

2000 SEA TURTLE SUMMARY BREEDING AND STRANDING ACTIVITIES CAPE HATTERAS NATIONAL SEASHORE

Part 1 - Breeding Activity

Cape Hatteras National Seashore (CAHA) beaches were patrolled daily between June 1 and August 28, 2000 in search of turtle crawls. Park volunteers, Student Conservation Association volunteers and Park staff conducted patrols. Approximately 55 miles were monitored each day on Bodie, Hatteras and Ocracoke Islands.

Nest Composition and Distribution

Eighty-four confirmed nests were located in 2000 (Table 1). Sixty-two nests (74%) were found on Hatteras Island, twenty-two (26%) of the nests were located on Ocracoke Island and no nests were found on Bodie Island (Table 2). Hatteras Island had one less recorded nest than last season, Ocracoke Island had six less nests, and Bodie had one less nest (none in 2000). The first known nest of the season was unusually early occurring on April 16. This was laid by a leatherback turtle, an extremely rare nester at this latitude. Normal nesting activity began on May 23 and the last nest was laid on August 24. This season was the forth-highest season on record since extensive monitoring began in 1987 (Chart 1, Table 3).

Three species of sea turtle were known to have nested on CAHA beaches in 2000. These included 77 loggerhead nests (*Caretta caretta*), four green nests (*Chelonia mydas*), and three leatherback nests (*Dermochelys coriacea*) (Table 1). This is the sixth year green turtle nests were recorded in the Seashore in the past twenty years. Leatherback nesting at Cape Hatteras National Seashore was first documented in 1998. The animal nesting this season may have been the same individual as in 1998 since leatherbacks nest in alternate years. Two of the three leatherback nests at CAHA as well as one found at nearby Cape Lookout National Seashore (CALO) were laid nine or ten days apart (June 11, 20 and 29). This is the expected interval between egg laying events for a leatherback female in a given breeding season.

Nests were documented by patrols surveying the beaches beginning at dawn each day. However in four instances, visitors informed park staff of unrecorded nests. On one occasion, visitors reported a nest that was unearthed by erosion near Ramp 55. In the second incident, visitors found a nest unearthed partially by the tide and by what appeared to be a dog south of Cape Point. In the third case a nest was reported that had been overlooked on the previous day. A fourth nest was reported when hatchlings were observed by visitors on the beach one afternoon near Ramp 49. When staff arrived 27 hatchlings had entered the ocean and the remaining 59 were collected from the nest to be released at dark. These four nests may have been missed due to human error, erased by wind driven sands or obscured by human activities such as off-road vehicle (ORV) traffic.

Treatment

Beaches used for most nest relocations were 1) Hatteras Lighthouse beach and 2) Haul Over Ocean beach. Several nests, however, were relocated in areas other than the above locations closer to the original nest sites. In general nest relocation was confined to nests that might be threatened by erosion or overwash.

In a situation where eggs were believed present 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 treated exactly like nest sites, with all information recorded, poles labeled, and transponders inserted underground. A total of 11 digs were recorded. Six of these digs were later confirmed to be nests. It is unknown if the remaining five digs were nests or false crawls. Erosion or sand deposition altered the sites, making confirmation difficult or impossible. It should be noted that the dig sites which yielded nests are included in the nest numbers and calculations, and the digs which were unknown were kept in the dig category and not included in overall nest numbers or calculations.

