluted San Francisco Bay and parts of Gulf of the Farallones National Marine Sanctuary. Activities suggested in this action

plan include continued cooperation with the U.S. Coast Guard and NOAA's Hazardous Materials Office to update contingency plans for catastrophic oil spills in the sanctuary and coordination with MWRA for a sanctuary component in its emergency response plan for the outfall.

Water Quality Action Plan



Stellwagen Bank influences water circulation in Massachusetts Bay.



Levels of PCB and DDT are low in the sanctuary compared to other locations in Massachusetts Bay.

Goal

The goal of the Water Quality Action Plan is to monitor, assess and maintain water quality in the sanctuary for the protection of living and cultural resources and to foster cooperation with cross-jurisdictional partners that are charged with understanding, protecting and enhancing water quality.

Water Quality

Objective

WQ. 1 Assess Water Quality and Circulation

Strategy

- 1.1 Develop and implement a water quality monitoring plan.
- 1.2 Characterize the contaminant loading to the sanctuary from respective sources.
- 1.3 Encourage research and monitoring of endocrine disruptors and their effects on sanctuary resources.

WQ. 2 Reduce Pollutant Discharges and Waste Streams that May Affect the Sanctuary

- 2.1 Reduce threats to sanctuary water quality from vessel waste water discharges (other than ballast water).
- 2.2 Reduce ballast water exchanges in the sanctuary.
- 2.3 Reduce impacts of municipal and other shore-based waste water streams.
- 2.4 Develop contingency plans to address actions and responsibilities to remediate catastrophic water quality events in the sanctuary and support programs that prevent water pollution events.

Behavioral Disturbance

Marine Mammal Behavioral Disturbance Action Plan

When large ships pass close to feeding whales, some of the animals have been observed to breach and tail slap. While such behavior changes are obvious, the underlying cause and effect is still not understood. But the presence of the vessel and the sounds emanating from its engines and propellers may be significant factors in disturbing the feeding session.

In seeking their quarry, tuna fishermen have acknowledged using whale bubble nets and clouds as targets. Tuna feed on sand lance and herring, as do humpbacks. In their pursuit of the valuable catch, the fishing vessels have been seen to cross directly over the bubbles, which humpback whales use to disorient and surround their prey. This vessel activity may disrupt whale foraging behavior and could result in fishing vessels striking or hooking whales.

The sanctuary is a busy place, with vessels on various missions transiting the waters. It is also becoming a very noisy area. The collective ship traffic, including whale watch vessels, tuna fishing boats, recreational boaters, commercial shipping, and the plethora of other types, combined with aircraft overflights and industrial activities may be causing significant harm to the health and well-being of the animals, either directly to their ears or indirectly by interfering with their ability to communicate, feed, care for their young or navigate safely. Vessel noise may mask critical whale vocalizations, particularly between mothers and calves.

Among regular users of the sanctuary, the whale watch fleet is probably the most dependent on a healthy whale population. However, while all companies claim to support and follow voluntary whale watch guidelines, de-



Credit: SBMMS

Whale watching is a multi-million dollar industry for Massachusetts. Compliance with voluntary NOAA whale watching guidelines has been poor.

veloped cooperatively by the industry, government and conservation organizations, a sanctuary study showed that compliance with guidelines was poor. Numerous observations of recreational boaters observing whales indicate that they too ignore the guidelines. It is estimated that more than a million individuals watch whales, usually endangered humpbacks and finbacks, in the sanctuary each year. Whale watch regulations, a certification program and new research and monitoring programs are all activities suggested for more detailed consideration under this plan.



Credit: SBMMS

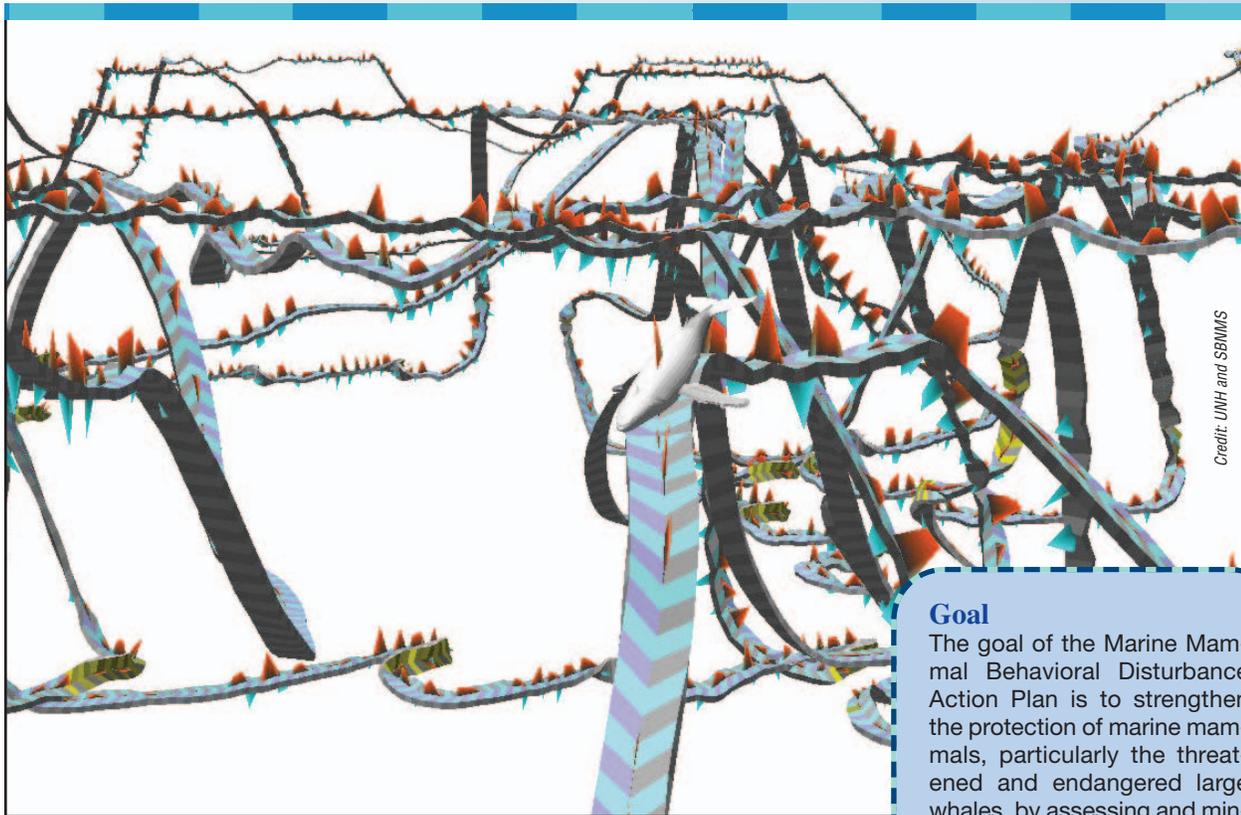
Researchers, under NOAA Fisheries permit, tag a humpback whale in the sanctuary for behavior studies.



