

434)951-6340 | dgmrinfo@dmme.virginia.gov

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DIVISION OF GEOLOGY AND MINERAL RESOURCES


Division of Geological and Mineral Resources
Sand Resources and Economic Heavy Minerals on Virginia's Continental Shelf

SAND RESOURCES AND ECONOMIC HEAVY MINERALS ON VIRGINIA'S CONTINENTAL SHELF

Virginia's continental shelf contains potentially valuable resources of natural aggregates consisting mainly of unconsolidated sand and gravel. Natural aggregates are widely used in the transportation and building construction industries. Clean, quartz-rich beach-quality sand is required for beach restoration projects and coastal ecosystem protection. The recovery and utilization of marine aggregates can be cost-effective when sufficient volumes of high-quality material are available in deposits located relatively close to shore. Since about 1995, beach-quality sand has been dredged from two shoal deposits located in Federal waters managed by the U.S. Bureau of Ocean Energy Management (BOEM). The Federal Outer Continental Shelf Lands Act (OCSLA) authorizes BOEM to lease and regulate marine minerals seaward of the State-Federal boundary line located three nautical miles (nm) from shore.

In some areas of the continental shelf, offshore sediments are also known to contain disseminated heavy minerals that have value as industrial commodities. Heavy minerals include ilmenite (FeTiO₃), rutile (TiO₂), and zircon (ZrSiO₄), among others that are characterized by specific gravity greater than about 2.9 (common quartz – not a heavy mineral – has a specific gravity of 2.65). Occurrences of these minerals reflect the geologic processes that have acted on bedrock and sediments in Virginia's Coastal Plain – erosion, sediment transport, and deposition – combined with marine processes that have sorted and re-distributed the sediments on the continental shelf.

Geologists from the Virginia Division of Geology and Mineral Resources (DGMR) are working cooperatively with the U.S. Bureau of Ocean Energy Management (BOEM) to better define the location, extent, mineralogy, and grain size characteristics of marine mineral resources.



Investigations and Reports

In 2010-11, DGMR partnered with BOEM on State Cooperative Agreement M10AC20021 to build a database of geological and geophysical data pertaining to Virginia's Outer Continental Shelf (OCS). The database includes information from vibracore samples, seafloor grab samples, side-scan sonar images, sub-bottom profile images, and available bathymetry. The data sources included DGMR archives, Virginia state agencies, federal agencies, and academic work groups. The project included a reconnaissance field survey and data collection in the Sandbridge Shoal area conducted August 3-5, 2011. A total of 93 grab samples were collected along with side scan sonar images at specific sample sites. Grain size analyses were completed for 90 samples and heavy mineral separation and mineralogical analyses were performed on 3 samples. The results of this work are documented in the Final Technical Report.

In May 2016, DGMR and BOEM completed a two-year initial round of studies as part of State Cooperative Agreement M14AC00013. Funding for the project was provided through the Hurricane Sandy rebuilding initiatives implemented under the Federal Disaster Relief Appropriations Act of 2013. The project study area encompasses the OCS region extending from the Virginia-Federal boundary at 3 nautical miles (nm) offshore to 8 nm offshore. The primary goal of the Cooperative Agreement is to improve the capability of Federal and State agencies and localities to plan for cost-effective coastal protection and restoration projects utilizing marine mineral resources on Virginia's OCS in a manner that is protective of the environment.

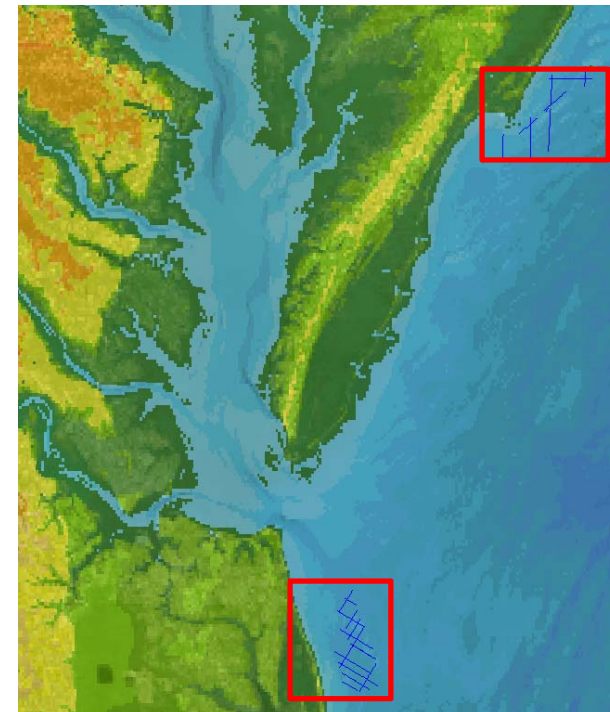
Three reports are available for download:

1. Grain size distribution and heavy minerals content of marine sands in Federal waters offshore of Virginia: Open-File Report 2016-01
2. GIS compilation of geophysical data on Virginia's outer continental shelf: Open-File Report 2016-02
3. Digital conversion of geologic core data, modeling, and visualization of sand resources on Virginia's continental shelf: Open-File Report 2016-03

WHY ARE WE STUDYING OFFSHORE SAND RESOURCES?

