

CAPE LOOKOUT NATIONAL SEASHORE  
2013 SEA TURTLE MONITORING AND MANAGEMENT REPORT



South Core Banks Loggerhead Sea Turtle Nest 002. NPS Photo 2013.

National Park Service  
Cape Lookout National Seashore  
131 Charles Street  
Harkers Island, NC 28531

## **INTRODUCTION**

Cape Lookout National Seashore (CALO) began monitoring marine turtles in 1976. Baseline data was collected for a portion of South Core Banks during an extensive six-year study from 1978 - 1983. Nesting turtles were tagged and nests marked during nightly patrols. Since 1984 Cape Lookout has conducted daytime monitoring to document strandings, protect nest sites, relocate nests in danger of being flooded and protect hatchlings. Cape Lookout is a significant northern nesting beach and supports among the highest number of loggerhead sea turtle (*Caretta caretta*) nests in North Carolina. The seashore also provides nesting habitat for leatherback (*Dermochelyes coriacea*), green (*Chelonia mydas*), and Kemp's ridley (*Lepidochelys kempii*) sea turtles. Each year data have been collected, analyzed, and presented to management in hopes of better protecting our marine turtle population. This report will summarize the 2013 project and consolidate many years of data. In addition to providing CALO with management data, the information gathered on CALO beaches continues to be an important link for many state, federal, and private Atlantic coast sea turtle managers.

## **COOPERATING AGENCIES**

Cape Lookout National Seashore cooperates with numerous agencies, including the North Carolina Wildlife Resources Commission (NCWRC), the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) on sea turtle protection. The North Carolina Sea Turtle Program Coordinator receives all original stranding reports and annual nesting activity reports. NCWRC also issues Cape Lookout National Seashore an Endangered Species permit for possession and disposition of stranded marine turtles and relocation of nests.

## **SITE DESCRIPTION**

Cape Lookout National Seashore is located in the southern Outer Banks of North Carolina between Beaufort and Ocracoke Inlets. The seashore consisted of four barrier islands during the nesting season. The northernmost island, North Core Banks (NCB) is approximately 18 miles long, extending from Ocracoke Inlet to Old Drum Inlet. The last 4 miles of NCB extends from Old Drum Inlet to Ophelia Inlet and is referred to as Middle Core Banks (MCB). South Core Banks (SCB) extends southward from Ophelia Inlet almost 24 miles to Barden Inlet. The Core Banks have a northeast to southwest orientation and exhibit a low profile landscape. The fourth island, Shackleford Banks (SB) is 9 miles long and has an east-west orientation with a higher dune system and larger areas of vegetation. All islands in the park are subject to constant and dramatic change by the actions of wind and waves.

## **METHODS**

All three of the main islands comprising the Seashore were monitored regularly for turtle nesting activity. Student Conservation Association interns and NPS staff patrolled NCB and SCB daily searching for nesting activity from May 1<sup>st</sup> to September 15th. Each patrol began early in the morning so that the island was checked for turtle activity by 12:00 PM. The MCB section of NCB was monitored irregularly due to difficult access. Shackleford Banks was monitored three times a week. Sea turtle crawl activities were recorded and nests were marked according to protocol. Sea turtle monitoring and management is outlined in the Interim Protected Species Management Plan (National Park Service 2006). In addition to these program procedures the seashore participated in a genetic mark-recapture study of nesting female loggerheads using DNA derived from eggs. The

study was coordinated by the NCWRC for North Carolina and included the other Northern Recovery Unit states of Georgia and South Carolina. One egg from each nest was collected and preserved so DNA could be sampled at the University of Georgia genetic laboratory. As part of this study sea turtle crawl and nest activity was entered onto an online database at [www.seaturtle.org](http://www.seaturtle.org).

Nest losses to tidal flooding and predation are the primary threats to nesting success at CALO. Nests laid in the tidal wash zone, primary berm, and back swale are considered in danger of erosion or tidal flooding. Nests laid in locations likely to repeated flooding were relocated to a higher elevation on the primary dune. Relocated nests were moved into the nearest of six designated areas and vehicles were detoured to the back road around these areas when nests neared hatching. Smaller vehicle detours were erected around those nests that were not relocated and were outside other vehicle closures. Vehicle closures provide a rut-free corridor from the nest site to the ocean, preventing hatchlings from being run over or becoming entrapped in tire ruts and dying from predation or desiccation. Camping and campfires were not permitted in the closures to prevent disturbance of hatchlings by artificial lights.

Any sign of predation were noted and the approximate numbers of eggs or hatchlings destroyed were recorded. To discourage raccoon (*Procyon lotor*) predation, wire screens anchored by rebar were placed over all nests. Wire cages were used on SCB, if needed, on nests between the lighthouse and Power Squadron Spit, the area with the most predation problems from raccoons in the past. Nests and possible nests were monitored for hatching activity through November. Nests were excavated after hatching to determine nest success. Possible nests were treated as nests

through the nesting and hatching time frame. If the possible nest hatched it was added to the nest category and if it failed to show hatching activity after 75-80 days the site was excavated. It then was classified as a nest if eggs were found or as a crawl if no eggs were found.