Credit: SBMMS

Whether through ignorance of the guidelines or intention, recreational boaters often make close approaches to whales.

Behavioral Disturbance



Tagging studies produce data that make the ocean virtually transparent. This whale track shows a whale making repeated forays to the seafloor.

Goal
 The goal of the Marine Mammal Behavioral Disturbance Action Plan is to strengthen the protection of marine mammals, particularly the threatened and endangered large whales, by assessing and minimizing behavioral disturbance and harassment and by fostering cooperation with agencies having cross-jurisdictional responsibilities that affect them.

Marine Mammal Behavioral Disturbance

Objective

MMBD. 1 Reduce Marine Mammal Behavioral Disturbance and Harassment by Vessels

Strategy

- 1.1 Develop and implement management measures that mitigate behavioral disturbance and risk to whales due to vessel speed and close approach.
- 1.2 Develop a process to consider prohibiting vessels from transiting through humpback whale bubble clouds and/or nets.
- 1.3 Conduct risk assessments on other activities that could disturb marine mammals.
- 1.4 Develop a research program to better understand vessel interactions with whales.

MMBD. 2 Reduce Marine Mammal Behavioral Disturbance and Harassment by Noise

- 2.1 Establish a marine noise consortium to identify noise sources and possible effects.
- 2.2 Develop a marine acoustics research program to establish baseline noise levels and long-term noise budgets.
- 2.3 Develop a policy framework for investigating and mitigating noise impacts within the sanctuary.

MMBD. 3 Reduce Marine Mammal Behavioral Disturbance and Harassment by Aircraft

- 3.1 Identify information gaps and gather data on overflight activities to determine whether they disturb marine mammals.
- 3.2 Develop outreach advisories with NOAA Fisheries to inform the aviation community regarding overflight in proximity to whales.

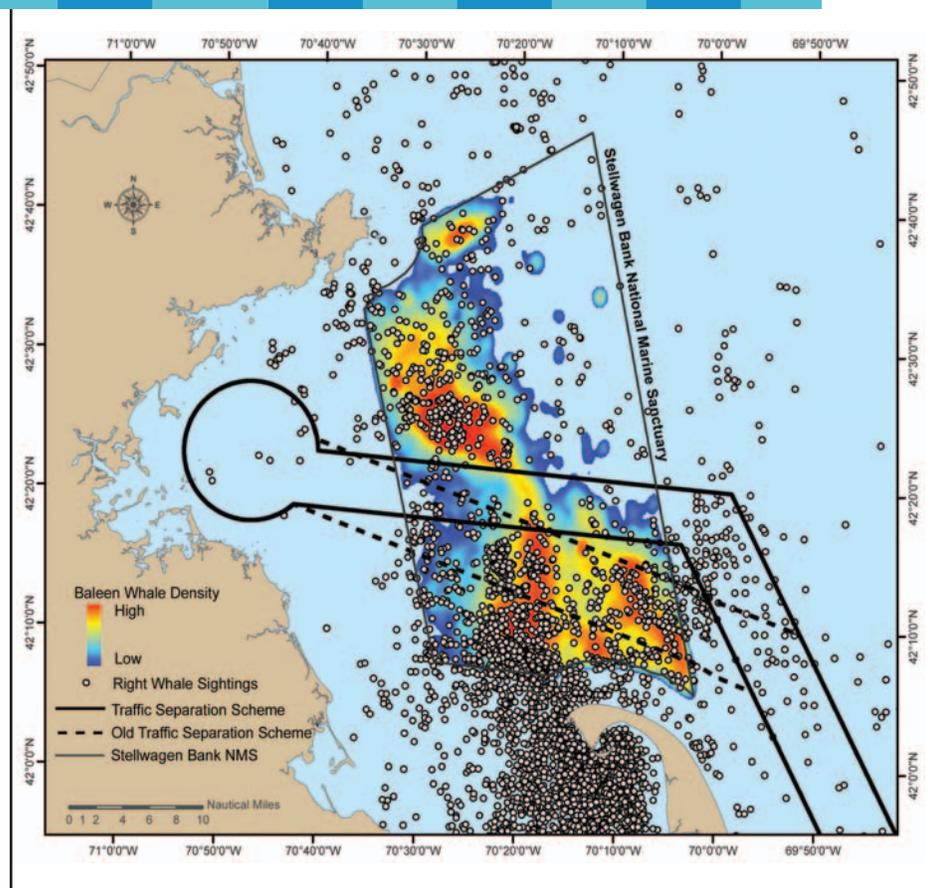
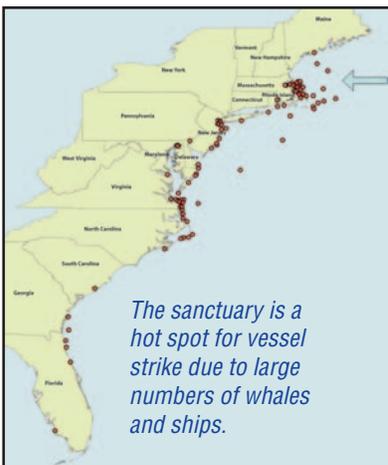
Vessel Strike Action Plan

