

CAPE HATTERAS NATIONAL SEASHORE

2006 SEA TURTLE ANNUAL REPORT



National Park Service
Cape Hatteras National Seashore
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INTRODUCTION

Five species of sea turtles are found at Cape Hatteras National Seashore (CAHA) – the leatherback (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricate*), Kemp’s ridley (*Lepidochelys kempi*), loggerhead (*Caretta caretta*) and green (*Chelonia mydas*). In the 1970’s, the leatherback, Kemp’s ridley and hawksbill were listed under the Federal Endangered Species Act as endangered and the loggerhead as threatened. The green, listed on July 28, 1978, is designated as threatened in its entire range except in the breeding populations in Florida and on Mexico’s Pacific coast, where it is listed as endangered.

Non-breeding sea turtles can be found in the nearby waters during much of the year. CAHA lies near the extreme northern limit of nesting for three of the five sea turtle species including: the loggerhead, green, and leatherback; the loggerheads being the most common. Nest numbers have fluctuated greatly within the last 20 years with only 11 nests documented in 1987, and a maximum of 99 nests documented in 2002. The Kemp’s ridley and hawksbill are not known to nest at CAHA, but are known to occur here through the occasional stranding.

The beaches of CAHA have been consistently monitored since 1987. CAHA follows management guidelines defined by the North Carolina Wildlife Resources Commission (NCWRC) in the *Handbook for Sea Turtle Volunteers in North Carolina*. The quality of surveys has improved over time and has developed into the current standardized protocols. Each year data has been collected and analyzed to gain a better understanding of sea turtle use within CAHA. This report summarizes the monitoring and results for 2006.

COOPERATING AGENCIES

CAHA cooperates with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) on sea turtle protection. All original stranding reports and annual nesting activity reports are submitted to the North Carolina Sea Turtle Program Coordinator at the NCWRC. An annual permit is issued to CAHA by NCWRC under the authority of the FWS for the possession and disposition of stranded marine turtles and relocation of nests.

SITE DESCRIPTION

CAHA is located along the northern Outer Banks region of North Carolina. Consisting of more than 30,000 acres distributed along approximately 64 miles of shoreline, it is part of a dynamic barrier island system. Federal ownership in CAHA extends from ocean to sound across three barrier islands—Ocracoke, Hatteras, and Bodie—spanning Dare and Hyde counties. The former U.S. Coast Guard housing area in Buxton and eight village enclaves are excluded from CAHA boundaries. The villages include Rodanthe, Waves, Salvo, Avon, Buxton, Frisco, and Hatteras on Hatteras Island and Ocracoke on Ocracoke Island. On the oceanside of the villages, federal ownership was established as a 500-foot

strip measured landward from the mean low water at the time of acquisition. Fishing piers located in Rodanthe, Avon, and Frisco are operated as park concessions. The 5,880-acre Pea Island National Wildlife Refuge, located at the northern end of Hatteras Island, is part of CAHA, but administered for refuge purposes by the FWS.

METHODS

Ocean beaches of CAHA were patrolled daily from May 15 to September 15 in search of turtle crawls and nesting activity. After September 15, the beaches were surveyed two to three times a week for possible late nests and/or hatchling emergence events from possible missed nests through November 15. Volunteers in the Park (VIP'S) and park staff monitored approximately 55 miles of beach covering Bodie, Hatteras, and Ocracoke Islands. For purposes of sea turtle management, Bodie Island District covered from Ramp 1 to Ramp 30; Hatteras District from Ramp 30 south to Hatteras Inlet on the north side; and Ocracoke District from the south side of Hatteras Inlet south to Ocracoke Inlet. Efforts began early in the morning so that all beaches had been patrolled by no later than 12:00 p.m.

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, relocation was confined to nests that were threatened with loss from erosion; nests laid below the high tideline that would receive frequent tidal inundation; and nests laid within a mile of a fishing pier. Nests were considered confirmed when the egg cavity with eggs was located. There were a few situations where eggs were believed to be present (based on presence of primary and secondary body pits) but could not be found. Rather than abandoning the site because staff could not locate eggs (recognizing the possibility of human error), the activity was categorized as a "dig" but treated as a nest. GPS coordinates were recorded for all turtle activities. A transponder ball was buried at a set distance and depth in front of all nests and "dig" sites. A series of three PVC posts were placed in line with and behind the nest with measurement distances recorded. The nest site was protected with four 2"x2" wooden posts with signs stating the area was closed to entry for a sea turtle nest and should not be disturbed. String with flagging was placed between the sign posts and the area was monitored for signs of violations and/or predation.

