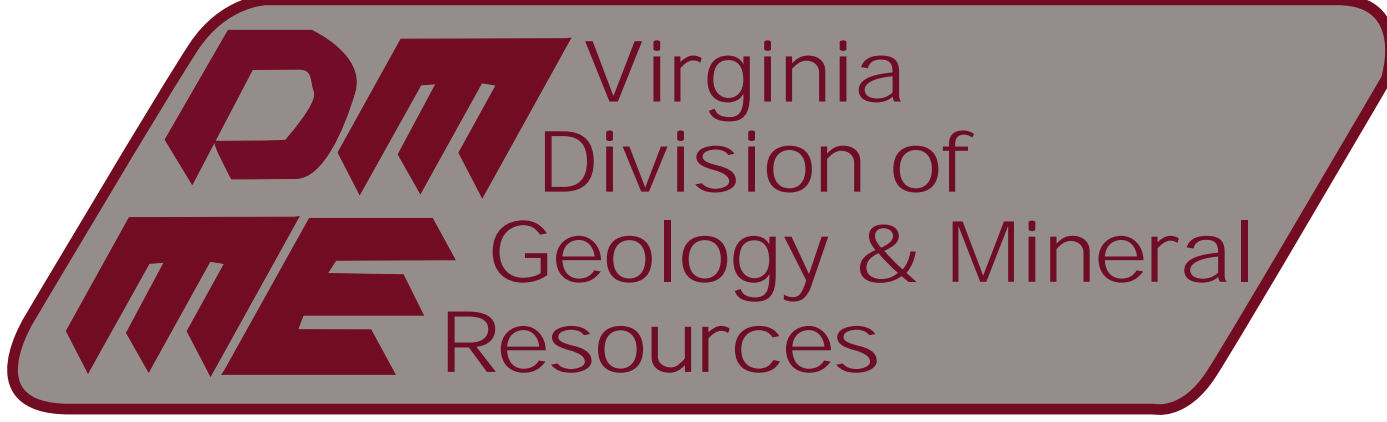


SAND RESOURCES EVALUATION ON VIRGINIA'S OUTER CONTINENTAL SHELF AND DIGITAL DATA ACCESS

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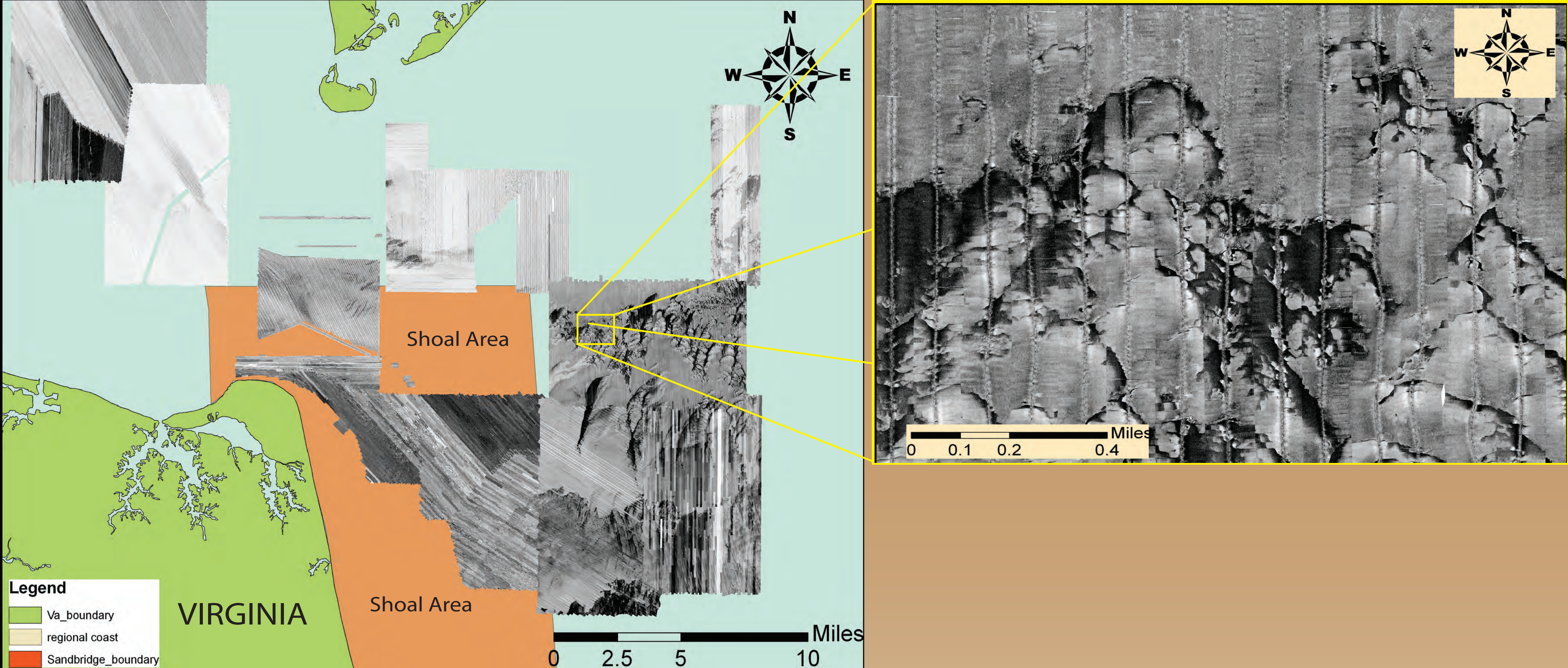