Beach Nourishment

VDGMR BOEM project update

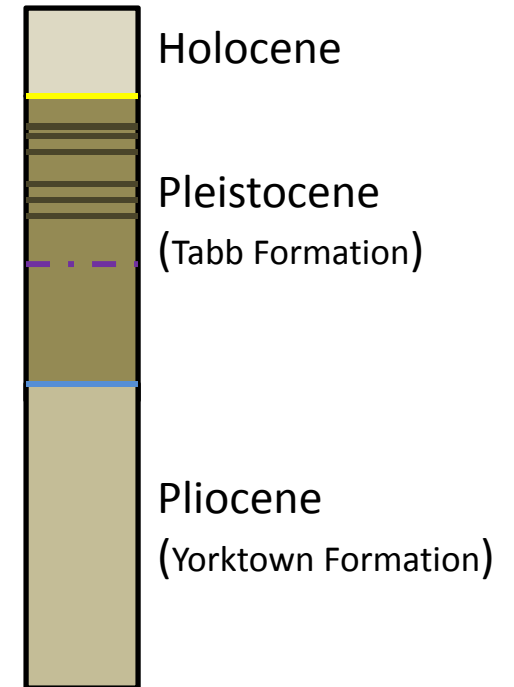
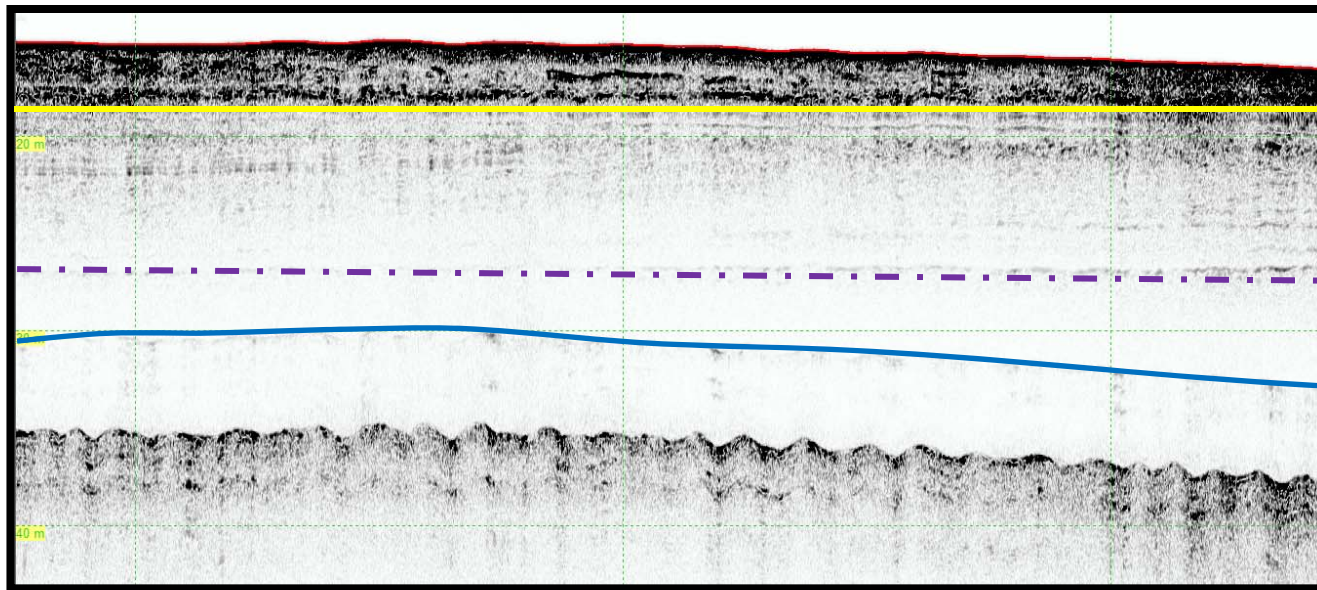


