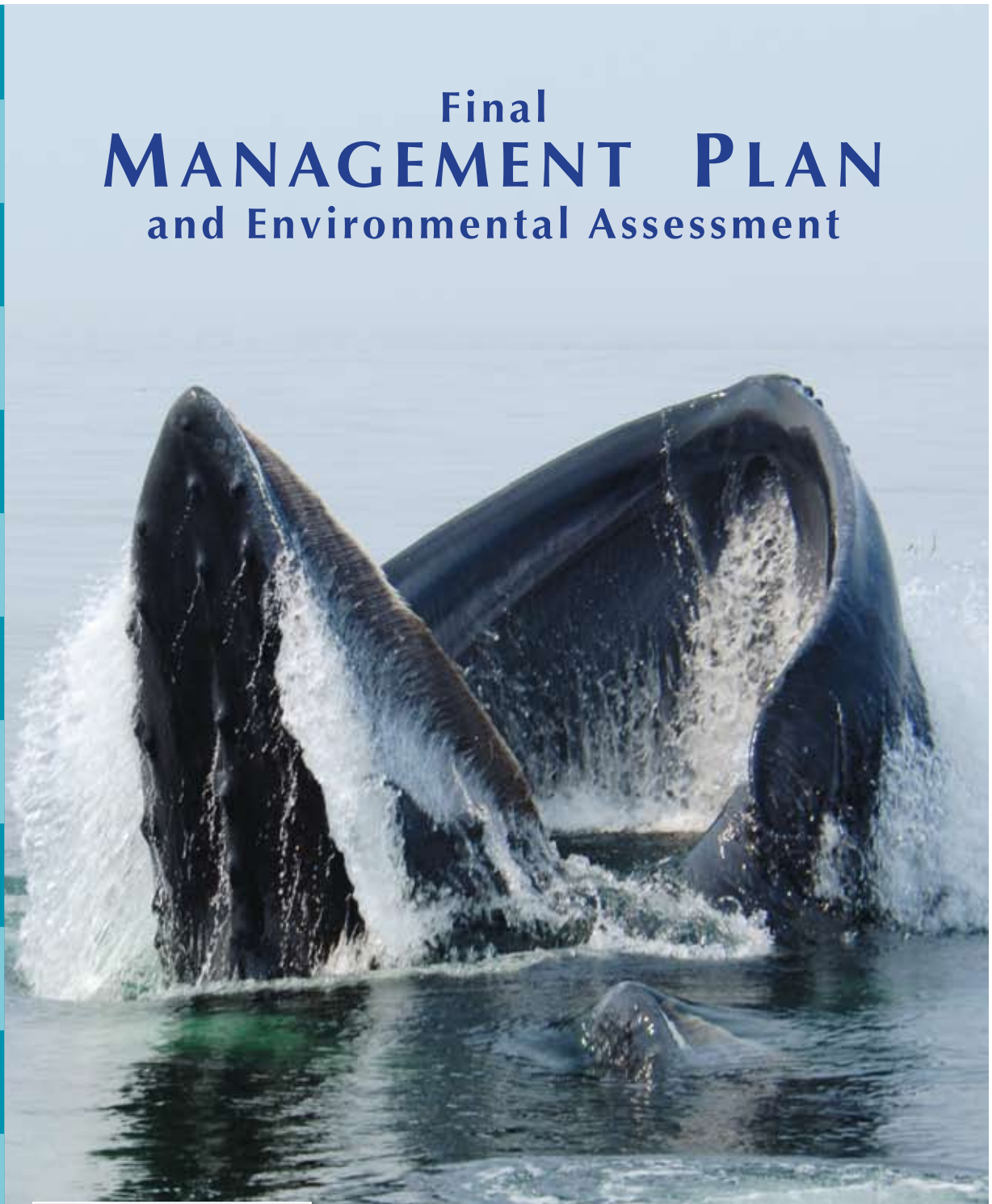
National Marine Sanctuaries
Gerry E. Studds Stellwagen Bank

Stellwagen Bank National Marine Sanctuary

Final Management Plan and Environmental Assessment



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National Oceanic and Atmospheric Administration
U.S. Department of Commerce

In Memoriam

Gerry E. Studds
1937–2006

Gerry Eastman Studds, former Congressman from the Massachusetts 10th District (1973–1996) and tenacious advocate for the ocean. Congressman Studds authored the National Marine Sanctuaries Reauthorization and Improvement Act of 1992, which officially designated the Stellwagen Bank National Marine Sanctuary. His legacy lives on in the sanctuary's research, education and conservation efforts, as well as in the vast array of marine legislation that he eloquently supported. In honor of his dedication to marine issues, Congress renamed the sanctuary the Gerry E. Studds Stellwagen Bank National Marine Sanctuary during the 1996 reauthorization of the Sanctuaries Act.

