REPORT OF

WILDLIFE MANAGEMENT STUDY

Progress Report (No. 3)

Division of Wildlife Refuges

Region 4

Project: Chincoteague NWR, Virginia & Cape Romain NWR, South Carolina

Code : Chincoteague No. 1

Date : October 31, 1971

Title: An Attempt at the Northward Extension of the Breeding Range of the Atlantic Loggerhead Turtle (Caretta caretta caretta) by Egg Transplants

ABSTRACT

A total of 1,488 loggerhead turtle eggs from 11 pre-dated nests was collected from Cape Romain National Wildlife Refuge beaches in late July, 1971, and transplanted in separate wire enclosures on the Chincoteague NWR beach the next day. Nest ages varied from 1 to 57 days old with greatest hatching success occurring a week after transplanting in the four oldest nests. The two youngest nests had no hatching while 30 to 38-day nests had less than 10 percent success. Total hatching success of the 1,488 eggs was 39.9 percent with 547 or 36.8 percent entering the Atlantic Ocean.

The main conclusion of the 1971 study is that hatching success is much higher in loggerhead turtle nests laid 45 days prior to transplanting with decreasing successes evident in younger nests. Although three quarters of the hatching success was completed within a week of the transplant of older nests, hatchlings continued to emerge for as long as 60 days later. Study Procedure A, Egg Transplanting, is now completed and the Study Outline dictates that extensive beach patrolling for returnees be initiated in the summer of 1974 and continue through 1980 to determine the need for an expanded transplant program on this and other coastal refuges.

OBJECTIVES

Primary objectives of the Study are an attempt to extend the breeding range of the loggerhead turtle northward towards the limits of previous range. During the three-year study a secondary objective of determining what ages of egg clutches are most suitable to transplant in order to obtain a high incidence of hatching.

INTRODUCTION

Introduction and justifications for the Study were listed in the initial Wildlife Management Study Outline submitted on August 29, 1969. The

first two years of the transplant from Cape Romain NWR to Chincoteague NWR were quite variable in hatching success. In 1969, 44.4 percent of 617 transplanted eggs hatched, whereas in 1970, only 3.4 percent of 677 eggs hatched. One obvious difference between the two years was the age of the eggs when collecting, transporting and transplanting took place. The 1969 transplant involved mostly older nests, whereas the 1970 transplant were younger nests. Consequently, this year an effort was made to collect eggs of all ages within the reported 60-day development period.

No nests were found on Back Bay NWR this year although a few turtles attempted to nest there (two unsuccessful nests in 1970) and were discouraged by extensive public use. A single nest was laid at Pea Island NWR this year and after a 75-day incubation period approximately 100 hatchlings returned to the ocean. Another nest was reported north of Nags Head, North Carolina in 1971.

METHODS

This is the final year of Study Procedure A - egg transplanting. Study Procedure B - natural nest evaluation will begin in 1974. This report (Progress Report #3) deals exclusively with this year's egg transplant of 1,488 eggs from 11 nests from Cape Romain NWR to Chincoteague NWR.

Personnel at Cape Romain NWR began marking freshly laid turtle nests on Cape Island on May 28 and continued to do so through June and until July 6, 1971. Twenty-nine nests were marked and dated during this period and an additional one was marked on July 27. Of these 30 nests, 11 were dug up on July 27 and transplanted within 18 hours on the wild beach area north of the D dike cross-over at Chincoteague NWR, approximately 400 air miles north of their original nests.

Cape Romain Manager Neely transplanted half of the remaining 19 nests of varying ages on the same beach where they were laid to determine if handling alone influenced hatching success. The remaining nests were merely marked and dated to use as controls. Unfortunately, follow-up excursions to the Cape Island beaches to compare results of the two groups were scarce and only one of each group was known to hatch a majority of eggs. Also predation, especially on nests by raccoons, destroyed at least one of the transplanted nests and six of the control nests. Consequently, we can drew no conclusions from this phase of the 1971 study.

