

CAPE LOOKOUT NATIONAL SEASHORE
2012 SEA TURTLE MONITORING AND MANAGEMENT REPORT



A rare day time nesting Leatherback Sea Turtle on South Core Banks. NPS Photo 2012.

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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 2012 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 1st 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.

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 digs were monitored for hatching activity through November. Nests were excavated after hatching to determine nest success. Digs were treated as nests through the nesting

and hatching time frame. If the dig 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 2012 was on May 4 and the last on August 18, for a 107 day nesting season. A total of 451 activities were documented of which there were 228 nests and 223 false crawls, (Table 1.). There were 213 loggerhead, 10 green, 4 leatherback, and 1 Kemp’s ridley nests. The nesting intervals of the four leatherback nests suggest one female nester and the intervals of the ten green nests suggest two female nesters (Table 2 and 3). Figure 1 illustrates the daily nesting activity for the season. Mapped nest locations are in Appendix 1.

Table 1. 2012 Activities by Study Area.

	North Core Banks	South Core Banks	Shackleford Banks	CALO Total
NESTS	60	131	37	228
CRAWLS	64	136	23	223

The number of nests found in 2012 (228 nests) was above the annual average for CALO (134 nests) (Fig. 2 and 3). South Core Banks continued to have more nests than the other islands in 2012.

Table 2. Leatherback Nesting Interval.

Date	Activity #	Island
5/31/2012	SCB 023	SCB
6/10/2012	SCB 066	SCB
6/20/2012	SCB 098	SCB
6/28/2012	SCB 116	SCB

Table 3. Green Nesting Interval

Date	Activity #	Island
7/3/2012	SCB 129	SCB
7/17/2012	SCB 203	SCB
7/27/2012	SCB 242	SCB
8/7/2012	SCB 263	SCB
6/11/2012	SB 018	SB
6/27/2012	SB 028	SB
7/9/2012	SB 035	SB
7/20/2012	SB 047	SB
7/31/2012	SB 055	SB
8/10/2012	SB 058	SB

Figure 1. The daily number of nests at 7 day increments from May 4 to August 18.

