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Project: Numerical Modeling Evaluation of the Cumulative Physical Effects of Offshore Sand Dredging for Beach Nourishment

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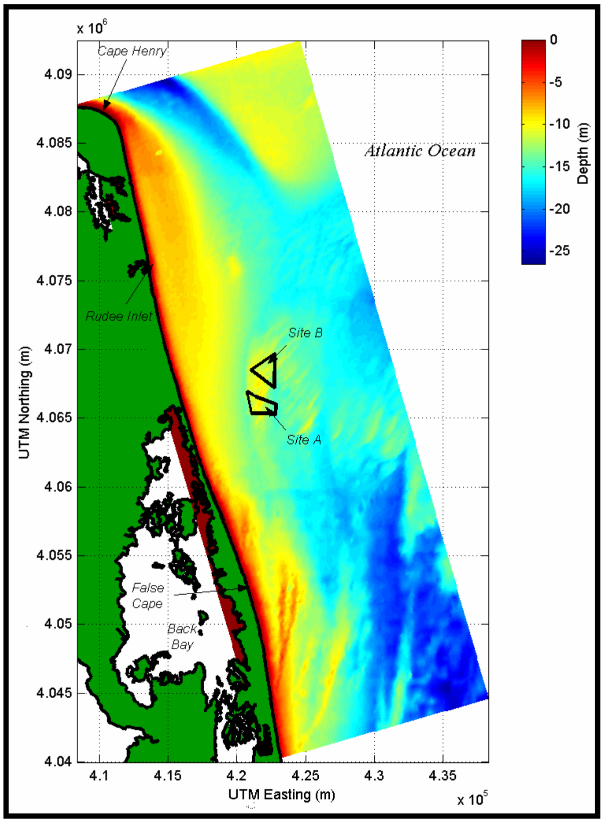
The Minerals Management Service (MMS), a bureau within the U.S. Department of the Interior, has responsibility for managing all mineral resources on the Federal Outer Continental Shelf (OCS), a zone that extends three (3) miles seaward from State coastline boundaries to 200 miles offshore. Although most interest in this zone relates to oil and gas resources, the potential for exploitation of sand resources as a source for beach and barrier island restoration has grown rapidly in the last several years as similar resources in State waters are being depleted or polluted. The overall study purpose addresses the need for physical environmental information to support potential lease decisions offshore the east coast of the U.S. from southern New Jersey to Cape Canaveral, Florida. Specifically, the study examines the potential for negative impacts to coastal and nearshore environments, particularly from alterations to the local wave and sediment transport regime, due to long-term dredging and significant removal of sand from shoals offshore southern New Jersey, southeastern Virginia (Sandbridge Shoal), North Carolina (north of Oregon Inlet), and Cape Canaveral, Florida. Shoals in these areas are expected to serve as long-term and continual sources of borrow material, due to existing beach renourishment cycles, and to repair damage from severe coastal storms. In certain instances, such as Sandbridge Shoal offshore southeastern Virginia, several jurisdictions or entities want to use the same borrow area(s) on different cycles. This raises the issue of cumulative effects of multiple sand dredging events and/or dredging at multiple sites, particularly related to alterations to the local wave and sediment transport regime.



The most effective means of quantifying incremental and cumulative physical environmental effects of sand dredging from shoals on the continental shelf is through the use of spectral wave transformation numerical modeling tools that recognize the random nature of incident waves as they propagate onshore. Although the interpretation of wave modeling results is relatively straightforward, evaluating the significance of predicted changes for accepting or rejecting a borrow site is more complicated. A substantial part of this study was aimed at assessing the significance of simulated changes between existing and post-dredging conditions versus natural variability in wave climate and potential sediment transport rates to determine the relative importance of predicted changes. It is expected that information generated will enable the MMS to assess potential impacts of long-term offshore dredging and to identify potential dredging alternatives aimed at minimizing or precluding adverse physical environmental impacts.