Atlantic cod, *Gadus morhua*, is a keystone predator species of major ecological importance within the Stellwagen Bank National Marine Sanctuary. It is better known as a popular species for commercial and recreational fishing. While cod often graces the tables of homes and restaurants as the "center-of-the-plate-special," it needs also to be recognized and appreciated as a functionally significant component of the sanctuary's wildlife.

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About This Document

This document is the revised final management plan and environmental assessment for the Stellwagen Bank National Marine Sanctuary. The plan's primary goal is the protection of sanctuary resources, including the conservation of marine biodiversity within the sanctuary. The attendant sub-goals include protecting the sanctuary's ecological integrity while ensuring sustained provision of the sanctuary's environmental services. Befitting sanctuary status, the plan advocates a standard for conservation that is higher than may apply broadly throughout the whole Gulf of Maine.

The management plan is the product of an extensive public process begun in 2000 that resulted in a total of more than 45,500 comments provided during the public scoping and draft management plan review periods, and that relied on the efforts of more than 300 individuals participating in scoping meetings and over 200 people participating on eleven working groups. Comments on the draft management plan came from all 50 states, two U.S. Territories and 48 countries attesting to the sanctuary's national significance. The vast majority of these comments urged that more be done to restore and protect the sanctuary's resources and indicated that the existence value (i.e., non-market value) of the sanctuary's resources is highly regarded.

In addition to core research and analyses originating for the preparation of this document, the management plan draws upon information and rationales provided in more than 840 scientific and professional papers and reports, the great majority being peer-reviewed journal articles. The management plan was extensively peer reviewed by scientists and managers within NOAA and was offered for critical review and comment to numerous related federal and state agencies.

This final management plan serves as a non-regulatory policy framework for addressing the issues facing the sanctuary over the next five years. It identifies the need and lays the foundation for restoring and protecting the sanctuary's ecosystem. It provides strategic guidance for management actions and focuses those actions on four priority programmatic areas: capacity building, ecosystem protection, marine mammal protection and maritime heritage management.

Craig D. MacDonald, Ph.D.

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Executive Summary

Overview

The Stellwagen Bank National Marine Sanctuary (SBNMS or sanctuary) stretches between Cape Ann and Cape Cod at the mouth of Massachusetts Bay in the southwestern corner of the Gulf of Maine (GoM). Nearly the size of the state of Rhode Island and located wholly within federal waters, sanctuary boundaries include the submerged lands of Stellwagen Bank, all of Tillies Bank and Basin, and the southern portions of Jeffrey's Ledge. The sanctuary protects 842 square miles (638 square nautical miles) of open ocean, overlaying a diverse seafloor topography and array of benthic and pelagic habitats that support biological communities broadly representative of the GoM.

The sanctuary's mission is to conserve, protect and enhance the biological diversity, ecological integrity and cultural legacy of the sanctuary while facilitating uses that are compatible with the primary goal of resource protection. When Congress designated the 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. The Stellwagen Bank sanctuary is the only federal entity mandated to conserve biological diversity and protect maritime heritage resources in the offshore waters of the GoM.

The management plan review process was a public collaboration of immense proportion largely begun in 2000 that resulted in a total of over 45,500 comments provided during both the public scoping and draft management plan review periods, and that relied on the efforts of more than 300 individuals participating in scoping meetings and over 200 people participating on eleven issue-driven working groups. During the draft management plan review period alone, 25,529 comments came from all 50 states, two U.S. Territories and 48 countries attesting to the sanctuary's national significance. The vast majority of these comments urged that more be done to restore and protect the sanctuary's resources and indicated that the existence value (i.e. non-market value) of the sanctuary's resources is highly regarded. The entire process was coordinated with, and reviewed by, the 45 members and alternates on the Stellwagen Bank Sanctuary Advisory Council holding appointments principally during 2002-2006 and offering representation from Connecticut to Maine.

The Stellwagen Bank 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 region's 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 appropriate fish production) that are environmentally sustainable and compatible with the widely recognized need and Congressional mandate for resource protection.