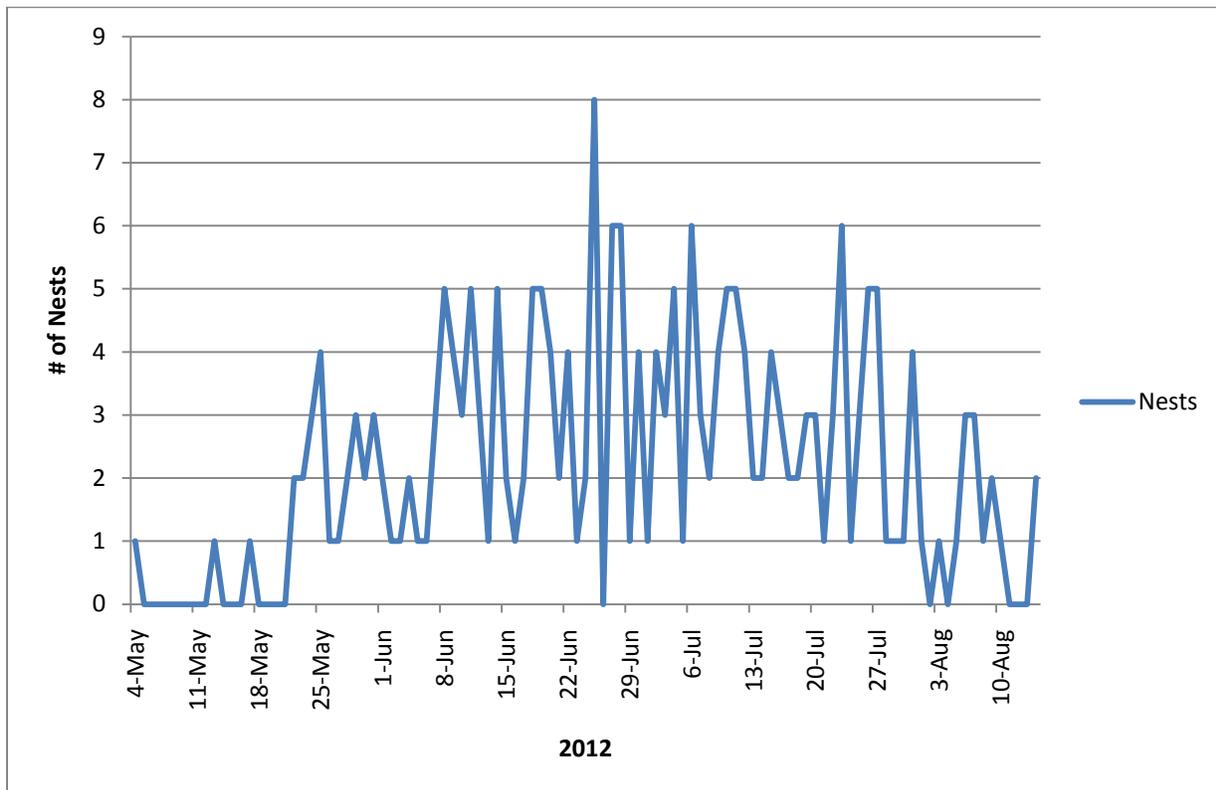


Figure 2. Cape Lookout Sea Turtle Activities 1990-2012

