Seabed Forms
Northwest Atlantic United States
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Prepared for:
Northeast Regional Ocean Council (NROC)
Northeast Ocean Data
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1. INTRODUCTION

This data product was created as part of the Northwest Atlantic Marine Ecoregional Assessment (2010) and revised with additional data in 2015. The Nature Conservancy developed this science-based ecoregional assessment for the Northwest Atlantic Marine region (Bay of Fundy to Cape Hatteras, North Carolina). This assessment synthesizes information on oceanography, chemistry, geology, biology, and social science to inform decisions about coastal and marine ecosystems. By integrating this information at a regional level, the Conservancy is able to provide both a greater understanding of the interrelated biological diversity of the marine ecoregion, and a clearer picture of the current condition of its natural areas and the challenges to their continued persistence. The ten categories of targets identified as the primary structure for the marine ecoregional assessment are: coastal and estuarine habitats, benthic habitats, diadromous fish, demersal fish, pelagic fish, forage fish, nearshore shellfish, shorebirds and seabirds, marine mammals, and sea turtles. For more information and a detailed report, please visit http://nature.org/namera/.

Seabed forms characterize seafloor topography in a systematic and categorical way that is relevant to the scale of benthic habitats. Seafloor topographic features have a large influence on oceanographic processes, and on the distribution of benthic habitats. These seabed forms are derived from bathymetry data and can be described by a combination of just two variables: seabed position and slope. Seabed position (also referred to as topographic position or slope position) describes the topography of an area compared to the locations surrounding it. These seabed forms, from high flats to depressions, represent depositional and erosional environments that typically differ in fluvial processes, sediments, and organism composition.

This data layer was derived using NAMERA's bathymetry layer (Anderson et al. 2010). Source data for this bathymetry model include National Geographic Data Center's Coastal Relief Model (CRM), and the data were with insets from the NOS Bathymetric & Fishing Maps (BFM). The BFM contours were drawn by hand, by cartographers interpreting topography from soundings. The BFM contour maps provide a more credible topography in some of the problematic sections of the CRM. The Canadian portion of the ecoregion, including the Bay of Fundy, was covered by USGS' Gulf of Maine 15' Bathymetry. Because the spatial resolution of this layer (~350 meter cell size) is coarser than the CRM (~82 m cell size), it was used only to fill in areas north of the Hague line and in a section of eastern Georges Bank. We removed a fringe from the CRM where data had been inferred up to 9 km beyond actual soundings.

2. PURPOSE

This dataset was created for the Northwest Atlantic Marine Ecoregional Assessment (NAMERA) in order to map seabed forms. Seabed forms characterize seafloor topography based on their slope and relative position.

3. SOURCES AND AUTHORITIES

- Anderson, M. G., Greene, J., Morse, D., Shumway, D. and Clark, M. 2010. Benthic Habitats of the Northwest Atlantic in Greene, J.K., M.G. Anderson, J. Odell, and N. Steinberg, eds. The Northwest Atlantic Marine Ecoregional Assessment: Species, Habitats and Ecosystems. Phase One. The Nature Conservancy, Eastern U.S. Division, Boston, MA.
- National Geographic Data Center's Coastal Relief Model (CRM), with insets from the NOS Bathymetric & Fishing Maps (BFM)
- Fels, J., Zobel, R. 1995. Landscape position and classifying landtype mapping for statewide DRASTIC mapping project. North Carolina State University. Technical Report. VEL.95.1 to the North Carolina Department of Environment, Health, and Natural Resources, Division of Environmental Management.

4. DATABASE DESIGN AND CONTENT

Native storage format: ArcGIS File Geodatabase Raster Dataset
Columns and Rows: 19313, 23737
Number of Bands: 1
Cell Size: 83.6767624 meters
Source Type: Generic
Pixel Type: unsigned integer

Pixel Depth: 8 Bit
Statistics:
Minimum: 1
Maximum: 7
Mean: 2.708901096001606
Standard Deviation: 1.795406206319162

Dataset Name: SeabedForms

Dataset Status: Complete

5. SPATIAL REPRESENTATION

Reference System: GCS North American 1983
Horizontal Datum: North American Datum 1983
Ellipsoid: Geodetic Reference System 1980
Linear Unit: Meter (1.0)
Angular Unit: Degree (0.0174532925199433)
False Easting: 0.0
False Northing: 0.0
Central Meridian: 0.0

Geographic extent: -78.124 to -63.608, 33.273 to 46.851

IS0 19115 Topic Category: Environment, Oceans, Biota

Place Names:
Albemarle Sound, Baltimore Canyon, Bay of Fundy, Block Island Delta, Cashes Ledge, Chesapeake Bay, Cholera Bank, Delaware Bay, Georges Bank, Georges Basin, German Bank, Great South Channel, Gulf of Maine, Hudson Canyon, Hydrographer Canyon, Jeffreys Ledge, Jordan Basin, Lake Ontario, Long Island Sound, Mid-Atlantic Bight, Nantucket Shoals, Norfolk Canyon, Northeast Channel, Stellwagen Bank, Southern New England, Wilkinson Basin

Recommended Cartographic Properties:
(Using ArcGIS ArcMap nomenclature)

Categories, Unique values: RGB
Depression (1): 68 – 79 – 137
Mid Flat (2): 215 – 176 – 158

Upper flat (3): 255 – 255 – 190
Low Slope (4): 38 – 115 – 0
Scarp (5): 168 – 0 – 0
Side Slope (6): 152 – 230 – 0
Upper Slope (7): 255 – 170 – 0

6. DATA PROCESSING

Processing environment: Microsoft Windows 7 Professional, Service Pack 1; ESRI ArcGIS 10.2.2, Spatial analyst extension;

	Process Steps Description
1	Using bathymetry layer from NAMERA (Anderson et al. 2010), calculated SLOPE in degrees
2	RECLASSIFY Slope layer based on the following classes: 0 – 0.015 (Level flat); 0.015 – 0.05 (Flat); 0.05 – 0.8 (Gentle Slope); 0.8 – 8 (Slope); > 8 (Steep slope)
3	Using bathymetry layer, calculated relative position of each seafloor cell using methodology described in Fels and Zobel (1995), with a search radius of 61 cells.
4	RECLASSIFY resulting layer based on mean elevation difference, using the following classes: <-30 (Lowest); -30 - -5 (Low); -5 – 5 (Mid); 5 to 30 (Upper); > 30 (Uppermost).
5	Combined slope and relative position to create 30 possible seabed forms, which were then simplified to seven. These seven categories were selected based on prior exploratory analyses, which had the main objective of simplifying the categories while maintaining, or improving, their explanatory power. See Anderson et al. (2010) for more details.

7. QUALITY PROCESS

Attribute Accuracy: The accuracy of the attributes is a result of the accuracy of the source data.

Logical consistency: These data are believed to be logically consistent.

Completeness: This layer was creating using NAMERA bathymetry layer (Anderson et al. 2010). Areas with data gaps are a result of areas without enough bathymetric information. There is a major data gap (40x 20 mile box) just south from the North Carolina – Virginia border, where no bathymetry exists.

Positional Accuracy: The accuracy of the data is a result of the accuracy of the different data sources used to derive the bathymetry layer.

Timeliness: Based on data from 1800s to present.

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