## **RESULTS**

The monitoring procedures used at CALO prior to 1990 were significantly different than those used after that year. Records from those years will not be included in this report. 1990 marked the beginning of monitoring procedures following the USFWS Index Nesting Beach program

### *NESTING RESULTS*

The first recorded nesting activity in 2013 was on May 22 and the last on August 26, for a 97 day nesting season. A total of 374 activities were documented of which there were 192 nests and 182 false crawls, (Table 1.). There were 189 loggerhead and 3 green nests. Figure 1 illustrates the daily nesting activity for the season. Mapped original nest locations are in Appendix 1.

Table 1. 2013 Sea Turtle Activities by Study Area.

	North Core Banks	South Core Banks	Shackleford Banks	CALO Total
NESTS	73	96	23	192
CRAWLS	90	83	9	182

The number of nests found in 2013, 192 nests, was above the annual average of 137 nests for CALO (Fig. 2 and 3). South Core Banks continued to have more nests than the other islands in 2013 (Figure 4.).

Figure 1. Daily Number of Nests at 7 Day Increments from May 22 to August 26.

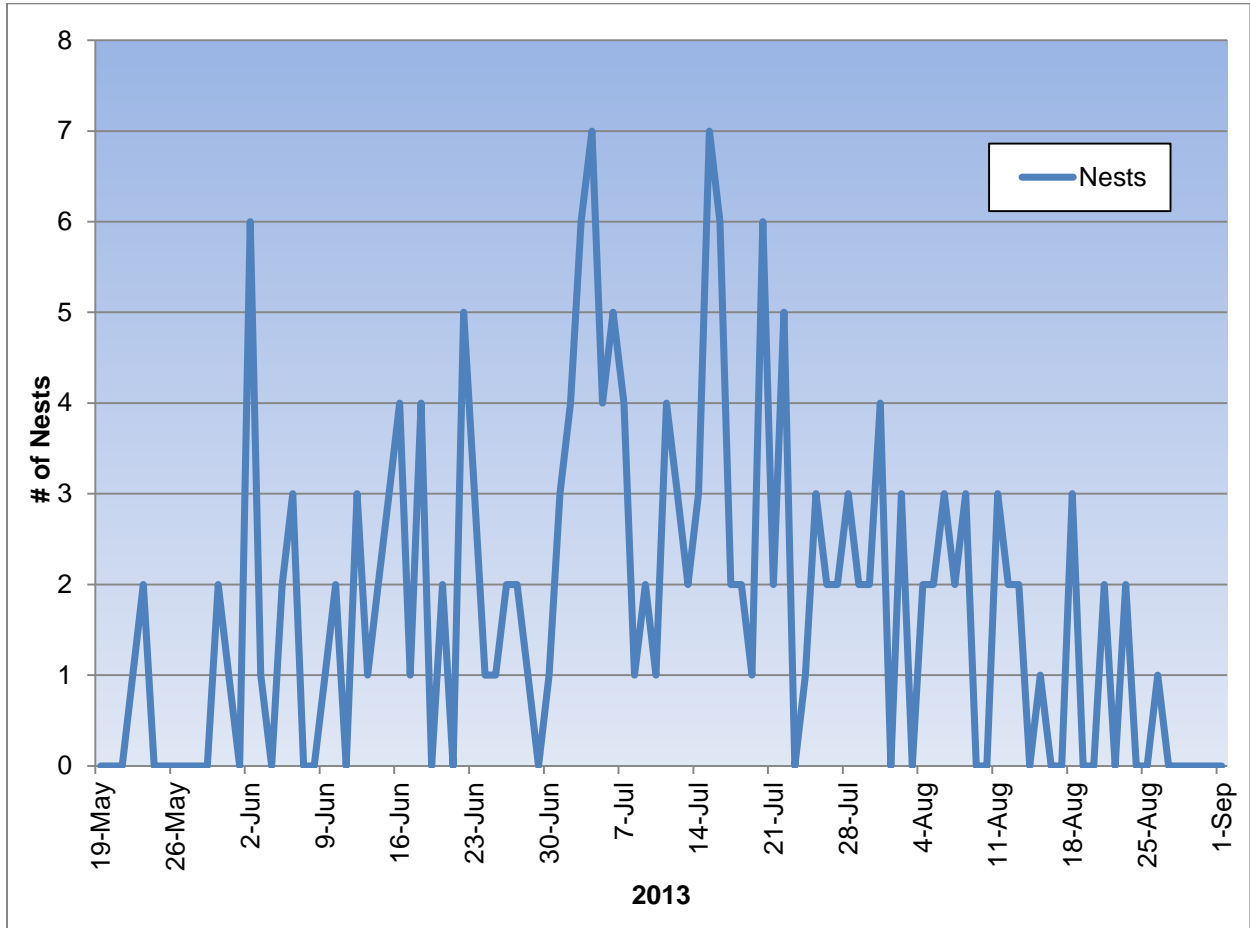


Figure 2. Cape Lookout Sea Turtle Activities 1990-2013

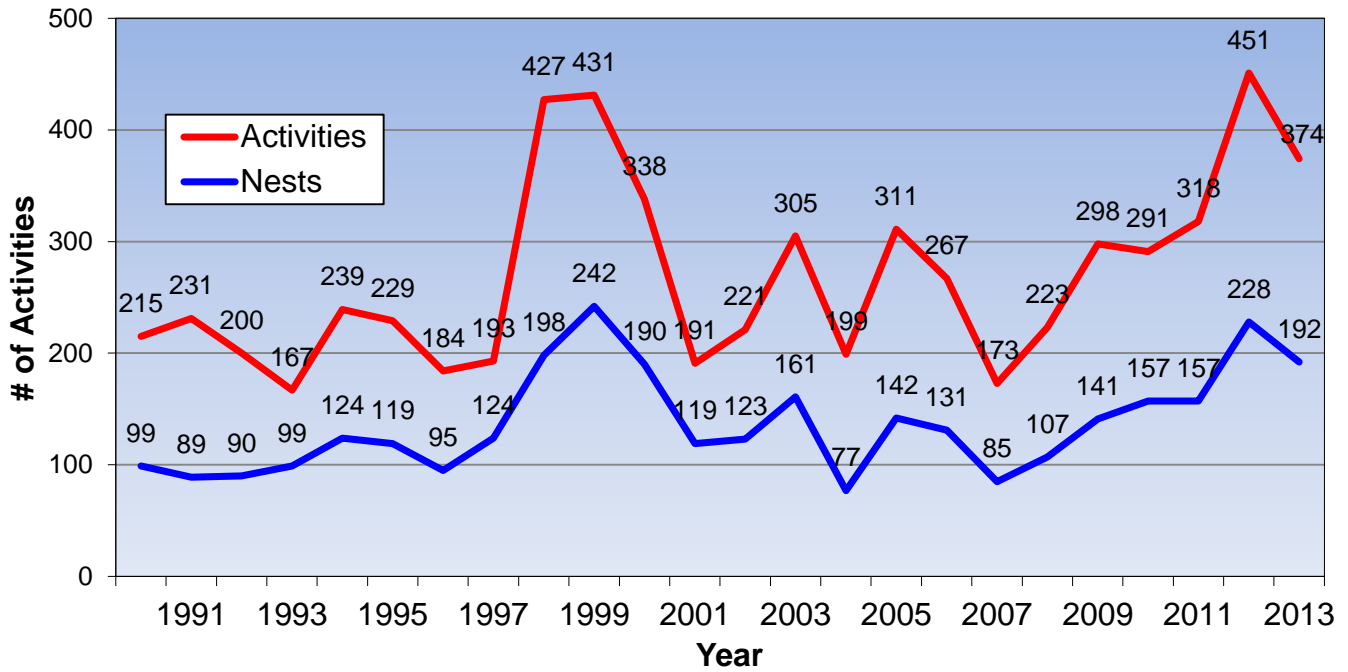


Figure 3. Cape Lookout Sea Turtle Nests 1990-2013

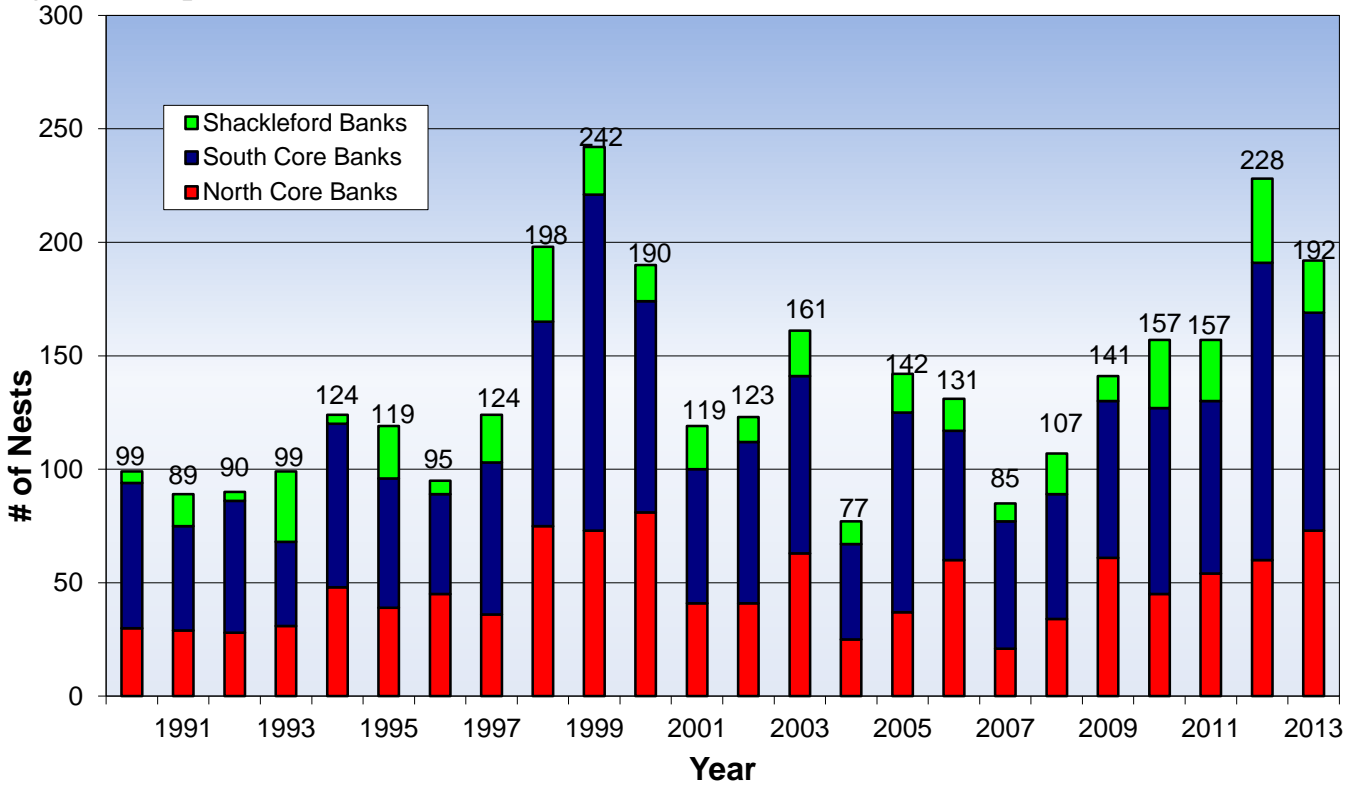


Figure 4. 2013 Turtle Nests by Mile Section





## *HATCHING RESULTS*

Follow-up of nesting activity involved observing nest and dig sites for signs of hatching, recording relevant data, and excavating the site. By collecting hatch information, it can often be determined if predators, human disturbance or environmental occurrences have adversely affected a nest.

