

Tidal Marsh Vegetation Classification  
Northeast United States  
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Prepared for:  
Northeast Regional Ocean Council (NROC)  
[www.northeastoceandata.org](http://www.northeastoceandata.org)

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## 1. INTRODUCTION

This data product was developed in collaboration with the U.S. Environmental Protection Agency, Region 1 (EPA R1). As part of an 18-month project, EPA R1 convened multiple meetings of an expert work group to both update regional (ME to NY) coastal vegetation datasets on the Northeast Ocean Data Portal (eelgrass meadows and tidal marsh) and to determine appropriate methods for mapping blue carbon stocks in these habitats.

Salt marshes of the northeastern U.S. are dynamic landscapes that provide significant ecosystem services to humans across the coast and provide critical habitat to wildlife. These coastal marshes can be separated into several distinct vegetation communities including high and low marsh, which vary in elevation, salinity, and frequency of inundation. Understanding and mapping these vegetation zones is important for regional conservation of habitat for tidal marsh wildlife as well as for tracking the effects of environmental and anthropogenic change on coastal marshes. Remote sensing of these habitats has, until now, been difficult across large spatial scales due to spectral similarities between marsh grass species and the difficulty in remotely sensing a coastal ecosystem across different tidal stages.

The EPA R1 work group sought tidal marsh data that were mapped consistently across the region of interest (ME to NY). The work group decided to use multiple datasets to address the needs of this effort. A dataset developed by the [Saltmarsh Habitat and Avian Research Program \(SHARP\)](#), contains a regional classification produced using a combination of Digital Elevation Model and National Agriculture Imagery Program (NAIP) multispectral imagery, and provides a contiguous classification of tidal marsh cover types from coastal Maine to Virginia. However, these data had gaps in the region of interest around New Bedford Harbor, MA, due to lack of available or interpretable NAIP imagery in that area. To fill this gap, the work group recommended extracting marsh habitat information from the Conceptual Marsh Units of Massachusetts salt marshes dataset from USGS (“CMUs”). Massachusetts CMUs are polygons created from the 2005 Massachusetts salt marsh dataset that were

delineated to smaller, conceptual marsh units by the geoprocessing of surface elevation data.

Each layer associated with these datasets are maintained separately in the Portal but visualized together. The layers are named as follows:

- Tidal Marsh Vegetation Classification (DEM)
- Tidal Marsh Vegetation Classification (No DEM)
- MA\_CMU

The data user is encouraged to read this and the metadata of each individual source layer carefully, as the methods to produce vegetation classes, feature geometry, attribute details, and timeliness are not necessarily consistent among datasets.

- [Metadata for Tidal Marsh Vegetation Classification \(DEM\)](#)
- [Metadata for Tidal Marsh Vegetation Classification \(No DEM\)](#)
- [Metadata for MA\\_CMU](#)

## 2. PURPOSE

The purpose of compiling tidal marsh datasets for consistent representation across the region is to support the mapping the estimated blue carbon stocks within coastal vegetated habitats throughout coastal New England waters for coastal and ocean planning.

## 3. SOURCES AND AUTHORITIES

- SHARP 2017. “Marsh Habitat Zonation Map”. Saltmarsh Habitat and Avian Research Program. Ver: 26 Oct 2017. <https://www.tidalmarshbirds.org>; “DEM” and “No DEM” layers also available as web services via <https://www.sciencebase.gov/catalog/item/5a4d4db3e4b0d05ee8c4d195> and <https://www.sciencebase.gov/catalog/item/5a68c9d1e4b06e28e9c721b6>; The methods for developing this layer as well as suggestions for appropriate uses are detailed in: [Correll, MD, W Hantson, TP Hodgman, BB Cline, CS Elphick, WG Shriver, EL Tymkiw, and BJ Olsen. 2019. Fine-scale mapping of coastal plant communities in the northeastern USA. Wetlands 39\(1\): 17-28.](#)
- Ackerman, K.V., Defne, Z., and Ganju, N.K., 2021, Geospatial Characterization of Salt Marshes for Massachusetts: U.S. Geological Survey data release, <https://doi.org/10.5066/P97E086F>.

## 4. DATABASE DESIGN AND CONTENT

Dataset Status: Complete

*(this example represents data details specific to one of the tidal marsh datasets; other products have similar information.)*

Native storage format: ESRI ArcGIS GRID

Columns and rows: 101521, 97913

Number of bands: 1

Cell size: 3m, 3m

Pixel type: unsigned integer

Linear Unit: Meter (1.000)

Angular Unit: Degree (0.01745329)

Statistics:

Minimum: 0

Maximum: 9

Mean: 0.201

Standard deviation: 1.304

Cover/community types categorized in this layer are as follows:

**VALUE = 1 High marsh:** Area flooded by average or larger than average amplitude tide (resulting in weekly to monthly flooding) and is dominated by *Spartina patens*, *Distichlis spicata*, *Juncus gerardii* and short form *Spartina alterniflora*. In addition, *Juncus roemerianus*, *Scirpus pungens*, *Scirpus robustus*, *Limonium nashii*, *Aster tenuifolius*, and *Triglochin maritimum* are secondary cover.

**VALUE = 2 Low marsh:** Area flooded regularly by daily tides and dominated by tall form *Spartina alterniflora*.

**VALUE = 4 Mudflat:** Exposed muddy areas free of vegetation.

**VALUE = 5 *Phragmites australis*:** An exotic species mainly invading disturbed marshes that (sometimes temporarily) cause a shift to a fresh water state.