At day 50-55 of the incubation cycle, the closure was expanded to encompass the area 50 feet duneward of the nest site down to the tideline. Width of the closures (running parallel to the shoreline) varied from 75/150/350 feet, depending on type and levels of recreational use on that particular beach. For example, a nest on a remote beach would receive a closure of 75 feet in width; a nest in a heavy pedestrian use area such as a village would be 150 feet in width; and a nest in an off road vehicle (ORV) area would be 350 feet in width. If a nest was located on a beach open to ORV use, large signs were posted to notify drivers that the established closure included the shoreline at all tides. When possible, an ORV corridor was maintained duneward of the nest. Reflective arrows and detour signs were clearly posted to alert drivers of the change in traffic

pattern. If a nest was laid high up on the beach or in the dunes and did not allow for traffic to be detoured around it, the beach was completely closed from dune to the surf as well as for a width of 350 feet. The perimeter of the closure was 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 through weekly access reports published by the park. The reports were posted at visitor centers and ramps and distributed to the local tackle shops. Many of the local fishing and ORV groups also posted this information on their fishing web boards. Within the closure 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).

As hatchlings can become disorientated by artificial light, silt fencing was used at all nest sites prepared for hatching to block any sources of light pollution from nearby villages or ORV’s operating with headlights after dark. The fencing was placed in a “U” shape behind the nest and extended oceanward to the high tide line. Sites were then checked on a daily basis for hatching events. Most nests hatched during the evening/night hours either in one event (i.e. “boil”) 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. In cases where hatching events or dates were unknown, nest cavities were unearthed 80-90 days after the laying date. Hatching closures were promptly removed after nest excavations.

All species of sea turtles that strand on CAHA are documented in cooperation with the NCWRC and the National Marine Fisheries Service (NMFS). Handling and collection permits are issued to the park by the NCWRC and all reports are submitted to them within 24 hours of a stranding event. Live animals are transported to a permitted rehabilitation facility for immediate care. A stranding report is completed for each animal documenting such information as species, condition, sex, carapace measurements, tags, wounds or abnormalities, and evidence of fishing gear entanglement or other possible causes leading to injury or death. Photos of each stranding are taken as frequently as possible. Samples were collected from some of the strandings for an ongoing DNA and aging study. Flippers, eyes and muscle tissues were collected from select individuals and were eventually transferred to the NMFS Beaufort laboratory.

RESULTS

Nesting

Sea turtle nest numbers encountered at CAHA vary from year to year. The yearly nest numbers used in this report were taken from the turtle database and may vary from the numbers stated in previous year’s annual reports (Figure 1). This variation is a result of possible data management and quality assurance process deficiencies in past years. The first recorded nesting activity for the 2006 season occurred on Ocracoke Island with two nests laid on May 18. The last recorded nest laid was on September 11, also on Ocracoke Island. The 2006 nesting season lasted for 117 days. A total of 149 activities were

documented of which 76 were confirmed nests, eight were digs, and 65 were false crawls (Table 1). Two species were known to have nested within the park with a total of 72 loggerhead nests and four green nests. There were no leatherback nests documented in 2005 or 2006. Twenty-three nests and digs were lost to storm activity either before hatching or before a post-hatching excavation could take place to confirm species and egg numbers.

Figure 1. Cape Hatteras National Seashore sea turtle nest numbers from 1987-2006.