Nest hatching began on July 28<sup>th</sup> and ended on November 15<sup>th</sup>, for a 111 day nest hatching period. The last nest was inventoried on December 3<sup>rd</sup> at day 97 of incubation on Shackleford Banks. A known total of 19,744 eggs, 13,907 hatchlings, and 498 hatched dead were counted. The total hatch success, number of total hatched eggs divided by number of total eggs, was 70%. The total emergence success of 68% (13,409 emerged) was calculated by subtracting the total hatched dead from the total hatched and dividing by the total of eggs (Table 2). This is the same calculation for each individual nest emergence success. The emergence success reported on [www.seaturtle.org](http://www.seaturtle.org) for Cape Lookout is 62%, which subtracts live hatchlings that were still in the nest. The seashore has not traditionally subtracted the live hatchlings in the nest which receive emergence assistance and to remain consistent with 24 years of data will report emergence success based on the traditional calculation. The emergence success range was from 0% to 99%. The average clutch size was 108 eggs. It took an average of 64 days for nests to incubate to hatch. The range of incubation was from 51 days to 86 days. Ten nests were lost to erosion events, 7 with unknown clutch size. A total of 35 nests were over-washed by the ocean. Twenty nine of these 35 nests hatched. The emergence success for these 35 flooded nests was 56%.

