ENVIRONMENTAL STUDIES PROGRAM: ONGOING STUDIES

Region: Headquarters

Planning Area(s): Central and Western Gulf of Mexico

Title: Environmental Investigation of the Long-Term Use of Trinity and Tiger Shoals as Sand Resources for Large Scale Beach and Coastal Restoration in Louisiana (formerly, Biological Surveys and Physical Modeling for New Borrow Areas Identified Offshore Louisiana)

Cost Range: $700,000 **Period of Performance:** 9/01/2006-8/31/2011

Conducting Organization: Louisiana State University-Coastal Marine Institute

BOEMRE Contact: Roger Amato

Description: The State of Louisiana is embarking on a massive effort to renourish and restore the coastal areas along its entire shoreline. The U.S. Army Corps of Engineers' Louisiana Coastal Area plan completed in December 2004 outlines a multi-billion dollar effort to restore and maintain the State's coastal areas and estimates that as much as 61 million cubic yards of Federal sand will be needed for the coastal restoration/barrier island replenishment projects required under the plan. MMS, in the Departmental comments to the Corps on the final LCA plan, expressed its support for the plan, especially for the near-term critical LCA restoration features for the Barataria Basin barrier islands and Caminada-Moreau Headlands. Thus, the MMS must be in a position to negotiate leases with the State for the use of sand; many of these areas appear to have little or no biological or physical information available to evaluate impacts. It is imperative that MMS have the necessary environmental information to evaluate those requests, as well as the information necessary in formulating lease stipulations and conditions.

In FY 2004, MMS initiated a multiyear cooperative program with the Louisiana Department of Natural Resources (LDNR) to assess and evaluate offshore sand sources offshore Louisiana for use in coastal and barrier island nourishment projects. Although identified deposits, such as Ship Shoal, represent an extremely large source of material, in many instances the distance from the shoal to the project area is too great to make it economically viable. New deposits in closer proximity to projected project areas are being investigated. This includes shoal areas such as Trinity Shoal and Tiger Shoal, as well as buried paleo-channel deposits (which are known to exist throughout coastal Louisiana). The MMS/LDNR cooperative effort will serve to pinpoint viable areas where sand may be used for planned and future Louisiana coastal projects.

Objectives: The purpose of the study is to address environmental concerns, prior to actual dredging of the identified sand resource areas, the likelihood of adverse environmental

impacts on resident biological organisms and on the local wave climate and sediment transport regime from sand dredging for the purposes of beach renourishment. The information provided from this study will be used to prepare environmental analyses to meet the requirements of current environmental laws and legislation and incorporate results, as appropriate in lease requirements for the dredging of OCS sand.

Biological Objectives:

- Compile and synthesize existing oceanographic literature and data sets to develop an understanding of the baseline benthic ecological conditions on and around potential sand borrow areas.
- Conduct biological field data collection efforts to supplement those existing resources.
- Analyze the biological field data in conjunction with existing literature to characterize and evaluate the present infauna, epifauna, demersal fishes, benthic habitat, and sediment grain size in proposed borrow areas.
- Address the potential effects of offshore sand dredging on benthic communities including an analysis of the potential rate and success of recolonization following cessation of dredging.
- Using the procedures set out in the NAS Special Report 262: A Process for Setting, Managing, and Monitoring Environmental Windows for Dredging Projects, develop a time schedule of environmental windows that best protects benthic and pelagic species from adverse environmental effects.
- Address the cumulative biological effects of multiple dredging events over various timeframes within the identified borrow sites.
- Develop a document summarizing the above information to assist decision-makers in preparing an environmental analysis that meets the requirements of the National Environmental Policy Act.

Physical Objectives:

- Examine the potential for alteration in the local wave field following dredging and the excavation of sand from within the identified sand borrow sites offshore the Louisiana coast.
- Explore the potential for increased wave action after dredging within identified borrow sites and any resultant adverse localized changes in erosional patterns and longshore coastal transport which could result in significant losses of beach sand after renourishment.
- Examine the potential for changes in local sediment transport rates as a result of altering the local bathymetry, particularly in light of the recent studies which indicate that bathymetry does influence the manner in which waves approach the shoreline during storm events.
- Examine the cumulative physical effects of multiple dredging events within the identified borrow sites.

Methods:

Biological: To evaluate the possible biological impacts associated with dredging, the present condition of benthic and fish assemblages will be characterized and

interpretations will be developed to assess those impacts. The characterization of benthic communities will be done using existing literature, collection of field data and laboratory analysis. Grab samples, trawls, sediment profiling cameras, water column profiles and other current sampling techniques will be used to characterize the benthic biology in the field. The structure of benthic communities and fish assemblages will be analyzed for diversity, evenness, species richness, biomass, taxonomic composition, gut content, and secondary production, etc. Community cluster analysis will be performed as well. An evaluation of the potential environmental impacts to the biological community will be conducted by making inferences and interpretations based on the field data, laboratory analysis, historical information, past studies and the most recent scientifically accept theories and models.

Physical: To evaluate the possible physical impacts associated with dredging of identified borrow sites, wave transformation modeling and sediment transport potential calculations will be performed for 1) present existing conditions, and 2) present conditions with the proposed excavations sand from the identified borrow sites. Comparison of computations for existing and post-dredging conditions illustrate the relative impact of borrow site excavation on wave-induced coastal processes. Nearshore wave heights and directions along the shoreline landward of the proposed borrow site will be estimated using a state-of-the-art spectral wave model (STWAVE or SWAN), which will be used to simulate the propagation of offshore waves to the shoreline. Offshore wave data, available from offshore wave buoys maintained by the National Data Buoy Center (NDBC) will be used to derive input wave conditions for the model used.

Importance to BOEMRE: To provide data and information for NEPA environmental reviews and leasing documents on potential impacts and to provide mitigation measures for dredging sand from these shoals. Mitigation measures may be incorporated into leases as term sand conditions.

Current Status: In progress

Final Report Due: 8/31/2011

Publications:

Affiliated WWW Sites:

Revised Date: February 25, 2011