

Cape Lookout Turtle Monitoring

By Julie Parrish and Michael Rikard

The field rangers of Cape Lookout National Seashore (CALO) began monitoring marine turtles in 1976. Baseline data were collected from 1978 to 1983, during which time nightly patrols and tagging of the nesting loggerheads were conducted. Since 1984, CALO has continued to monitor turtle activity, document strandings, protect nest sites, relocate endangered nests (1987 being the exception) and protect hatchlings. CALO continues to be the most significant northern nesting beach for the Atlantic Loggerhead and supports the second highest number of nests in North Carolina. In addition to providing CALO with management data, the information gathered on CALO beaches

is an important link for state, federal and private Atlantic Coast sea turtle managers.

Site Description

Cape Lookout National Seashore lies in the central coastal area of North Carolina between Beaufort and Ocracoke Inlets. The Gulf Stream passes within 20 to 40 miles of Cape Point, bringing in a variety of stranded turtles. Pamlico and Core sound creates the second largest eastern estuarine system and makes for excellent turtle habitat. The park is divided into three islands by Barden's Inlet and New Drum Inlet. The northernmost island is referred to as Core Banks North (CBN) and is approximately 22 miles long. Core Banks South (CBS) extends southward from New Drum Inlet

21 miles to the Cape Lookout Bight area. Both CBN and CBS have a northeast to southwest orientation and exhibit a low profile landscape. Shackleford Banks is 9 miles long and has an east-west orientation creating a higher dune system and larger areas of vegetation. All three islands are subject to constant and dramatic change by the actions of wind and waves.

Methods

The Seashore is divided into three study areas, corresponding to the three islands comprising the Seashore. A Research Sector, which was a separate study area from 1978-1986, was located 1.25 miles north of the Lighthouse and extended southward to the Cape Lookout point.

CBN and CBS were patrolled daily from June through August by Student Conservation Association (SCA) Students and NPS rangers. Daily patrols of Shackleford Banks were discontinued since it yielded only two nests or 5 percent of the 1987 Seashore total. Any visitor reported turtle activity was investigated and foot patrols of Shackleford Banks (SH) were conducted very infrequently. Attempts were made to conduct early morning patrols of CBN and CBS, but logistical constraints sometimes extended patrols into the late afternoon hours. Some turtle activity may have been missed due to wind, tide, and rain, which obscure turtle tracks by afternoon.

Individual data sheets were completed for each turtle activity located. Nests in danger of erosion or overwash were relocated to safer areas. A "dig" occurred when the turtle excavated a body pit or disturbed a large amount of sand but the egg chamber was not located. Digs and nests were protected by markers; individual exclosures surrounded each. Exclosures were erected 50 days after the lay and maintained to provide funnel-shaped corridors from nest sites to the ocean. This provided rut-free access to the ocean for the hatchlings. Hatchling activity monitoring was conducted throughout October on a daily basis. All nests which could be relocated were excavated for follow-up data.

Nesting

1988 nesting activity began on June 8 and continued until August 19, for a 72 day nesting season. The average nesting season from 1979-1988 is 80 days. Of the 100 activities documented, there were 40 nests, 10 digs, and 50 crawls. Crawls were turtle tracks not associated with any type of digging activity by the turtle. General results for each study area are given in Table 1.

Table 1. 1988 Activities by Study Area

Area	Nest	Dig	Crawl	Activity
CBN	13	5	23	41
CBS	27	4	27	58
SH	—	1	—	1
Totals	40	10	50	100

As can be seen from Figure 1, nesting activity has continued to decline since 1985. In 1988 CALO had 35 percent fewer turtle activities than in 1985, 33 percent fewer than in 1986, and 10 percent fewer than in 1987. Possibly this is a natural fluctuation, since nesting numbers decreased from 1980 until 1983 and then showed a slight upward trend from 1984 to 1985.

In past years, the research sector yielded a high percentage of the total park nests. In 1987 and 1988 the

research sector yielded only 23 percent and 28 percent respectively. The northern portions of CBS and CBN have continued to increase in total activity and actual nests. Figure 2 is a comparison of turtle nests by area from 1977 to 1988.

As shown in Table 2, CBN continues to be a significant nesting beach. Hatch success was 5 percent greater on CBN than on CBS, probably due to more relocations. 70 percent of CBN nests were relocated compared to only 15 percent of CBS nests. Incubation periods are longer on CBN than on CBS, possibly due to nest temperatures and sand grain size.