ABSTRACT

The Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources (DGMR) with support from the U.S. Department of Interior, Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) is developing a digital geologic database to characterize offshore sand and gravel resources in state and federal waters off the coast of Virginia. The initial goal of the project is to assemble a digital database of all available data that will help identify potential sand deposits for future beach nourishment and coastal protection projects. The second goal is to evaluate the potential for economically viable heavy mineral sand deposits found offshore. The database includes links to relevant publications, geotechnical descriptions for all grab samples and vibracore samples, along with all available side-scan sonar images and sub-bottom sonar data collected by private, state, academic and federal institutions.

As part of this project DGMR is also experimenting with various web-based mapping applications to give the public full access to all of Virginia's available offshore hard minerals data. DGMR is developing a Google Earth API plug-in allowing the user to access all data with any Internet browser from the DGMR website. Google Earth's user friendly interface will allow the greatest number of users to be able to instantly access the data by familiar zoom controls and visible layering toggles to see only details or data they are interested in. The interface will also allow DGMR to link individual points to larger database searches and downloads. The success of this model could lead to the distribution of additional Virginia digital resources using the Google Earth API plug-in.

SIDE SCAN SONAR MOSAIC IMAGES

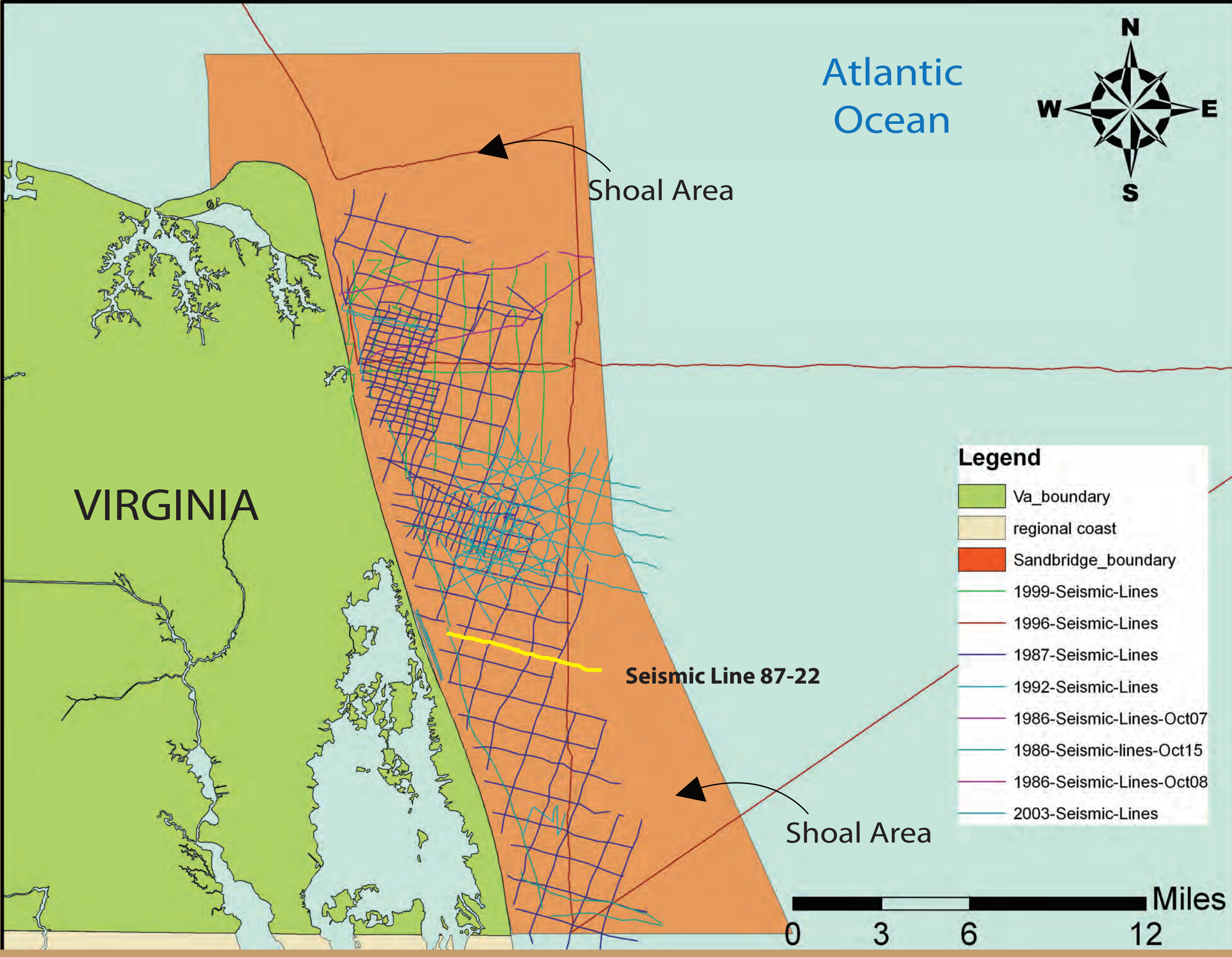


Side-scan sonar mosaics (georeferenced tiffs) found on Virginia's outer continental shelf. Mosaics are compilations of individual side-scan sonar lines showing large scale variations on sea floor.

SIDE-SCAN SONAR

Initially the DGMR did not intend to include side-scan sonar images in it's database. The National Oceanic Service (NOS) hydrographic survey database (www.ngdc.noaa.gov/mgg/bathymetry/hydro.html), operated and maintained by NOAA, contains over 400 sq. miles of side-scan sonar mosaics found within Virginia's Administrative boundaries and Virginia State waters. Though there is more coverage in the Chesapeake Bay and Potomac River, the coverage of the Virginia coast is surprising could be beneficial for later interpretation. The image to the right is an example of what the mosaic looks zoomed in. Combined with surficial sampling, side-scan sonar data could greatly assist surface geology mapping.