**VALUE = 6 Salt pools/pannes:** Depressed, bare areas with sparse vegetation cover and extreme high soil salinities. Generally, pools retain water between high tides while pannes do not.

**VALUE = 7 Open water:** Free-flowing water included within 500m analysis buffer.

**VALUE = 8 Terrestrial border:** Area infrequently flooded by storm and spring tides and can include areas of marsh with fresh/brackish water due to a high water table and/or runoff from impervious surfaces. Typical plant species include *Typha angustifolia*, *Iva frutescens*, *Baccharis halimifolia*, *Solidago sempervirens*, *Panicum virgatum*, *Scirpus robustus*, and *Spartina pectinata*.

**VALUE = 9 Upland:** Non-marsh cover included within 500m analysis buffer.

## 5. SPATIAL REPRESENTATION

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: -73.96 to -66.97, 40.67 to 45.10

ISO 19115 Topic Category: environment, oceans, biota

Place Names:

Atlantic Ocean, Cape Cod Bay, Cape May, Chesapeake Bay, Connecticut, Delaware, Delaware Bay, Gulf of Maine, Hudson River, Long Island Sound, Maine, Maryland, Massachusetts, Massachusetts Bay, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Rhode Island Sound, United States, Virginia

Recommended Cartographic Properties:  
(Using ArcGIS ArcMap nomenclature)

Unique Values (R, G, B)

1 (High Marsh): 56, 168, 0

2 (Low Marsh): 152, 230, 0

4 (Mudflat): 230, 152, 0

5 (Phragmites): 255, 255, 0

6 (Pool/Panne): 0, 92, 230

7 (Open water): 0, 92, 230

8 (Terrestrial border): 115, 76, 0

9 (Upland): 168, 0, 0

## 6. DATA PROCESSING

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

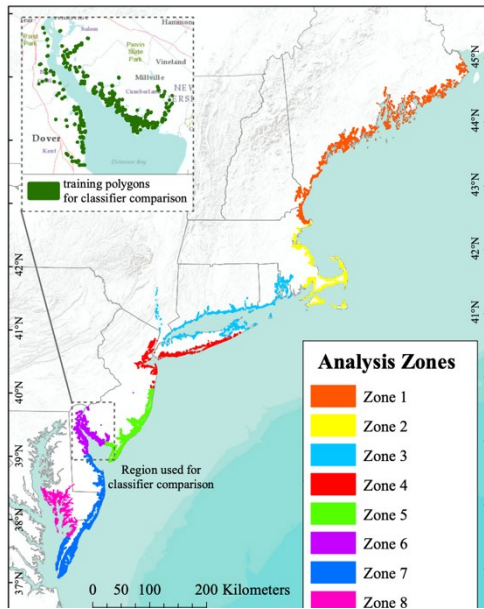


Figure 1. Geographic extent of Correll et al. 2019 study site from Maine to Virginia divided into eight biogeographic regions.

### Tidal Marsh Vegetation Classification

The "Tidal Marsh Vegetation Classification, DEM, Northeast U.S." was combined with "Tidal Marsh Vegetation Classification, no DEM, 3m, Northeast U.S." to provide a contiguous classification of tidal marsh cover types from coastal Maine to Virginia (Analysis Zones 1 – 8). The “DEM” and “no DEM” layers are maintained separately in the webservice that the Portal displays but they are visualized together on the map.

These datasets covered the area of interest (ME to NY) and further south to the eastern shore of Chesapeake Bay. There was a data gap within the area of interest, near New Bedford Harbor, MA, due to lack of interpretable NAIP imagery (see area between Zone 2 and 3 in figure at left).

### Conceptual marsh units of Massachusetts salt marshes 2021

Data were downloaded from sciencebase.gov. Features depicting the extent of salt marsh were extracted from the full dataset using the

query TYP = vegetated. Features classified as vegetated in this dataset were considered to be equivalent to the “High Marsh” class by the work group.

A mask was applied to the CMUs to remove areas of habitat that were mapped in the Tidal Marsh Vegetation Classification dataset. Marsh polygons within the area of New Bedford Harbor, MA were retained to fill the gaps in the Tidal Marsh Vegetation Classification dataset.

### Combined visualization on the Northeast Ocean Data Portal

The Tidal Marsh Vegetation Classification layers (DEM and No DEM) and Massachusetts CMUs from New Bedford Harbor were visualized using the same classification (see Section 5 Spatial Representation) and combined as separate layers within a single web service for seamless viewing on the Portal.

## 7. QUALITY PROCESS

Attribute Accuracy: Original content was acquired from authoritative sources. Any attribute editing was informed by specific information in the metadata. Detailed zone descriptions, accuracy estimates for each cover type, and data limitation details are provided

at <https://nalcc.databasin.org/documents/documents/53ff96d6c2814d43aa92dc4948aa>

[7d64/](#). For more information about the development of the data please contact Mo Correll at [Maureen.correll@maine.edu](mailto:Maureen.correll@maine.edu).

**Logical Consistency:** This dataset integrates coastal vegetation habitat data from numerous 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.

**Completeness:** Data are based upon the most recent available eelgrass habitat GIS datasets, tidal marsh habitat GIS dataset, and coastal carbon density dataset 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 dataset. The user should consult the metadata of each individual dataset for positional accuracy information.

**Timeliness:** This dataset is based on best available information as of September 30, 2021; however, the timeliness of the dataset varies by state. Due to the biological characteristics of coastal vegetated habitats, the user should not assume that all sites are up to date and should consult each dataset'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.