

Eelgrass Meadows
Northeast United States
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Prepared for:
Northeast Regional Ocean Council (NROC)
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1. INTRODUCTION

Eelgrass (*Zostera marina*) meadows are critical wetlands components of shallow coastal ecosystems throughout the region. Eelgrass meadows provide food and cover for a great variety of commercially and recreationally important fauna and their prey. Eelgrass and other seagrasses are often referred to as "Submerged Aquatic Vegetation" or SAV. This distinguishes them from algae, which are not classified as "plants" by biologists (rather they are often placed in the kingdom protista) and distinguishes them from the "emergent" saltwater plants found in salt marshes. In addition to the term SAV, some coastal managers use the term SRV or submerged rooted vegetation.

The eelgrass meadows layer was created from separate datasets for the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, and New York. Where possible, polygon datasets depicting the most recent eelgrass surveys were used. Attributes with common themes for each dataset were integrated in order to better represent SAV extent and year sampled. The data user is encouraged to read this and the metadata of each individual state's data carefully, as geometry, attribute details, and timeliness are not necessarily consistent among datasets used to develop this layer. Details of each state's data source are described in the data processing section.

2. PURPOSE

The purpose of mapping the distribution of eelgrass (Submerged Aquatic Vegetation - SAV) is to determine areas where eelgrass is present throughout coastal New England waters in order to support coastal and ocean planning.

3. SOURCES AND AUTHORITIES

- Maine Department of Marine Resources, Bureau of Resource Management
- Maine Department of Environmental Protection
- University of New Hampshire
- New Hampshire Department of Environmental Services
- NH GRANIT (New Hampshire Geographically Referenced Analysis and Information Transfer System)
- Piscataqua Region Estuary Partnership
- Massachusetts Department of Environmental Protection
- Massachusetts Division of Marine Fisheries
- MassGIS
- Rhode Island Eelgrass Task Force
- Connecticut Department of Energy and Environmental Protection
- Peconic Estuary Partnership
- New York Natural Heritage Program

4. DATABASE DESIGN AND CONTENT

Native storage format:

Feature types:

Eelgrass bed polygons

Data Dictionary:

Line	Name	Definition	Type	Size
1	FID	Automatically generated	ObjectID	*
2	Shape	Geometric representation of the feature	geometry	*
3	state	State in which the eelgrass bed is located	text	5
4	year	Year in which the eelgrass bed was documented	double	*
5	sav	Genus of SAV (either Zostera or Ruppia)	double	*
6	acres	Area of the eelgrass bed measured in acres	double	*

Feature Class Name: ne_regional_eelgrass_2020

Total Number of Unique Features: 6489

Dataset Status: Complete

5. SPATIAL REPRESENTATION

Geometry Type: vector polygon

Reference System: GCS_North_American_1983
Horizontal Datum: North American Datum 1983
Ellipsoid: Geodetic Reference System 1980

XY Resolution: XY Scale is .000000001
Tolerance: 0.0000000089831583

Geographic extent: -72.48 to -66.97, 41.15 to 45.10

ISO 19115 Topic Category: environment, oceans, biota

Place Names:

Atlantic Ocean, Beverly Harbor, Block Island, Blue Hill Bay, Boston Harbor, Broad Cove, Broad Sound, Buzzards Bay, Cape Cod Bay, Cape Neddick Harbor, Casco Bay, Chatham Harbor, Cobscook Bay, Cohasset Harbor, Connecticut, Dennys Bay, Duxbury Bay, Dyer Bay, Englishman Bay, Falmouth Harbor, Fishers Island Sound, Frenchman Bay, Gloucester Harbor, Goosefare Bay, Gouldsboro Bay, Great Bay, Gulf of Maine, Hingham Bay, Hull Bay, Ipswich Bay, Johns Bay, Little Narragansett Bay, Little Bay, Little Kennebec Bay, Little Machias Bay, Long Island Sound, Machias Bay, Maine, Manchester Bay, Massachusetts, Muscongus Bay, Nantucket Harbor, Nantucket Sound, Nauset Harbor, Narragansett Bay, Narraguagus Bay, Narrow River, New Hampshire, Ninigret Pond, Oarweed Cove, Passamaquoddy Bay, Penobscot Bay, Pigeon Hill Bay, Piscataqua River, Pleasant Bay, Plymouth Bay, Plymouth Harbor, Portsmouth Harbor, , Point Judith Pond, Portsmouth Harbor, Potter Pond, Prospect Harbor, Quonochontaug Pond, Rhode Island, Saco Bay, Sakonnet River, Salem Sound, Sandy Bay, Scituate Harbor, Seal Cove, Sheepscoot Bay, Spinney Creek, Vineyard Sound, Westport River, York Harbor