In order to account for the 7 nests lost with unknown egg counts we have calculated an estimated emergence success of 65 % in 2013 (Table 2). The average clutch size for the seashore was given to those nests as the number of eggs, allowing them to be calculated into the estimated emergence success. The seashore total of 7 lost nests at an average clutch of 108 eggs equals 756 eggs with 0% emergence success.

Table 2. SEA TURTLE HATCH SUMMARY 1990-2013

Year	Nests	Avg. Clutch	Flooded	Avg. Incu	Eggs	Emerged	EMR % *	Est.Total EMR% **
1990	99	115	1	57	10,376	7,369	71%	69%
1991	89	115	6	62	8,393	5,197	62%	61%
1992	90	114	4	63	9,419	6,791	73%	71%
1993	99	115	9	59	10,365	7,544	74%	74%
1994	124	120	3	62	14,459	11,296	79%	79%
1995	119	115	38	57	12,357	6,157	51%	47%
1996	95	115	16	65	10,091	5,602	57%	53%
1997	124	122	3	63	14,824	10,740	73%	73%
1998	198	114	39	62	19,672	13,315	69%	61%
1999	242	116	90	62	23,224	11,751	53%	44%
2000	190	111	2	67	19,527	13,471	69%	65%
2001	119	113	5	65	12,358	9,555	79%	75%
2002	123	119	7	61	13,657	10,758	79%	75%
2003	161	119	45	65	16,440	10,067	61%	53%
2004	77	104	36	64	7,309	3,139	43%	40%
2005	142	111	54	60	12,423	6,569	53%	42%
2006	131	125	19	61	14,808	10,843	73%	66%
2007	85	109	19	60	8,759	6326	72%	68%
2008	107	111	60	60	11063	6868	62%	57%
2009	141	116	77	64	15130	7574	50%	46%
2010	157	105	80	57	14666	7956	54%	49%
2011	157	114	30	56	12910	8186	63%	46%
2012	228	111	84	62	25293	16,188	64%	64%
2013	192	108	35	64	19,744	13,409	68%	65%

\*emergence success for nests with known egg and hatch totals

\*\*includes an estimate of egg totals for nests lost and not excavated

In 2013, a total of 54 nests were relocated. The emergence rate for relocated nests was 61% and the emergence rate for non-relocated nests was 71% (Table 3). Of the 192 nests, 182 were inventoried and 10 nests were washed away/predated with an unknown egg count and/or unknown success.