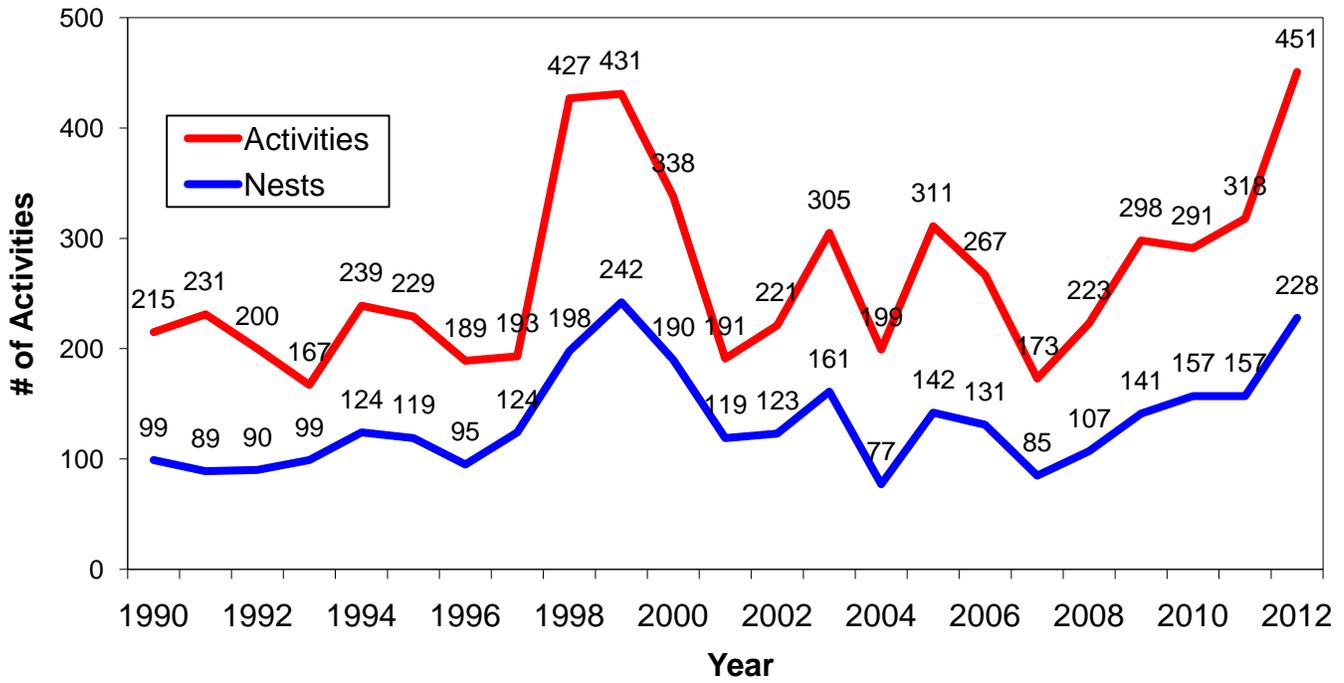
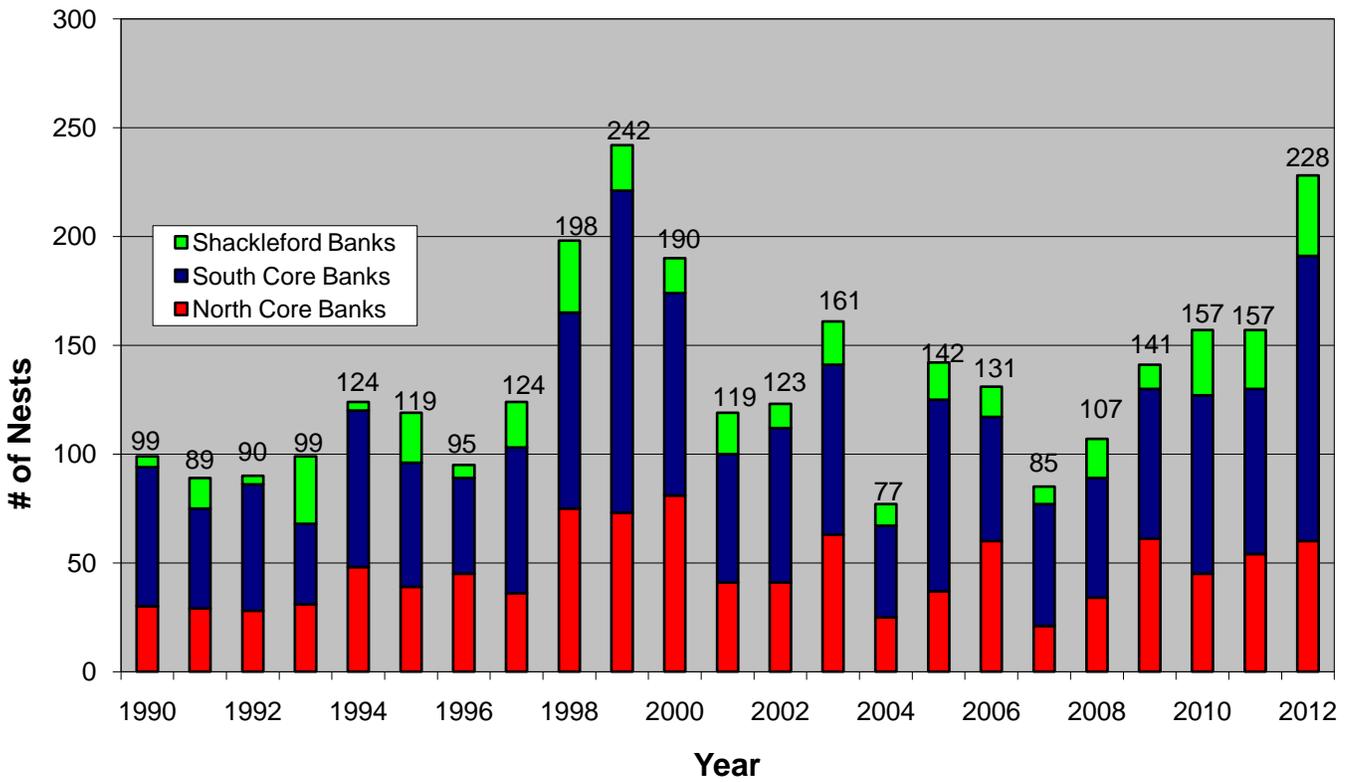