Marine Mammal Vessel Strike Action Plan

On July 1, 2007, a new shipping route into and out of Boston went into effect. The change in the Traffic Separation Scheme, to an area known to have historically fewer whales than the old shipping lanes, was due in large part to a coordinated sanctuary research and conservation effort. Using a 25-year database of whale sightings, sanctuary staff demonstrated that there could be up to an 81% reduction of strikes to all great whales and, in particular, up to a 58% reduction of strikes to the critically endangered right whale.

But the International Maritime Organization's decision to institute this shift of the lanes through the sanctuary does not mean that whales are now safe from all ship strikes. Because the sanctuary is so heavily used by whales, substantial numbers can still be found in the new shipping lanes. In addition, new ocean uses, such as the liquid natural gas (LNG) ports just west of the sanctuary boundary, will bring additional vessel traffic into these waters. Ships heading to and from Massachusetts ports and harbors are not required to use designated pathways, and sanctuary generated images show that commercial shipping vessels ply most of the waters of Massachusetts Bay.

While the recommended strategy of a change in the shipping lanes has already been fulfilled, the Marine Mammal Vessel Strike Action Plan contains a number of additional recommended actions that could protect whales in these waters. Important among these items is the

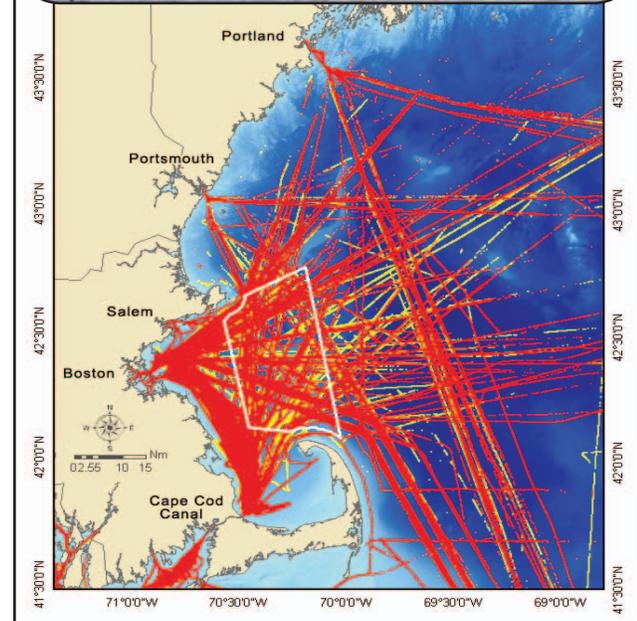


On July 1, 2007, the shipping lanes to Boston were realigned to protect whales, due in large part to sanctuary efforts.



use of the Automatic Information System, a real-time vessel tracking system instituted by the Coast Guard for all ships over 300 gross tons. Although the original purpose for this system was ship and personnel safety as well as homeland security, the tracking may allow for refinement of an early warning system for whale avoidance.

