2004 SEA TURTLE SUMMARY
BREEDING AND STRANDING ACTIVITIES
CAPE HATTERAS NATIONAL SEASHORE

Introduction

Cape Hatteras National Seashore (CAHA) lies near the northern proximity of nesting sea turtles. Non-breeding sea turtles can be found in the nearby waters, especially inshore sounds, during much of the year. CAHA follows management guidelines defined by the North Carolina Wildlife Resources Commission (NCWRC) in *Handbook for Sea Turtle Volunteers in North Carolina* (2002). An annual permit is issued by NCWRC under the authority of the U.S. Fish and Wildlife Service.

Breeding Activity

Beaches were patrolled daily between June 1 and September 1, 2004 in search of turtle crawls. Volunteers in the Park, Student Conservation Association volunteers and Park staff monitored approximately 55 miles each day on Bodie, Hatteras and Ocracoke Islands.

Nest Composition and Distribution

There were 50 nests located in 2004 (Table 1). This is low compared to recent years. Eighty-nine nests were found in 2003 and a record high of 101 nests were found in 2002. This year's figure is also lower than the average of 75 nests per year recorded at CAHA (Chart 1) in the past 12 years. Beaches have been consistently monitored since 1987 but the quality of surveys varied in the early years. It should be noted that in 2004 sea turtle nest numbers were down by about 50% throughout the southeastern United States and Caribbean. The reasons for low nesting numbers are unknown. Of the 50 nests found this season, 39 (78%) were found on Hatteras Island, 10 nests (20%) were found on Ocracoke Island and 1 nest (2%) was located on Bodie Island. The first known nest of the season was found on May 22 and the last nest was laid on August 17.

Three species of sea turtles were known to have nested on CAHA beaches in 2004. There were 46 loggerhead nests (C*aretta caretta*), one leatherback nest (Dermochelys coriacea) and three reported green nests (*Chelonia mydas*). Two of the three green turtle nests were lost to storm activity and thus could not be examined for post-hatching confirmation. This is the eleventh year green turtle nests were recorded at CAHA in the past 25 years. This figure is likely low due to inadequate documentation in early years. This is the fifth year since 1998 that leatherback nesting has been recorded here. Neighboring Pea Island Wildlife Refuge reported a total of one green nest this season.

Leatherback nests have been found here in 1998, 2000, 2002, 2003 and 2004. The presence of a leatherback nest in 2003 confirms that more than one female of the species uses CAHA as a nesting ground since the species has a minimum of two years between nesting cycles. It is known that more than one leatherback individual nested in North Carolina in 2004 since a leatherback turtle nested at Cape Lookout National Seashore the same night the leatherback nest

was found at CAHA. CAHA remains the northernmost nesting location on record for the species (Rabon et al, 2004).

Nests were documented by patrols surveying the beaches beginning at dawn each day between June and August. It is unknown if any nests were laid prior to the monitoring season. Small numbers of loggerhead nests have been found in May in past years. A leatherback nest has been found as early as April 16 in 2000.

Treatment

Nests were either left in place or relocated for environmental reasons. In general, nest relocation has been discouraged under recommendations of the NCWRC and USFWS; therefore, with few exceptions, nest relocation was confined to nests that might be threatened with loss by erosion or overwash.

In the few situations where eggs were believed to be present (based on presence of primary and secondary body pits) but could not be found, the activity was categorized as a "dig". Rather than abandoning the site because staff could not locate eggs (recognizing the possibility of human error), these sites were closed and treated exactly like nest sites, with all information recorded, poles labeled, and transponders buried.

Of the 50 nests, 32 (64%) were protected at the original nest site and 18 (36%) were relocated (Table 2). All relocation activity took place on Hatteras Island. Of the 18 relocated nests, 16 (89%) were moved because of natural factors and 2 (11%) due to potential effects from fishing pier lighting. Several environmental factors were considered in decisions to relocate nests including, high erosion rates, close proximity to the tide line or to an unstable, escarped dune line. Two nests were moved when found to be within one mile of a fishing pier. Piers emit light pollution that attracts hatchlings, which then fall prey to fish congregating near the piers. The resource management division has submitted recommendations that would decrease light pollution generated by the three fishing piers within CAHA. Other artificial structures causing relocation are the groins at the original site of the Cape Hatteras Lighthouse near Buxton. Nests laid on the beach around the groins are very susceptible to sudden shoreline changes.