Table 2. 1988 Nesting Summary

	CBS	CBN	Totals
Nests	27 (68%)	13 (32%)	40
Digs	4 (40%)	5 (50%)	10
Crawls	27 (54%)	23 (46%)	50
Relocated	4 (15%)	9 (70%)	13
Excavated	23 (86%)	13 (100%)	36
Av. clutch	116 eggs	116 eggs	116
Av. hatch	73 eggs	97 eggs	85
Hatch success	61%	66%	63%
Av. incubation	64 days	67 days	65
Eroded/flooded	13 (49%)	4 (31%)	1

The 'dig' category proved very beneficial: digs were protected as nests. Further excavation and evidence of hatching enabled 9 of the 13 original activities marked as digs to be reclassified later as nests. These 9 were on CBS. Thirteen nests that were in danger of being overwashed or eroded away were relocated to safer areas: 70 percent of CBN nests and 15 percent of CBS nests were relocated. No appreciable differences in hatch rates for relocated and nonrelocated nests were noted.

Hatching

Follow-up of nesting activity involved observing nest and dig sites for signs of hatching, recording relevant data, and excavating the site five days after the natural hatch. Often this can determine if a nest has been adversely affected by predation, human disturbance or environmental occurrences.

Follow-up studies were completed on 36 of the 40 nests. 2315 eggs hatched, giving an average clutch size of 113, yielding an average hatch of 85 turtles per nest. CBN had two nests with over 150 eggs each. It

took an average of 67 days for nests to incubate, which is longer than the CALO normal and probably due to cooler spring and summer temperatures. The overall hatch success for 1988 was 63 percent. Many of the relocated nests received overwash because they were not relocated to higher elevations, only a greater distance from the mean high tide. Seventeen, or 38 percent of the CALO nests were flooded or eroded away. The hatch success of nests which did not receive overwash was 77 percent; it was 43 percent for those that did.

It is agreed that nesting beach management programs can increase natural hatch success by 20 to 30 percent. Because of relocation efforts CALO's turtle program should regularly produce hatchlings from 70 to 85 percent of the clutch. The relocation program on CBN yielded 66 percent hatch rate. Hatch success on CBS was less because 49 percent of the nests were flooded or washed away. These were located 27, 39, and 41 feet from the mean high tide. Three CBS nests less than 41 feet from the high tide were totally washed away; 11 other nests, located from 42 to 90 feet from the mean high tide also experienced devastating overwash (hatch percentages of 0). Fourteen nests located from 12 to 115 feet from the mean high tide did not receive overwash, showing elevation of nest location to be as important as distance from high tide.

Any nest less than 100' from mean high tide on CBN was moved approximately 100' from high tide. Nests less than 15' from mean high tide on CBS were moved approximately 50' from high tide. Based on 1987 and 1988 data the 100' was fairly protective for CBN nests. The 15' distance used for CBS nests did not provide adequate protection.

High fall tides, 'northeasters,' and passage of hurricanes are fairly common at Cape Lookout. It is rare that a hatching season passes without extreme high tides, which overwash nest sites. During the 1988 hatching season, high tides on Sept. 26 and 27, a combination of lunar tides and a mild 'northeaster,' led directly to the death of 265 hatchlings on CBS.

During these high tides, nests #37 and 38 were excavated and 107 drowned hatchlings were found. The nest cavities were filled with approximately 8 inches of standing water. Motionless turtles were laid in rows of 10's, for approximately 45 minutes, the turtles were stimulated by slightly compressing their plastrons. Hatchlings were inverted (head

lower than tail) and the head raised and lowered to provide a route for drainage and a patent airway. By using these three techniques, 10 hatchlings were revived. These 'saves' were documented as live hatchlings. They were too weak to make the trek to the surf, out once they were placed on the intertidal zone they made it past the breakers on their own.

Predation and human disturbance at CALO are not as significant hatchling mortality factors as overwash. As long as vehicle tracks are eliminated from the nest site to the waters edge, and the hatchlings are not distracted by artificial light, ORV's are not as damaging as overwash. None of the CBS nests were predated by raccoons or ghost crabs. Five CBN nests showed signs of ghost crab invasion, but only one had signs of egg destruction. One nest had 0 percent hatch success and showed signs of a bacterial problem, attributed to a ghost crab's breaking eggs within 24 hours after the lay. It is felt that strict enforcement of the "No fish remains left on the beach" regulation has helped reduce the ghost crab population to a more natural level.

