

MARINE TURTLE NESTS
SCREENING PROGRAM AT
CANAVERAL NATIONAL SEASHORE,
FLORIDA
IN 1987

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ABSTRACT

Canaveral National Seashore completed the fourth year of the Marine Turtle Nests Screening Program in 1987. A total of 1776 marine turtle nests were deposited on the 23.25 miles of federally protected beach. Included in the total were 1670 loggerhead (Caretta caretta) nests, 90 green (Chelonia mydas) nests and 1 leatherback (Dermochelys coriacea) nest. Species determination could not be made on 15 nests. Loggerhead is a threatened species and greens and leatherbacks are listed as endangered.

Park rangers placed wire screens over 766 turtle nests (43.1 percent of the total nests deposited) to prevent raccoons (Procyon lotor) from depredating the turtle eggs. The remaining nests were not screened either because raccoons had depredated the nests prior to the rangers' arrival or the nests were deposited after the screening program had been terminated for the season.

Of the screened nests, 653 hatched and emerged successfully. Of the unprotected nests, an estimated 55 nests hatched. The estimated total hatching of 708 nests represents a hatching success of 39.9 percent.

During the four years of the turtle nests screening program, Canaveral National Seashore has never achieved the minimum nesting success goal of 50 percent established by the Recovery Plan for Marine Turtles (Hopkins and Richardson, 1984). Screening, while allowing an increase in nesting success, is labor-intensive and expensive. Nests screening is not the method to achieve the nesting success which may prevent the further decline of threatened and endangered marine turtles. Canaveral National Seashore should explore other methods to ensure that the minimum nesting success of 50 percent is met. Direct control of the raccoon population on the beach has been recognized as an effective method to increase marine turtle production.

INTRODUCTION

During the summer of 1987, Canaveral National Seashore (CANA) conducted for the fourth year a program to document and enhance the success of marine turtle nests. The 23.25 miles of beach at CANA is a major rookery for the threatened loggerhead (Caretta caretta) and a sizable number of the endangered green turtles (Chelonia mydas). Occasionally, hawksbill turtles (Eretmochelys imbricata) and leatherback turtles (Dermochelys coriacea) will nest on the federally protected beach. Both of these species are on the endangered species list.

Numerous raccoons (Procyon lotor) roam the beach nightly and directly impact the turtle nests by eating the eggs and/or the hatchlings. In order to reduce the amount of raccoon depredation, park rangers place wire mesh screens over the newly deposited turtle nests.

Nightly patrols were conducted to collect data on turtle nesting, raccoon depredation and nest success. This paper reports the results of the work conducted at CANA in 1987 and offers recommendations for future marine turtle projects.

STUDY SITE AND METHODS

Canaveral National Seashore (CANA) lies between Bethune Beach to the north and the Kennedy Space Center to the south. The Brevard/Volusia County line bisects the Seashore. The 11.25 miles of beach in Volusia County is locally known as Apollo Beach. The 12.0 miles in Brevard County is known as Playalinda Beach. The entire 23.25 miles of the Seashore is characterized by a natural beach with well defined, vegetation-covered dune. There is little human development except for seven private residences on the north end of the Seashore and numerous wooden boardwalks over the dune. No artificial light is present. The beach is closed to the public from sunset to sunrise, except for occasional ranger-led turtle watch programs.

From May 4 until July 25, rangers patrolled the beach from midnight until dawn, weather permitting. All turtle emergences were recorded whether a nest was deposited or not. Turtle nests were examined for raccoon depredation. If a nest was undisturbed, a 4 feet x 4 feet wire mesh screen was placed on the sand surface over the top of the nest cavity. The wire mesh size was 2 inch x 4 inches. Turtle nests that had less than 20 eggs disturbed by raccoons were also screened after damaged eggs were removed and the remaining eggs reburied. No attempt was made to count the eggs in the nest cavity.

Daytime beach patrols were conducted daily from July 26 until September 26. Data on turtle crawls, raccoon depredation and turtle nests hatching were recorded. No screening occurred during this period. Three days after a nest was observed to hatch and/or the hatchlings emerged, the screen was removed. Each screened nest was monitored for 65 days. If no hatching or emergence had been observed, the eggs were excavated to determine if they had failed to hatch or rangers had failed to observe the emergence.

Undisturbed nests located near the surf line where wave action was likely to erode the site were relocated and screened. Nests found in the dune among large concentrations of vegetation were also relocated and screened.

Full details of survey and screening methods are detailed in Bryant (1986a and 1986b).

RESULTS

Nesting

Table 1 shows the number of turtle nests and false crawls by species.