Table 3. 1990-2013 EMERGENCE SUCCESS FOR RELOCATED vs. NON-RELOCATED NESTS

YEAR	PERCENT OF NESTS RELOCATED	EMERGENCE RATE-RELOCATED	EMERGENCE RATE-NON RELOCATED*	PERCENT OF NESTS EXCAVATED
1990	69	71%	74% (67%)	94
1991	63	57%	76% (72%)	97
1992	43	71%	76% (74%)	97
1993	54	74%	73% (73%)	90
1994	79	80%	73% (73%)	96
1995	55	61%	38% (31%)	86
1996	73	56%	64% (48%)	89
1997	74	69%	86% (86%)	95
1998	59	77%	55% (41%)	85
1999	51	49%	59% (40%)	79
2000	63	66%	74% (61%)	93
2001	50	81%	76% (68%)	89
2002	45	73%	84% (77%)	93
2003	41	47%	75% (58%)	86
2004	44	63%	23% (20%)	97
2005	34	42%	61% (42%)	79
2006	39	85%	64% (54%)	90
2007	24	79%	70% (65%)	95
2008	30	57%	64% (57%)	92
2009	25	61%	46% (41%)	92
2010	13	75%	51% (45%)	89
2011	27	36%	78% (49%)	62
2012	22	74%	61% (61%)	99.5
2013	28	61%	71% (67%)	95
<i>AVERAGES</i>	47	65%	66% (57%)	90

\* Number in parentheses is an estimate including nests with unknown egg totals

Since 1990 the twenty four year average emergence success is 65% for relocated nests and 66% for non- relocated nests (Table 3).

*Hatch Results by Species*

The 189 loggerhead and 3 green turtle emergence successes were 68% and 51%, respectively (Table 4.). Two of the three confirmed green nests hatched. The green turtle incubation range was from 62 to 81 days with an average of 72 days.

Table 4. Loggerhead, and Green Sea Turtle Hatch Summary, 2013.

	Loggerhead	Green
NESTS	189	3
# EGGS	19348	396
# HATCHLINGS	13702	205
# HATCH DEAD	494	4
EMERGENCE SUCCESS	68%	51%
AVERAGE CLUTCH	107 eggs	132 eggs
AVERAGE INCUBATION	64 days	72 days

### *Predation*

In 2013, only one nest suffered losses due to what appeared to be raccoon or fox predation before the nest could be screened on SCB. This particular nest only had three predated eggs on the surface and appeared to abandon her nesting attempt. Red fox tracks were spotted on SCB at other nests in 2013. SCB158 had raccoon and fox tracks at the nest site, but no predation observed. Another nest on SCB was dug up by a mammal after it was hatched, inventoried and the metal screen removed. On NCB a nest was dug up by a raccoon after the nest was hatched, inventoried and the metal screen removed.

### *Human Disturbance*

Off-road vehicles disregarding beach closures threaten the survival of hatchlings. Hatchlings are at risk of being directly crushed and/or becoming trapped in tire ruts. At night vehicle lights could disorientate hatchlings. In 2013, park law enforcement staff issued zero violation notices for vehicular sea turtle closure violations.

## **STRANDINGS**

Collecting information from stranded turtles is also an important phase of the CALO Sea Turtle Monitoring Program. CALO documents strandings, collects data for the N.C. Sea Turtle Project Coordinator and the National Marine Fisheries Service (NMFS) and assists in the transportation of live strandings to rehabilitation facilities.

238 strandings occurred at CALO in 2013. All strandings were reported to the NCWRC and were documented with a “Sea Turtle Stranding and Salvage Network” stranding report. Green turtles accounted for the majority of the strandings (187). There were also 26 loggerheads, 23 Kemp’s ridleys, 1 leatherback, and 1 unknown. 188 turtles stranded on the inshore soundside and 50 turtles stranded on the offshore oceanside. There were 110 live strandings. One cold stun event occurred in the beginning of the year in January with 73 live turtles and the other occurred at the end of the year in November with 35 live turtles. The live stranded turtles were transported out of the park and sent to Topsail Sea Turtle Hospital or NC Aquarium at Pine Knolls Shore. Turtles were scanned for external and Passive Integrated Transponder (PIT) tags. Two tagged turtles were found in 2013. A leatherback live stranding had external flipper tags that were placed on the turtle in Costa Rica or Panama. The turtle was able to be freed from the sand bar it stranded on. A loggerhead that live stranded/cold stunned on 1/4/12 at Cape Lookout and was successfully rehabilitated, tagged, and released from Topsail Sea Turtle Hospital on 6/2/12 was later found dead on Shackleford banks on 10/11/13. Figure 5, Figure 6, and Table 5 provide stranding data by year, month, and species from 1990 to 2013.

Figure 5. Sea Turtle Stranding Totals at CALO (1990-2013) with a simply linear regression line.