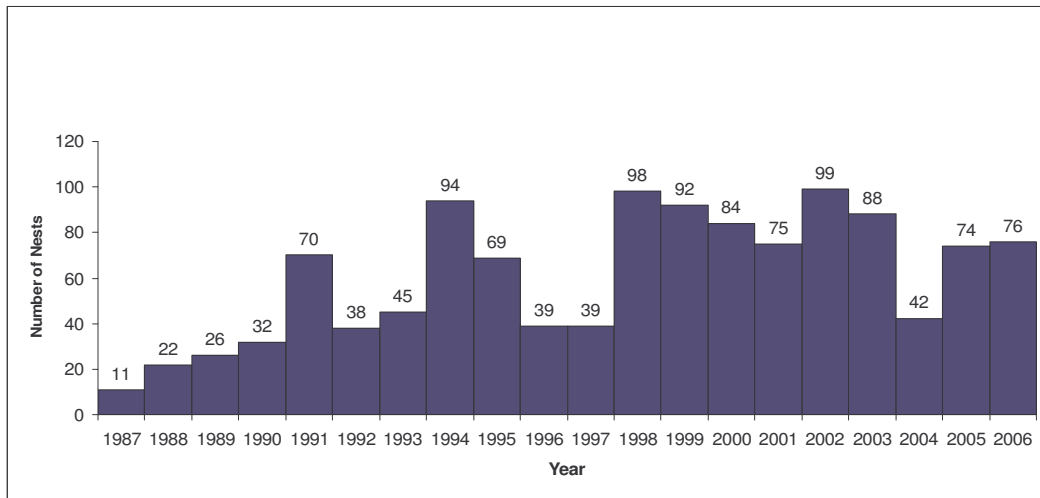
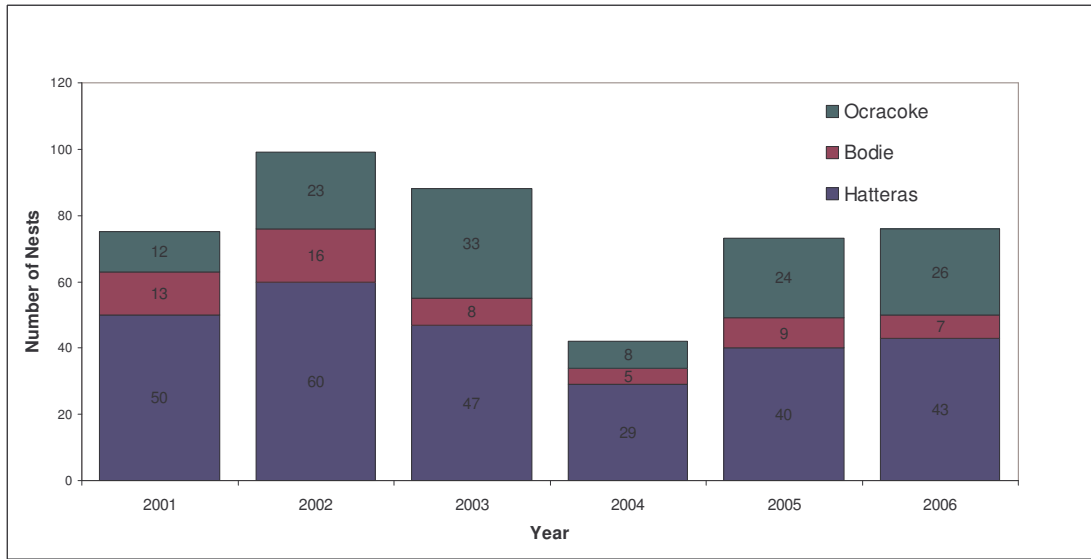


Table 1. Nest activity by district in 2006.

	Bodie Island	Hatteras Island	Ocracoke Island	CAHA Total
Nests	7	43	26	76
Digs	1	2	5	8
False Crawls	5	24	36	65

The total number of nests encountered in each district in 2006 was very similar to the total number in each district in 2005 (Figure 2). Of the confirmed nests found this season, 43 (57%) were found in Hatteras District, 26 (34%) were found in Ocracoke District, and seven (9%) were found in Bodie Island District. For maps of all turtle nests and false crawls refer to Appendix A. Thirty nests (39%) were found in ORV areas, 15 (20%) were fronting villages, and 31 (41%) were in locations only accessible by foot.

Figure 2. Nest numbers by district from 2001-2006.