Table 1 Turtle Nests and False Crawls. 1987.
 Canaveral National Seashore

<u>Species</u>	<u>Nests</u>		<u>False Crawls</u>	
Loggerhead	1670	(94.0%)	1645	(91.2%)
Green	90	(5.1%)	125	(6.9%)
Leatherback	1	(0.1%)	0	(0.0%)
Undetermined Species	15	(0.8%)	34	(1.9%)
Total	1776	(100.0%)	1804	(100.0%)

The false crawl-to-nests ratio (1:1.015) is nearly identical to the false crawl-to-nests ratio of 1986 (1:1.03). The mean nesting density for 1987 was 76 nests per mile or 48 nests per kilometer. This nesting density is nearly one half that observed in 1986 when the nesting density was 145 nests per mile. Green turtle nests accounted for 5.1 percent of the total nesting. This is the highest percentage of green turtle nests at CANA.

Fifteen nests were listed as "Undetermined Species." In these nests, the adult turtle was not encountered and rain or wave action had obliterated the crawl tracks, making positive identification impossible.

Predators

Raccoons were the only major cause of depredation on turtle nests. Ghost crabs (*Ocypode quadrata*) were evident on the beach and were observed to depredate some emergent hatchlings. Extent of ghost crab depredation on hatchlings was not quantified and is believed to be insignificant. Feral swine (*Sus scrofa*) were not present on the beach. Human disturbance of turtle nests was not recorded.

Nest Relocation

Thirty loggerhead and two green nests were relocated. Reasons for relocation are given in Table 2.

Table 2 Relocated Nests, 1987. Canaveral National Seashore

<u>Reason For Relocation</u>	<u>Loggerhead Nests</u>	<u>Green Nests</u>
Near surf line	9	0
Among vegetation in dune	10	1
At base of boardwalk	2	0
Nest cavity too shallow	8	1
Raccoon tampering	1	0
Total nests relocated	30	2

Nest Depredation Rates

Nest depredation rates were calculated by recording the number of fresh nests that were depredated by raccoons prior to the arrival of the ranger. Provancha and Provancha (1985) refer to this as the twelve hour predation rate since they conducted beach surveys the following morning within twelve hours of nest deposition. At CANA, in most cases the time span from nests deposition until crawl counts (beach survey) were conducted was less than four hours. However we continue to refer to this as the twelve hour predation rate for reporting consistency. The mean twelve hour depredation rate was 55.6 percent. This represents the percentage of nests that were not available for screening.

Screening

Rangers placed wire mesh screen over 766 turtle nests. Table 3 gives screening data.

Table 3 Turtle Nests Screened, 1987. Canaveral National Seashore

<u>Species</u>	<u># of Undisturbed Nests Screened</u>	<u># Depredated Nest Screened</u>	<u>Total</u>
Loggerhead	688	51	739
Green	26	0	26
Leatherback	1	0	1
Total Screened	715	51	766

The 51 nests described as "depredated and screened" were all loggerhead nests where raccoons had disturbed fewer than 20 eggs. The remaining eggs were reburied after any broken eggs and yolks were removed from the nest cavity.

Including the nests that had been partially depredated and then screened, rangers placed wire screens over 43.1 percent of the total nests deposited.

Depredation of Screened Nests

Fifty-five (7.2%) of the screened nests were destroyed by raccoons. This is the highest percentage of screened nests destroyed in the four years of the screening program. In most instances, raccoons dug a tunnel from the edge of the screen. An additional fifteen screened nests were disturbed by raccoons reaching through the screen. In these fifteen cases, the remaining undisturbed eggs were reburied and the screen re-applied after additional sand was added to the surface. The additional sand increased the distance between the eggs and the screen and made it impossible for a raccoon to reach the eggs through the screen.

Outcome of Screened Nests

Of the 766 nests screened, 650 hatched and emerged successfully. Table 4 gives the outcome of the screened nests.

Table 4 Outcome of Screened Nests, 1987. Canaveral
National Seashore

<u>Outcome</u>	<u>Number</u>	<u>Percentage</u>
Hatched	653	85.2
Destroyed by Raccoons	55	7.2
Inundated or Eroded	10	1.3
Unable to Relocate Nests	48	6.3
Total Nests Screened	766	100.0

Outcome of Unscreened Nests

Screens were not placed on 1010 nests. Either these nests were noted to have been depedated upon arrival of the rangers during the beach survey or they were deposited after the screening operation had ceased on July 25. Data from the 1986 turtle nesting season at CANA (Bryant 1986b), indicated that 5.4 percent of the unscreened nests were successful. Using that figure, one can extrapolate that 55 unscreened nests hatched successfully (1010 unscreened nests multiplied by 5.4%).