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 biodiversity 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. Comprehending the great importance of marine biodiversity and the need to maintain ecological complexity and resiliency in the sanctuary, this management plan is based on the principal concept of managing marine resources for biodiversity conservation.

Key Findings

Primary production (production of new organic matter principally by photosynthesis) at Stellwagen Bank is comparatively high, being three times greater than the GoM in general and twice as high as at Georges Bank. There are well over 575 known species of animals in the sanctuary and the list is largely incomplete. Living landscapes (anemone forests, sponge gardens, hydroid meadows, worm tube beds) carpet the seafloor and the associated marine communities support benthic and pelagic species that are dependent upon them. The number of invertebrate species that constitute these landscape features remains to be adequately counted. Water column and seafloor habitats sustain over 80 species of fish and provide important feeding and nursery grounds for 22 marine mammal species, including the endangered humpback, fin and sei whales and the critically endangered North Atlantic right whale. The area supports foraging activity by 53 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. Numerous shipwrecks occur throughout the sanctuary, encapsulating the rich maritime history of the place. Of the 35 historic shipwrecks located thus far, five shipwrecks at four sites are listed on the National Register of Historic Places.

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 and recreational viability of most current uses in the sanctuary. Key prey species include sand lance (small semi-pelagic fish), herring and planktonic copepods. Sand lance numbers in the sanctuary are the highest and most concentrated anywhere in the southern GoM, and the sanctuary is in an area of high relative abundance of herring. Accordingly, the sanctuary is one of the most intensively used whale habitats in the northeast continental region of the U.S. The World Wildlife

Fund and *USA TODAY* named Stellwagen Bank and vicinity one of the top ten premiere places in the world to watch whales. The readers of *Offshore* magazine voted Stellwagen Bank the best place to watch wildlife and the number three favorite recreational fishing spot in the northeastern U.S. As the U.S. partner of BirdLife International, the Massachusetts Audubon Society (Mass Audubon) has designated Stellwagen Bank an Important Bird Area (IBA) because of its exceptional habitat.

However, 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. Fishing has removed almost all of the big old growth individuals among biologically important fish populations, and reshaped biological communities and habitats in the process. Commercial fishing lands 17.0 million pounds to 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 bycatch (based on 2002/2003 estimates). The part of the catch from the sanctuary that actually is landed amounts to 1.9%–2.8% of the total New England landings value for all northeast fisheries. Fishing removes 3,200 metric tons of herring from the sanctuary each year on average, an amount that raises concern over the ecological sufficiency of the forage base for whales and other sanctuary wildlife. The area in and around the sanctuary is a high use area for fixed gear vessels and is a hotspot for observations of fishing gear entanglements with whales in the GoM. While this distinction makes the sanctuary an ideal location to focus disentanglement efforts for large whales, the high relative frequency of sighted entanglements is not in keeping with the sense of the term "sanctuary." Additionally, fishing gear has impacted nearly all historic shipwreck sites that have been investigated in the sanctuary.

The sanctuary receives more commercial shipping traffic than any other location within U.S. jurisdiction in the GoM and approximately ten percent of the vessel/whale collisions recorded world-wide is reported from 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 non-compliance with NOAA whale watch guidelines, based on the distance traveled by the whale watch boats, was 78%. The sanctuary may be prone to biological invasion by exotic species. This is based on factors associated with community maturity and niche opportunities created by a history of lowered species diversity and extensive chronic habitat disturbance by fishing, together with the sanctuary's location amid extensive commercial shipping traffic that can serve as primary vectors for the introduction of exotics from hull bottoms and ballast water. Harmful algal blooms and degraded water quality continue to be concerns with expanding coastal development and increasing urbanization in the region, coupled with unrelenting population growth and commensurate waste management needs. Creeping offshore industrialization along the western boundary of the sanctuary in the form of deepwater LNG ports may lead to chronic underwater noise affecting sanctuary resources in virtual perpetuity. Over half of all resource condition categories (10 of 17) evaluated for the sanctuary had fair through poor ratings. The general trend for habitat and living resources appears to be static and in need of improvement.

Management Plan

This document provides the basis to consider how things should be done differently to improve the resource conditions of the sanctuary, since that is what the findings indicate is needed. The Sanctuary Advisory Council provides a vision for the future that contrasts the current conditions in the sanctuary:

> *"The 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."*

The management plan represents the first step toward achieving this vision.