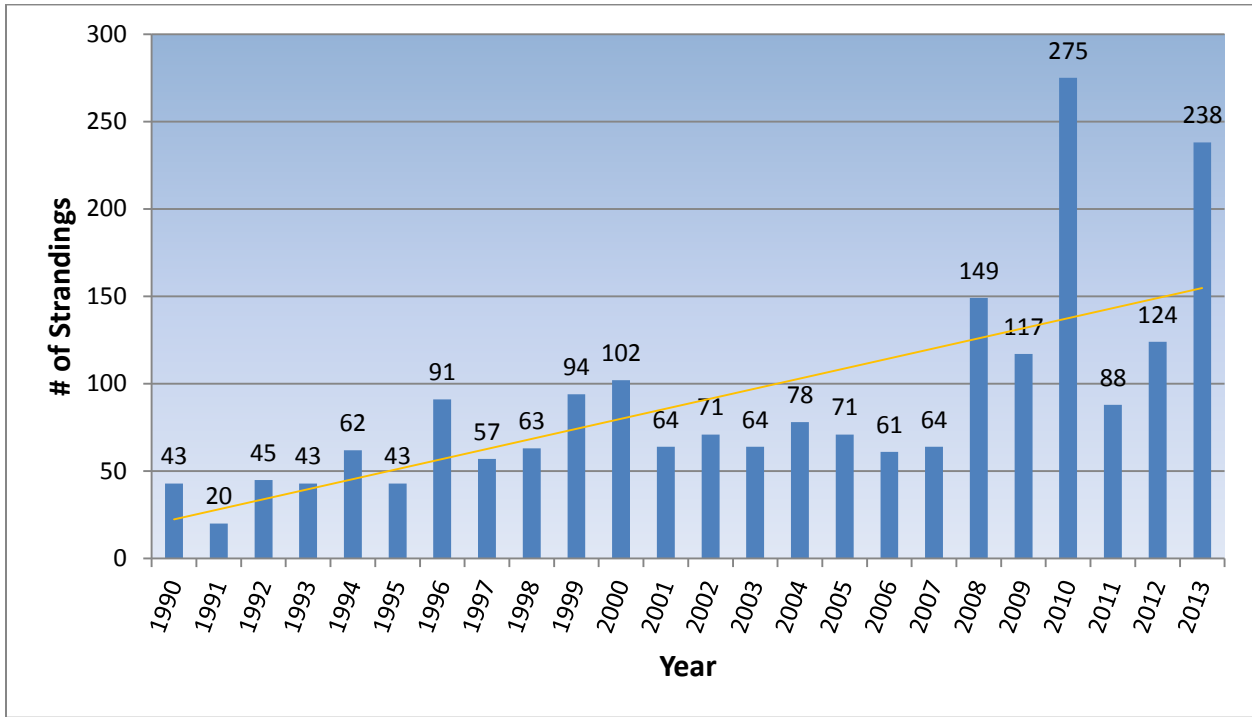


Figure 6. 2013 Sea Turtle Strandings at CALO by Month.

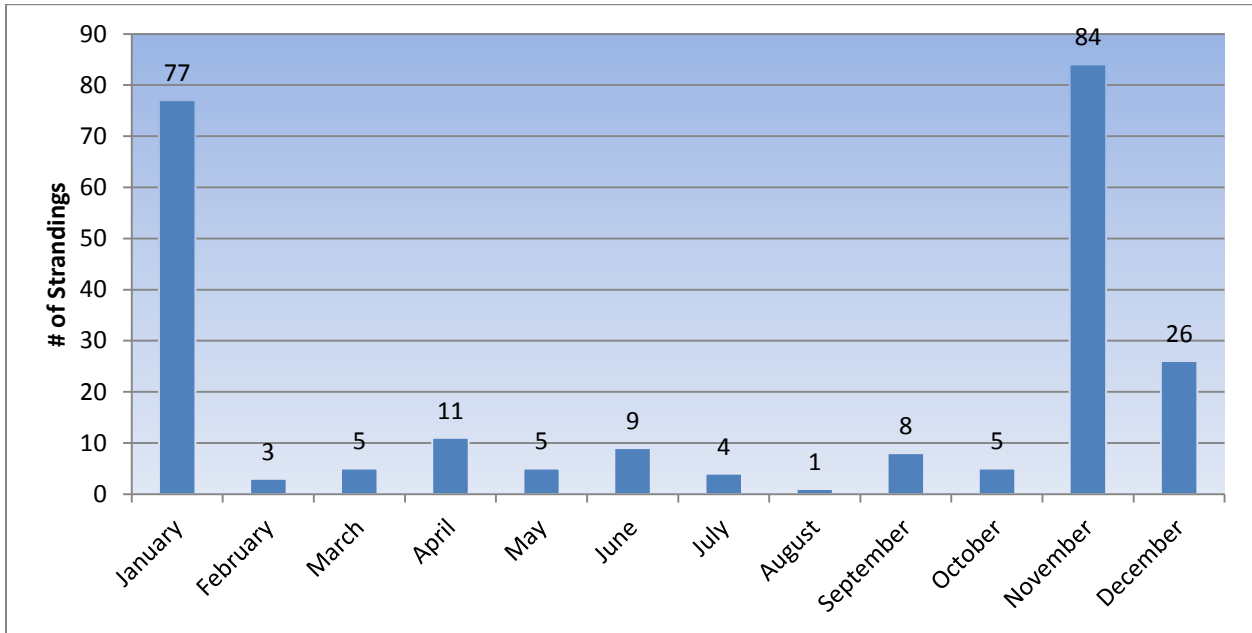


Table 5. CALO SEA TURTLE STRANDINGS 1990 – 2013

YEAR	Stranding Totals	Logger-head	Green	Kemp's Ridley	Leather-back	Hawksbill	Unknown
1990	43	33	7	1	2	0	0
1991	20	16	2	1	0	0	1
1992	45	30	13	1	1	0	0
1993	43	29	6	5	2		1
1994	62	30	24	5	2	0	1
1995	43	27	7	6	1	0	2
1996	91	63	21	4	3	0	0
1997	57	49	1	7	0	0	0
1998	63	43	8	12	0	0	0
1999	94	36	41	15	2	0	0
2000	102	46	40	11	4	0	1
2001	64	38	15	9	2	0	0
2002	71	33	26	5	7	0	0
2003	64	44	9	7	2	1	1
2004	78	45	28	4	1	0	0
2005	71	37	21	6	0	2	5
2006	61	35	16	8	0	0	2
2007	64	19	38	1	0	0	6
2008	149	29	116	2	0	0	3
2009	117	36	66	14	0	0	1
2010	275	131	116	27	0	0	0
2011	88	18	44	26	0	0	0
2012	124	25	73	25	1	0	0
2013	238	26	187	23	1	0	1



## DISCUSSION

The nesting and hatching season started on May 22 and ended on November 15, 178 days. The relatively wet and cooler summer prolonged incubation lengths for nests. The initial nests to hatch took 66 to 78 days of incubation to hatch. The late season nests took from 71 days to 86 days of incubation to hatch. The average incubation rate of 64 days in 2013 was 2 days longer than the 24 year average of 62 days.