Individual nests were transferred by Chincoteague NWR personnel in styrofoam coolers and sand to keep nests separated and avoid overheating during the trip. Eggs in the three oldest nests (Nos. 2,7 & 8) started hatching while being reburied at Chincoteague. Each nest was reburied in individual 16-inch by 36-inch screen wire cylinders which were buried half way under the sand so that the eggs were covered with 12 to 15 inches of loose sand. These enclosures were checked by various

Refuge personnel at least twice daily for the remainder of the summer until September 30, 1971 when the threat of hurricane Ginger caused Refuge Biologist Keel to exhume the remaining eggs for final tally.

RESULTS AND DISCUSSION

Table 2 shows the number of eggs in the 11 individual nests and the age in days of each. As suspected, the four oldest nests (Nos. 2,4,7 and 8) had the highest success in hatching and the two youngest nests (Nos. 3 and 10) had no hatching.

Of the total 1,488 eggs transplanted in 1971, 594 or 39.9 percent hatched while 894 or 60.1 percent did not. Of the 594 which hatched, 547 or 92.1 percent entered the ocean while the majority of the remainder were too weak to emerge from the sand in the enclosure and died. According to Biologist Keel, the young healthy turtles were carried from the nest to the surf because they would fall into ghost crab burrows or fall prey to the crabs themselves if left to make the trip alone. It was noted also that entry into the surf was less difficult on an outgoing tide.

The difficulty of hatchlings to reach the surf was noted in the previous two years of the study also. Any slight depression in the sand such as foot prints or tire marks presented critical obstacles. This may in part be caused by the wire enclosures we use to contain each nest. The young turtles hatch at night and emerge within the enclosure after wearily burrowing to the surface. They probably spent the majority of the remaining time before being released roaming the enclosure searching for an exit to the surf.

Chronology of Hatching

Nine of the 11 nests had some degree of hatching success. As mentioned, the three oldest nests began hatching immediately while transplanting on July 28 with the bulk of the hatching occurring during the first week of August. A few late stragglers prolonged the hatching span 60 days in the case of one nest and for 45 days in another case and 32 days in another. In one other highly successful nest (No. 4), hatching was completed within two weeks (Table 1). At Cape Romain, under natural conditions, egg laying to hatching is around 60 days whereas in this study we have found extensions of this to as high as 120 days as in nest No. 2 this year and in nest No. 3 in 1969.

Only one pre-hatching sump was found this year. Biologist Keel noted, however, that the pre-hatching period on Chincoteague was characterized by high winds which probably caused constant filling in of the sump within the wire enclosures.

Table 1

Time of Hatching of Loggerhead Turtles
Chincoteague National Wildlife Refuge
1971

Nest Number	Number Eggs	Hatching Dates					Total Hatched
		Dump	Begin	50%	75%	100%	
1	123	NA	Unknown	--	--	--	2
2	180	July 29	July 30	July 31	Aug. 3	Sept. 30*	160
3	139	NA	None	--	--	--	0
4	135	NA	Aug. 9	Aug. 10	Aug. 10	Aug. 22	130
5	69	NA	Sept. 5	Sept. 5	Sept. 5	Sept. 5	1
6	130	NA	Sept.11	Sept.11	Sept.11	Sept.11	2
7	148	NA	July 30	Aug. 5	Aug. 6	Sept. 2	137
8	167	NA	July 31	Aug. 2	Aug. 4	Aug. 16	127
9	133	NA	Sept. 5	NA	NA	NA	18
10	112	NA	None	--	--	--	0
11	152	NA	Sept. 7	Sept.11	Sept.12	Sept.12	17
Totals & Averages	1,488	--	Aug. 20	Aug. 21	Aug. 23	Sept. 3	594

*A single live hatchling was uncovered during the final pre-hurricane tally.

Hatching Success

Total hatching success in the total of 11 nests and 1,488 eggs was 39.9 percent in 1971 compared to 3.4 percent in 1970 and 44.4 percent in 1969. Success of hatchlings reaching the water from the total eggs was 36.8 percent this year as 47 turtles hatched but died before entering the surf. As mentioned previously, most of these succumbed prior to emergence from the nest.