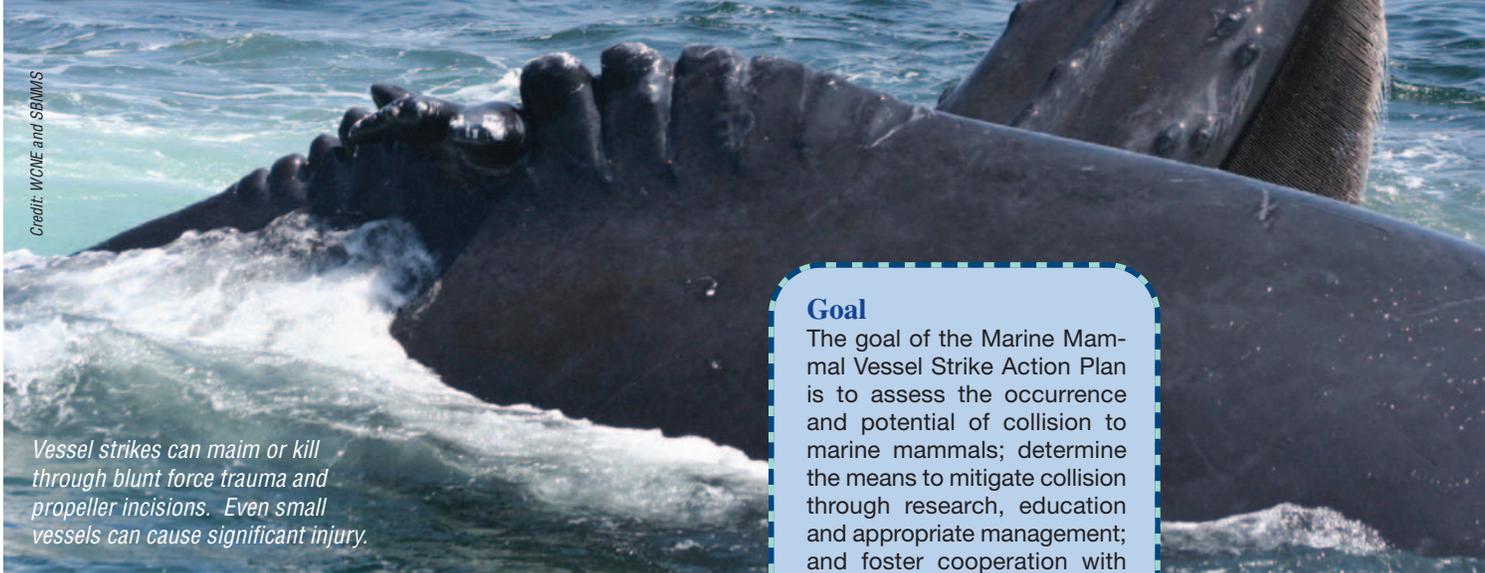
The sanctuary area receives more ship traffic than any other U.S. location in the Gulf of Maine, as evidenced by two months of data from the Coast Guard's Automatic Identification System.



Vessel Strike Action Plan



Credit: POCOS



Credit: WCNE and SBMMS

Vessel strikes can maim or kill through blunt force trauma and propeller incisions. Even small vessels can cause significant injury.

Goal

The goal of the Marine Mammal Vessel Strike Action Plan is to assess the occurrence and potential of collision to marine mammals; determine the means to mitigate collision through research, education and appropriate management; and foster cooperation with cross-jurisdictional agency partners that affect marine mammals.

Marine Mammal Vessel Strike

Objective

MMVS. 1 Reduce the Risk of Vessel Strike Between Large Commercial Ships and Whales

Strategy

- 1.1 Consult with NOAA Fisheries Service on its proposed strategy to reduce ship strike to North Atlantic right whales and evaluate how such measures would affect the sanctuary.
- 1.2 Develop, demonstrate and evaluate the sanctuary Information and Reporting Center.
- 1.3 Determine the conservation benefit of reconfiguring the existing Traffic Separation Scheme within the sanctuary to reduce the risk of ship strike to whales.

MMVS. 2 Reduce the Risk of Vessel Strike through Speed Restriction on Vessels

- 2.1 Institute year-round voluntary speed restrictions for all vessels operating in the sanctuary.

MMVS. 3 Support and Develop Research Programs to Reduce the Risk of Vessel Strike

- 3.1 Work with NOAA Fisheries Service to support its ongoing database of all known vessel strikes in and around the sanctuary.
- 3.2 Work with NOAA Fisheries Service to institute a toll-free number to enable callers to anonymously report vessel strikes in the sanctuary.
- 3.3 Investigate research strategies to determine responses of whales to approaching vessels.
- 3.4 Conduct year-round monitoring to identify type, size, route and speed of vessels in the sanctuary.
- 3.5 Investigate use of forward-looking sonar or other real-time detection technologies.