This 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 management plan ultimately could be considered for action prior to the next management plan review nominally scheduled for 2015. 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.

This document provides strategic guidance for management actions and focuses those actions on four priority programmatic areas: capacity building, ecosystem protection, marine mammal protection and maritime heritage management. NOAA is focusing on these priority areas because they will significantly contribute to achieving the vision and mission of the sanctuary. The eleven action plans in this document address issues relative to these four areas and are based extensively on the advice of working groups established by the Sanctuary Advisory Council.

Copies of the final management plan and environmental assessment can be obtained by writing to Dr. Craig MacDonald, Sanctuary Superintendent, Stellwagen Bank National Marine Sanctuary, 175 Edward Foster Rd., Scituate, MA 02066 or by facsimile to (781) 545-8036 or please call (781) 545-8026 or send an email to stellwagen@noaa.gov. Copies of this document may be downloaded from the internet at http://stellwagen.noaa.gov/management.

Organization of this Document

The management plan is organized into eleven principal sections.

Section I provides background information on the national marine sanctuaries and the management plan review process.

Section II is an overview of the institutional setting within which the sanctuary operates.

Section III presents the sanctuary setting. This section is divided into three sub-sections: biodiversity conservation; physical setting, including geography, geology, and oceanography; and primary producers and decomposers.

Section IV describes the resource states of the sanctuary and provides context and foundation for the action plans in Section VII. This section is divided into eight sub-sections: seafloor and water column habitats, benthic invertebrates, fishes, seabirds, sea turtles, marine mammals, and maritime heritage resources.

Section V discusses the kinds and status of human use and the economic value where available.

Section VI is a summation of the effects of human uses on sanctuary resources including a discussion of cumulative impacts.

Section VII contains the action plans, which detail the management actions the sanctuary will take to address priority issues and meet the purposes and policies of the National Marine Sanctuaries Act.

Section VIII provides an environmental assessment of the two alternatives considered: no action and revising the management plan.

Section IX lists the sources and literature cited in this document.

Section X presents the results of the public comment process including a numerical and geographic analysis of the findings. It provides general responses to comments and questions and summarizes the revisions made.

Section XI includes a number of appendices, which provide supporting information on various aspects of the management plan.

The sanctuary management objectives, included in this management plan, are organized by priority programmatic area and their respective action plan in the list that follows.

Acknowledgements

This management plan was written and compiled by:

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Document design and layout was by Marla Laubisch.

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From 2002-2006, the Sanctuary Advisory Council was instrumental in the development of this management plan. NOAA acknowledges and thanks the Advisory Council representatives for their individual and collective contributions to this process. The following members of the Advisory Council are acknowledged for chairing the working groups that led to development of the action plans in this document: Regina Asmutis-Silvia, Susan Farady, Alan (Jerry) Hill, Porter Hoagland, Ph.D., Judith Pederson, Ph.D., Mason Weinrich, Richard Wheeler, John Williamson and Sally Yozell. NOAA also acknowledges and thanks the many members of these working groups. The early foundation for this management plan review was laid during 1998-1999 by Brad Barr, former Sanctuary Superintendent, and the previous Advisory Council (1996-2000), and is recognized.

The ONMS gratefully acknowledges the enormous assistance provided by the NOAA Fisheries Service Northeast Regional Office and Northeast Fisheries Science Center for access to the numerous and extensive databases that underlay many of the analyses in this management plan, for the many agency scientists and managers who devoted considerable time serving on the working groups as members and technical advisors as well as for providing critical comment and review of the draft management plan, and for collaboration with sanctuary staff on several key research projects conducted to inform sanctuary management. Related assistance was provided by local and State agency partners, which also is acknowledged. The ONMS's collaboration with NOAA's National Centers for Coastal Ocean Science yielded substantial information to characterize the sanctuary's ecological setting, and is acknowledged.

Photography and Art Credits

COVER. Feeding humpback whales, Teapot and Tectonic, during a tagging cruise—Credit: WCNE and SBNMS. Photo taken under NOAA Fisheries Permit #981-1707. Sea star and steam release pipe from coastal steamship *Portland* —Credit: NURC-UConn, SBNMS and The Science Channel. Northern red anemone on boulder ridge—Credit: USGS. Wolffish prowls along the sanctuary seafloor—Credit: NURC-UConn.

