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Links to Documented and Potential Environmental Impacts of Tunicates

NOTE: Text in gray (italic) indicates the topic has not been addressed to date.

- Implications of Invasive Species in Narragansett Bay, Providence College.
- Coastal Resources Fact Sheet, MIT Sea Grant Program. (PDF format)

Marine Invasive Species, Didemnum lahillei, a colonial tunicate; ascidian; s...squirt, Links to documented and potential environmental impacts of tunicates

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USGS National Geologic Studies of Benthic Habitats, Northeastern United States

Marine Invasive Species

Didemnum lahillei, a colonial tunicate; ascidian; sea squirt

Modified Tuesday, 19-Oct-2004 14:39:44 Eastern Daylight Time

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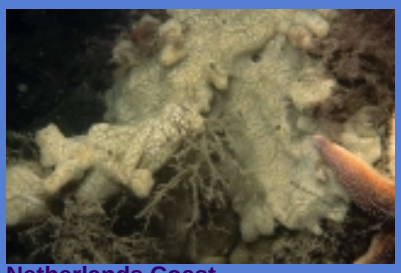
Click on figures for larger image to download.


Netherlands Coast


California Coast


New England Coast


New England Offshore

Taxonomic Classification

Phylum *Chordata*, Subphylum *Tunicata*, Class *Ascidiacea*, Order *Aplousobranchia*, Family *Didemnidae*, Genus *Didemnum*, Species *lahillei.* Hartmeyer, 1909.

Summary of Occurrence

Didemnum lahillei is a marine colonial tunicate (ascidian; sea squirt) that has been observed at several locations in the northeast Pacific and North Atlantic Ocean basins. It exhibits the characteristics of an invasive species: 1) sudden occurrence where not before known; 2) rapid reproduction and excessive biomass; 3) no known predators. It is native to Europe.

The rapid spread of *Didemnum lahillei* alters marine habitats and threatens to interfere with fishing, aquaculture, and other coastal and offshore activities.

It is found on hard substrates that include dock structures and floats, wood and metal pilings, moorings and ropes, steel chain, automobile tires, polythene plastic, rock outcrops, gravel seabed (pebbles, cobbles, boulders), and ship hulls. It overgrows organisms such as tunicates, sponges, macroalgae, hydroids, anemones, bryozoans, scallops, mussels, and oysters. Where *D. lahillei* occurs on the seabed, it likely covers the siphons of infaunal bivalves. *D. lahillei* has been reported from coastal areas in California, New England, northwest France, and the Netherlands. It also has been observed on the continental shelf off New England in the Gulf of Maine region. It has been found at water depths ranging from intertidal to continental shelf depths of 48m (157 ft).

Gross Morphology and Growth Habits

Didemnum lahillei colonies exhibit a wide variety of morphological variants that range from: 1) long, ropey or beard-like colonies that commonly hang from hard substrates such as docks, lines, and ship hulls; to 2) low, undulating mats with short surficial appendages that encrust and drape rocky seabeds (pebbles, cobbles, boulders, and rock outcrops).

Purpose and attribution

The goal of this website is to assemble and communicate information on the distribution, biology, and marine habitat impacts of the highly invasive colonial tunicate *Didemnum lahillei*. Researchers and others are encouraged to share published and preliminary research results and anecdotal observations on these topics. All contributions are acknowledged. The information displayed on this website is in the public domain. Users are expected to give proper credit for images, data, and ideas they incorporate into their work.

Contributions to the website can be sent to Page Valentine, USGS, pvalentine@usgs.gov

Images of *Didemnum lahillei* posted on this website represent occurrences that have been verified through visual inspection or dissection by persons

familiar with the species. Images that have not been verified as *D. lahillei* are noted as a "provisional identification" in the image caption and in the occurrence tables.