Hatching

Follow-up of nesting activity involved observing nest and dig sites for signs of hatching, recording relevant data, and excavating the site. For management purposes, digs were treated similar to nests, however, for analysis purposes, digs in this report were treated as false crawls. Nests were excavated no earlier than 72 hours post-hatching. The last nest was excavated on November 20. Fifty-three (70%) of the 76 known nests hatched. The average clutch size was 114.8 eggs (average calculated from 62 nests with known clutch size). The average clutch size was calculated using information collected during relocations (pre-hatching) and nest excavations (post-hatching). Excavations could not be conducted for all nests because some nests were lost during storms and for other nests clutch size could not be determined because the nest was relocated as it was washing out. It took an average of 62.9 days to incubate (average calculated from 44 nests with known lay and emergence dates). Some emergences may have gone undetected because of low emergence rates or the hatch may have gone undetected as a result of rain erasing hatching tracks. A total of 7059 eggs were excavated post hatching and 4444 of these eggs produced hatchlings that emerged from the nests on their own (Table 2). An additional 241 live hatchlings were discovered during nest excavations and were released on site. The emergence success was 63%, the highest for any nest being 99% and lowest 0%. Nest sites that were lost to storm events before a confirmed hatching event were recorded as having a 0% hatching success if lost before the nest was in its hatching window. If a nest was lost and had been expanded for hatching (day 50-55 of incubation) the hatching and emergence success was considered to be unknown. For detailed information regarding specific numbers, dates and locations refer to Appendix B for nests and Appendix C for false crawls.

Table 2. Sea turtle hatch summary 2001-2006.

Year	Nests	Avg. Clutch	Ave. Incub. (days)	Eggs	Emerged	EMR %
2001	75	111.7	64.5	6257	3402	54%
2002	99	108.7	58.6	10108	7201	71%
2003	88	115.7	69.1	4627	2708	58%
2004	42	103.4	58.5	2999	1609	53%
2005	73	114.6	58.0	6072	4142	68%
2006	76	114.8	62.9	7059	4444	63%

Tropical Storms Alberto and Ernesto and Hurricane Florence along with spring tides and a strong November nor'easter had a great impact on the 2006 nesting season. A total of 23 nests were lost or failed to hatch due to flooding, sand deposition or erosion from storm activity. Three nests were relocated as eggs were discovered physically washing out of the nest chamber. The last nest of the 2006 breeding season to be laid in the park, located on Ocracoke Island, was completely lost to erosion during a large nor'easter moving through the state November 21-25, 2006.

Of the 76 nests, 60 (79%) were protected at the original nest site and 16 (21%) were relocated (Table 3). Nests were relocated in all districts. A total of 1867 eggs were relocated and 953 hatchlings emerged for an emergence rate of 51% for relocated nests. The emergence rate for non-relocated nests was 67%. The highest number of relocations took place in the Hatteras District with 13 (30%) of the total 43 nests moved. Two (8%) of 26 nests were relocated on Ocracoke and one (14%) of seven nests was relocated in the Bodie Island District. Of the 16 relocated nests, 12 (75%) were moved because of natural factors such as being laid at or below the high tide line or due to erosion. Three of these were relocated late in their incubation cycle (after eggs were discovered to be physically washing out of the nest chamber). Two of these nests still produced hatchlings even though they were relocated on days 43 and 44. Four (25%) were moved due to potential effects from fishing piers.

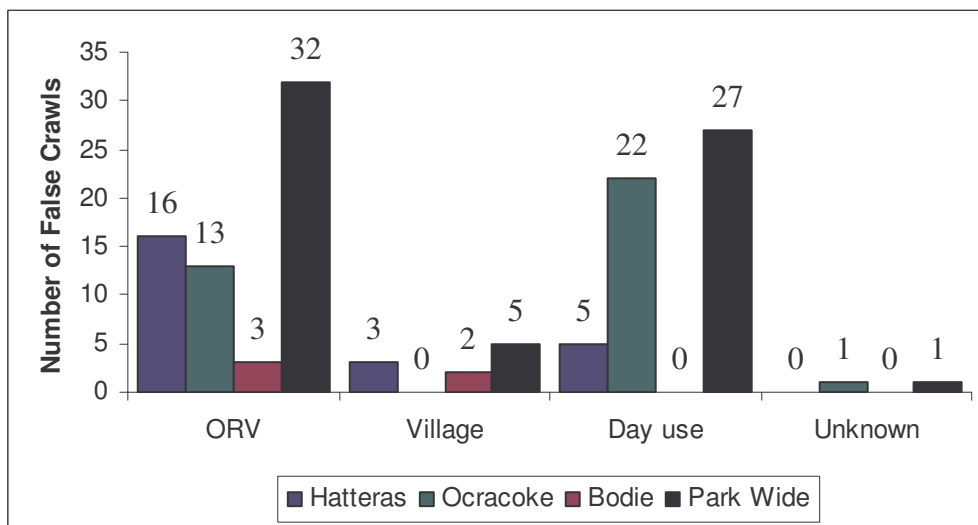
Table 3. Relocated nests at CAHA in 2006.