FIRST PAGE. Atlantic cod, *Gadus morhua*, is a keystone predator species of major ecological importance within the Stellwagen Bank National Marine Sanctuary—Credit: Douglas Costa

Section I. Captain Henry S. Stellwagen—Courtesy of the Stellwagen Family

Section II. Smooth sunstar on seafloor—Credit: USGS

Section III. Northern red anemone and American lobster—Credit: USGS

Section IV. Squid and starfish on mud habitat—Credit: USGS

Section V. Sand lance over gravel, shells and coarse sand—Credit: USGS

Section VI. Frilled anemones on a boulder—Credit: USGS

Section VII. Burrowing anemone with pink shrimp—Credit: USGS

Section VIII. Northern sea stars in a muddy basin—Credit: USGS

Section IX. Shell pile in the trough between sand waves—Credit: USGS

Section X. Horse star over pebbly substratum—Credit: USGS

Section XI. Gravel with encrusting coralline algae and sponges—Credit: USGS

Page 26 "Inside the anemone forest" painting—Credit: Joline Putnam, RI School of Design[1]

Page 36. "Exploring the deep boulder reef" painting—Credit: Mary Jane Brush, UConn[2]

Page 43. Diatoms (*Chaetoceros affins*, *Coscinodiscus* sp., *Chaetoceros debilis*)—Credit: Paul Hargraves, Univ. RI

Page 48. Feeding humpbacks and seabirds—Credit: Ari Friedlander, Duke Univ/SBNMS (NOAA Permit 981-1707)

Page 49. American lobster, cunner and benthic invertebrates—Credit: Matthew Lawrence, SBNMS

Page 58. Hydromedusae—Credit: Norman Despres

Page 68. Field of sand dollars—Credit: USGS

Page 74. Northern puffer—Credit: Norman Despres

Page 80. Greater shearwater—Credit: Glen Tepke

Page 88. Leatherback turtle—Credit: Glen Tepke

Page 90. Humpback whale calf fluke—Credit: Kate Sardi, WCNE/SBNMS (NOAA Permit 981-1707)

Page 116. "Evening Shipping on Boston Bay, 1898" painting—Credit: William G. Muller

Page 130. Various human uses during a summer day on the SBNMS—Credit: Regina Asmutis-Silvia

Page 130. Commercial Fishing section—Credit: SBNMS/NOAA

Page 142. Recreational Fishing section—Credit: SBNMS/NOAA

Page 152. Whale Watching section—Credit: Regina Asmutis-Silvia

Page 153. Other Recreation and Tourism section—Credit: Deborah Marx, SBNMS

Page 154. Maritime Transportation section—Credit: SBNMS

Page 164. Cunner and invertebrates—Credit: Tane Casserley

Page 182. Whale tagging research boat—Credit: WCNE/SBNMS; Humpback and NOAA Ship Nancy Foster—Credit: WCNE/SBNMS (NOAA Permit 981-1707); Sanctuary exhibit at Gloucester Maritime Heritage Center—Credit: Anne Smrcina, SBNMS; SBNMS facilities—Credit: Anne Smrcina, SBNMS

Page 205. Haddock—Credit: NURC-UConn; Greater Shearwater—Credit: WCNE/SBNMS; Atlantic herring—Credit: Jon Witman, Brown Univ.; Sea Scallop—Credit: USGS

Page 225. Breaching humpback whale—Credit: Ari Friedlander, Duke Univ/SBNMS (NOAA Permit 981-1707); Recreational boat and humpback whales—Credit: Kate Sardi, Duke Univ./SBNMS (NOAA Permit 981-1707); Dead right whale with propeller marks—Credit: PCCS; Entangled humpback whale—Credit: PCCS (NOAA Permit 932-1489)

Page 244. *Portland's* steam release pipe—Credit: NURC-UConn, The Science Channel and SBNMS; *Portland's* bitts with encrusting invertebrates—Credit: NURC-UConn, The Science Channel and SBNMS; Teacups in *Portland's* galley—Credit: NURC-UConn/SBNMS; Pipes and mug on *Portland's* deck—Credit: NURC-UConn, The Science Channel and SBNMS.

LAST PAGE. Whales and birds feeding at sunset in the Stellwagen Bank National Marine Sanctuary—Credit: Cara Pekarcik, WCNE/SBNMS (NOAA Permit 981-1707)

[1,2]Both paintings are scientifically accurate portrayals of characteristic seafloor landscapes based on the artists' examination of over a hundred hours of underwater video made by remotely operated vehicles (ROVs) in the sanctuary. Both artists are formally trained scientific illustrators.

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