Entanglement Action Plan

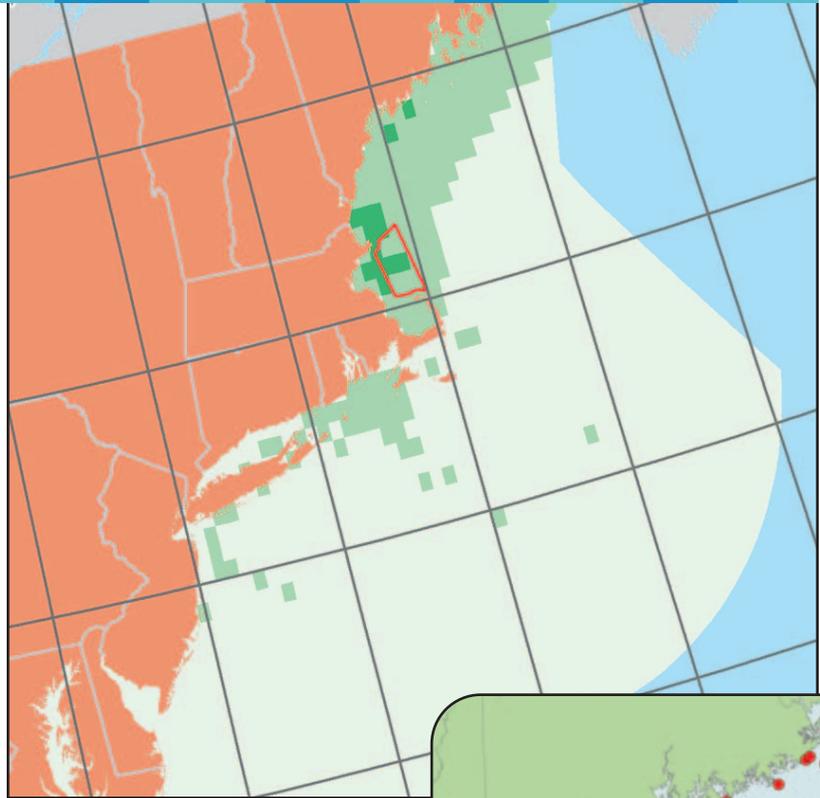
Marine Mammal Entanglement Action Plan

The excitement of a whale disentanglement mission is tangible. Human rescuers, dwarfed by the great whales they are attempting to free, must closely approach their subjects and strip away the life-threatening lines and gear. These missions can be time-consuming, stretching over many hours or even days, weeks or months, and sometimes result in failure. For every whale rescued, there may be others that the team is unaware of, suffering agonizing injuries until they succumb. In whale strikes, especially with right whales, the animals were usually healthy before their demise, so the carcass floats – giving researchers a clue to mortality and danger zones. With entanglements, bindings may restrict movement and feeding, leading to a slow death due to incisions and infection, starvation or drowning. The blubber-depleted carcass then sinks, leaving no clue to the fate of the animal.

The Stellwagen Bank sanctuary, one of the world's top 10 premier whale watching areas, also attracts a large measure of fishing activity. The sanctuary area has the highest concentration of fixed fishing gear along the entire eastern seaboard of the United States. Fixed fishing gear includes lobster pots and gill nets. Traps and pots are also used for crabs, hagfish and whelks. These types of fixed gear can create a gauntlet through which the whales in the sanctuary must swim each day in their search for prey.

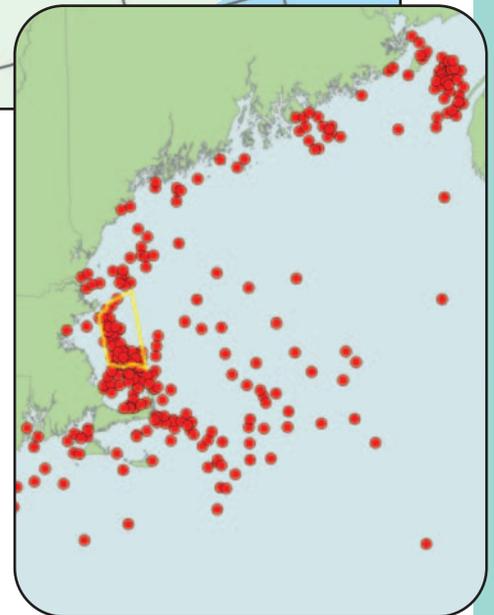
Recent evidence shows that tuna fishing lines, trolled through whale feeding grounds, have hooked the wrong species. The strong lines and sharp hooks, necessary for catching large tuna, can dig into the blubber of these unintended targets, possibly causing harm to the whale and is a violation of federal law.

Over the past few years, sanctuary staff and vessels have assisted in several disentanglements both inside and outside the sanctuary. The new research vessel *Auk* provides an ideal platform for extended station-keeping as disentanglement missions are not a 9-to-5 job, continuing as long as conditions allow for safe operation.



The sanctuary area has the highest density of fixed fishing gear along the U.S. eastern seaboard as indicated by dark green.

The action plan recommends several other methods by which other groups, such as fishermen and whale watch companies, can supply support vessels in these emergency operations. Other activities included in the plan look at the development of safer gear, such as the use of sinking line, which is now required in Massachusetts state waters, and “weak links” in vertical lines that extend from underwater pots or nets to buoys on the surface. The sanctuary may be able to serve as an important testing ground for promising new risk-reduction technologies.



The sanctuary is a hot spot for whale entanglements.



Tuna fishing gear can hook whales and is a violation of law.

Entanglement Action Plan



Entangling gear can create painful and possibly life-threatening injuries. Between 50-70% of humpbacks and right whales in the Gulf of Maine exhibit entanglement scars. Disentanglement operations are dangerous and costly, and only address a small number of the whales that are affected.



Goal

The goal of the Marine Mammal Entanglement Action Plan is to devise a framework to assess and minimize the risk of entanglement of marine mammals, sea turtles and seabirds in the sanctuary; promote methods to successfully disentangle animals; foster cooperation with cross-jurisdictional agency partners; and educate sanctuary users regarding the issue.

Marine Mammal Entanglement

Objective

MME. 1 Aid Disentanglement Efforts

Strategy

- 1.1 Maximize the degree to which entangled animals in the sanctuary are sighted and reported.
- 1.2 Maximize the ability of vessels and aircraft to stand by entangled animals.
- 1.3 Undertake activities leading to improved understanding and prevention of entanglement events in the sanctuary and improvements in disentanglement technology.

MME. 2 Reduce Marine Mammal Interaction with the Trap/Pot Fishery

- 2.1 Obtain gear modifications.
- 2.2 Serve as test-bed to develop and demonstrate low-risk fishing gear.

MME. 3 Reduce Marine Mammal Interaction with the Gillnet Fishery

- 3.1 Obtain gear modifications.
- 3.2 Develop research programs.

