

# Stellwagen Bank National Marine Sanctuary

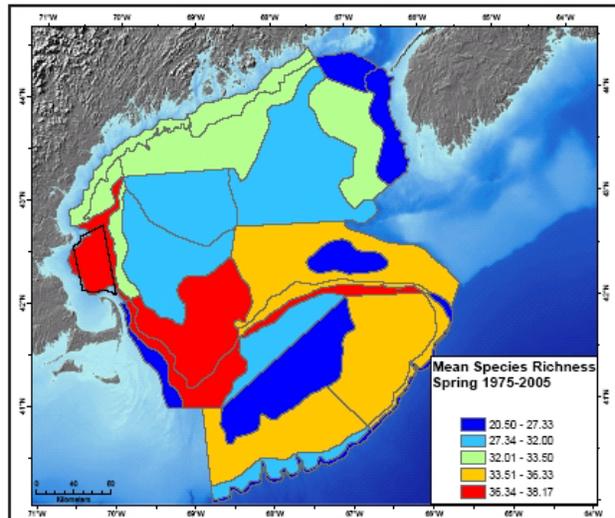
## Conservation of Biodiversity

### Management Issue

Understanding how key fish and invertebrate species, seafloor communities, and associated habitats respond to a range of human impacts is critical for assessing compatible human uses within the boundaries of Stellwagen Bank National Marine Sanctuary (SBNMS or Sanctuary) and meeting program goals focused on resource protection.

### Description

The Sanctuary encompasses a complex mosaic of seafloor habitats with diverse fish and invertebrate communities. Human activities such as fishing with trawls and dredges as well as industrial activities like cable installations have demonstrable effects on seafloor communities and patterns of biological diversity. Understanding community responses to both natural and human caused perturbations across a range of habitats, the dynamics of habitat and community recovery, and the underlying mechanisms that control such responses is critical for developing predictive models to enable ecosystem approaches to management within the Sanctuary. Instrumentation, data collection, analysis and modeling approaches developed for this site can serve as a model for other National Marine Sanctuaries.



*SBNMS is a “hot spot” of fish diversity in the Gulf of Maine Large Marine Ecosystem. Map Credit: SBNMS*

### Questions and Information Needs

- 1) How do communities respond to local versus regional scale patterns of disturbance (e.g., local fishing versus storms)?
- 2) How do communities respond to human versus natural disturbances across a range of spatial scales?
- 3) Do communities recover in a successional manner or are trajectories for recovery stochastic and unpredictable?
- 4) How are rare species distributed and is distribution pattern indicative of a need for attention to conservation requirements (e.g., everywhere rare versus patchy and rare)?
- 5) What indices of community composition, habitat complexity, and biological diversity are sensitive to changes in state and are useful for management?
- 6) Are meso-scale models that link oceanographic and biological processes useful for predicting responses to changes in conditions and management approaches?

### Scientific Approach and Actions

- Continue and expand time series sampling of communities using visual census and habitats using hydro-acoustics.
- Evaluate species, community, diversity and habitat indices as well as visualization approaches as useful data products for managers and the public.
- Develop and evaluate models linking regional and local processes to predict future states of communities, habitats and patterns of diversity within SBNMS.

*Updated: 5/1/2010*

*For More Information -- <http://www.sanctuaries.noaa.gov/science/assessment>*

## Key Partners and Information Sources

National Undersea Research Center at the University of Connecticut, NCCOS, U.S. Geological Survey, University of Southern Maine, Boston University, National Marine Fisheries Service, Woods Hole Oceanographic Institution.

## Management Support Products

- Data products for managers and public illustrating state of key species, community, habitat and biological diversity across a time series.
- Predictive models to evaluate changes in environmental variables and management scenarios on patterns of biological diversity

## Planned Use of Products and Actions

- Inform management and stakeholder communities of the status of key species, communities, habitats and patterns of diversity within Stellwagen Bank NMS.
- Improve decision-making processes based on predicted outcomes of management alternatives.
- Work with appropriate partners to develop policies regarding sustainable use of sanctuary resources.

## Program References

### SBNMS Management Plan.

- Understand ecosystem structure and function (EBSM.3)
  - (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 EBSM.
  - (3.4) Develop models that afford a predictive capability to better understand sanctuary dynamics and to guide EBSM.

### SBNMS Condition Report

- What is the status of biodiversity and how is it changing?

### ONMS Performance Measures

- Expand observing systems and monitoring efforts within and near national marine sanctuaries to fill important gaps in the knowledge and understanding of ocean and Great Lakes ecosystems
- Investigate and enhance the understanding of ecosystem processes through continued scientific research, monitoring, and characterization to support ecosystem-based management in sanctuaries and throughout U.S. waters.



*Diverse invertebrate community of a boulder reef.  
Photo Credit: SBNMS*

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