Four CBS nests and one CBN nest showed signs of human disturbance. Several people had watched the laying of nest #14; later an extravagant nest excavation was made and no eggs were left.

The Cape Lookout Lighthouse attracted hatchlings from a nest approximately one mile south of the Lighthouse. Some of them trekked 100' into the dunes before their tracks vanished. No light barriers were used in 1988.

Overall the 1988 turtle program was successful and yielded valuable information for managing this special species. It is hoped that future management will be based on the past 12 years of extensive data instead of being left up to individual's ideas or single year data.

Recommendations

1. It is essential that either night or early morning turtle patrols be conducted on a daily basis from June 1 through October 31, since this covers most of the nesting/hatching period. Wind, tide, and rain erases turtle tracks and lessens data validity for that year when activities are missed.

2. Overwash and erosion have consistently been the most direct hatchling mortality factor. Therefore nests should be relocated to prevent overwash.

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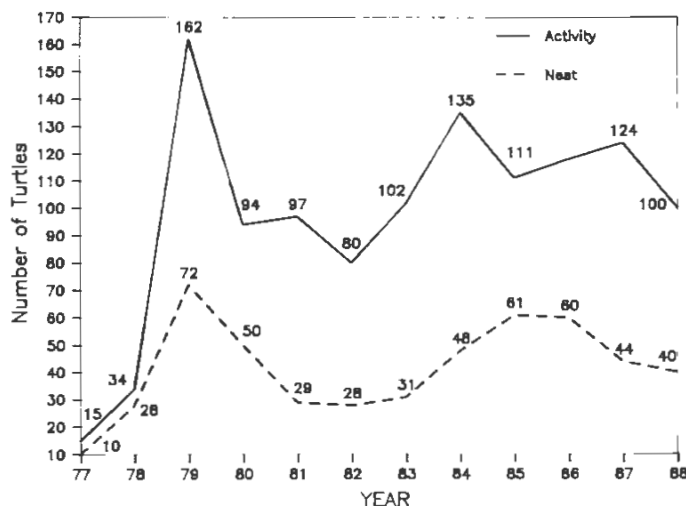


Figure 1. Cape Lookout Turtle Activity 1977-1988

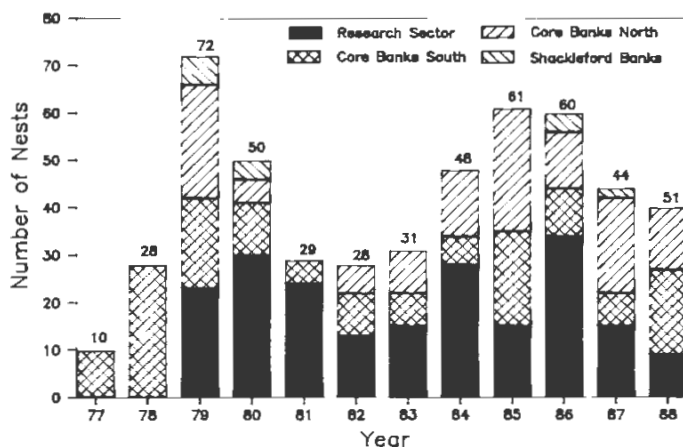


Figure 2. Turtle Nests/Study Area Comparison

3. Fishermen should be required to discard fish scraps in the surf, reducing artificial increase of the ghost crab population, thereby lowering hatchling predation.

4. Each year it is documented that hatchlings from nests near the Cape Lookout lighthouse go into the dunes instead of toward the water. All nests within one mile North or South of the Lighthouse should be shielded from artificial light a few days prior to the expected hatch date.

5. When marking a nest or dig, measure 12" up from the surface sand at the nest site marker, use a permanent marker to circle the nest site marker at the 12" line. This will allow staff to monitor increase or decrease of

sand depth over nests. Any change in sand depth could cause the hatchlings to become trapped underneath. Sand deposition may also effect nests temperatures and length of incubation.

6. The nesting decline at CALO over the past three years may in part be due to problems associated with artificial light. Artificial lighting distracts and keeps potential nesting females away and disorients hatchlings on their trek to the sea. Therefore driving on or near the beach at night should be prohibited from June 1 until October 31.

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