Hatching Success

Hatching events at various nests either took place in one nightly episode or intermittently over several nights. All nests were examined after hatching to determine productivity rates. Nests were excavated at a minimum of 72 hours after hatching events. In cases where hatching events or dates were unknown, nest cavities would be unearthed 80-90 days after the laying date. A total of 1,870 eggs were known to have hatched (Table 3). Of these, 1,609 hatchlings emerged from the nest cavities. Overall, hatching and emerging numbers were low for the second consecutive year due to hurricane impacts. A seasonably early and unexpected Hurricane Alex passed over CAHA on August 3. Twenty nests were lost from erosion and water inundation, including the one leatherback nest and two reported greens. Several days of storm swells and tides were felt from Hurricane Francis beginning on September 2 and Ivan, beginning on September 18. These weather events claimed an additional eight nests. The last nest laid during the season was flooded when a low pressure system passed offshore on October 23. Twenty-nine (58%) of the 50 nests were unsuccessful, all attributed to storm impacts. Twenty-one (42%)

nests successfully hatched, with an average hatch success of 72.8%. However the overall season's hatch rate falls to 30.5%, when combined with lost nests. This is only slightly higher than the record low of 27.2% in 2003. Individual nest success ranged from 0% to 99%. No nests were lost to predation in 2004.

Nest Protection

Any single nest left in place, or relocated, was protected by an approximately 30' x 30' posted closure during the incubation period. At 55 days into incubation, these small closures were expanded to the surf line. The width of the closure was based on the type and level of use of the beach: 75' in a vehicle free area with little or no pedestrian traffic; 150' adjacent to villages or other high levels of day use; 350' in ORV areas. Opposite the surf line on the upper end of the closure, the closed area was expanded to a minimum of 50' duneward from the nest. If present, all vehicle tracks were smoothed over manually with rakes or with a steel mat attached to an ATV, so as not to impede hatchlings attempting to reach the surf (NMFS, USFWS 1991). In several cases, silt fence was used behind nests nearing hatching dates. Fencing was used to block light pollution from the villages and from beach vehicles operating after dark. Fencing is often buried and/or removed by high tides and strong winds and often damaged in the process. Therefore, the use of silt fencing requires daily maintenance of the site. Larger signs were posted to notify drivers that the established closures included the surf line at all tides. Interpretive signs warned how vehicle traffic could harm eggs and hatchlings. Traffic detours behind the nest area were clearly marked with signs and reflective arrows. Closure materials were removed no earlier than 72 hours after hatching occurred, and after the excavation of the nest was complete.

In the 2004 season, there were 45 nests found in ORV areas. Of these, five sites required complete closures to through traffic during the expected hatching period. These complete closures excluded all ORV traffic from dune to ocean at a width of 350' parallel to the shoreline. These temporary closures were necessary due to the nest location on the upper beach or in the dunes. There was not enough room behind the nests for ORV traffic to pass. These areas were well posted and large signs warned visitors at ORV Ramps of "No through traffic to the next Ramp". The public was notified of closures that would temporarily limit ORV traffic. A press release was sent to local and regional newspapers. Local tackle shops and ORV organizations were contacted when closures were established or reopened. A notice explaining that commercial fishing activities were not allowed in any of these posted areas was given out with annual commercial fishing permits. Three of the five sites were located on the narrow beaches from Ramps 30 and 34. Two other nests, located northeast of Ramps 55 and 67 respectively, required full closures when beaches were opened to beach driving due to the adoption of a draft interim ORV plan (1978).

False Crawls

Of the 128 turtle crawls located during the 2004-breeding season, 78 (61%) of these were false crawls or aborted nesting attempts (Table 4). This is a significant rise compared to 35% in 2002 and 2003. Forty-five (57%) of the false crawls were found in areas open to ORV use, and 15 (23%) were located in heavy day use areas such as lifeguard beaches and other sites serviced by parking lots. Nine (18%) false crawls each were found on beaches adjacent to village development as well as on beaches which did not fall into the previous mentioned categories and

thus had lower concentrations of human activity. As in past years, the highest percentage of false crawls (77%) occurred on Hatteras Island in 2004. This rate represents a significant increase compared to 46% found on the island in 2003.