Table 2

Transplanted Loggerhead Turtle Nests
Chincoteague National Wildlife Refuge
1971

Enclosure & Nest No.	Number Eggs	Est. Age at Transplant	Hatched		Not Hatched		Number to Ocean
			No.	%	No.	%	
1	123	30 days	2	1.6	121	98.4	0
2	180	54 days	160	88.9	20	11.1	157
3	139	25 days	0	0.0	139	100.0	0
4	135	46 days	130	96.3	5	3.7	125
5	69	38 days	1	1.4	68	98.6	1
6	130	30 days	2	1.5	128	98.5	2
7	148	57 days	137	92.6	11	7.4	125
8	167	54 days	127	76.0	40	24.0	124
9	133	35 days	18	13.5	115	86.5	3
10	112	1 day	0	0.0	112	100.0	0
11	152	30 days	17	11.2	135	88.8	10
Totals	1,488	--	594	39.9	894	60.1	547 (36.8%)

Hatching success of the four oldest nests (Nos. 2,4,7 and 8) which were 46 to 57 days old at transfer and containing 630 eggs was 84.3 percent. Hatching success of the 30 to 38-day old nests (Nos.1,5,6,9 and 11) containing 607 eggs was only 6.6 percent and hatching success of the two remaining nests under 30 days old (No. 3, 25 days and No. 10, 1 day) which had 251 eggs was zero. These data are presented in Table 2. Keel noted also in concluding the 1971 field work and digging up nest No. 10 on September 30, that many of the eggs still contained live embryos. At the time these eggs had been incubating 65 days and may have still hatched during October if not exposed to hurricane tides.

SUMMARY AND CONCLUSIONS

From the three-year egg transplant portion of this study we can conclude that eggs from loggerhead turtle nests can be successfully moved a great distance and transplanted with a fair degree of success. The determining factor of success, however, appears to be the stage of development of the embryo at the time of transplanting. This year's data from 11 transplanted nests of widely varying ages from 1 to 57 days indicates that nests 45 days or older have a high degree of success while those from 30 to 40 days have little success and those under 30 days are very doubtful. Hence the 44.4 percent success in 1969 when primarily old nests were used and the 3.4 percent success in 1970 when only 1 to 30-day old nests were taken.

Another conclusion is the obvious extension of the usual 60-day incubation period in northward transplanted nests where stragglers continued to emerge for weeks after the bulk of hatching was completed. Factors such as sand and air temperature, humidity, sand moisture, disturbance in transportation and handling all probably contribute to hatching success and longevity. Hatchling emergence into the wire enclosures and exposure for prolonged periods prior to release no doubt contributed to the weakened conditions of some of the turtles. Under an expanded transplant program, enclosures could be eliminated if a wild beach is used and a predator population is not exceedingly high.

RECOMMENDATIONS

In a memorandum of October 13, 1971 summarizing 1971 results, Chincoteague Manager Appel recommends that the egg transplanting from Cape Romain to Chincoteague continue annually till 1977. The original study outline recommended egg transplants of 600 eggs each for 1969, 1970 and 1971 and beach patrolling for returning turtles from 1974 to 1980. Due to a disappointing transplant success in 1970, the 1971 transplant size was increased from 600 eggs to nearly 1,500 and during the three years over 800 hatchlings entered the ocean at Chincoteague NWR. While this is considerably less than the major portion of 1,800 as originally hoped for, it should be a good sample to determine if returnees will occur from 1974 to 1980.

Therefore, at least as far as the study Procedure A is concerned, I recommend no further transplants until the 1974 to 1980 evaluations occur. I feel we have determined in part what conditions and methods must be followed to increase chances of a successful nest transplant and that we have returned enough turtles to the sea to evaluate these efforts. Unfortunately we have no method to mark hatchlings nor of ever knowing for sure if returnees came from the 1969-71 nest transplants. However, since no loggerheads have been seen nesting on the Chincoteague beaches in many years, any sightings in the future would be encouraging and an expanded transplanting program can begin then.

REFERENCES CITED

See page 6, Progress Report #1. Also,

Keel, Ralph, et al, Chincoteague NWR, 1971 field notes

Neely, Burkett, et al, Cape Romain NWR, 1971 field notes

Distribution of Report Copies:

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