	Bodie	Hatteras	Ocracoke	Total
Non-relocated nests	6	30	24	60
Relocated nests	1	13	2	16
Total	7	43	26	76

False Crawls

Sixty-five false crawls or aborted nesting attempts were recorded for the 2006 breeding season (Table 1). False crawls account for 44% of the total turtle activities within the park. Twenty-four (37%) false crawls occurred in Hatteras District, 36 (55%) occurred in Ocracoke District and five (8%) occurred in Bodie Island District. Loggerheads accounted for 60 (92%) of the total false crawls and the remaining five (8%) were identified as greens. Of the 65 false crawls, 32 (49%) were located in ORV areas, five (8%) were located fronting village areas, 27 (42%) were in areas only accessible by foot, and one (1%) was classified unknown (data missing) (Figure 3).

Figure 3. False crawls by district and area in 2006



Closure Violations

Park Resource Management staff documented violations at turtle closures throughout the nesting and hatching seasons. A total of 23 ORV, 14 pedestrian and 22 dog incursions were recorded for the 2006 season park wide. Entry into a nesting area would require people to pass under or drive through flagged string tied between signed posts. These numbers are conservative estimates as actual number of vehicles, people or animals could not always be determined. Footprints and tracks were often recorded as a single illegal entry when an undeterminable amount of tracks had been through the area representing multiple violations.

There were three documented cases of pedestrians entering and digging at a nest site. All attempts to locate eggs failed and nest cavities remained undisturbed. There were seven incidents of vandalism recorded, where pedestrians physically removed protective sign posts and/or PVC locator pipes from a nest area. Forty-four cases of illegal fireworks near nesting sites were documented.

Strandings

In 2006, 75 stranded sea turtles were documented along the beaches and soundside shoreline (Table 4, Figure 4). Sixty-five of the stranded turtle were located on ocean beaches and 10 were found on the soundside shoreline. The majority of the strandings were found on Hatteras Island where 44 (59%) strandings were documented. Bodie Island documented seven (9%) turtle strandings and Ocracoke had 24 (32%). Park wide, 45 (60%) were identified as loggerhead, 11 (15%) were Kemp's ridley, 16 (21%) were green, 2 (3%) were leatherback, and one (1%) was not identifiable.

Table 4. Sea turtle strandings at CAHA from 1996-2006.

Year	Stranding Totals	Species Composition*						Location	
		CC	LK	CM	DC	EI	unk	Oceanside	Soundside
1996	47	26	8	10	3	0	0		
1997	98	64	17	10	3	0	4	62	36
1998	85	45	25	12	2	0	1	53	32
1999	226	149	55	22	0	0	0	138	88
2000	332	226	31	43	2	0	2	245	87
2001	69	41	11	11	4	1	2	46	23
2002	93	52	10	30	0	0	1	50	43
2003	109	87	8	11	2	1	1	88	21
2004	97	35	10	42	4	0	6	44	53
2005	63	33	3	20	1	2	4	42	21
2006	75	45	11	16	2	0	1	65	10