Factors Influencing Nest Success

The single event affecting overall hatching success in 2004 was Hurricane Alex in early August. Eggs of twenty nests on Hatteras and Ocracoke Islands were either physically lost to heavy seas or drowned by flooding tides. An additional nine nests were similarly lost to two subsequent tropical storms and one low pressure system.

No nests were lost to depredation. This is the first year since 2001 that red fox (*Vulpes vulpes*) have not targeted loggerhead nests. In 2003, one nest located on Bodie Island was depredated by a red fox. Trapping efforts on Bodie and Hatteras Islands have greatly reduced this predation threat. (See **Predator Removal** below.)

Human Disturbance

It is unknown to what extent human activities disrupt nesting activities. Although CAHA remains open to the public 24 hours a day, NPS staff is not available around the clock to safeguard and monitor the Park's natural resources. Human disturbance likely occurs but goes unreported and opportunities to educate visitors are lost. Nighttime human activity can cause nesting females to abort nesting attempts. Recreational beach equipment and furniture can also cause turtles to forgo egg laying by hampering or trapping animals attempting to locate a nesting site (NMFS, USFWS 1991). Substantial quantities of unattended personal items are left overnight on CAHA beaches in front of the villages. However, the overall amount has decrease likely do to education. For the fourth consecutive year, turtle patrol has tied notices to personal objects found on the beach after dawn, advising owners of the threats to nesting sea turtles as well as safety issues and NPS regulations.

The vandalism of protective closures and nests of both bird and turtle escalated in 2004. Posted closures protecting three turtle nests nearing their expected hatch date were seriously vandalized leaving the sites vulnerable. In one incident, several large signed posts alerting ORV operators and directing traffic around the back side of the closure were removed and dragged down the beach. In a separate incident, an ORV entered a vehicle-free area in front of Avon village to reach two sea turtle nests. All of the signed posts were pulled from the ground and strewn along the beach and in the surf. Two 100-foot sections of filter fence were torn from their stakes and discarded in the surf. There were five holes dug in the sand though fortunately the egg cavity was not disturbed.

Artificial light is known to disturb nesting females. It also disorients and misorients hatchlings, often with fatal results (NMFS, USFWS 1991). As large-scale beach house development along Park boundaries has intensified, so has light pollution. ORVs are permitted to operate on CAHA beaches after dark. No longer are beaches of Hatteras or Bodie Island free of light pollution. In 2003 and 2004, filter fence was used in virtually all nests in these locations, whereas Ocracoke Island still has many areas free of artificial light. In 2001, a total of 773 beach fires were documented during the sea turtle nesting season and this problem continues. (Abandoned

smoldering pits containing charred lumber, cans, nails and broken bottles remain as a continued hazard to visitors as well as turtles.). Fireworks are another source of light pollution. They are sold locally and are commonly used, although illegal, on CAHA beaches.

Counts were kept of pedestrian and vehicle entry in turtle closures from June through September. These were made through direct observations or from human tracks and vehicle tracks found in closures. Numbers are conservative since sites are not monitored at all times and intensity of surveys varied. Also, any tracks on the ocean side of a closure were subject to washing away between tides. A total of 38 observations documenting 107 pedestrians were made park wide. Entry required people to pass under flagged string tied between signed posts. One hundred and two of the 107 tracks were recorded on Hatteras Islands. A total of 18 observations were made documenting 30 vehicles within closures. As with pedestrian entry, the majority of the vehicle violations, 23 of 30, occurred on Hatteras Island. ORVs drove through areas where signs and reflective arrows clearly marked established detours behind the closures. Most ORVs drove in front of the nest areas during periods of low tide. Signs could not be placed in the low tide area, since they would wash away with the approach of each high tide and accompanying waves. Signs placed at the high water mark did state the surf line was closed at all tides. Also, PVC pipes were driven into the sand from the signs to the low tide line and marked with string and flagging emphasizing the tidal closure.

