

## APPLIED COASTAL

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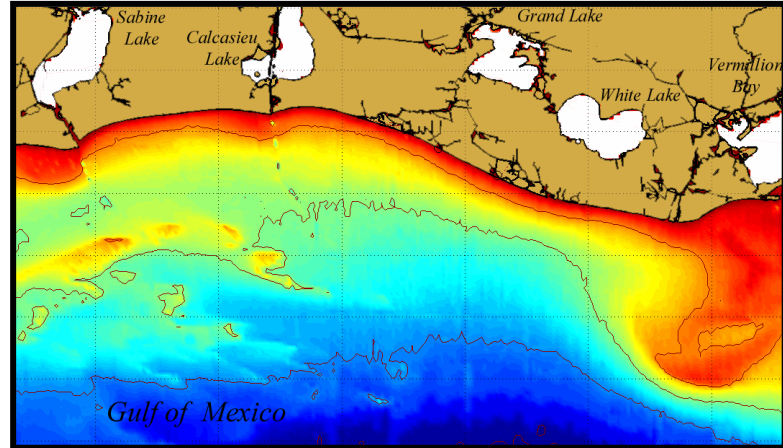
**Project:** Geology, Geomorphology, Sand Resources, Storm Surge, and Wave Analysis of the Southwestern Louisiana Chenier Plain and Adjacent Shelf

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**Completion Date:** 2002

**Contract Amount/Company Responsibility:** \$24,000/\$24,000

The outer coastline of Louisiana is ~625 km long and represents part of the passive, subsiding central portion of the northern Gulf of Mexico coastline. The Louisiana coastline has three distinct geomorphic regions: 240 km of the coastline is characterized by barrier islands along the Mississippi River delta plain; 205 km is associated with the active deltas of both the Atchafalaya and Mississippi Rivers; and the remaining 180 km encompasses the chenier plain of southwestern Louisiana. The chenier plain extends from Southwest Pass westward to Sabine Pass at the Louisiana/Texas border. It is intersected by the Mermentau, Calcasieu, and Sabine Rivers (east to west), and contains Freshwater Bayou Canal, an artificially cut channel in its eastern portion. The project area is located immediately offshore and along the coastline of Rockefeller State Wildlife Refuge. Rockefeller Wildlife Refuge lies between the Mermentau River on the west and Southwest Pass on the east. Alongshore drift and onshore transport move sediment and bioclasts in and out of the system, whereas transgressions and regressions play a major role in the type of shell that is concentrated in ridges. Storms such as hurricanes and cold fronts often transport fine-grained sediment into the system. Offshore sediment along the chenier plain primarily consists of sand and silty clay. The purpose of this study was to provide a coastal processes assessment for the Gulf shoreline of Rockefeller Refuge, including a description of the geologic history, geomorphologic setting, and sand resources, and an evaluation of storm surge and wave propagation patterns to assist in determining the suitability of constructing hard structures as a means of shore protection in this region.



Due to the relatively high coastal erosion rates along the Rockefeller Wildlife Refuge, shore protection methods were considered as a method for slowing the regional shoreline migration rate. The low-lying marsh shoreline, as well as the regional fine-grained sediments, allows overtopping and severe erosion even during minor storms. To quantify the influence of storm waves and surge on the shoreline, an analysis of nearshore wave climate and storm surge was conducted. Because no long-term nearshore wave data existed for the study area, it was necessary to perform a wave transformation analysis to determine nearshore wave conditions using available offshore wave data. Modeled nearshore waves and surge levels were used to compute maximum shear stress values along a transect perpendicular to the shoreline. In addition, the influence of regional shoals on local wave processes was evaluated using semi-quantitative methods. In this manner, a conservative estimate of wave sheltering provided by the shoals could be estimated without requiring extensive wave refraction/diffraction models. This analysis provided information needed for coastal engineering design and the assessment of erosion control alternatives.