

2-1993


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Mattison, Catherine A.; Burney, Curtis M.; and Fisher, Louis, "Trends in the Spatial Distribution of Sea Turtle Activity on an Urban Beach (1981-1992)" (1993). *Marine & Environmental Sciences Faculty Proceedings, Presentations, Speeches, Lectures*. 296.
https://nsuworks.nova.edu/occ_facpresentations/296

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TRENDS IN THE SPATIAL DISTRIBUTION OF SEA TURTLE ACTIVITY ON AN URBAN BEACH (1981-1992)

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Broward County, in southeast Florida has 38.6 km of heavily developed coastline, including tall condominiums, hotels, and businesses. In spite of this dense development, the distributional patterns of loggerhead sea turtle nesting show striking similarity during the past 12 years. Total nest counts have increased significantly over this time, both within and outside the developed areas (Burney and Mattison, 1992). Three questions were addressed in this study. Do sea turtles choose nest sites randomly in Broward County, Florida? Are observed nesting patterns consistent from year to year? Does the density of beach front development influence nest site selection?

METHODS

Daily beach surveys were conducted during sea turtle nesting seasons since 1981. Nests surveyed from 1981 through 1986 and those surveyed from 1990 through 1992 were mapped using Florida DNR beach survey markers numbered from 1-84 (north to south, North County line to Port Everglades). Counts from 1981-86 survey years were initially mapped in 2000 foot beach zones (markers 1 & 2 = beach zone 1, 42 zones total), while 1990-92 counts were mapped in 1000 foot zones (84 zones total). Data from 1990 through 1992 were then converted to the initial map beach zones for comparison. The total number of nests deposited each year, in each zone, were then tabulated and plotted.

RESULTS AND DISCUSSION

Figure 1 compares the mean nesting patterns from each zone as a percent of the total for all zones for each year for years 1981-86 and 1990-92. Beach/nest location data was not available from 1987-89. Some zones were consistently utilized for nesting, while others were consistently avoided. Figure 2 shows the significant ($p < .001$) correlation of the nest distributions in Figure 1. Figure 3 presents correlation coefficients of the 1990-92 nesting patterns compared to those of other years in the study. The 1990 and 1991 distribution patterns were significantly correlated with all years in the study, while the 1992 pattern was correlated with data since 1985 but not with earlier years of the study. Figure 4 illustrates the average zonal nesting in all years (1981-1992), and specifically identifies shore structures or beach features characteristic of low and high nest density locations.

The data strongly suggests that nesting in Broward County, Florida has been non-random and consistent throughout the period examined. Salmon (1992) also found that turtles deposited nests non-randomly in an urban setting (Boca Raton, Florida), with a significant positive correlation between nesting density and the height of objects behind the nesting beach. Turtles clustered their nests in front of objects that presented a high silhouette, such as tall condominiums. Unfortunately, due to ambient light levels these areas are also those in which hatchlings were misoriented.

High nesting density in Pompano Beach, Galt Mile and in zones 41-42 (Figure 4) may be associated with high profile buildings as suggested by Salmon (1992), however the relationship is possibly more complex in Broward County where the most densely nested beach (Hillsboro Beach) is characterized by low-profile residences. This is the type of profile that produced lower nesting densities in Boca Raton. Unlike the City of Boca Raton, enforcement of beach front lighting restrictions throughout the remainder of the County does not exist yet. The low density nesting zones in Broward County are historically associated with fishing piers, inlets and the section of Ft. Lauderdale beach directly adjacent to State Road A-1-A.

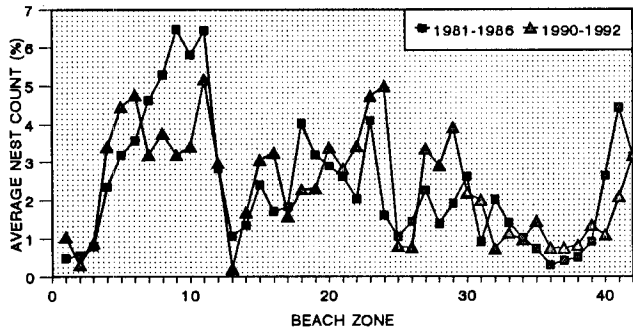
It appears that multiple factors including silhouette profile, pedestrian and vehicular traffic, and the lighting associated with fishing piers may account, in part, for nest distribution in Broward County. If conservation efforts to recover sea turtle populations are successful, understanding how beach front development may affect "attractiveness" of a beach to nesting sea turtles may also allow better management of an increasing nesting population.