Emerging hatchlings were killed unintentionally by vehicles on two occasions in October of 2004. Both cases were promptly reported to NCWRC. One incident occurred on 10/12/04 on Ocracoke Island where a nest hatched on top of a dune adjacent to NC Route 12. Four hatchlings were found dead on the highway when a bio-tech came to monitor the nest during the night. Live hatchlings were found on the backside of the nest, digging under the filter cloth fencing that had been erected to protect them from the road and any associated vehicle lights. After a three hour search, with the assistance of the local Coast Guard and another volunteer, 30 hatchlings were recovered from the road or the side of the pavement. The nest was monitored for the rest of the night as well as the next two consecutive nights to make certain any remaining hatchlings were protected. No more turtles were lost. When the nest was exhumed, all hatchlings were accounted for.

This nest had been relocated during its incubation period when it was felt the entire nest would be washed out from hurricane waves on 9/03/04. Since most of Ocracoke Island beaches were underwater at the time, it was relocated on top of a section of man made dune next to another loggerhead nest that had not been relocated. It was thought that filter fence, erected at the beginning of the hatching window, would give it adequate protection. During the hatching period there was little to no moon and the lights from the North Carolina ferry docks located two miles away created the brightest point in the sky. It appeared the turtles were orienting themselves towards those lights and as a result towards the highway.

A second incident occurred in daylight hours on the beach northeast of Ramp 49 on 10/27/04. The Park received a call from a fisherman saying he had seen approximately 20 turtle hatchlings crawling towards the water that afternoon. Though many reached the surf, he said some had been run over by passing beach vehicles. Upon arrival, NPS staff collected six dead, crushed hatchlings at the tideline. As there was no known turtle nest on this stretch of beach, the area

was searched but no evidence of a nest was found. A half mile of beach was closed to public entry for the next three days to protect any additional hatchlings that may emerge. No evidence of further hatchlings was reported. A nest in the area, likely laid mid to late August, may have been missed due to human error. It is also possible that the nesting females tracks were obliterated by tire tracks or the unusually high tides created by two hurricanes during that period. It was unusual, though not unprecedented, to have hatchlings emerge during daylight hours. This has occurred here in the past most often when a late season nest has been subjected to very cool night temperatures. In this case, the week preceding the appearance of the hatchlings had been cloudy and cool with evening temperatures dipping into the mid-fifties.

Dog Disturbance

Dogs continue to enter closures. Dogs or dog tacks were documented within turtle closures, representing 22 animals. Of those, nineteen occurred on Hatteras Island. Dogs can potentially be a serious threat by digging up incubating eggs as well as injuring nesting adults or hatchlings. Though a leash regulation exists, many dogs on the beach are not leashed or only leashed by their owners as a Park vehicle approaches. From mid May through September, data was collected on the number of leashed vs. unleashed dogs observed along the Seashore beaches. The survey results do not represent the total number of dogs in the park but a sample taken by resource management staff during their work hours. This is the second consecutive year such data was collected. Of the 2983 dogs counted in 2004, 1845 (62%) were leashed and 1138 (38%) dogs were not leashed This is a marked increase in compliance compared with the same time period in 2003 when 42% of the 3425 dogs were leashed and 58% were not. This change may reflect the increase in written warnings and citations issued. The total number of leashed dogs counted within each of the three districts in 2004 ranged from 62% to 65%.

Predator Removal

For the third consecutive year, USDA trappers removed red and gray fox from CAHA. Trapping efforts occurred during May 25-June 3 and July 20-30, 2004 on Bodie and Hatteras Islands. This summer's project resulted in the removal of nine red fox on Bodie Island. This brings the total number of red fox removed since 2002 to 52 animals. In addition, six grey fox (*Urocyon cinereoargenteus)* were trapped on Bodie Island. Of the 15 fox, eight were removed in May/June and seven were removed in July. There was no trapping success on Hatteras Island in 2004 where at least one animal still resides. Old tracks were seen north of Avon and fresh tracks were seen along the beach between Buxton and Hatteras villages.