Deliverables:

- Sand thickness and volume for 2 areas
 - Wallops Island
 - Sandbridge
- Geologic framework study for area from the bay mouth and south
- Heavy Mineral Analysis

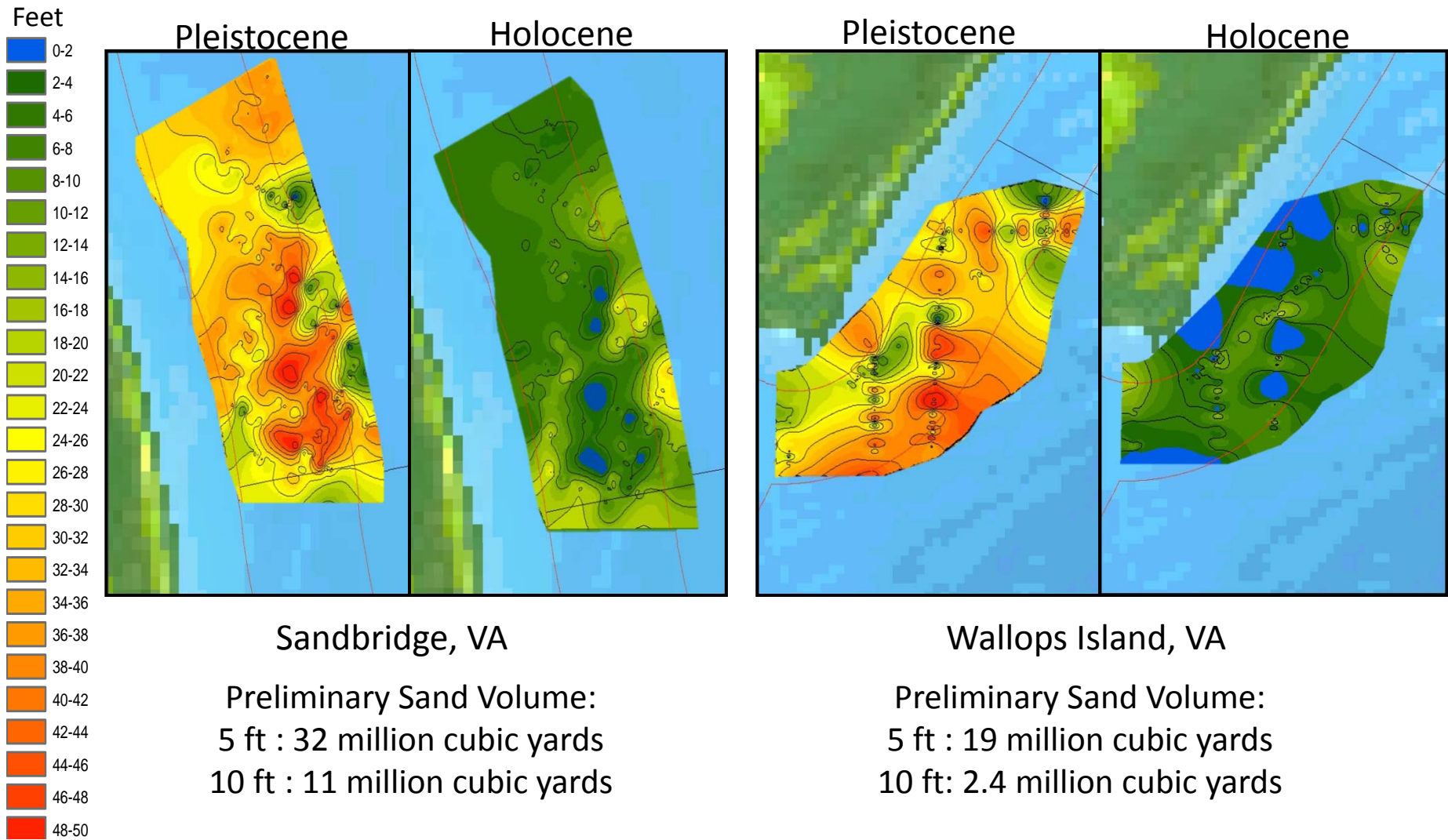
VA Stratigraphy

- Determined Regional Stratigraphy:



- Holocene –Pleistocene unconformity ———
- Pleistocene- Pleistocene Reflector - . - . - .
- Pleistocene – Miocene unconformity ———

Pleistocene/Holocene Layer Thickness



Heavy Mineral Data

- Data encompasses samples from the 1980s to 2017
- Possible concentration due to mouth progradation?
- Colman and others 1990