LITERATURE CITED

Burney, C.M. and Mattison, C. 1992. Sea Turtle Conservation Project, Broward Co. Florida. 1992 Report. Broward County Dept. of Natural Resource Protection. Fort Lauderdale, Florida. 52 pp.

Salmon, M. 1992. Florida Atlantic University, Boca Raton, Florida. Personal communication.

NESTING PATTERN COMPARISON
NORTH BROWARD COUNTY, FLORIDA
PORT EVERGLADES TO PALM BEACH LINE

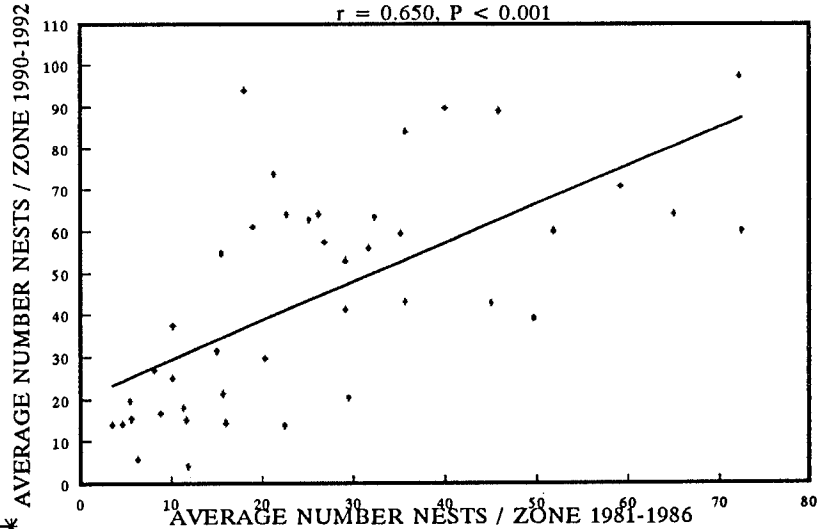


NOTE: AVG NEST COUNT % = NUMBER OF NESTS IN EACH ZONE, EACH YEAR DIVIDED BY TOTAL NESTS IN REGION (x 100).

Figure 2 →

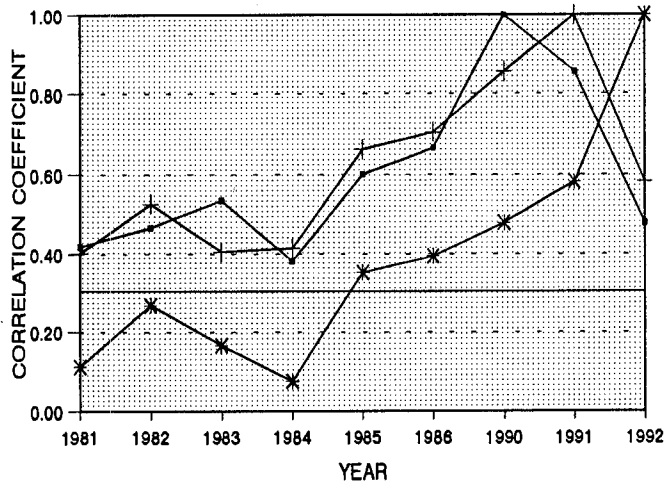
← Figure 1

COMPARISON OF NESTING DENSITIES
 $r = 0.650, P < 0.001$



← Figure 3

NESTING PATTERN CORRELATIONS



□ 1990 + 1991 * 1992 — 95% Level

Figure 4 →

BEACH DISTURBANCE SITES