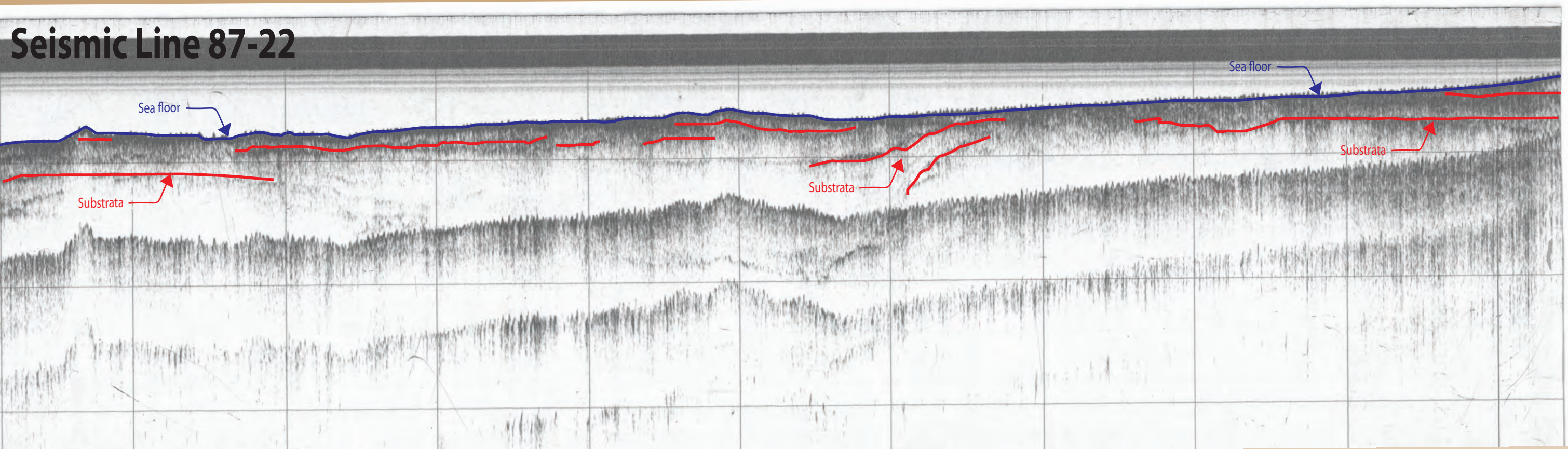
SUB-BOTTOM PROFILE



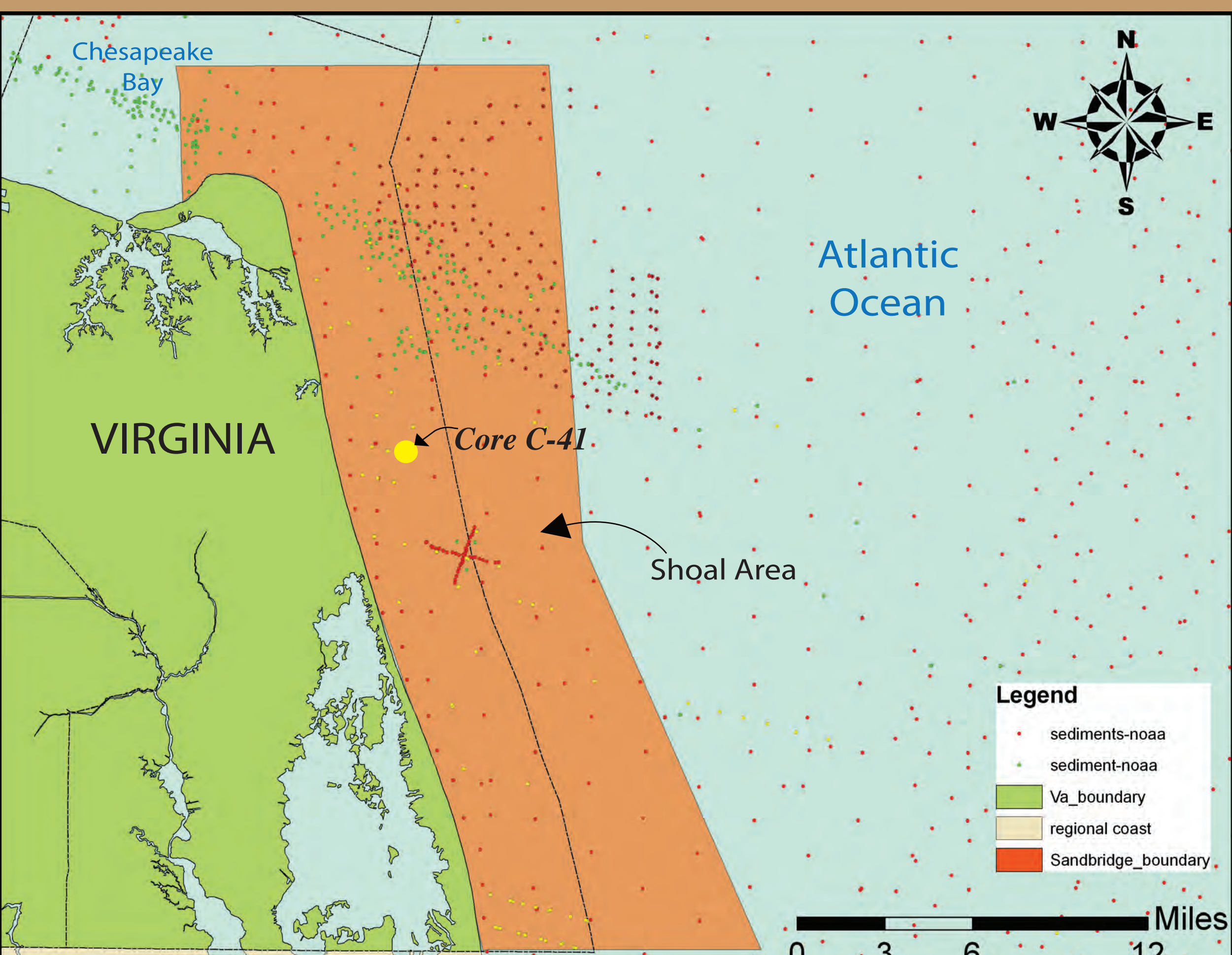
Primary focus of historical sub-bottom surveys in the region is Virginia's Outer continental shelf and shoals.

Sub-bottom Profile

All sub-bottom data was collected, maintained and digitized by VIMS. Tracklines were logged using Loran-C and a GPS, hard paper copy seismic lines were scanned at 300dpi as tiffs converted to jpgs and linked to corresponding line segments. Additional information for the sub-bottom lines are found in seismic points shape-files associated with the drawing. The image below is of Seismic Line 87-22, the line is shown in two way travel time. The sea floor is easily picked out and depicted by the blue line. Substrata are shown as red lines.