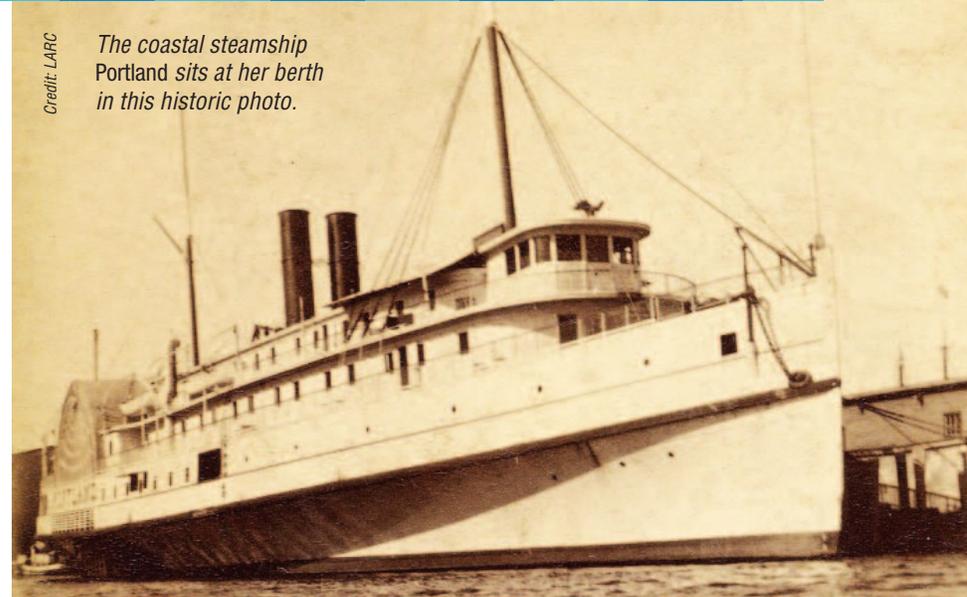
Maritime Heritage

Maritime Heritage Action Plan

On the night of November 26, 1898, the coastal steamship *Portland* departed from India Wharf in Boston on its regularly scheduled trip to Portland, Maine. While en route, a tremendous storm sank the steamship off Cape Ann. All passengers and crew, an estimated 192 individuals, were lost in the tragedy and the sinking location remained a mystery for nearly a century. Today, we know that this shipwreck, “New England’s *Titanic*,” sits on the sanctuary’s seafloor. The steamship’s historical and archaeological importance as a well preserved example of coastwise passenger travel at the end of the 19th century led to its listing on the National Register of Historic Places. In addition to this listing, sanctuary researchers have successfully pursued designations for two other archaeological sites in the sanctuary – the coal schooners *Frank A. Palmer* and *Louise B. Cray*, which collided and sank together in December 1902, and the unlucky coal schooner *Paul Palmer*, which departed port on Friday the 13th in June 1913 and a few days later caught fire and sank off Cape Cod.

The Maritime Heritage Action Plan addresses sanctuary-specific historical resource inventory, assessment, management, protection, and interpretation requirements. It fulfills the NOAA Office of National Marine Sanctuaries and the Maritime Heritage Program strategic plans, and it complies with the Preserve America Executive Order (E. O. 13287) tasking NOAA with preserving and protecting historic resources in the agency’s care.

The sanctuary is required to manage its historical resources in a fashion that facilitates public access to the extent compatible with the overall goal of resource protection. The Maritime Heritage Action Plan directs the sanctuary to determine the level of protection and access for all historical resources based upon historical and archaeological significance and an assessment of potential threats to historical resource stability



Credit: LARC

The coastal steamship *Portland* sits at her berth in this historic photo.



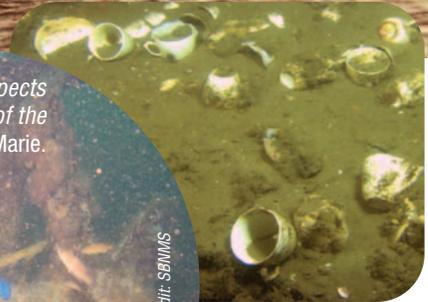
Credit: SBNMS and NURC-UConn

A side-scan image reveals the *Palmer-Cray* wreck.



A diver inspects the wreck of the *Josephine Marie*.

Credit: SBNMS



Credit: NURC-UConn, SBNMS and The Science Channel

ROV image of cups from the *Portland*'s galley.



Credit: SBNMS

Marine life covers the *Paul Palmer* shipwreck.



Credit: SBNMS

Remotely operated vehicles (ROVs) are used extensively to discover and document sanctuary shipwrecks.

and archaeological integrity. The greatest threat to the sanctuary’s historical resources results from fishing activities. The sanctuary’s ongoing historical resource characterization has revealed that past interactions between historic shipwrecks and fishing gear have resulted in degraded archaeological integrity, reduced historical and archaeological significance, and diminished aesthetic qualities. Other potential anthropogenic threats to historical resources include artifact collecting,

Goal

The goal of the Maritime Heritage Action Plan is to inventory, assess, protect, manage and interpret prehistoric and historic archaeological resources in the sanctuary. Appropriate sites shall be nominated to the National Register of Historic Places.

Maritime Heritage

Maritime Heritage

Objective

Strategy

MH. 1 Establish a Maritime Heritage Program

- 1.1 Develop the foundation and infrastructure for a maritime heritage program and integrate this program into existing sanctuary programs.
- 1.2 Identify and pursue additional sources of funding beyond ONMS.
- 1.3 Identify and form partnerships, relationships, and MOUs with entities that have specialized knowledge and abilities that support the documentation and interpretation of the sanctuary's maritime heritage resources.

