

TECHNICAL SUMMARY

Study Title: Archaeological Damage from Offshore Dredging: Recommendations for Pre-Operational Surveys and Mitigation During Dredging to Avoid Adverse Impacts

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Sponsoring OCS Region: Headquarters–Sand and Gravel Unit, Leasing Division

Applicable Planning Areas: East and Gulf of Mexico Coasts

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Background: The Minerals Management Service (MMS) is charged with environmentally responsible management of Federal Outer Continental Shelf (OCS) sand and gravel resources, that is, those resources lying seaward of the State/Federal boundary. The National Historic Preservation Act requires Federal agencies to protect historic and cultural resources which include shipwrecks, historic fortifications, and coastal settlements, as well as prehistoric human occupation sites that have become submerged due to the global and local rise in sea level. As a Federal agency, the MMS must protect the significant archaeological and historic sites that maybe impacted by its activities. In addition, regardless of the historical significance of a shipwreck or site, these structures provide fish habitat and are considered potential Essential Fish Habitat. These structures can, and in many cases do, support extensive sport fishing and diving industries. Therefore, MMS funded this current study to review its current practices and procedures related to identification and protection of archaeological resources.

Objectives: The project objectives were to: 1) Review of the worldwide literature to determine current dredging practices in other countries; 2) review of the literature on the nature and type of submerged cultural resources likely to be encountered on the continental shelf; 3) review of the methods and technology for locating and identifying submerged cultural resources, as well as the current MMS criteria for remote-sensing surveys; 4) review of reports of cultural resources damaged by dredging operations and the reasons the damage occurred; 5) canvass the dredging industry to determine the current practices and procedures for mining sand, focusing on equipment and accuracy of the dredging process; 6) review of mitigation requirements of other jurisdictions to prevent adverse impacts on submerged resources. Particular emphasis was placed on buffer or exclusion zones; and 7) synthesis of the study results into a set of recommendations on dredging methods, protocols, policies, and monitoring requirements to minimize impacts on submerged cultural resources

Description: Based on the results of the study, recommendations to avoid adverse impacts to archaeological resources during dredging in the OCS were organized into the seven categories summarized below.

1. Implement a GIS-based Data Management Strategy: Establish and maintain a GIS for management, research, and monitoring of submerged cultural resources in sand borrow areas under the jurisdiction of MMS.

2. Refine and Test Existing Baseline Studies That Define Potential Archaeological Resources: MMS management of submerged cultural resources is essentially based on a series of baseline studies carried out over two decades ago. As the nature, scope and distribution of prehistoric and shipwreck resources are key elements in developing a responsible and effective management program, a comprehensive reexamination of those issues is highly recommended. Refined prehistoric and shipwreck models could be tested using data that will be generated by investigations designed to locate and identify submerged cultural resources in the OCS sand borrow areas.

3. Revise the Requirements for Equipment and Methods for Locating and Identifying Submerged Cultural Resources: The existing requirements need to be updated to reflect the state-of-the-art means of locating and identifying cultural resources. Recommendations were made for a wide range of changes in MMS survey guidelines. Key recommendations include: positional accuracy (from 5 to 1 m), line spacing (from 50 to 30 m) and 10 m line spacing for anomaly definition, use of digital magnetometers and sonar systems that allow digital data recording integrated with differential GPS (DGPS) versus paper strip charts, use of multibeam echosounder systems (versus single beam), increase of range scale coverage (from 100% to 150%), contouring magnetic data for target assessment and reporting, and use of heave, pitch, and roll compensation equipment to improve record quality.

4. Develop Scientific Basis for Buffer Zones: Buffer zones to protect archaeological resources have no scientific basis, and the sizes and shapes used currently have not been tested. There are also concerns the buffer zones around a site could result in full pedestals that may eventually erode and damage the site. Two formulas were developed to calculate buffer zones and create a series of plots, based on simple assumptions. MMS should develop a program to test formulas for buffer zone definition and monitor field sites to determine effectiveness.

5. Require Dredges to be Equipped with DGPS Positioning Equipment: DGPS will allow the position of the dredging equipment to be precisely tracked relative to buffer zones during the entire dredge cycle. MMS should require submittal of the track plot and buffer zones to show compliance.

6. Require Monitoring During- and Post-Dredging: MMS should consider requiring an on-board archaeological monitor, particularly in high-potential areas. Alternatively, there could be a reward/penalty incentive program to encourage operators to report when there is evidence of an encounter with an archaeological site. Post-dredging monitoring data are critical to providing the documentation needed to validate the effectiveness of prescribed buffers, as well as monitor the stability of the borrow area over time particularly as it affects slope stability and edge effects.

Many of these stability concerns are applicable to infrastructure (e.g., pipelines, platforms, and wellheads).

7. Revise Archaeological Report and Data Delivery Requirements: All data should be delivered in digital format, be georeferenced, and include magnetic contour maps of the survey area and all potentially significant anomalies, high-resolution sonar images of all anomalies, and multibeam mosaics of the survey area.

Study Products: Research Planning, Inc., Tidewater Atlantic Research, Inc., and Baird & Associates Ltd., 2004. Archaeological Damage from Offshore Dredging: Recommendations for Pre-Operational Surveys and Mitigation During Dredging to Avoid Adverse Impacts. U.S. Department of the Interior, Minerals Management Service, Sand and Gravel Unit, Leasing Division, Herndon, VA. OCS Report MMS 2004-005, 75 pp. + appendices.