

The Minerals Management Service: Continental Shelf Sand Activities 2003

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Sand and gravel resources located on the Outer Continental Shelf (OCS) of the United States are under the jurisdiction of the Minerals Management Service (MMS), a bureau within the Department of the Interior. The OCS is defined as that part of the seafloor and subsurface lying between the seaward extent of State jurisdiction and the seaward extent of Federal jurisdiction. For most states, offshore Federal lands begin 3 miles from shore, except for Texas and the Gulf coast of Florida, where jurisdiction begins at 10 miles. The seaward limit Federal jurisdiction is the Exclusive Economic Zone (EEZ).

The regulation of exploration and production of sand and gravel on the U.S. OCS parallels that for oil and gas, with the OCS Lands Act providing the legal authority and MMS as the lead agency. MMS has the authority to conduct competitive sales for commodities such as sand and gravel for use as construction aggregate or industrial minerals and material. In addition, Public Law 103-426 gives MMS the authority to convey, on a noncompetitive basis, the rights to OCS sand, gravel, or shell resources for shore protection, beach or wetlands restoration projects, or for use in construction projects funded or authorized by the Federal Government. There is no fee or royalty associated with the leasing of sand and gravel under the noncompetitive provision.

The Federal OCS covers an area of about 1.76 billion acres. As the steward of all seabed and submerged mineral resources on the Federal OCS, the MMS Sand and Gravel Program works cooperatively with coastal states and other federal agencies to collect geological data and information in order to locate sources of clean sand for possible use in beach nourishment and coastal restoration projects.

Coastal states negotiate leases with the MMS for access to Federal sand for public works projects; Federal Agencies who wish to use these resources sign MOAs with MMS. The MMS will also oversee the leasing process for competitive sales for OCS sand and gravel should a private entity seek to produce these resources for use as construction aggregate in the future.

As the agency overseeing the use of OCS sand and gravel resources, MMS has the responsibility to ensure that offshore dredging operations are conducted in a safe and environmentally sound manner. The MMS prepares required NEPA documents to evaluate proposed dredging projects or reviews and coordinates with other governmental entities on the preparation of those documents. The MMS Sand and Gravel Program develops and oversees environmental studies to provide information to assist in the assessment of environmental impacts associated with the development of sand borrow areas. Research is tailored, as best as possible, to meet the needs of possible prospects and the MMS. Since 1991, the MMS Environmental Studies Program funds have been used to initiate environmental studies to support the MMS Sand and Gravel Program. The MMS has spent over \$8 million for marine mineral environmental studies and is at the cutting edge of adopting new technologies to understand offshore sand and gravel resources.

Sand mined on the OCS has been used in public works projects by Federal, State, and local agencies for shoreline protection, beach nourishment, and wetland restoration. By 2003, MMS conveyed nearly 20 million cubic yards of sand for public works (beach nourishment and coastal restoration) projects off the States of Florida, Maryland, Virginia, South Carolina, and Louisiana. During the

coming years, requests are anticipated from New Jersey, Delaware, North Carolina, Alabama, Texas and Louisiana. Recently, Louisiana estimated that the State will need to request nearly 35 million cubic yards of Federal sand to supply material for a massive barrier island restoration effort.

This significant growth in demand for OCS sand for public works projects reflects the combination of several trends. Sand resources in State waters are becoming depleted after years of excavation, and as opposition to the environmental impacts associated with the use of those resources close to shore increases. Coastal erosion problems are accelerating with increasing coastal populations at higher risk from natural hazards. Simultaneously, communities are seeking to protect and expand coastal-dependent industries and tourism, and the threat of sea level rise is looming. The OCS is expected

to become the principle source of sand for emergency and long term beach nourishment and coastal restoration along the mid-Atlantic, southeast, and Gulf Coast States.

COOPERATIVES WITH COASTAL STATES

In 2003, the MMS Sand Program continued working with several coastal States through cooperative agreements (Figure 1). The work efforts are focused on locating and evaluating sand and gravel deposits located on the Federal portion of the continental shelf. Furthermore, the MMS anticipates that by the beginning of fiscal year 2004 additional cooperatives will begin with Maine, Massachusetts, and Louisiana. Recently, the MMS has also begun negotiations with New Hampshire to initiate a cooperative. The following briefly describes each of the cooperative efforts and the expected efforts with the anticipated new cooperatives into 2004.



Figure 1. States working with the MMS through cooperative programs focused on locating and assessing of deposits of sand and gravel in the Federal portion of the continental shelf. Additionally, the map indicates several significant areas of the continental shelf known to contain substantial sand resources. Dark blue indicates a cooperative agreement is anticipated by fiscal year 2004, mauve color filler indicates existing cooperatives. Recently, negotiations to develop a cooperative have also begun between the MMS and New Hampshire.

