

The Effects of Beach Nourishment on Sea Turtle Nesting and Reproductive Success, a Case Study on Hutchinson Island, Florida

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Between 1995 and 1997, Ecological Associates, Inc. conducted a three-year study to assess the effects of a four-mile beach nourishment project on sea turtle nesting and reproductive success. The study site was located in Martin County on Hutchinson Island, a barrier island on the southeast Florida coast. Hutchinson Island was an ideal site for a case study because it had never been nourished, it supported high-density nesting by loggerhead turtles, and a long-term nesting database was available. The experimental design consisted of three treatments, each three kilometers in length. Two of the treatments were nourished, while the other served as a control. Following construction, one of the nourished treatments was tilled to reduce sediment compaction; the other was not. The control was neither nourished nor tilled. A complete year of pre-construction (baseline) data was collected during 1995. Dredged sand (1.2 million cubic yards) was placed on the beach during the winter of 1995/1996, and two years of post-construction monitoring began in April 1996.

The wide, relatively flat beaches of nourished treatments had no apparent affect on the relative number of emergences of turtles onto the beach. However, the percentage of emergences resulting in nests (nesting success) declined in both nourished treatments following construction, suggesting that changes in beach characteristics had decreased the attractiveness of the beach as nesting habitat. Because this effect was similar in both tilled and untilled treatments, it indicated that factors other than compaction (e.g., beach profile) were responsible. A determination of nest site suitability was apparently made relatively early into the crawl, as nesting crawls on nourished beaches were significantly longer than non-nesting crawls. Turtles utilized the entire width of available habitat for nesting. This placed nests nearest the ocean at increased risk of being washed out as the beach equilibrated during subsequent periods of erosion.

The nourished beaches were generally more compact, wetter, coarser and warmer than those of control and pre-nourished beaches. Tilling significantly reduced compaction levels and effectively eliminated the impacts of high compaction (>500 psi) on the frequency of abandoned digs and the time required by turtles to excavate an egg chamber. The warmer sands of nourished treatments significantly reduced incubation periods and may have contributed to a higher incidence of late-stage embryonic mortality. However, despite changes in the incubation environment there were no significant differences in overall reproductive success. Recommendations are provided for mitigating the negative effects of beach nourishment on the sea turtle reproductive process.