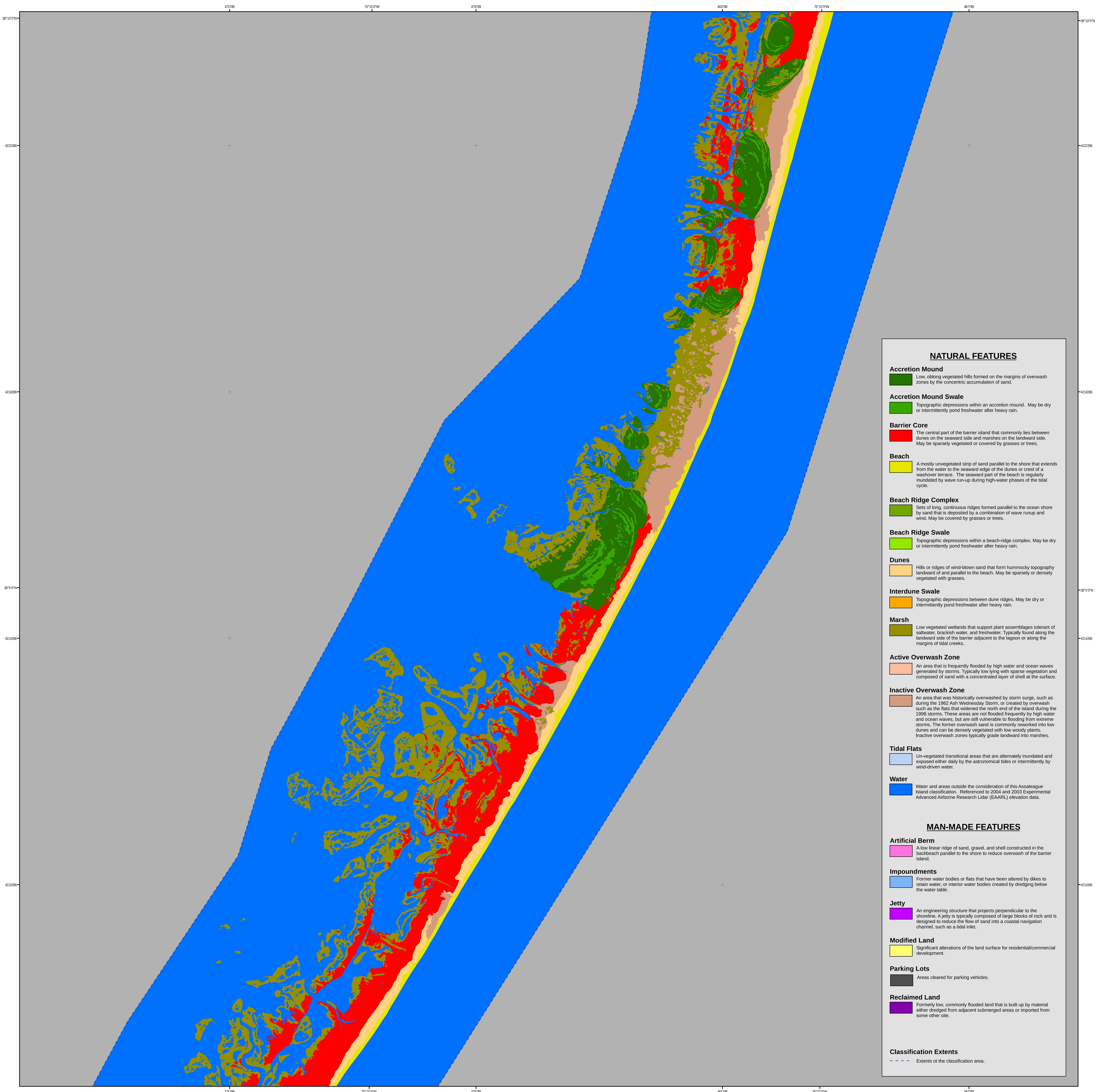
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN FILE REPORT 2007-1388
TILE 2 OF 3
Morton, R. A., Bracone, J. E., Cooke, B., 2007,
Geomorphology and Depositional Sub-Environments of Assateague Island MD/VA,
U. S. Geological Survey Open File Report 2007-1388 (On DVD).



NATURAL FEATURES

Accretion Mound
Low, oblong vegetated hills formed on the margins of overwash zones by the concentric accumulation of sand.

Accretion Mound Swale
Topographic depressions within an accretion mound. May be dry or intermittently pond freshwater after heavy rain.

Barrier Core
The central part of the barrier island that commonly lies between dunes on the seaward side and marshes on the landward side. May be sparsely vegetated or covered by grasses or trees.

Beach
A mostly unvegetated strip of sand parallel to the shore that extends from the water to the seaward edge of the dunes or crest of a washover terrace. The seaward part of the beach is regularly inundated by wave run-up during high-water phases of the tidal cycle.

Beach Ridge Complex
Sets of long, continuous ridges formed parallel to the ocean shore by sand that is deposited by a combination of wave runup and wind. May be covered by grasses or trees.

Beach Ridge Swale
Topographic depressions within a beach-ridge complex. May be dry or intermittently pond freshwater after heavy rain.

Dunes
Hills or ridges of wind-blown sand that form hummocky topography landward of and parallel to the beach. May be sparsely or densely vegetated with grasses.

Interdune Swale
Topographic depressions between dune ridges. May be dry or intermittently pond freshwater after heavy rain.

Marsh
Low vegetated wetlands that support plant assemblages tolerant of saltwater, brackish water, and freshwater. Typically found along the landward side of the barrier adjacent to the lagoon or along the margins of tidal creeks.

Active Overwash Zone
An area that is frequently flooded by high water and ocean waves generated by storms. Typically low lying with sparse vegetation and composed of sand with a concentrated layer of shell at the surface.