ALABAMA —The State of Alabama’s Geological Survey (GSA) began cooperative work with the MMS in 1991. The cooperative is focused on evaluation of sand resources located in the OCS as sources for coastal restoration and wetland needs. By 1992, shoreline sites were identified with the highest priority for restoration including Dauphin Island, west of the mouth of Mobile Bay and Period Pass, and Little Lagoon Inlet, east of Mobile Bay on the Morgan Peninsula. Scientists working on the cooperative determined that the shoreline of southeastern Dauphin Island could be restored by application of 1.8 million cubic yards of sand while Little Lagoon needs about 120,000 cubic yards of sand.



Figure 2. This is a reach of beach along Alabama’s Morgan Peninsula a valuable regional and national recreational resource. The view in this April 2003 photo is toward the east.

In 1997, the cooperative work provided a detailed description of the petrology of a large sand ridge, Target Site 4 containing an estimated 30 million cubic yards of material in Federal waters south of Mobile Bay. Results of the sediment analyses indicated that the sand is compatible for use as a beach nourishment material. MMS and the State, through the University of Alabama, concluded a 3-year cooperative effort to model the geologic system of the nearshore zone adjacent to Dauphin Island. The study presents recommendations pertinent to beach restoration of Dauphin Island.

The cooperative continues to expand the Sand Resource Geographic Information System (GIS) Database, adding geologic and geophysical data in addition to evaluating and integrating existing data. Significant progress is being made in preparation of internet viewing capabilities for the project data, reports and maps. The

GSA and MMS developed a CD report in 2002 entitled: “Sand Resources and Shoreline Profile Geospatial Data and Interactive Map”. The CD contains text and figures describing coastal and offshore petrology, stratigraphy data and seabed morphology. GSA and MMS continue to evaluate sand resource sites offshore the Morgan Peninsula as sources of material for beach nourishment of the Morgan Peninsula. Local and regional support is strong for beach restoration and hurricane protection projects along coastal Alabama.

MARYLAND-DELAWARE — The State of Maryland has determined that not enough sand exists inside the three-mile limit of state jurisdiction to supply future beach restoration projects. Consequently, in 1992, the State and the MMS began a cooperative program to develop a sediment database, and to locate and assess offshore sand shoals as possible sources of material for future beach

projects. Initially, the Maryland Geological Survey (MGS) obtained vibracores from an area that extends from the Delaware line to the southern end of Assateague Island. Three shoal fields were identified to contain an estimated 250 million cubic yards of sand suitable for beach nourishment.

Through a Memorandum of Agreement (MOA) with the U.S. Army Corps of Engineers (USACE) and the National Park Service (NPS) in July 1998, 134,000 cubic yards of sand were dredged from Great Gull Bank and placed in low parts of Assateague Island to prevent breaching. Great Gull Bank is a large shoal 4-6 miles offshore of Assateague

Island. It was identified through the work of the cooperative program. In 2001, Maryland's Department of Natural Resources received a MMS lease to access about 100,000 cubic yards of sand from Great Gull Bank to nourish the dunes along 2 miles of Assateague State Park. This project was completed in conjunction with the Assateague National Seashore project. The MMS received a request from the NPS for 1.8 million cubic yards of sand to repair severe erosion on the northernmost part of Assateague Island National Seashore also using sand from Great Gull Bank. A three party MOA with MMS, NPS and USACE in 2001 permitted use of the sand for the project that was completed in late 2002.



Figure 3. The berm along the northern portion of Assateague Island constructed using Federal OCS sand in 2002. The view shown in this April 2003 photo is toward the south.

NEW JERSEY—In 2002, the State of New Jersey submitted a 5-year plan for continuation of its offshore sand cooperative program with the MMS. The cooperative will focus efforts on an evaluation of five previously identified sites as locations of possible sand resources. The plan was accepted by MMS and the State has submitted proposals for the first and second years of work. The MMS approved funding for the second year of the planned work in April of last year.

NORTH CAROLINA — The North Carolina/MMS cooperative has characterized the geologic environment and sand resources potential within a large area offshore of Dare County. The results are published as a North Carolina Geological Survey open-file report and are also available as a CD-ROM interactive database and GIS product. The results of an environmental study that analyzes the physical and biological information collected from the same survey site became available in early 2003.

