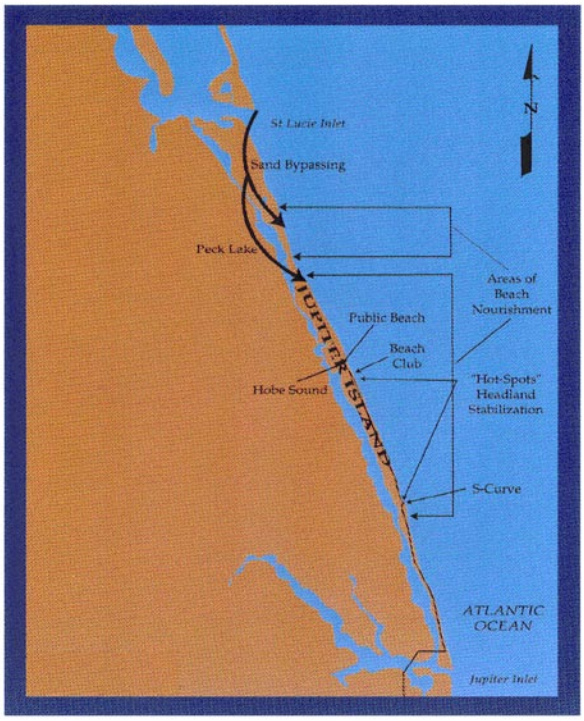
Shoreline Erosion and Management Study
Jupiter Island, Florida

Project Characteristics:

- *Beach Erosion Management Plan*
- *Shoreline Change Analysis*
- *Wave Modeling*
- *Sediment Transport*
- *Recommended Solutions*



Woods Hole Group performed a combined alternatives and shoreline change analysis to optimize the use of coastal engineering structures and beach nourishment along Jupiter Island Beach, Florida. This study combined numerical model analyses of offshore wave climate, wave refraction and diffraction, and longshore and cross-shore sediment transport. The wave modeling phase of this study was undertaken to develop an understanding of the wave climate and beach stability along the shoreline of Jupiter Island. An accurate description of the wave climatology in this area was required to study sediment transport patterns, and provide an analysis of alternatives for protecting the beach.

This wave study represented the first long-term site-specific evaluation of wave climatology for the Jupiter Island shoreline. Since no direct wave measurements were employed, the offshore wave conditions were based on the best information available: updated hindcast wave data and modeling of typical severe storms. To evaluate sediment transport adequately two methodologies were employed. First, a shoreline change model, GENESIS, was utilized to estimate longshore transport trends based on historical shoreline positions and the modeled wave information.

To supplement this analysis, calculations regarding sediment transport "potential" were performed to indicate the maximum quantity of transport possible based on a sediment-rich environment. Based on the review of historically implemented and *alternative* technologies for beach preservation, three viable options were identified for quantitative analysis: beach nourishment, headland control, and submerged offshore breakwaters. Through in-depth analyses, these options were evaluated for application at Jupiter Island, likelihood of success, ease of permitting, and associated costs. For each option, the shoreline change model, GENESIS, was employed to provide a quantitative assessment.

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