CC = Loggerhead

LK = Kemp's ridley

CM = Green

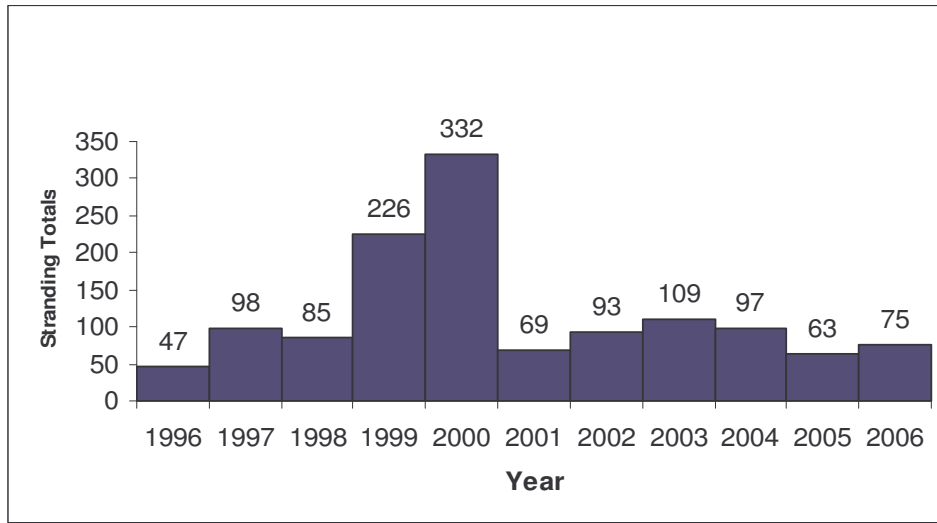
DC = Leatherback

EI = Hawksbill

uk = unknown

* Initials are based on species scientific (Latin) name, not common name

Figure 4. Sea turtle stranding at CAHA from 1996-2006.



Seventy-three turtles (97%) were dead when found. Cause of death in most cases was unknown. The highest amount of strandings occurred in the month of June, when 15 turtles were documented (Table 5). Injuries and abnormalities were recorded on each stranding report. Three turtles had propeller wounds, seven had carapace damage (including one completely cut in half), eleven were missing flippers, five were missing heads and one exhibited scars indicative of entanglement. The remaining turtles showed no apparent cause of death. All or parts of 16 turtles were salvaged for NOAA Fisheries researchers.

Table 5. Monthly totals of sea turtle strandings at CAHA in 2006.

Month	Number of Strandings
January	6
February	0
March	0
April	2
May	8
June	15
July	4
August	6
September	10
October	8
November	11
December	5
Total	75

All turtles were scanned for Passive Integrated Transponder (PIT) tags. PIT and metal tags were found in one Kemp's ridley and metal tags were found on one loggerhead (Table 6).

Table 6. Tagged sea turtles found at CAHA in 2006

Date Found	Species	Location	Metal Tag #	PIT Tag #	Tag Information (if known)
28-May-06	CC	0.1 m N of R30	XXX387; XXX388	none	none
2-Oct-06	LK	soundside at Hatteras Inlet	XXP553; XXP5?5	43143EOB4D	none

DISCUSSION

Storm Activity

Loss of nests to storm activity continues to negatively impact hatch success. While Cape Hatteras was spared from the full force of a hurricane this season, the beaches felt the effects of many tropical storms and hurricanes as they passed by off-shore. A total of 23 nests were either physically lost to heavy seas or drowned by flooding tides.

Predation

Nests were spared from fox predation in the 2006 season. This is the third year in a row that turtle nests have not been the target of red fox. Trapping efforts by the USDA that began in 2002 have greatly reduced this threat for Bodie and Hatteras Islands. This years trapping effort occurred for a two week time period in the month of June and resulted in the removal of four red fox and three grey fox from CAHA, all from Bodie Island. A fox sighting was reported by park staff at the Cape Point Salt Pond; however trappers were not able to confirm any evidence of the animal's presence. Since trapping was initiated in 2002, 58 red fox, 27 grey fox, 99 raccoon, 21 Virginia opossum, seven feral cats, and one feral dog have been removed from within the park boundaries.

Loss of eggs and hatchlings to ghost crabs continue to be documented. At least 10 nests were recorded as having either ghost crab holes burrowed deep into the nest cavity and/or eggshell fragments found on top of the sand in association with crab tracks. Night nestwatch volunteers documented ghost crab activity at six of the 14 nests where volunteers were stationed during the turtle hatching season. An undeterminable number of eggs and hatchlings are lost to ghost crabs each year.