Figure 3. Cape Lookout Sea Turtle Nests 1990-2012



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 23rd and ended on October 20th, for an 89 day nest hatching period. The last nest was inventoried on October 30th at day 81 of incubation. A known total of 25,293 eggs, 17,134 hatchlings, and 946 hatched dead were counted. The total hatch success, number of total hatched eggs divided by number of total eggs, was 68%. The total emergence success of 64% (16,188 emerged) was calculated by subtracting the total hatched dead from the total hatched and dividing by the total of eggs (Table 4). This is the same calculation for each individual nest emergence success. The emergence success reported on 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 23 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 111 eggs. It took an average of 62 days for nests to incubate. Only one nest was lost to a storm event. Hurricane Sandy washed away NCB 124 with the numbers of eggs unknown. A total of 84 nests were over-washed by the ocean. Fifty four of these 84 nests hatched. The emergence success for these 84 flooded nests was 36%.

Table 4. SEA TURTLE HATCH SUMMARY 1990-2012

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%	42%
2012	228	111	84	62	25293	16,188	64%	na

*emergence success for nests with known egg and hatch totals

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

In 2012, we relocated 50 nests. The emergence rate for relocated nests was 74% and the emergence rate for non-relocated nests was 61% (Table 5). We inventoried 227 nests and 1 nest was washed away and the egg count/ success were unknown.

Table 5. 1990-2012 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%	99.5
<i>AVERAGES</i>	<i>47</i>	<i>65%</i>	<i>65%</i>	<i>90</i>

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

Since 1990 the twenty three year average emergence success is 65% for relocated nests and 65% for non- relocated nests (Table 5).

Hatch Results by Species

The 213 loggerhead, 10 green, 4 leatherback, and 1 Kemp’s ridley turtle emergence successes were 64%, 67%, 22% and 75%, respectively (Table 6.). Nine of the ten confirmed green nests hatched. The green turtle incubation range was from 63 to 69 days with an average of 65 days. Three of the four leatherback nests hatched, though emergence success was low. Based on the genetic results and the nesting interval the four nests were from one female. The leatherback incubation range was from 73 days to 76 days with an average of 75 days. The Kemp’s nest incubation was 70 days.

Table 6. Loggerhead, Green, Leatherback, and Kemp’s ridley Sea Turtle Hatch Summary, 2012.

	Loggerhead	Green	Leatherback	Kemp’s
NESTS	213	10	4	1
# EGGS	23459	1398	320	116
# HATCHLINGS	16000	952	95	87
# HATCH DEAD	907	13	26	0
EMERGENCE SUCCESS	64%	67%	22%	75%
AVERAGE CLUTCH	111 eggs	140 eggs	80 eggs	116 eggs
AVERAGE INCUBATION	61 days	65 days	75 days	70 days

Predation

In 2012, four nests suffered losses due to what appeared to be raccoon predation before nests could be screened on SCB. The mammal tracks were obscured and could have also been canine tracks. A coyote was spotted on SB and canine tracks were noted on both SCB and SB in 2012. At least six nests had reports of unknown mammal tracks at nest site. Dead hatchlings on the beach were observed at four nests. Two nests lost eggs due to a raccoon reaching through metal screen and pulling out eggs. A total of 17 nests were impacted by mammalian predation events on SCB. There were no predator interactions recorded on NCB or SB.

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 2012, park law enforcement staff issued four violation notices for vehicular sea turtle closure violations. These vehicles drove between posts and the ocean at low tides or drove through posts and rope.

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.

One hundred twenty four strandings occurred at CALO in 2012. 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 (73). There were also 25 Kemp’s ridleys, 25 loggerheads, and 1 leatherback. Seventy five turtles stranded on the inshore soundside and 49 turtles stranded on the offshore oceanside. There were 22 live strandings. One cold stun event occurred in the beginning of the year in January with 8 live turtles and the other occurred at the end of the year in December with 5 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 Passive Integrated Transponder (PIT) tags. One PIT tagged turtle was found in 2012. Figure 4 and Table 7. provide stranding data by species and year from 1994 to 2012

Figure 4. Sea Turtle Stranding Totals at CALO (1990-2012) with a simply linear regression line.