Recommended Cartographic Properties:
(Using ArcGIS ArcMap nomenclature)

Simple Fill Symbol: .4 point, outline color: same as fill, color model: HSV 167-100-66 Scale range for optimal visualization: 5,000 to 3,000,000

6. DATA PROCESSING

A description of each states' datasets and the subsequent processing are described below.

Maine – Maine's "Eelgrass2010" dataset contained 5179 polygon features depicting eelgrass sites. These sites were documented through low-altitude aerial photographic surveys conducted between 2001 and 2010 along sections of the Maine coastline. Maine's "Eelgrass Beds 2018" contained 956 polygons depicting updated data on Casco Bay eelgrass areas. The 2010 dataset was produced by Maine Department of Marine Resources (MEDMR) and the

2018 data was produced by Maine Department of Environmental Protection (MEDEP) through on-screen digitization of eelgrass stands that also documented percent cover using a four category scale. Verification was carried out through various methods, including by foot, by boat and by plane. Casco Bay eelgrass data from the 2010 dataset were eliminated and replaced with the 2018 data. Polygons containing a density value of 0 were described in the metadata as interior polygons containing no eelgrass. These polygons were eliminated.

Full documentation for Maine’s Eelgrass2010 and Eelgrass Beds 2018 datasets can be found [here](#) and [here](#).

New Hampshire – New Hampshire’s “Great Bay Estuary Eelgrass 2019” dataset contained 149 polygon features depicting eelgrass sites. These sites were documented through low-altitude aerial photographic surveys in the Great Bay Estuary in the late summer of 2019 as part of a yearly survey intended to track changes over time. The dataset was produced by New Hampshire Department of Environmental Services (NHDES) and the Piscataqua Region Estuary Partnership. The eelgrass habitat mapped from the aerial imagery was verified using the ground truthing data from preselected locations and ad hoc locations chosen during the course of the field work. Ground truthing was done from a small boat during the same season as the photographs were taken. The source data discriminated between sites with just eelgrass, just widgeon grass, and sites with both eelgrass and widgeon grass. This information was retained in the regional dataset.

Full documentation for New Hampshire’s Great Bay Estuary Eelgrass, 2019 dataset can be found [here](#).

Massachusetts – Massachusetts eelgrass sites were compiled from six separate datasets containing data from 1995 – 2019 from the MassDEP Eelgrass Mapping Project. The area(s) of the Massachusetts coast covered by each dataset are described below.

Project Years	Project Area
1995	Entire MA Coast
2001	Coast-wide MA Coast except Elizabeth Islands (Gosnold) and Mount Hope Bay
2006/07	Selected embayments, coast-wide including Elizabeth Islands
2010-2013	2010 - South Shore of Cape Cod: Woods Hole to Chatham, selected embayments, Pleasant Bay; 2012 - North Shore, Boston Harbor, South Shore to Provincetown; 2013 - Buzzards Bay, Elizabeth Islands, Martha's Vineyard and Nantucket
2015-2017	2015 - South Shore of Cape Cod, Pleasant Bay, Nantucket; 2016 - North Shore, Boston Harbor, South Shore to Canal;

	2017 - Buzzards Bay, North Shore of Cape Cod, Elizabeth Islands and Martha's Vineyard
2019-2022	2019 - South Shore of Cape Cod, Pleasant Bay, North Shore of Nantucket

The source data distinguishes between eelgrass (*Zostera marina*) and widgeon grass (*Ruppia maritima*) and this information was retained in the regional dataset.

Full documentation for Massachusetts' eelgrass datasets can be found [here](#).