VIBRACORE, GRAB SAMPLES AND MINERAL ANALYSIS



Sample image of cores and grab samples collected around the Sandbridge shoal area off the coast of Virginia.

CORES GRAB AND MINERAL ANALYSIS

Most of the cores and grab samples came from the National Geophysical Data Center (NDGC) (www.ngdc.noaa.gov) supported by the National Oceanic and Atmospheric Administration (NOAA). The remaining samples, most of which were collected in previous sand surveys for beach renourishment projects, were collected, housed and maintained by the Virginia Institute for Marine Sciences (Berquist, 1986; Berquist and Hobbs, 1988; Berquist and Hobbs, 1989; Berquist et al., 1990; Hardaway et al., 1995; Hobbs et. al., 1990; Hobbs et al., 1996; Kimball and Dame, 1989; Kimball et al., 1991). The data points are broken up into three categories, cores, grab samples, and mineral analysis. Work by Berquist and Hobbs indicates that some of the sand communities have high concentration of potentially economic heavy mineral constituents. Built into the database we have 279 mineral samples, 3120 grab samples, and 1046 cores. An example of a vibra-core sample with mineral analysis can be seen on right.

CORE LOG		PROJECT:ST MINE VA BEACH SAND	
CORE I.D.: 41		DRILLER: ALPINE, ATLANTIC TWIN	
DATE: AUG 2, 87		LOC. LAT. 36 47 91 LONG. 75 54 58 LORAN 27445.1	
FIELD LOCATION DETERMINED BY: LORAN-C		DESCRIPTIVE LOCATION: JUDGES INLET	
TYPE OF CORE: 3.5 INCH VIBRACORE, 20 FOOT		DATE: SEPT 2, 87	
LOGGED BY: JAMES E. DYDAK		RECOVERY: 15.2	
WATER DEPTH: 25 FEET		PENETRATION: 19.8	
DEPTH	SAMP #	DESCRIPTION	DEPTH
0	1	micaceous silty f to vf sand	0
0.1	1	w/visibly scat shell frags	0.1
0.30-0.35	141-1	angled lcn shell layer	0.30-0.35
0.42-0.44	1	horiz layer about 1 cm shell frags	0.42-0.44
0.5	1		0.5
1	1	SY 4/1 dark gray	1
1.5	1		1.5
2	1	more sand above, clay below	2
2.5	1	SY 4/1 dk greenish gray	2.5
3	141-2	slty clay w/some shell frags	3
3.5	1	ls to dk sand and gravel	3.5
4	1	SY 5/1 gray	4
4.5	1		4.5
5	1	f to vf sand w/ some shell frags	5
5.5	1	SY 5/1 gray	5.5
6	1		6

Core C41									
Sample Name	Core Length (m)	Grain Size (mm)	% Sand	% Mud	% Gravel	Sand % (Mud)	Sand % (Gravel)	Gravel % (Mud)	Gravel % (Gravel)
C41-1	100	3753	91	8.5	0.6	3.07	3.06		

Sample Name	Wt% Magnetite	Wt% Hematite	Wt% Goethite	Wt% Pyrite	Wt% Pyrrhotite	Wt% Sphalerite	Wt% Pyrite	Wt% Pyrrhotite	Wt% Sphalerite
C41-1	0.06	19.82	19.82	13.24	2.47	14.16	1.4	3.88	

Sample Name	Wt% Magnetite	Wt% Hematite	Wt% Goethite	Wt% Pyrite	Wt% Pyrrhotite	Wt% Sphalerite	Wt% Pyrite	Wt% Pyrrhotite	Wt% Sphalerite
C41-1	0.11	19.82	19.82	13.24	2.47	14.16	1.4	3.88	

CONCLUSION

Completion date for this project is September 2011, and the Virginia DGMR is well on it's way to completion. In addition to the data seen here the DGMR may be able to begin the analysis phase. Analysis will start with a surficial geologic map and if time remains spatially analyzing heavy mineral extent. A complete analysis of all the seismic data and volumetrics will be reserved for future funding. Understanding the complexity of offshore sands is going to be imperative for future beach replenishment projects.

In terms of related projects, our research indicates that no work has been done showing seasonal shoal migration or how the shoals are changing over time, especially since several million cubic tons have been removed for earlier beach replenishment projects, or related to strong Atlantic hurricanes. Understanding the temporal and spatial distribution would help industry and the local governments as they prepare for the future.

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