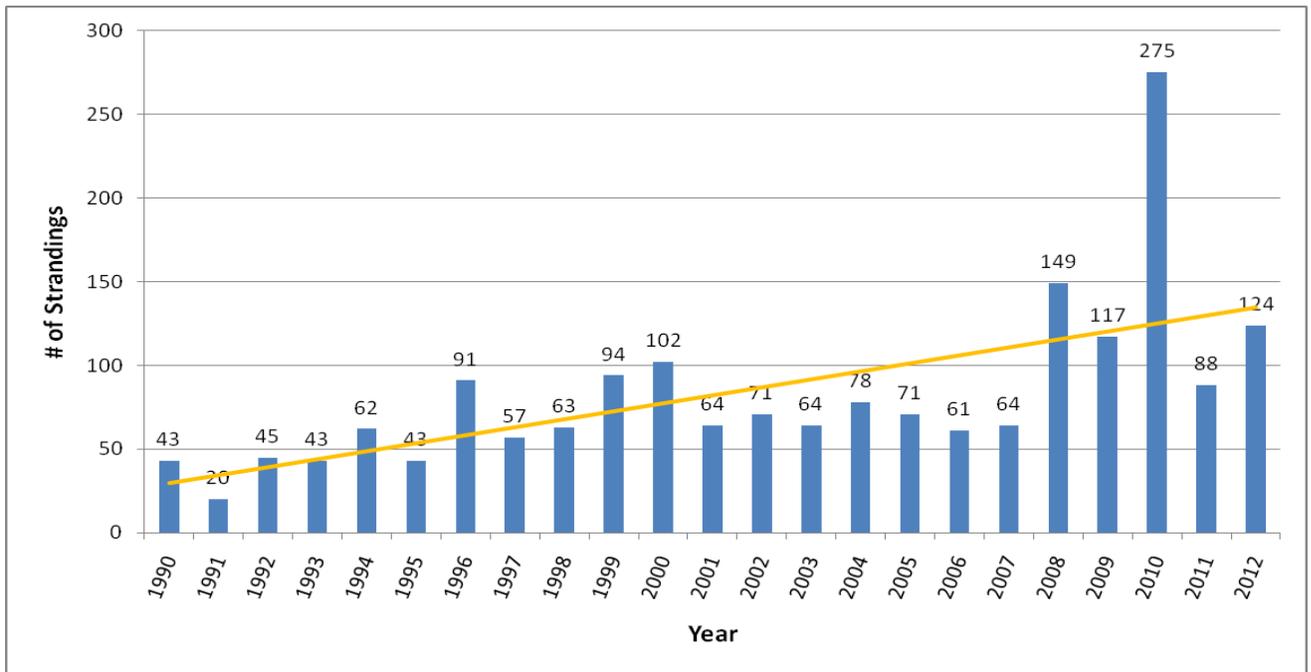


Table 7. CALO SEA TURTLE STRANDINGS 1990 – 2012

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

DISCUSSION

This nesting season marked the highest sea turtle crawl activity to date with 451 activities. The year 2012 also marked the second highest number of nests at 228 with the highest in 1999 with 242 nests. The nesting and hatching season started early and ended early. It spanned from May 4th to October 20th, 169 days. The first nest on May 4th was the earliest loggerhead nest on record for the seashore. The majority of nesting and hatching season was free of tropical storm impacts and only one nest was washed away due to Hurricane Sandy in late October. We were able to inventory 99.5% of nests. The MCB section of NCB was difficult to access due to Old Drum Inlet being a free flowing inlet in 2012. We were able to cover the 4 mile section about twice a week during the nesting season. There was little activity observed, but there was a wild nest recorded after it hatched. One other wild nest was found after hatching on SCB that may have initially been recorded as a false crawl.

In an effort to streamline the annual sea turtle report, this 2012 report omitted sections and results that previous annual reports included and changed the general format. Estimated emergence results will no longer be calculated and reported. Results will be reported for known data only.

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.