Adding the successful screened nests (653) to the estimated successful unscreened nests (55), it is estimated that a total of 708 nests hatched at CANA in 1987. This represents a 39.9 percent nesting success.

DISCUSSION

Nesting

The 1776 marine turtle nests are the smallest number of nests recorded at CANA since records have been kept for the entire length of the Seashore. Table 5 gives nesting numbers for the four years that data is available. There appears to be no apparent reason for the significant drop in the number of turtle nests.

Table 5 Marine Turtle Nestings By Year
 Canaveral National Seashore

<u>Year</u>	<u>Loggerhead</u>	<u>Green</u>	<u>Leatherback</u>	<u>Undetermined Sp.</u>	<u>Total</u>
1984	2111	23	0	0	2134
1985	2389	94	0	25	2508
1986	3331	22	3	18	3374
1987	1670	90	1	15	1776

Nests Hatching Success

Screening has proven to be an effective technique to increase turtle hatchling production. McMurtray (1986) reported that less than three percent of the turtle nests were successful prior to the screening program. Table 6 gives percentages of nests that hatched successfully.

Table 6 Percentage of Total Nests That Hatch Successfully
 Canaveral National Seashore

<u>Year</u>	<u>Successful Nests</u>
1982	less than 1% (from McMurtray, 1986)
1983	less than 3% (from McMurtray, 1986)
1984	estimated less than 30%
1985	approximately 33%
1986	45.9%
1987	39.9%

Screening is labor-intensive and costly. During the 1987 season, four individuals (as opposed to two teams of two as in previous years) patrolled the beach from midnight to dawn. In previous years, work was conducted from 4:00 a.m. to 12:00 noon. Even working throughout the nesting hours, CANA was unsuccessful in meeting the goal of fifty percent nests success established by the Recovery Plan for Marine Turtles (Hopkins and Richardson 1984).

Recommendations

In order to achieve the nesting success established by the Recovery Plan, it is necessary for CANA to alter the existing program. One alternative would be to increase the number of personnel involved in the screening program. By increasing the number of rangers available nightly to screen nests it would decrease the time interval from the moment the nests are deposited until the screens are applied. In order to double the number of rangers, it would require a large increase in budget for salary costs, all-terrain vehicles, fuel, supplies, repairs and support. The costs would be prohibitive.

Another alternative is to control the raccoon population on the beach. This alternative has many advantages over screening. Raccoon control would eliminate the problem of raccoons tunnelling under the screens. The percentage of screened nests tunneled into suggests that some raccoons have learned to thwart the screens. Under the current program, screening has been halted before the peak of the green turtle nesting season. In 1987, only 26 of 90 (28.9%) green nests were screened. Raccoon control would allow a greater number of green turtle nests to be successful.

Raccoon control would also allow CANA to meet or exceed the nest success goals established by the Recovery Plan at a cost reduction from current levels. Raccoon population control is the method of nests enhancement recommended by the Recovery Plan and is used by Merritt Island National Wildlife Refuge (Leenhouts 1986), Cape Canaveral Air Force Station (Anonymous 1987) and numerous other agencies along the Atlantic coast.

LITERATURE CITED

- Annon. (1987) Sea turtle nesting summary and project report. Cape Canaveral Air Force Station, Florida, FY-87. Pan Am World Services, Inc. Environmental Engineering, PALE. (Contract F08606-84-C-0001) 8 pp.
- Bryant, R. M. (1986a) 1985 marine turtle nest screening program at Canaveral National Seashore, Florida. CPSU Technical Report 21. University of Georgia, Athens. 17 pp.
- Bryant, R. M. (1986b) Evaluation of the marine turtle nests screening program at Canaveral National Seashore, Florida in 1986. National Park Service, Titusville, Florida. 30 pp.
- Hopkins, S. R. and J. I. Richardson. (1984) Recovery plan for marine turtles. National Marine Fisheries Service. 355 pp.
- Provancha, J. A. and N. J. Provancha. (1985) Evaluation of predation rates on marine turtle nests at John F. Kennedy Space Center in 1985. National Aeronautics and Space Administration. (Contract No. NASA10-10285). 19 pp.
- Leenhouts, W. E. (1986) 1986 sea turtle nesting and production on the Merritt Island National Wildlife Refuge. Merritt Island National Wildlife Refuge, Titusville, FL. 11 pp.
- McMurtray J. D. (1986) Reduction of raccoon predation on sea turtle nests at Canaveral National Seashore, Florida. CPSU Technical Report 20. University of Georgia, Athens. 52 pp.