Website design: Donna Newman, USGS

Image processing and archival: Dann Blackwood, USGS

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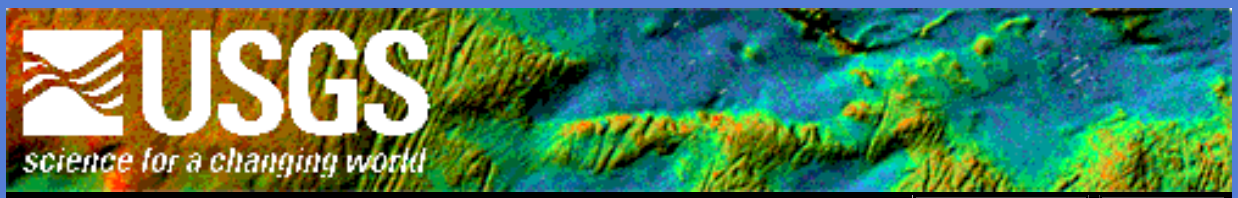

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- **Stellwagen Bank National Marine Sanctuary Region off Boston, Massachusetts**
- **Marine Invasive Species**
- **Seabed Analyses of the Stellwagen Bank NMS Region**

This is http://woodshole.er.usgs.gov/project-pages/stellwagen/index.html

Maintained by webmaster-woodshole@usgs.gov

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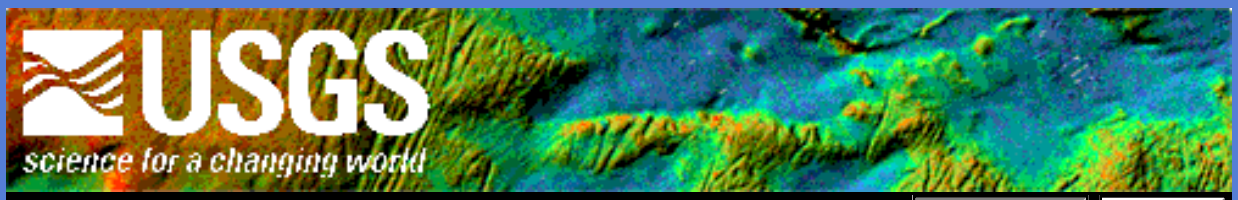

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Stellwagen Bank National Marine Sanctuary Region off Boston, Massachusetts

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INTRODUCTION

The Stellwagen Bank National Marine Sanctuary region is heavily utilized by humans and by marine species. It is a rich commercial and recreational fishing ground. It provides essential habitat for many species of marine mammals, including the endangered North Atlantic Right Whale; and it is the focus of a large tourism industry centered on whale watching. The sanctuary abuts the Massachusetts Bay Disposal Site, which serves as a repository for material dredged from the harbors of Boston and nearby cities; and it lies seaward of Boston's new ocean outfall that discharges treated sewage effluent into Massachusetts Bay. The sanctuary lies in the major shipping lane to and from Boston Harbor; and recently its seabed has been traversed by a fiber optics communications cable that connects New England with Nova Scotia and Europe.

LIST OF PUBLICATIONS

Sea Floor Map and Imagery Publications

GEOLOGIC FEATURES

Thumbnail Images *of representative geologic features in the Stellwagen Bank NMS region*

SEA FLOOR MAPS ON CD-ROM

Sea Floor Topographic, Backscatter, and Interpretive Maps and Bottom Photos of the Massachusetts Bay Disposal Site Region off Boston, Massachusetts
U.S. Geological Survey Open File-Report 98-344

Sea Floor Topographic Map and Perspective View Imagery of Quadrangles 1-18, Stellwagen Bank National Marine Sanctuary off Boston, Massachusetts
U.S. Geological Survey Open File Report 98-138

Sun-Illuminated Sea Floor Topographic Maps and Perspective View Imagery of Quadrangles 1-18, Stellwagen Bank National Marine Sanctuary off Boston, Massachusetts
U.S. Geological Survey Open-File Report 99-363

Sea Floor Maps Showing Topography, Sun-Illuminated Topographic Imagery, and Backscatter Intensity of the Stellwagen Bank National Marine Sanctuary Region off Boston, Massachusetts
U.S. Geological Survey Open-File Report 00-410

POSTERS

Acoustic Backscatter Mapping in Stellwagen Bank National Marine Sanctuary
By: Tanya S. Unger, Jessica L. Baker, Page C. Valentine, William W. Danforth, and John E. Hughes Clarke

Mapping the Sea Floor of the Stellwagen Bank National Marine Sanctuary, Massachusetts Bay using GIS
By: Jessica L. Baker, Tanya S. Unger, and Page C. Valentine

Glacial and Post-Glacial Processes and Topography in the Stellwagen Bank National Marine Sanctuary Region off Boston, Massachusetts
By: Page C. Valentine, Tanya S. Unger, and Jessica L. Baker

Habitat Mapping of the Gulf of Maine
By: B.J. Todd, P.C. Valentine, V.E. Kostylev, and R.A. Pickrill