SOUTH CAROLINA —The South Carolina/MMS Offshore Resource Cooperative is continuing its phased mapping efforts along the area offshore of North Myrtle Beach to Folly beach, and is analyzing potential sand sources as compatible to adjacent beaches. Through a negotiated lease with the City of Myrtle Beach,

approximately 150,000 cubic yards of Federal sand was placed on Surfside Beach in 1998. Since then, Coastal Carolina University and the South Carolina Department of Natural Resources researchers have been constructing maps of marine habitats and sand resources located on the offshore the northern portion of the State.



Figure 4. The view in this photo is to the north toward Myrtle Beach, SC before nourishment that used Federal OCS sand.



Figure 5. The oceanfront beach along the north toward Myrtle Beach, SC after nourishment with Federal OCS sand.

TEXAS—In 1999, the Bureau of Economic Geology (BEG) renewed the investigation of sand resources for the southeast Texas continental shelf in cooperation with the MMS. The southeastern Texas coast is undergoing long-term shoreline retreat. This retreat has received more attention as storms Josephine in 1996 and Frances in 1998 caused erosion and the destruction of houses and infrastructure. From 1993 through 1995, the MMS and BEG worked under a cooperative agreement to collect and analyze data pertaining to Sabine and Heald Banks. The renewed cooperative is incorporating the earlier acquired data into a Coastal GIS. The BEG Coastal GIS uses ArcIMS allowing the data and documentation to be used and downloaded by the public through the internet.

The Coastal GIS possesses several spatial coverages obtained from various sources depicting diverse features and areas along the coast and in the offshore.

VIRGINIA —The Virginia Institute of Marine Science (VIMS) represents the Commonwealth in the cooperative in effect since 1989. During recent years, the cooperative has monitored the nearshore geologic environment of Sandbridge shoal, as well as, adjacent coastal beaches. Scientists with the cooperative are beginning new efforts to locate and evaluate alternative sand sources in anticipation of the eventual depletion of useable sand from Sandbridge Shoal.



Figure 6. The ocean front beach and berm at the U.S. Navy Facility, Dam Neck, VA 2002. The view is toward the south with Sandbridge Beach, City of Virginia Beach visible through haze in the background.

The USACE Norfolk District and the MMS signed an MOA in mid 2001 for use of OCS sand from Sandbridge Shoal for the Sandbridge Beach, Beach Erosion and Storm Damage Reduction Project, Virginia Beach. Sandbridge is a section of the City of Virginia Beach, Virginia. The project, completed early this summer, used 2,000,000 cubic yards of Sandbridge Shoal sand for the beach

construction. The U.S. Navy requested nearly 1,000,000 cubic yards of sand from Sandbridge Shoal for the 2003 Dam Neck Facility Berm Restoration project scheduled for September 2003. With completion of these projects, a total of 4,000,000 cubic yards of sand will have been removed from Sandbridge Shoal for projects along coastal southeastern Virginia.



Figure 7. The ocean beach along the ocean shore of the U.S. Navy's Dam Neck Training Facility in 2002. The resort area of the City of Virginia Beach Virginia in the background to the north and along the coast.

FLORIDA—The MMS and the Florida Geological Survey (FGS) are evaluating sand resources offshore Florida's central-Atlantic coast for possible use for shore protection projects. Severe erosion affects over 65% of the sandy beaches along Florida's central-Atlantic coast. The cooperative has analyzed geological and geophysical data collected across the area. Recently, site-specific data were undergoing analysis to determine the thickness and lateral extent of the identified sand features. By late 2000, Brevard County had requested from the MMS an additional 2.8 million cubic yards of Federal sand for the South Reach portion of the Brevard County Shore Protection Project. By August 2001, the MMS amended its lease with Brevard County to include this area. The South reach segment involved restoration of about 4 miles of shoreline encompassing the Towns of Indiatlantic and Melbourne Beach. The project was successfully completed in April 2003.

ANTICIPATED ADDITIONAL COOPERATIVES

The MMS scientists have been working with scientists from California, Louisiana, Maine, Massachusetts and

New Hampshire to develop cooperative projects to similarly assess continental shelf sand resources as sources of material for coastal public works projects.

CALIFORNIA—Scientists of the California Geological Survey (CGS) and the California Department of Boating and Waterways (CDBW) are working with the MMS to develop and fund a new cooperative study. The anticipated 5 year study, "Assessment of Coastal California Continental Shelf Sand Resources for Use in the Restoration of California Beaches" will focus on assessment of continental shelf sand resources offshore. Priority areas include: San Francisco Bar, Surfside/Sunset in Huntington Beach, South Orange County, San Clemente, and San Diego County.