This year's data shows that the number of red fox removed decreased from the previous years; twenty-eight were removed in 2002 and 15 in 2003. However, this was the first year that grey fox were removed in predator management efforts. It may indicate that additional predation could occur with the addition of another opportunistic predator. The presence of grey fox could also be an indicator that red fox numbers are declining because the two species are ecologically competitive, typically with the red fox being the more dominant species. In either circumstance, the presence of grey fox on the beach is a concern.

Education

Three educational programs were conducted during the hatching season. Programs were held on Ocracoke and Hatteras Islands where public school students learned about sea turtles by

participating in post-hatching nest examinations. Approximately fifty people from the local Hatteras Island community gained insights on sea turtles when they watched hatchlings scurry to the surf. A 12-minute television program was created to educate the public about nesting sea turtles and measures taken by CAHA to protect nests and hatchlings. It has aired numerous times throughout North Carolina and Virginia. Many additional contacts were made informally at other nest sites. Visitors on the beach were often invited to observe a post-hatching nest examination whenever possible.

Stranding Activity

All species of sea turtles that strand on CAHA shorelines are documented in cooperation with the NCWRC and National Marine Fisheries Service (NMFS). A stranding report is completed for each animal documenting such information as species, condition, sex, carapace measurements, tags, wounds or abnormalities and evidence of entanglement. Photos are also taken. If alive, animals are transported to a permitted facility for care. NMFS biologists are conducting sea turtle DNA and aging studies. As often as possible, flippers, eyes and muscle tissue was collected from carcasses by park staff and transferred to the NMFS Beaufort laboratory. Collections were done under a permit issued by NCWRC.

In 2004, 97 stranded turtles were documented along the shores of CAHA (Table 5, Chart 2.). This represents a 12 % decrease from 2003 total. Annual totals since 1996 have ranged from a low of 47 found in 1996 to a peak of 332 in 2000. Of the current 97, 44 were located on the ocean beaches with 53 on the soundside shoreline. This year was the first time stranding numbers on the soundside was greater than ocean beach stranding numbers. As with past year's, the majority of the strandings were found on Hatteras Island. Park wide, 35 (36%) were identified as loggerhead, 42 (43%) were green, 10 (10%) were Kemp's ridley (*Lepidochelys kempi*), 4 (4%) were leatherback, and 6 (6%) were not identified. In past years, the main species represented were loggerhead, however in 2004, green turtles took the greatest toll.

Ten turtles (10%) were alive when discovered. NC Sea Turtle Network volunteers assisted in transporting many turtles to the Roanoke Island Animal Hospital where health assessments were made. Network for Endangered Sea Turtles (NEST) cared for them at the NC Aquarium in Manteo until they are released. Satellite tracking devices were mounted on a few of these turtles before release. Live strandings occurred mainly in the colder months (Table 6) and on the sound waters. Turtles were cold-stunned in response to falling water temperatures caused by cold fronts. A live leatherback was euthanized by a veterinarian. While conducting a necropsy a Mylar balloon was found blocking the intestines. One live turtle was hooked by a recreational fisherman and the line cut (approximately 100 ft.) before park staff arrived.

Eighty-seven turtles (90%) were dead when found. Cause of death in most cases was unknown. Half of the year's total was found in a 2-month period between November and December. November strandings could not be attributed to hypothermia as the waters remained above lethal temperatures until December. In other cases, three dead turtles had fresh propeller wounds on their carapace. One animal was wrapped in fishing line and another had a long-line hook embedded in its lower esophagus. Noteworthy was the absence of an ocean-side stranding spike in the spring. In a three month period from April through June, a total of nine turtles were

reported, a low for this time of year. Spring strandings have been in decline since offshore gill net regulations were changed following a large number of strandings in 2000.

Conclusions and Recommendations

Breeding activity was low throughout the southeastern US and Caribbean in 2004. For the second consecutive year, hatching success was extremely poor due to impacts of hurricanes. These follow the year 2002, when hatching success was higher than normal due to the prevalence of warm, dry weather. Leatherback nests have been found in five of the past seven years. It is very possible that some nests are being missed since daily turtle patrols are tailored to loggerhead biology. Leatherback nesting has been noted here in April. Fox predation has been greatly reduced by the trapping efforts. Trapping efforts need to continue. Numbers of false crawls rose dramatically, accounting for 78% of all reported turtle activity. It is unknown how many nesting attempts were aborted due to natural or human disturbances.