The seashore continued to participate in the genetic mark-recapture study of the northern recover unit of sea turtles in 2012. Results can be viewed at 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 2012, there were 223 false crawls and 228 nests for a ratio of 0.98:1. 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 832 nests for the last five years in North Carolina. In 2012 CALO had 27% 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

2012 GIS SEA TURTLE ACTIVITY MAPS

Figure 5. 2012 North Core Banks Sea Turtle Activities

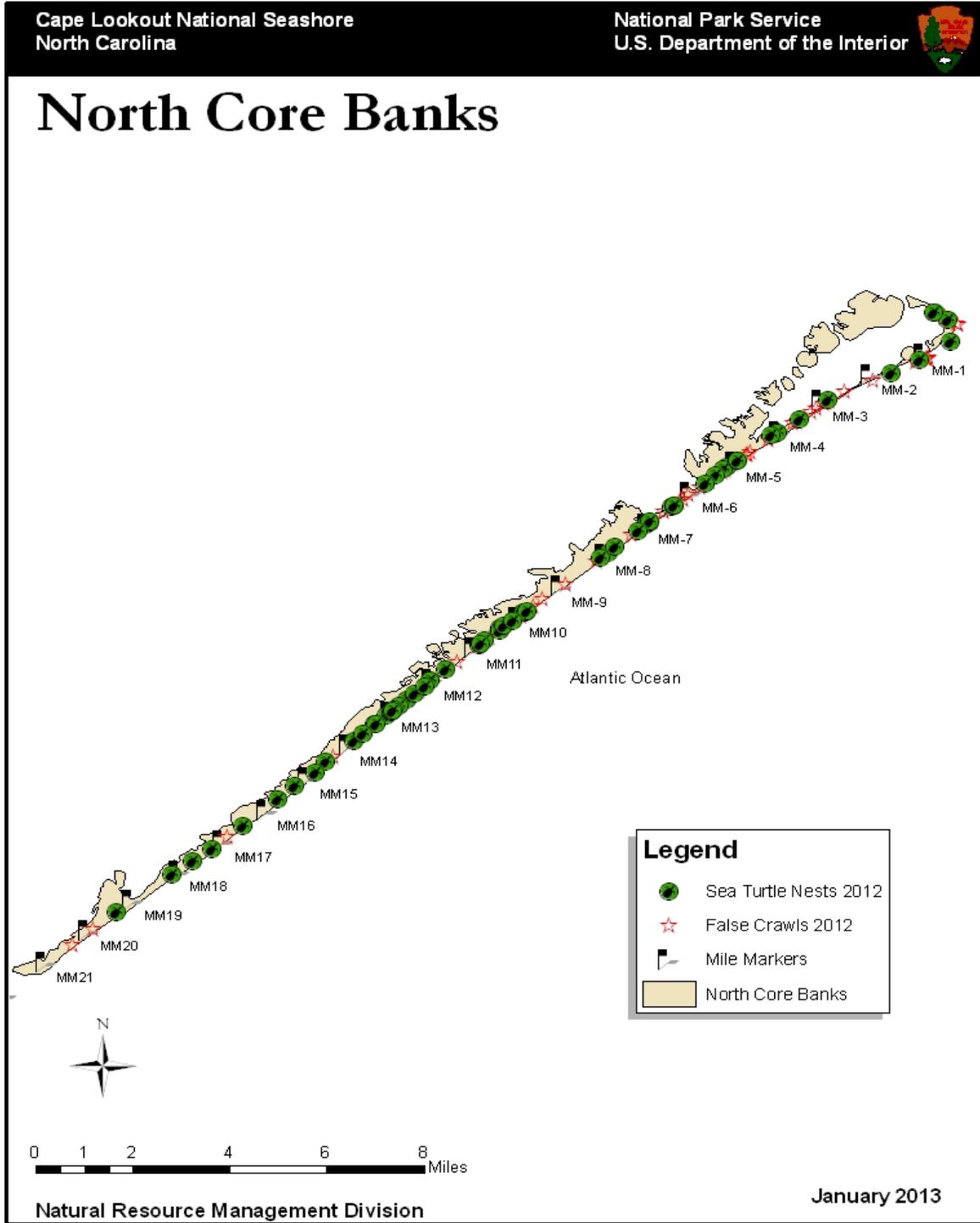


Figure 6. 2012 South Core Banks Sea Turtle Activities.