FACT SHEETS

Mapping the Sea Floor and Biological Habitats of the Stellwagen Bank National Marine Sanctuary
U.S. Geological Survey Fact Sheet 078-98

Seabed Observation and Sampling System
U.S. Geological Survey Fact Sheet 142-00

SEABED PHOTOGRAPHS

Photographs of Seabed Habitat and Fauna

RELATED WEBSITES

Stellwagen Bank National Marine Sanctuary

NOAA National Marine Sanctuaries

NMFS Northeast Fisheries Science Center

New England Fishery Management Council

Marine Protected Areas of the United States

Boston Harbor/Massachusetts Bay On-Line Publications

The Center for Coastal Studies

National Undersea Research Center

Northeast U.S. Marine Observations

Gulf of Maine Moored Buoy Program (GoMoos)

Whale Center of New England, Gloucester, MA

New England Aquarium

Northeast Consortium

Center for Coastal and Ocean Mapping Joint Hydrographic Center

Gulf of Maine Council on the Marine Environment

Commercial Fisheries News

FLY OVER THE SEABED

Massachusetts Bay Disposal Site

Stellwagen Bank National Marine Sanctuary

Indigenous Organisms of Stellwagen Bank

GEOGRAPHIC NAMES

Stellwagen Bank-Jeffreys Ledge Region

INTRODUCTION (continued)

The sea floor mapping survey of the Stellwagen Bank National Marine Sanctuary region covers approximately 1100 square nautical miles of seabed located off Boston, Massachusetts and extending from Race Point Channel (just north of Cape Cod) to the southern part of Jeffreys Ledge (north of Cape Ann). It was conducted on four cruises over a two-year period from the fall of 1994 to the fall of 1996 using a multibeam echo sounder installed aboard the Canadian Hydrographic Service vessel *Frederick G. Creed*.

The sedimentary environments and biological habitats found on the sea floor are being identified and interpreted by using video and photographic imagery and sediment samples that have been collected on many cruises to the region since the mapping was initiated. Research results and products are presented here in the form of maps, posters, fact sheets, sonar images, and bottom photographs.

The great topographic detail of the seabed revealed by the sonar images warrants the naming here of many geographic features. Some features were named in consultation with local fishermen. The names are documented in the "GEOGRAPHIC NAMES" section.

The project has published two map series of 18 quadrangles each (see location map) in which new sea floor topography and sun-illuminated topographic imagery are presented at a scale of 1:25,000 (1 cm on the map represents 250 m on the sea floor). In addition, a map series showing the entire region on a single sheet at a scale of 1:60,000 is presented as a set of 3 maps; one shows contoured seabed topography only, a second adds seabed topographic imagery, and the third adds the backscatter intensity (or reflectivity) of the seabed. See the "LIST OF PUBLICATIONS" for a complete list of maps and CD-ROMs.

The sea floor observed in the Stellwagen Bank NMS region has been shaped for the most part by glacial processes, and the resulting topographic features have been modified since the melting of the ice and the return of the sea. Seabed shapes are interpreted here to represent a geologic history that developed in several stages. Ice containing rock debris moved across the region, sculpting its surface and depositing sediment to form the major basins, banks, ridges, and valleys. Minor features represent the latter stages of deglaciation. They are the result of processes at work when much of the area was covered by stationary rotting ice, and when at the same time small valley glaciers and ice falls were active in and near areas of high topographic relief. Subsequently, the sea invaded the region formerly occupied by ice, and glacial features were partly eroded and some new deposits formed. Today the sea floor is modified mainly by strong southwestward-flowing bottom currents caused by storm winds from the northeast. These currents erode sediments from the shallow banks and transport them into the basins. With time the banks become coarser, as sand and mud are removed and gravel remains; and the western flanks of the banks, as well as adjacent basins, are built up by deposits of mud and sand.

The Stellwagen Bank National Marine Sanctuary Mapping Project is a cooperative effort supported by the Coastal and Marine Geology Program of the U.S. Geological Survey and agencies of the National Oceanic and Atmospheric Administration (including the National Marine Sanctuary System, the National Marine Fisheries Service, the National Undersea Research Program, and the Office of Coast Survey). The acquisition and processing of the multibeam sonar data that form the basis of the maps was conducted with technical support from the University of New Brunswick and the Canadian Hydrographic Service.

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Maintained by webmaster-woodshole@usgs.gov
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