The majority of nesting and hatching season was free of tropical storm impacts and only nine nests were washed away due to erosion. Seven of these nests were lost to a northeast swell event during the federal government shutdown. Three of these nests had been relocated to what was higher ground, but were washed out regardless. Some of these nests could have been saved by emergency relocation if staff were working. The shutdown also impacted our ability to collect accurate nest inventory data as three nests were noted as hatched during the shutdown, but were washed away before they could be inventoried. Ninety percent of the nests were inventoried. Two undetected nests that were uncovered by erosion on the north end of NCB were emergency relocated. Both nests hatched after being relocated. There were a total of five undetected nest that were later discovered after the lay date. Numerous heavy rain days may have contributed to these nests being missed by turtle patrol.

The past five years has seen a higher number of stranded sea turtles. There is an increasing trend of more strandings. The majority of turtles have been stranded on inshore beaches and have been

juveniles. There has also been a trend of more juvenile greens and Kemp's ridley than loggerheads in the past five years at the seashore. November, December, and January were the busiest months of the year for strandings due to several cold stunning events.

The seashore continued to participate in the genetic mark-recapture study of the northern recover unit of sea turtles in 2013. Results can be viewed at [www.seaturtle.org](http://www.seaturtle.org).

### **U.S. Fish and Wildlife Service Biological Opinion and Performance Measures**

The USFWS provided CALO a biological opinion that included two performance measures on sea turtles for the Interim Protected Species Management Plan. The first performance measure requires that the sea turtle false crawl to nest ratio is less than or equal to 1:1 (annually). In 2013, there were 182 false crawls and 192 nests for a ratio of 0.95:1. The second performance measure states we should have 20 percent or greater of the state's total sea turtle nests for the last five years. There was an average of 975 nests for the last five years in North Carolina. In 2013 CALO had 20% of the state's total sea turtle nests for the last five years.

### **Literature Cited**

National Park Service. 2006. Interim Protected Species Management Plan/ Environmental Assessment. Cape Lookout National Seashore, North Carolina.

