BEACH EROSION ALONG THE LOWER WEST COAST OF PENINSULAR FLORIDA

Roland S. Banks[1]

ABSTRACT

Detailed study by aerial photography of 24 km of coastline along Anna Maria and Longboat Keys has provided proof of massive beach retreat in recent years. Typical erosion rates for this stretch of beach have been 1.0 to 2.0 m/yr. with some areas recording over 3.0 m/yr.

Beach erosion rates have been obtained from aerial photography of Manatee and Sarasota Counties, Florida, dated 1957 and 1973. The study interval covers only 16 years, which is sufficiently short that the results are noisy. For this reason, beach erosion values were measured at 31 different points along Anna Maria and Longboat Keys (barrier islands), over a study stretch about 24 km. long. The data points were corrected for tidal variation between the two photograph years and measurements were converted into four-point moving averages (see Fig. 1).

The four-point moving averages varied from a minimum of 0.40 m/yr. to a maximum of 3.16 m/yr. The overall mean was 1.17 m/yr. of retreat. Since the scale of uncertainty resulting from picking points off the aerial photographs amounts to 0.32 m/yr., the overall mean retreat rate is probably greater than 0.85 m/yr., and less than 1.49 m/yr. Field inspection over a period of 20 years has shown that erosion has been spectacular (W.F. Tanner, personal communication). Similar observations were made from site visits to the coast farther north and south, but no measurements were taken in those areas.

Maximum erosion rates were noted near the center of the study area, and minimum rates near the northern and southern ends. The computed littoral component of wave power (P_L) averaged 150 joules per meter-second. The P_L values (see Fig. 1) increased from north to south, and hence did not match precisely, the trend in erosion rates along the beach. The discrepancy between these two data sets is probably due to the fact that beach erosion is only one source of sand in the near-shore zone, an additional source being the bottom, outside the surf zone (Entsminger, et al., 1975).

In an area farther south on the lower west coast of Florida, Missimer (1973) summarized U.S. Army Corps of Engineers data showing that the coast of Sanibel Island, in Lee County, has been almost stable for the interval 1858-1967. Approximately half of the beach under study showed no measurable change, or local changes (in one direction or the other) of less than 0.50 m/yr. with very little in the way of systematic alteration. The other half included a relatively long segment of about 5 km, near the southeastern end of the island, where accretion has varied from zero to a maximum of 1.87 m/yr., and two shorter segments, near the northern end of the island, where erosion has averaged close to 1.25 m/yr. and where aggradation has varied greatly up to a local maximum of roughly 7 m/yr.

It is evident that large local variation in erosion rates occur along the lower west coast of Florida. The cause of these local variations is complex and depends on many variables including bottom topography, coastline configuration and wave height, power, direction, and littoral component. Nevertheless, this study provides conclusive evidence of severe erosion rates along the Anna Maria and Longboat Keys coastline during the last two decades.

REFERENCES

Entsminger, L.D., R.S. Banks and W.F. Tanner, 1975. The coefficient "k" in the "a-b-c . . ." model. Abstracts with Programs, vol. 7, p. 486.

Missimer, Thomas, 1973. The depositional history of Sanibel Island, Florida. Unpublished M.S. thesis, Florida State University, Tallahassee; 121 p.

[1]Geology Department, University of North Carolina, Chapel Hill

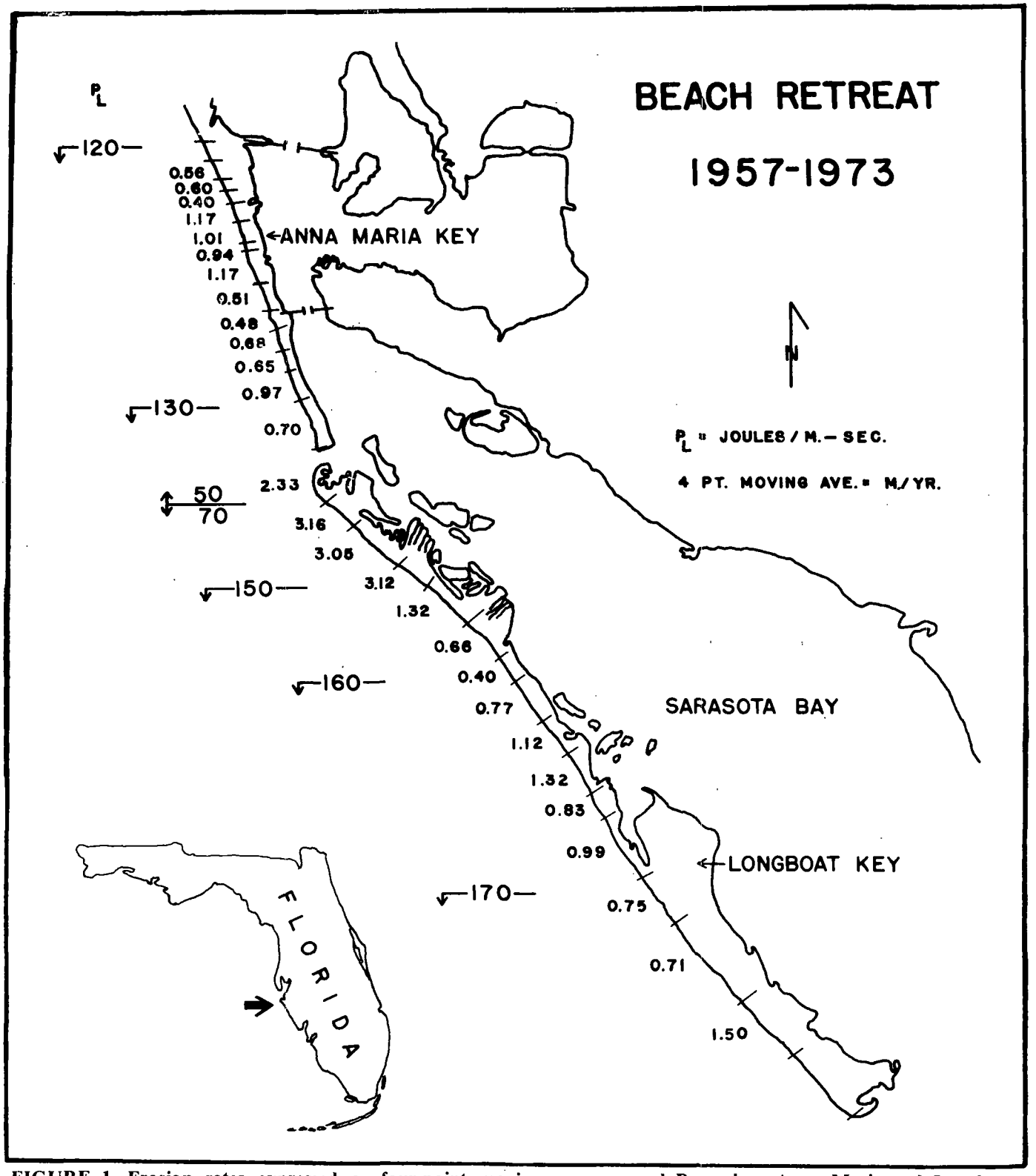

FIGURE 1—Erosion rates expressed as four-point moving averages and P_L values Anna Maria and Longboat Keys.