MH. 2 Inventory, Assess and Characterize Historical Resources

- 2.1 Characterize prehistoric and historic use patterns to assist with the location of historical resources through the identification and collection of historical, archaeological and anthropological documentation.
- 2.2 Conduct systematic field surveys to locate, identify and inventory historical resources.
- 2.3 Assess historical resources for their National Register of Historic Places eligibility and nominate appropriate sites to the National Register of Historic Places
- 2.4 Characterize historical resources within the sanctuary.

MH. 3 Protect and Manage Historical Resources

- 3.1 Implement a management system that protects historical resources while allowing for uses compatible with resource protection.
- 3.2 Implement an assessment protocol to assign sanctuary historical resources to the appropriate category.
- 3.3 Identify partnerships and relationships for site monitoring and compliance of historical resources permits and regulations.
- 3.4 Develop and implement an interpretive enforcement program.
- 3.5 Develop and implement a mooring buoy system on historical resources in collaboration with affected parties and regional scuba diving charter operators.
- 3.6 Implement the ONMS permitting guidelines for archaeological research (i.e., survey and inventory permit and archaeological research permit).
- 3.7 Develop and implement collection and conservation policies for artifacts previously recovered from the sanctuary before and after designation.

MH. 4 Develop and Implement a Maritime Heritage Outreach and Education Program

- 4.1 Identify and partner with regional museums, through MOUs/Agreements, to conduct maritime heritage exhibits and other outreach programs.
- 4.2 Develop and implement an artifact documentation and curation program through partnerships and relationships with local or regional maritime museums.

MH.5 Assess Shipwrecks and Other Submerged Objects for Potential Hazards

- 5.1 Establish an inventory of shipwrecks and submerged objects, inside and outside of the sanctuary boundaries, that may pose environmental threats to resources.
- 5.2 Coordinate information exchanges pertaining to shipwrecks and other submerged objects as environmental threats with NOAA's HAZMAT division and the ONMS for the development of the SHIELDS and RUST database systems.
- 5.3 Identify shipwrecks and other submerged sites to be examined with remote sensing technology and report findings to state and federal trustees.
- 5.4 Establish a monitoring program for shipwreck and submerged sites that have been located and are considered a threat to the sanctuary.

Sanctuary Advisory Council

Advisory Council Members and Alternates

Executive Board

Chair: Susan Faraday

Vice Chair: Sally Yozell

Secretary: Richard Delaney

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Alternate

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Credit: SBMMS

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Paul J. Diodati, Director
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Alternate:

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National Marine Fisheries Service

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U.S. Coast Guard

Rear Admiral Timothy Sullivan, Commander, First Coast Guard District
Designee:

LCDR Edward Marohn, First Coast Guard District, Fisheries Enforcement
Edward.J.Marohn@uscg.mil

Stellwagen Sanctuary Friends Group Established



Stellwagen Alive, Friends of Our National Marine Sanctuary is a new nonprofit organization dedicated to supporting the resource protection, research and education goals of the sanctuary. Established in summer 2007, the organization's first project was the "Aukathon" – an outreach-oriented sea kayak voyage from Provincetown to Scituate to Boston to Gloucester – with founding member Richard Wheeler.

Stellwagen Alive is a Massachusetts nonprofit public benefit corporation whose goals are: 1) to increase public awareness of the sanctuary, particularly its value to the New England region; 2) to educate the public about the special significance of the sanctuary and its associated ecological and historic resources; 3) to attract volunteers who are passionately committed to the protection and promotion of the sanctuary; and 4) to enhance sanctuary programming and operations. As a 501 c (3) organization, Stellwagen Alive can accept tax-deductible donations and gifts from individuals, private foundations and corporations. Jennifer Bender Ferre serves as executive director and can be reached by e-mail at Jennifer@stellwagenalive.org. The organization's Web address is: <http://www.stellwagenalive.org>

Acoustic Buoys Help Ships Avoid Right Whales

A right whale detection system, mandated through the National Marine Sanctuaries Act as a mitigation measure for threats from liquid natural gas port development on sanctuary resources, may make the Boston shipping lanes safer for marine mammals. Based on NOAA comments, license requirements for the port included installation of an array of acoustic buoys between the Traffic Separation Scheme lanes into and out of Boston. Initial design for the system was conceived by sanctuary research coordinator Dave Wiley, while the sanctuary's ocean noise specialist Leila Hatch shepherded the program through the policy process. The buoy system, built by

Cornell Lab of Ornithology's Bioacoustics Research Program and Woods Hole Oceanographic Institution, can detect the unique upcall of the northern right whale. When detected and confirmed by technical specialists at the Cornell lab, a near-real-time signal can be sent to an approaching LNG tanker about the proximity of whales. These acoustic detections are also being included in the NOAA Fisheries Right Whale Sighting Advisory System, which is broadcast to incoming ship traffic and made available on the Web at <http://rwhalesightings.nefsc.noaa.gov>. Cornell's Bioacoustics Research Program offers a web site where you can view the right whale status at the shipping lane buoys and learn more about this interesting animal. The address is: <http://listenforwhales.org>.

Compliance with Whale Watching Guidelines Studied

In the latest issue of the journal *Conservation Biology*, sanctuary research coordinator David Wiley reports that voluntary conservation guidelines may not be the most appropriate avenue to ensure resource protection. For the northeast region, which includes the sanctuary, an industry-government-research consortium had established a series of three speed zones for whale watching (increasingly slower speeds as proximity to whales shrinks) as well as recommendations on no-approach areas and angles of approach. Using inconspicuous observers on 46 commercial whale watch trips from 12 different companies, the research team found that most vessels were noncompliant with speed recommendations. Since other studies have indicated that vessel speed has a direct relationship to whale safety (injury and mortality rise with greater speeds), this noncompliance is worrisome. Coauthors for the paper are Richard Pace of NOAA Fisheries, Carole Carlson, formerly with International Fund for Animal Welfare, and Just Moller of the sanctuary.