Inactive Overwash Zone
An area that was historically overwashed by storm surge, such as during the 1962 Ash Wednesday Storm, or created by overwash such as the flats that widened the north end of the island during the 1998 storms. These areas are not flooded frequently by high water and ocean waves, but are still vulnerable to flooding from extreme storms. The former overwash sand is commonly reworked into low dunes and can be densely vegetated with low woody plants. Inactive overwash zones typically grade landward into marshes.

Tidal Flats
Un-vegetated transitional areas that are alternately inundated and exposed either daily by the astronomical tides or intermittently by wind-driven water.

Water
Water and areas outside the consideration of this Assateague Island classification. Referenced to 2004 and 2003 Experimental Advanced Airborne Research Lidar (EAARL) elevation data.

MAN-MADE FEATURES

Artificial Berm
A low linear ridge of sand, gravel, and shell constructed in the backbeach parallel to the shore to reduce overwash of the barrier island.

Impoundments
Former water bodies or flats that have been altered by dikes to retain water, or interior water bodies created by dredging below the water table.

Jetty
An engineering structure that projects perpendicular to the shoreline. A jetty is typically composed of large blocks of rock and is designed to reduce the flow of sand into a coastal navigation channel, such as a tidal inlet.

Modified Land
Significant alterations of the land surface for residential/commercial development.

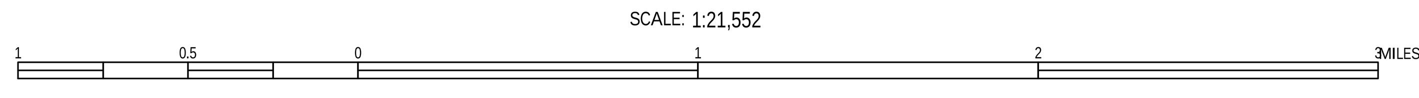
Parking Lots
Areas cleared for parking vehicles.

Reclaimed Land
Formerly low, commonly flooded land that is built up by material either dredged from adjacent submerged areas or imported from some other site.

Classification Extents
Extents ot the classification area.

Universal Transverse Mercator Projection. 1983 North American Datum-Zone 17 North
This map is not intended for use in navigation.

SCALE: 1:21,552



Project Description
The U.S. Geological Survey is studying coastal hazards and coastal change to improve our understanding of coastal ecosystems and to develop better capabilities of predicting future coastal change. One approach to understanding the dynamics of coastal systems is to monitor changes in barrier-island sub-environments through time. This involves examining morphological and topographic change at time scales ranging from millennia to years and space scales ranging from tens of kilometers to meters. Of particular interest are the processes that produce those changes and determining whether or not those processes are likely to persist into the future. In these analyses of hazards and change, both natural and anthropogenic influences are considered. Quantifying past magnitudes and rates of coastal change and knowing the principal factors that govern those changes are critical to predicting what changes are likely to occur under different scenarios, such as short-term impacts of extreme storms or long-term impacts of sea-level rise. Assateague Island MD/VA was selected for detailed mapping of barrier island morphology and topography because the island offers a diversity of depositional sub-environments that are representative of other barrier islands along the middle Atlantic coast. The geomorphology and sub-environment map emphasizes the origins of the surficial features and it also serves as a basis for documenting which sub-environments are relatively stable, such as the barrier island core, and those that are highly dynamic, such as the beach and active overwash zones.

Data Description
This classification was referenced and mapped using 1999 Digital Orthophoto Quadrangles (DOQ), 0.25 meter pixel resolution orthorectified aerial photography from 2003, historical aerial photographs, 2003 and 2004 Experimental Advanced Airborne Research Lidar (EAARL), and a 1993 Assateague Island data file showing a preliminary survey of island vegetation. Spatial variability of shape boundaries vary between 1 and 7 meters due to the variability between the data sources. Each geomorphic layer is stored in a standard format shapefile viewable in any GIS software.

Further Reading
Biggs, R. B., 1970, The origin and geologic history of Assateague Island, Maryland and Virginia, *in* Assateague Ecological Studies Final Report, part 1: University of Maryland Natural Resources Institute, Contribution no. 446, p. 8-41.
Dolan, R., Hayden, B, and Heywood, J., 1977, Atlas of environmental dynamics, Assateague Island National Seashore: National Park Service, Natural Resource Report No. 11, 40 p.
Halsey, S. D., 1978, Late Quaternary geologic history and morphologic development of the barrier system along the Delmarva Peninsula of the Mid-Atlantic bight: unpublished PhD. Thesis, University of Delaware, 592 p.
Morton, R. A., 2002, Factors controlling storm impacts on coastal barriers and beaches -- A preliminary basis for real-time forecasting: Journal of Coastal Research, v. 18, p. 486-501.
Morton, R. A., Guy, K.K., Hill, H.W., and Pascoe, T., 2003, Regional morphological responses to the March 1962 Ash Wednesday storm: Proceedings Coastal Sediments '03, 11p.
Pendleton, E.A., Williams, S.J. and Thieler, E.R., 2004, Coastal vulnerability assessment of Assateague Island National Seashore (ASIS) to sea-level rise: U.S. Geological Survey Open-File Report 2004-1020, Web Only. URL: pubs.usgs.gov/of/2004/1020/.

Geomorphology and Depositional Sub-Environments of Assateague Island Maryland, Virginia

By Robert A Morton[1], Jeremy E. Bracone[2], and Brian Cooke[3]

[1] U.S. Geological Survey, FISC, St. Petersburg, FL
[2] ETI Professionals, Contracted to USGS, St. Petersburg, FL
[3] Eckerd College, Saint Petersburg, FL

2007

MAP LOCATION