LOUISIANA — The State of Louisiana is embarking on a very ambitious program to stave off the effects of coastal land loss and to extensively rebuild the coastal barrier islands to provide storm protection and to protect the economically vital inshore ecosystem and resources. To assist that program, Louisiana Department of Natural

Resources and the MMS are working to develop and to fund a new 5 year cooperative scientific endeavor, "Assessment of Offshore Sand Sources along the Outer Continental Shelf of Louisiana and Management of Geological & Geotechnical Data."

The MMS is a major player in the effort as the only viable, large-scale source of compatible sand for placement on the existing barrier islands of the central Louisiana coast is Ship Shoal, a topographic feature that lies at its closest point, about 9 miles from the barrier islands. The MMS is working on negotiated agreements with the State of Louisiana to provide the initial uses of Ship Shoal sand for two major coastal projects.

The MMS is as a principle member of the State/Federal advisory groups (both the Federal Principles Group and the Regional Working Group) that are providing technical expertise on the Louisiana Comprehensive Area (LCA) Ecosystem Study. The LCA will outline a \$14 billion plan to preserve the Louisiana ecosystem; the LCA plan will be presented to Congress in 2004. A Louisiana Sand Management Working Group composed of Federal, State, local authorities, academia, and industry has been organized to provide advice relative to the long-term use of Federal sand offshore Louisiana.

MASSACHUSETTS — The MMS, the State Geologist of Massachusetts and Boston University are working to develop and fund the initial phase of a new 5 year cooperative effort, "Documenting Sand And Gravel Deposits on the Inner Continental Shelf: Merrimack Embayment, New England."

MAINE — The MMS, the University of Maine, and the State Geologist of Maine are working to develop and fund a new 5 year cooperative effort, "Multi-Year Cooperative Assessment of Sand And Gravel Resources of the Continental Shelf Offshore of Maine."

NEW HAMPSHIRE — The MMS and the University of New Hampshire and Jackson Estuarine Laboratory anticipate funding a new cooperative and the initial project, "Assessment of Sand Resources and the Geologic environment of the New Hampshire Inner Continental Shelf" as the initial stage of an anticipated 5-year cooperative endeavor.

ENVIRONMENTAL STUDIES

Environmental studies are conducted by the MMS to provide biological, physical, and other pertinent information necessary for the MMS to make decisions

about the impacts of conveying OCS sand resources. Among the recent studies is a cooperative agreement with VIMS to test monitoring protocols on Sandbridge Shoal to evaluate the long-term, cumulative effects of dredging. Ongoing environmental studies focus on evaluation of fish habitats and the use of shoals offshore Maryland and Delaware and Louisiana/Texas. The information obtained from these efforts will be used during essential fish habitat consultations when requests for sand are received; An study to examine the effects of dredging on ship wrecks and offshore prehistoric sites is underway while the U.S. Geological Survey (USGS) has begun a literature search to compile information on benthic assemblages on the shoals located on the east and gulf coasts.

In order to better meet the mandates of the Magnuson-Steven Fisheries Conservation Act, MMS is currently undertaking an unprecedented study to examine the importance of offshore shoals to fish populations.

Since the middle-1990's, the MMS has funded almost \$10 million of physical and biological studies to assist in the environmental evaluation of offshore sand dredging. Included are aggregate dredging impact studies in the United Kingdom (U.K.), conducted in cooperation with several aggregate entities, including Hanson Aggregates, South Coast Shipping, United Marine, and BMAPA. Since, the OCS also represents a future source of sand and gravel for construction aggregate, MMS is funding work in the United Kingdom to examine the potential impacts associated with aggregate dredging. The U.K. environmental studies were done because there are presently no commercial marine aggregate operations in the OCS from which to monitor long-term impacts.

MMS is a leader providing state-of-the art information in assessing the impacts to the shoreline if sand is removed from the OCS. MMS has funded numerical wave modeling studies designed to evaluate the latest wave models. Finally in 2003, demonstrating the importance and depth of MMS environmental studies efforts, the "Journal of Coastal Research" will publish a special issue containing twelve papers reporting the results of MMS- funded study efforts.

SUMMARY

Over a decade ago the MMS and coastal states recognized that OCS sand resources represent a viable and critical source for protection of the Nation's shores and wetlands. Because of this strategic view to the future, the MMS/State cooperatives have identified over 2 billion cubic yards of sand resources, and the MMS has conveyed

over 20 million cubic yards of sand for 14 shore protection projects. MMS is able to convey these resources when they're needed because in addition to locating and characterizing the resources, it has also done the environmental studies and analysis necessary to ensure that the sand can be removed without significant impact to the environment.

Additional information can be obtained by contacting the MMS Leasing Division, the authors at 703/787-1300, or visiting the MMS Sand Program website, <http://www.mms.gov/sandandgravel/>.