APPENDIX I  
2013 GIS SEA TURTLE ACTIVITY MAPS

Figure 7. 2013 North Core Banks Sea Turtle Activities

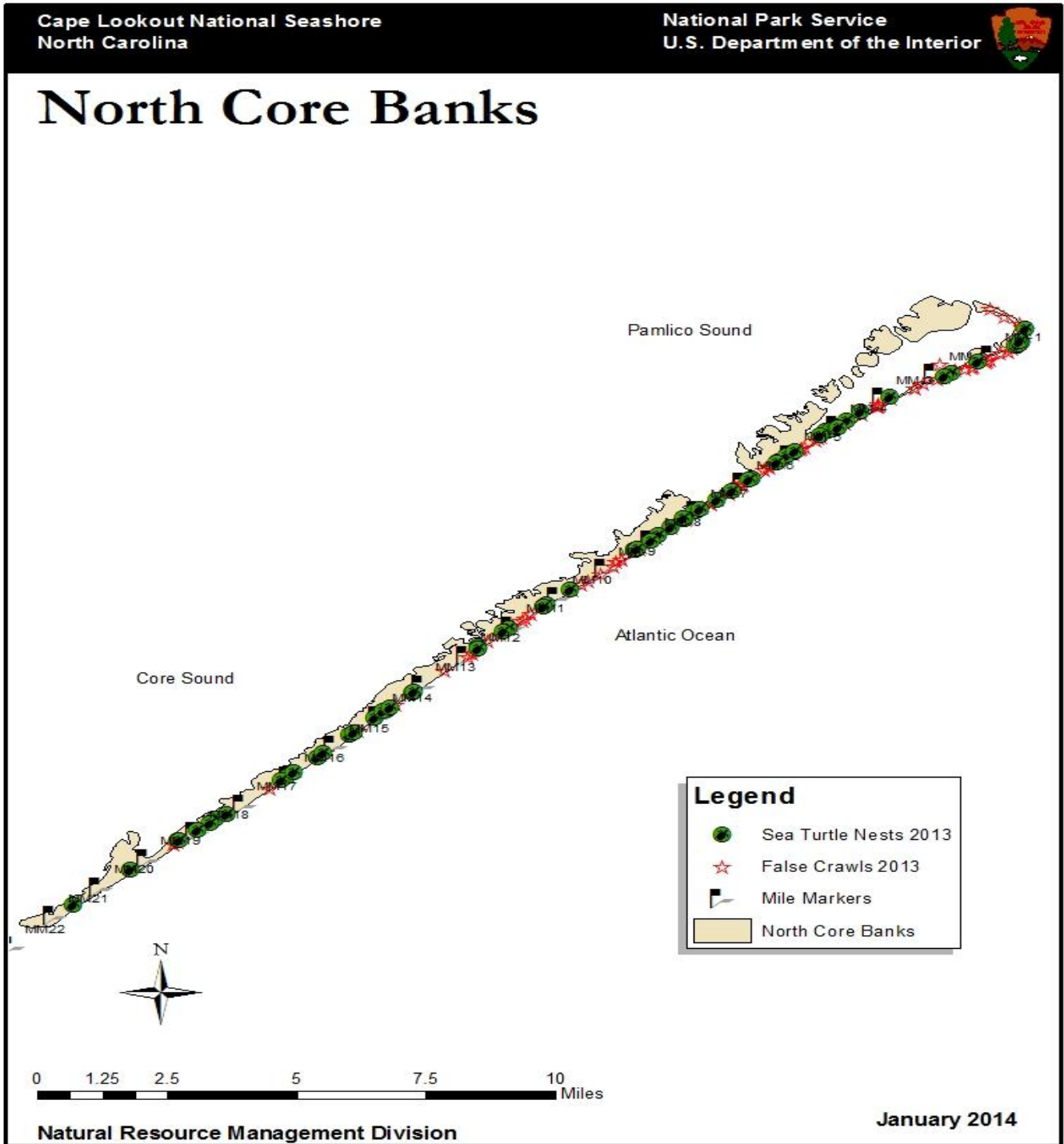


Figure 8. 2013 South Core Banks Sea Turtle Activities.

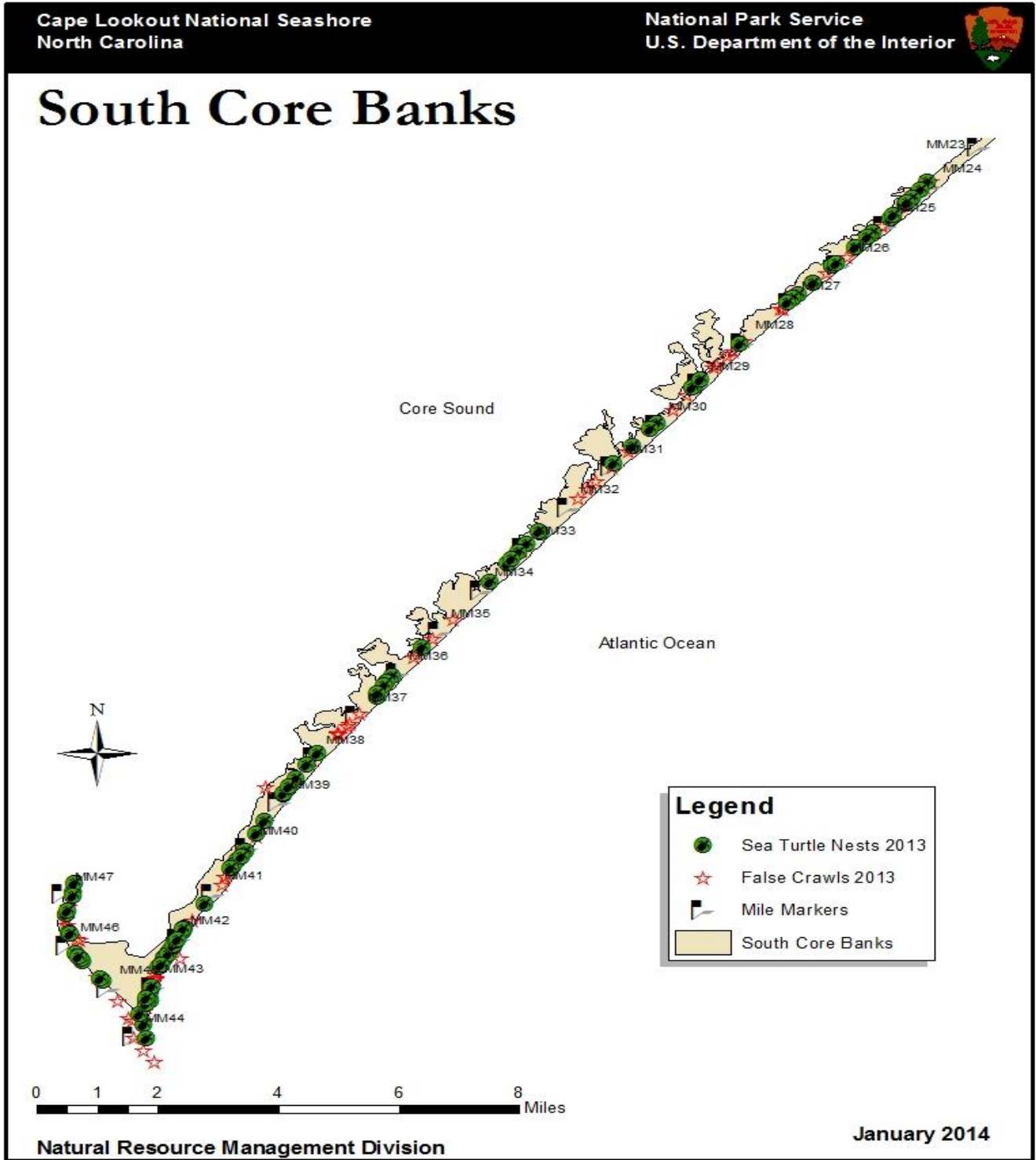


Figure 9. 2013 Shackleford Banks Sea Turtle Activities.