Rhode Island – Rhode Island’s “2016 Submerged Aquatic Vegetation” dataset contained 187 polygon features depicting eelgrass and other SAV, including widgeon grass. These data were developed by the Rhode Island Eelgrass Mapping Task Force and was provided by the University of Rhode Island Environmental Data Center. Polygons of submerged aquatic vegetation (SAV) were delineated from photo signatures identified on 4 band orthophotography. Ground-truthing was done after initial delineations were completed. Ground-truthing was done by boat using underwater video equipment and GPS. Final delineation and GIS database development was done using ground truth information. Before inclusion in the regional database, this dataset was edited such that only sites that contained eelgrass were included. Additional attribute fields, including those describing ground-truthing status and methodology and site locations were eliminated due to lack of corresponding fields in the majority of the other states’ datasets.

More information on eelgrass in Rhode Island can be found [here](#).

Connecticut – Connecticut’s “Eelgrass Beds 2017 Polygon” dataset contains 156 polygon features depicting eelgrass beds along the eastern end of Long Island Sound. These sites were delineated through low-altitude aerial photographic surveys flown at low tide. Ground-truthing was conducted by boat using a high-definition digital underwater video camera.

Full documentation for Connecticut’s Eelgrass Beds 2017 Polygon dataset can be found [here](#).

New York – Three datasets were combined to ensure complete coverage of New York eelgrass beds:

NY Statewide Seagrass (NY State Department of Environmental Conservation)

This dataset depicts presence and absence of seagrass based on aerial photography captured in 2002 for the south shore, in 2012 for the Long Island Sound, and in 2014 for the Peconics.

NY State Natural Heritage Communities 2019 (NY Natural Heritage Program)

Features represent occurrences of rare or high-quality natural communities (ecological communities), as recorded by the New York Natural Heritage Program, including “Marine Eelgrass Meadows” surveyed from 2003-2015.

Peconic Estuary Partnership

94 polygons in the Peconic_Eelgrass_Mapping_2014_Groundtruthed_Final.shp that were labeled to have some percentage of eelgrass coverage in the *Type* field were combined with 23 polygons in the Peconic_Eelgrass_Mapping_2014_Groundtruthed_Revisions.shp that were labeled to have some percentage of eelgrass coverage in the *Type* field. The “_Revisions” shapefile captured edits that were done during ground-truthing and verifying coverages from aerial photography. Therefore, a total of 117 polygons with eelgrass were included in the regional layer.

Processing environment: ArcGIS 10.8, Windows 10 Professional, Intel Core i7 CPU

	Process Steps Description
1	Available shapefiles were obtained from each state/entity and loaded into ArcGIS, and if necessary converted to the GCS North American 1983 coordinate system using the PROJECT tool
2	In selected datasets, polygons that delineated SAV areas that were not eelgrass or widgeongrass were deleted in the editing environment (see above descriptions for each state)
3	In selected datasets, polygons that did not represent the most current information were deleted in the editing environment (see above description for each state)
4	Datasets from each state were combined using the MERGE tool to create the regional eelgrass feature class
5	Domains were added to better characterize the fields Year, State, and Acres

7. QUALITY PROCESS

Attribute Accuracy: Original content was acquired from authoritative sources. Any attribute editing was informed by specific information in the metadata.

Logical Consistency: This dataset integrates eelgrass habitat polygon features from five separate sources. Common themes were identified across attribute fields that unify the datasets, and these were incorporated to provide consistency and efficient communication of information. Once merged, data were unified by field calculations and feature values were expanded upon via attribute domains in order to consistently identify density of bed and year sampled.

Completeness: Data are based upon the most recent available eelgrass habitat GIS datasets available for coastal New England states. Not all records have complete information for each field due to the differences in sampling and recording programs for each state.

Positional Accuracy: May vary by state. The user should consult the metadata of each individual state for positional accuracy information.

Timeliness: This dataset is based on best available information as of March 17, 2021; however, the timeliness of the dataset varies by state. Due to the biological characteristics of eelgrass, the user should not assume that all sites are up to date and should consult each state's metadata for more detailed information as to the timeliness of the data.

Use restrictions: Data are presented as is. Users are responsible for understanding the metadata prior to use.

Distribution Liability: All parties receiving these data must be informed of caveats and limitations.