

NESTING ACTIVITY OF THE LOGGERHEAD TURTLE *CARETTA CARETTA* IN SOUTH CAROLINA, II. PROTECTION OF NESTS FROM RACCOON PREDATION BY TRANSPLANTATION†

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ABSTRACT

Small mammals are significant predators of unhatched marine turtle nests in many parts of the world. Raccoons *Procyon lotor* destroy over 95% of the loggerhead turtle nests laid on some South Carolina beaches. To remove developing eggs from nest-associated clues which could aid raccoons, we transplanted whole and partially preyed-upon nests on Kiawah or Cedar Islands in 1972, 1973, 1977 and 1978. Eggs were moved to man-made cavities near the original nest cavities in erosion-free areas. Care was taken not to transfer clues from the original nest. Predation on wild (control) nests ranged from 55.1% (Cedar, 1978) to 93.8% (Kiawah, 1972). Transplant predation was significantly lower in all cases, ranging from 6.1% (Kiawah, 1972) to 18.7% (Kiawah, 1973). Hatching success of transplants was not significantly different from that of hatchery-reared or control clutches (60-81%). Transplanting may be an easier, less expensive method for protection of nests from predation or erosion than other procedures such as predator control, chemical aversion conditioning, or hatcheries, and merits further testing at other turtle rookeries.

INTRODUCTION

Marine turtles nest on sandy beaches in many tropical and temperate parts of the world. Hatchling production on many of these beaches has been extensively studied, and Hirth (1971) summarised numerous factors that affect hatching success of the green turtle *Chelonia mydas*. One of the major causes of mortality among

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developing turtle eggs or emerging hatchlings is predation by small or medium-sized mammals. At Tortuguero, Costa Rica, dogs and coatis destroyed about 25% of *Chelonia mydas* nests surveyed in 1977 (Fowler, 1978) and coyotes are known to be predators of nests of the Atlantic ridley *Lepidochelys kempi* in Mexico (Carr, 1967). Domestic and feral hogs are nest predators on the Pacific coast of Costa Rica (Zahl, 1973), the Gulf and Pacific coasts of Mexico (INIBP, 1966) and the barrier islands of Georgia, where they take up to 100% of the unprotected nests of the loggerhead turtle *Caretta caretta* (Hillestad *et al.*, 1977; C. Blanck, pers. comm.). In many parts of the world human predation on nests has a significant impact on hatching success (Hirth, 1971).

In the southeastern United States, the major nest predator is the raccoon *Procyon lotor marina* (Worth & Smith, 1976; Davis & Whiting, 1977; Hopkins *et al.*, 1978). On Cape Island, South Carolina, where an estimated 1072 nests were laid in 1977, raccoons destroyed 37% of the nests in June, 45% in July, and 93% in August on the night they were laid (Stancyk, Talbert, Miller and Dean, unpublished data). During the same period, Hopkins *et al.* (1978) found that raccoons destroyed an average of 56.1% (range: 16.4–86.3%) of all nests laid on four different barrier islands in South Carolina. W. P. Baldwin and J. P. Lofton found that raccoon predation occurred at only 5.6% of the 600 recorded nests on Cape Romain in 1939 (Caldwell, 1959).

Although published studies of the subject are lacking, it appears that mammalian predators can use a variety of clues to find nests, including visual clues such as adult tracks and body pits, and olfactory clues such as the smell of the adult, eggs or the lubricating fluid which is exuded from the cloaca during oviposition. The objective of our experiments was to test whether predation would be reduced by careful removal of eggs from sites where visual and olfactory clues were present to locations on the same beach that lacked them. If successful, nest transplantation would be less labour-intensive and a more natural process than other hatchling production methods currently in use.

MATERIALS AND METHODS

Transplantation experiments were conducted on two barrier islands over four nesting seasons: Kiawah Island, South Carolina (1972, 1973), and Cedar Island, South Carolina (1977, 1978). Kiawah is larger (length of beach: 16.4 km), more developed, and contains more suitable nesting habitat than Cedar Island (beach length: 5.0 km), which is eroding along a significant portion of its length (Stephens *et al.*, 1975; Stancyk, Talbert, Miller and Dean, unpublished data). The general procedure is described below. Slight variations in methods from year to year are discussed with the results for that year.

On many occasions, nests were attacked by predators on the night of laying but not completely destroyed, and the remaining eggs were transplanted the next day.