Fishermen Make Sanctuary Waters Safer

The sanctuary is partnering with Scituate fishermen to help remove derelict fishing gear and other marine debris from the seafloor in the sanctuary. These lost lines, nets, traps and other items threaten the health of living marine resources such as

whales, the condition of cultural resources such as shipwrecks, and the safety and livelihoods of commercial fishermen. Marine debris can snare active fishing gear and threaten safe fishing operations, necessitating the use of valuable labor and fishing time to freeing the working gear. In a year-long demonstration project, due to close in April 2008, Captain Frank Mirarchi and mate Dave Haley of the dragger *Barbara L. Peters* have been collecting lost gear and bringing it to shore for safe disposal. A better understanding of how this gear is lost and where it accumulates may reduce the financial impacts and ecological and safety threats this gear presents to fishermen and wildlife.

Maritime Heritage

Recent developments in maritime heritage are highlighted by the listing of the five-masted schooner *Paul Palmer* on the National Register of Historic Places. The schooner's listing represents the culmination of six years of archaeological and historical research. Continued historical research on the *Louise B. Crary* shipwreck uncovered the descendants of the schooner's captain, William Potter. In a rare opportunity, sanctuary staff received a visit from the captain's daughter and granddaughter, who provided a personal perspective on their ancestor. The sanctuary has also been in touch with descendants of *Paul Palmer's* captain, Howard Allen. To make further connections to the descendants of persons lost on the steamship *Portland*, sanctuary maritime archaeologists are compiling biographical information about the *Portland's* passengers and crew that will be featured on the sanctuary web site in the future.

The installation of the R/V *Auk's* science winch in September 2007 provided additional technical capacity for field work. Using the new winch, sanctuary archaeologists conducted side scan sonar surveys of 21 locations where researchers planned to deploy acoustic recording units on the seafloor. The surveys sought to locate maritime heritage resources that would be negatively impacted by the ARU deployments. Fortunately, none were found.

In recognition of the increasing importance of diving and maritime heritage to the sanctuary's management, two new sanctuary advisory council seats were created to represent these two constituencies.



Gerry E. Studds

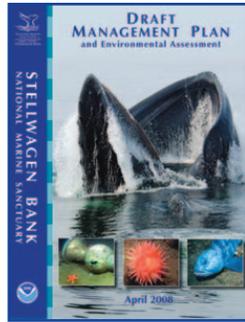
Stellwagen Bank
National Marine Sanctuary
175 Edward Foster Road,
Scituate, Massachusetts 02066



Web: <http://stellwagen.noaa.gov>
E-mail: stellwagen@noaa.gov

Obtain Your Copy of the Management Plan

The public is invited to visit our Web site at <http://stellwagen.noaa.gov> to view and download the complete Draft Management Plan and Environmental Assessment. Interested individuals may request electronic versions of the plan on CD by contacting the sanctuary offices by phone at 781-545-8026, by fax at 781-545-8036, by email at sbplan@noaa.gov or by mail at SBNMS, 175 Edward Foster Road, Scituate, MA 02066.



Printed copies of the draft management plan will be sent to public libraries, academic institutions, sanctuary education and research partners, and government offices in the sanctuary region. Visit our Web site for a complete listing of those locations.

We welcome your comments on the Draft Management Plan. Here's how:

E-mail: sbplan@noaa.gov
Mail: Stellwagen Bank
National Marine Sanctuary
175 Edward Foster Road
Scituate, MA 02066
Fax: (781) 545-8036
Public Meetings:

Various locations throughout New England during June 2008.

Written comments will be accepted at all meetings. Due to time constraints, oral comments must be limited to three minutes per individual.

Comments accepted through (postmarked by) Monday, August 4, 2008.

Help Shape the Future of Your Sanctuary! Draft Management Plan Public Meetings

Date	Location
June 5, 2008; 6:30 – 9:30 p.m. Portland ME	University of Southern Maine Law School - Talbot Lecture Hall 88 Bedford Street
June 9, 2008; 6:30 – 9:30 p.m. Wenham, MA	Gordon College - Lane Student Center, President's Dining Room 255 Grapevine Road
June 10, 2008; 6:30 – 9:30 p.m. Boston, MA	Boston University School of Management - Rooms 426 & 428 595 Commonwealth Ave.
June 11, 2008; 6:30 – 9:30 p.m. Plymouth, MA	Hilton Garden Inn - Plymouth Rooms 1 & 2 4 Home Depot Drive
June 12, 2008; 6:30 – 9:30 p.m. Hyannis, MA	Cape Codder Resort - JFK Ballroom, 1225 Iyanough Rd. Route 132 & Bearse's Way
June 16, 2008; 6:30 – 9:30 p.m. Portsmouth, NH	Sheraton Portsmouth Harborside Hotel - Harbor's Edge Room 250 Market Street
June 17, 2008; 6:30 – 9:30 p.m. N. Dartmouth, MA	University of Massachusetts, Dartmouth - Woodland Common 285 Old Westport Road
June 19, 2008; 6:30 – 9:30 p.m. Mystic, CT	Mystic Aquarium- Main Exhibit Hall 55 Coogan Boulevard