Leatherback Turtles

There were no leatherback nests documented in 2005 or 2006. Leatherback nests have been found at Cape Hatteras in 1998, 2000, 2002, 2003 and 2004. The presence of a leatherback nest in 2003 confirmed that more than one female of the species had been using CAHA as a nesting ground, since the species has a minimum of two years between

nesting cycles. In addition, leatherback nesting was recorded at Cape Lookout National Seashore on the same night as nesting at Cape Hatteras National Seashore in 2004. This provided strong evidence that more than one female was nesting in North Carolina in that season. CAHA remains the northernmost nesting location on record for the species (Rabon et al. 2004).

Human Disturbance

It is unknown to what extent human activities disrupt nesting activities. Although the seashore remains open to the public 24 hours a day, park staff is not available around the clock to safeguard and monitor CAHA's natural resources. The resource management division continues to receive disturbance reports of nesting female turtles from park visitors. For example, in the 2006 nesting season a visitor came to the Buxton District Office after sunset to report a turtle that had come to shore and was attempting to lay a nest in the Ramp 44 area. The individual stated that the turtle had been surrounded by ORVs with their lights shining on her and there were people out on the beach near her. A law enforcement ranger was called to respond to the incident. Two resource management staff also responded to the incident. By the time park staff arrived on scene, the turtle was gone and the ORVs had dispersed. Staff was unable to identify the location of the incident in the dark or find any signs of the turtle's crawl. The activity remains an unconfirmed report and was not documented for analysis in this report.

In another incident, morning turtle patrol came upon what were the barely visible remains of a turtle crawl from the previous night in a high density visitor use location. Small portions of the crawl could be distinguished amongst heavy pedestrian and ORV tracks. Without the full crawl visible it was hard to determine if any nesting activity had occurred. Park users in the vicinity of the crawl were approached to see if they had been present when the turtle came to shore the previous night. Several people were and while their reports varied, they all seemed to conclude that the turtle returned to the ocean without laying any eggs. In a similar incident, a nest laid in one of the villages went undetected. Pedestrian traffic had unknowingly obliterated the crawl before turtle patrol could survey the area. The nest was only discovered after it had hatched and turtle hatchlings, misorientated by village lights, were found under nearby beach cottages.

Artificial light is known to disturb nesting females and can disorient hatchlings. Outdoor, as well as unshaded indoor lights outshine the natural glow of the moonlight on the ocean waves misguiding hatchlings away from the sea as well as possibly deterring nesting females. In one documented case, all the emerging hatchlings went to the back of the filter fence (instead of to the ocean). Upon reaching the filter fence they were directed back to the ocean by the filter fence. No problems with hatchlings becoming entangled in the filter fencing were documented in 2006.

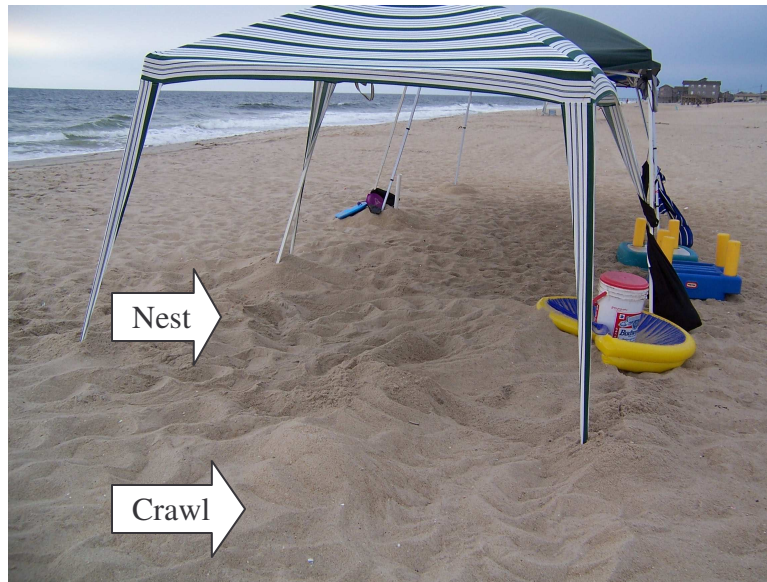
The park began utilizing fencing to deflect sources of artificial lights at a limited number of turtle nests sites on village and ORV beaches in 1998 in order to protect emerging hatchlings. By 2003, staff felt it was necessary for all nest sites within Bodie Island District and Hatteras District to be protected with fencing. Recent beach and dune erosion along Highway 12 on Ocracoke has opened up areas of what used to be

considered “remote” beaches to light pollution from passing vehicles, again necessitating the use of filter fencing. As of 2005, all turtle nests within their hatching window receive filter fence treatment.