CAHA is reducing the number of nests relocated due to potential human disturbances. Though compliance was fairly good, there were still a significant amount of drivers who disregarded the posted closures. Violations were most common in high ORV use areas where closures temporarily restricted through traffic. The Resource Management Division would need much more staff if it were to station monitors at closures to direct traffic. Law enforcement presence needs to be raised, especially in light of recent vandalism targeting these threatened and endangered species. Efforts made to educate the public through the media and interpretive programs should increase.

Nighttime activities potentially impacting breeding activities need to be continually examined at CAHA. These include beach driving, village light pollution and campfire activity. It is also essential to make sure no NPS facility is producing light pollution. NPS needs to work with Park concessionaires to reduce nighttime lights. In the future it is hoped that a portion of the concessionaire franchise fees may be used to help fishing piers purchase “turtle friendly” lights. Staff has met with Cape Hatteras Electric Membership about their interest in reducing light pollution at Hatteras Island beachfront development. They are presently investigating compatible options for security lighting provided to private residences. The Membership also plans to create educational materials for distribution. Partnerships such as these should be encouraged.

The presence of artificial dune lines along the Seashore inhibits natural overwash processes. The resulting narrow beaches leave limited turtle nesting habitat. Hurricane Isabel pushed back the artificial dune line in many places creating a broader beach and thus more nesting habitat. Quality habitat will not develop in areas where North Carolina Department of Transportation (NCDOT) continues to rebuild and maintain the existing dunes for Highway 12 protection. The NPS continues to support transportation alternatives that will allow natural processes to occur.

Efforts to document threatened and endangered sea turtle strandings need to continue. Sick and injured animals rescued are often successfully rehabilitated. Valuable information is also collected from dead stranded sea turtles and made available to other Federal and State agencies responsible for the protection and recovery of these species. Necropsies should be performed on as many turtles as possible in efforts to identify causes of death.

Submitted by:
Marcia Lyons, Resource Management Specialist
Cape Hatteras National Seashore
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Table 2. Relocated Nests at Cape Hatteras National Seashore 2004

		Total for CAHA	
Relocated nests		18	36%
	B/C Tide	16	
	B/C Pier	2	
Non-relocated nests		32	64%
Total		50	
		HATTERAS ISLAND	
Relocated nests		18	46%
Non-relocated nests		21	54%
Total		39	
		OCRACOKE ISLAND	
Relocated nests		0	0%
Non-relocated nests		10	100%
Total		10	
		BODIE ISLAND	
Relocated nests		0	0%

Non-relocated nests	1	100%
Total	1	

Table 3 . Hatch Success at Cape Hatteras National Seashore 2004

	# of Nests	Hatch Success (%)
Hatched Nests	21	72.8%
	# of Eggs	
Number of Known Eggs Hatched	1870	
Number of Hatchlings Emerged	1609	
Lost Nests	29	0.0%
Hurricane Alex	20	
Other Storm/Tide Events	9	
Combined Season Total	50	30.5%

*note the 51 live loggerheads in nest that hatched but did not emerge (counted as lost nest under other storm/tide events)

Table 4. Number of False Crawls by Area Type Cape Hatteras National Seashore 2004

Area Type	# of False Crawls
ORV use	45
Day use	15
Village	9
Other	9
Total	78

ORV use - beaches opened to off road vehicles

Day use - beaches adjacent to day use parking lots (also used after dark)

Village - beaches bordering village development

Other - beaches on which there is not a high volume of human activity

Table 5. Sea Turtle Strandings
Cape Hatteras National Seashore 1996-2004

Year	Stranding	Species Composition*					Location	
	Totals	CC	LK	CM	DC	uk	Oceanside	Soundside
1996	47	26	8	10	3			
1997	98	64	17	10	3	4	62	36
1998	85	45	25	12	2	1	53	32
1999	226	149	55	22	0	0	138	88
2000	332	226	31	43	2	2	245	87
2001	69	41	11	11	4	2	46	23
2002	93	52	10	30	0	1	50	43
2003	109	87	8	11	2	1	88	21
2004	97	35	10	42	4	6	44	53