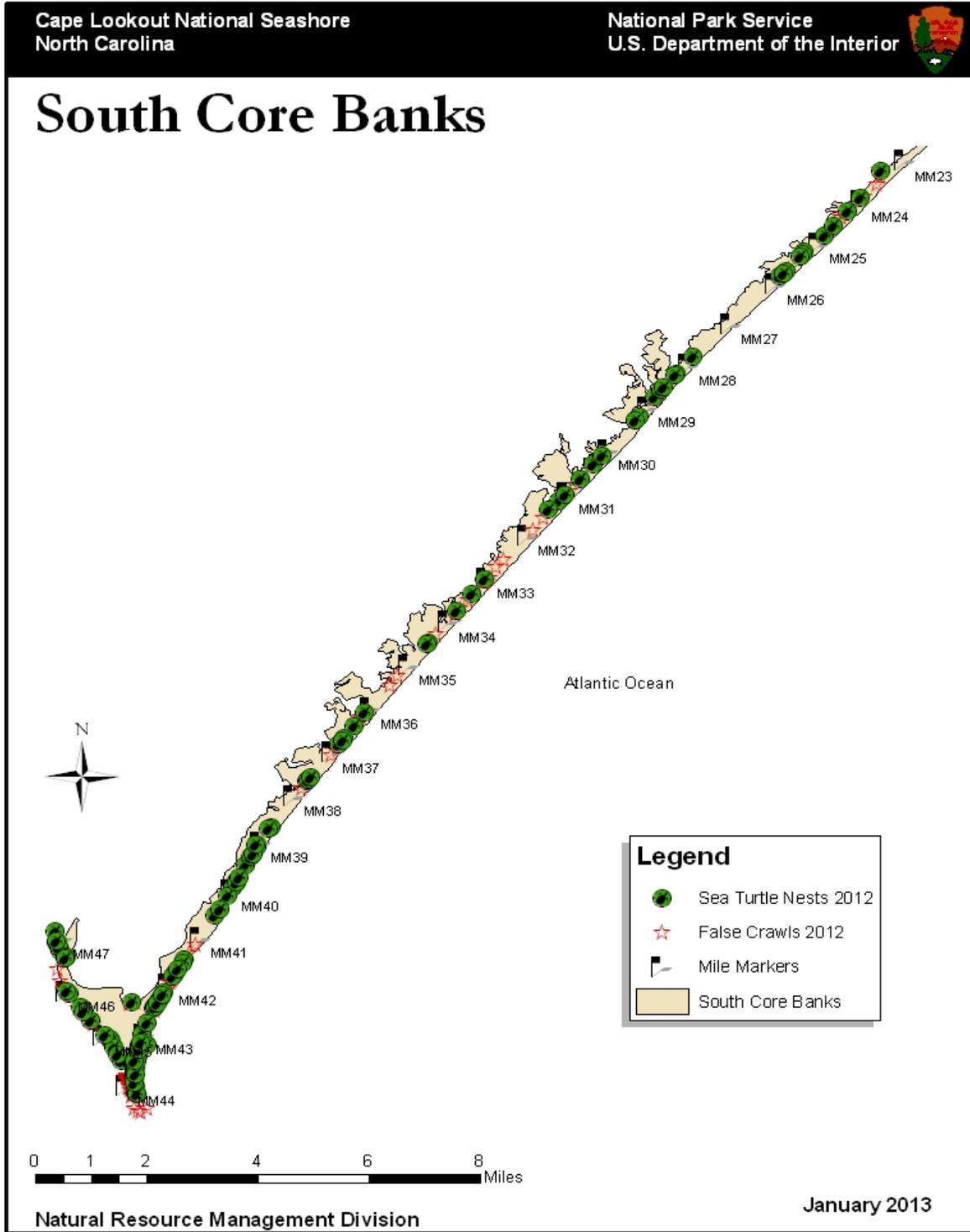


Figure 7. 2012 Shackleford Banks Sea Turtle Activities.