Filter fencing is a high maintenance and costly response to lighting issues. Fencing is often washed out by incoming tides, buried by winds and/or completely uprooted by storm activity. Nest sites in their hatching window are checked and maintained daily; however, this does not help hatchlings at nest sites where the filter fence has been knocked down during the night. Hatchlings may become entangled in the fencing if it is not properly maintained. The park will continue to use the filter fencing until a better option is identified.

Beach fires are another potential hazard to nesting turtles. On August 9 an adult turtle crawl was discovered going into the coals of a beach fire in front of one of the villages. These pits often contain charred wood/lumber, cans, nails and broken glass and are a hazard to visitors as well as turtles.

Many park visitors, especially in front of the villages, leave their recreational beach equipment and chairs or loungers on the beach overnight. This equipment and furniture can cause turtles to forgo egg laying by hampering or trapping animals attempting to locate a nesting site (NMFS, USFWS 1991). While conducting an early morning patrol, NPS staff discovered a nest that had been laid by a turtle under a beach canopy surrounded by recreational beach equipment (see picture below). The nesting attempt was fortunately successful and the turtle returned to the ocean unharmed. This is the sixth season that resource management staff has tied notices to personal property found on the beach after dawn, advising owners of the threats to nesting sea turtles as well as safety issues and NPS regulations regarding abandoned property. The date and time items are tagged is clearly written on each tag. Items left on the beach 24 hours after tagging are removed by NPS staff. Not all tagged items are removed within 24 hours as staff patrolling on ATVs cannot safely remove the property from the beach. At other times, not all abandoned property can be removed because of the abundance encountered and staff availability.



Turtle nest laid under canopy left on beach over night.

Beaches fronting villages are closed to ORV use in the summer months to provide for the safety of an increased pedestrian population. While many of these beaches are wide enough to support sea turtle nesting, problems that come with the high density of human activity make these beaches less than optimal nesting sites. With an increase in visitor use, the potential of human disturbance of nesting turtles increases. There are concerns that turtles may be deterred from nesting on beaches of their first choice and forced to lay eggs at a less optimal site.

Education

Volunteer nest sitters have spent numerous hours from early evening and into the night at nests within their hatching window fronting villages. They take this opportunity to talk with and educate the numerous visitors who are vacationing at the beach about the turtle program and how they can help the programs success. Many visitors become so excited about the possibility of seeing a turtle nest hatch that often times a volunteer may have groups of 20-30 people sitting quietly at a nest site with them. If the nest doesn't hatch many of visitors return the next night and the next until either the nest hatches or their vacation ends. The VIP nest sitting program is relatively new for the park and appears to be successful as an educational and stewardship effort. One dedicated volunteer made over 500 visitor contacts alone during a couple of months in the hatching season.

In addition, the resource management and interpretation departments have combined educational efforts at nest excavations. Some excavations were officially advertised at the Visitor Centers with the date, place and time set; while others were more informal, relying on the curiosity of by-passers. The latter was more conducive to excavations taking place in the villages where the beaches were typically busy. This again provided visitors with a positive "once in a life time" park experience. Between the night nest volunteers and having an interpretive ranger present at excavations, over 800 visitor contacts were made and 300+ brochures were distributed.

Strandings

During much of the year, non-breeding sea turtles can be found in nearby waters, especially inshore sounds. Their presence within park boundaries is usually documented as a stranding. A stranded turtle is a non-nesting turtle that comes to shore either dead, sick or injured. Much can be learned about sea turtle biology and life history through the documentation of such stranding events. This information also assists regulatory agencies in implementing and modifying conservation measures for protection of the species.

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