CC = Loggerhead
LK = Kemp's ridley
CM = Green
DC = Leatherback
uk = unknown

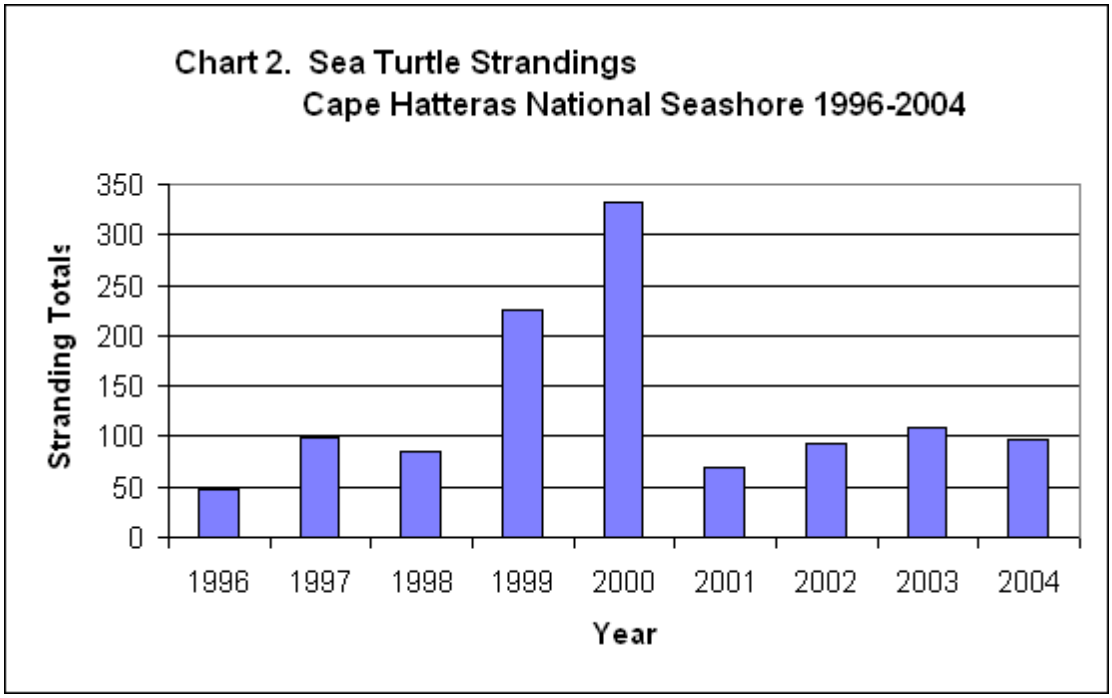

Table 6. Sea Turtle Strandings by Month
Cape Hatteras National Seashore 2004

Month	Number of Strandings
January	9
February	2
March	6
April	5
May	1
June	3
July	3
August	9
September	9
October	7
November	26
December	18
Total	97

Table7. Tagged Sea Turtles Found at CAHA in 2004

Date Found	Species	Location	Metal Tag #	PIT Tag #	Tag Information (if known)
1/09/03	CC	Ocracoke Inlet, Ocracoke Is.	RRF696; RRF695	43122F5A3A	Core Sound,NC
1/31/03	CC	Hatteras Inlet, Hatteras Is.	RRF496		Core Sound,NC
6/22/03	CC	1.5 mi. NE of Ramp 49, Frisco	A9864		Madeira Islands
6/30/03	CC	Ramp 49, Frisco	XXN469; XXN468		Core Sound,NC
1/11/04	CC	Ocracoke Inlet, Ocracoke Is.		RBS181	NMFS, Beaufort, NC, 12/4/03
3/12/04	CC	north of Buxton village	RRE975; RRE974		

6/18/04	DC	Oregon Inlet, Bodie Island	20936;20680		
11/16/04	LK	Hatteras Inlet, Ocracoke Is.		452A13422F	NMFS, Beaufort, NC, 11/03