Sixty nests (71%) were protected at the original site where found and 24 (29%) were relocated (Table 2). More specifically, 21 nests (34%) were relocated on Hatteras Island and three (14%) on Ocracoke Island (Table 2). Of the 24 relocated nests, 16 (66%) were moved because of environmental factors, four (17%) due to potential human disturbance, and four (17%) because both human and natural factors threatened the nest. Nests were relocated due to high erosion rates, close proximity to the tide line or to an unstable, escarped dune line. Many beaches in the Seashore are narrowing since the artificial dune line is preventing natural overwash which would create additional beach habitat. The Park attempted to leave nests in place, even within ORV areas, if the site appeared to be suitable habitat. One nest at Cape Point was relocated solely due to heavy ORV traffic. A common human factor causing relocation occurs when nests are located within a mile of a fishing pier. Piers emit light pollution attracting hatchlings which fall prey to fish which congregate near piers. The resource management division has submitted recommendations to the superintendent that would decrease light pollution generated by the three fishing piers. The piers are concessions in the park and operate under permits. Park Concessions Specialist stated that new permits should be issued in a year, in which lighting modifications will be addressed. Another artificial structure causing relocation when nests are laid near is the groins in Buxton. The beaches around the groins are very susceptible to sudden shoreline changes

Hatching Success

All nests were examined 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, nests cavities would be unearthed 80-90 days after the laying date. The total known eggs laid were 7,701. A total of 4,984 known eggs hatched. Of these, 4,756 hatchlings emerged from the nest cavities. The season's overall hatching success at CAHA in 2000 was 62% (Table 4). Individual nest success ranged from 0% to 99%.

Special note should be made of the rare leatherback nests. Of the three nests laid by this species, no eggs developed in the earliest nest laid in April. Eighty-four per cent of the eggs hatched from the second nest. The final nest rate was undetermined since eggs could not be found during final nest examination. CALO's leatherback nest did not hatch though some eggs had partially developed.

Overall in CAHA, relocated nests had a 78% hatch success while non-relocated nests had a 53% hatch success rate (Table 4). More specifically, Hatteras Island had a 78% hatch rate for relocated nests, and 52% for non-relocated nests. Ocracoke had a 79% hatch rate for relocated nests and 56% for nests in their original location. It is vital to state that the low percentages are not directly related to the relocation of nests, and these percentages are not to suggest that relocating nests increases hatching success. Hatch rates could most often be correlated with frequency of overwash and/or sand deposition.

Nest Protection

Designated relocation areas, containing several nests each were posted along their perimeters. Any single nest left in place or moved to a site other than one of the established relocation areas was protected by an approximately 30'x 30' posted closure during the incubation period. Fifty-five days into incubation, these small closures were expanded to the surf line and to a width of 150' or 300' parallel to shoreline. The width was narrowest near village or day use areas and widest in ORV sites. Opposite to the surfline on the upper end of the enclosure, 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. In several cases silt fence was used behind nests nearing hatching dates. Fencing was used to block light pollution from villages, as an added safeguard in ORV areas or, on Ocracoke Island, to protect hatchlings emerging close to Highway 12. 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. There were 19 of these partial closures in ORV beaches. Once ORV tracks became well established along the detour route, compliance was high. Pedestrians often walked through the closures along the ocean's edge but footprints were seldom seen above the tide line. Signs were removed no earlier than 72 hours after hatching occurred, and after the excavation of the nest was completed.

In the 2000 season there were 16 nest sites requiring complete closures during the expected hatching period in ORV designated beaches. These complete closures closed all ORV traffic from dune to ocean at a width of 200'-300' parallel to shoreline. These temporary closures were necessary due to the nest location on the upper beach or on the dunes. There wasn't enough room behind the nests for ORV traffic to pass behind. These areas were well posted and large signs warned visitors at ORV ramps of no through traffic to the next ramp. Two of these sixteen nests were lost to erosion and therefore closures were not necessary. One nest was relocated due to erosion. Five nests between Ramp 23 and Ramp 27 were closed simultaneously because their expected hatch

dates overlapped. Overall there was a high compliance with this closure. In comparison there was lower compliance at two complete closures on the south beach near Ramp 49. Here at low tide ORVs passed through frequently and several incidents were recorded of trucks driving over the nest on the upper beach. Similarly three complete closures in the Ramp 72 area received low compliance. Both the Ramp 49 and Ramp 72 receive high ORV use whereas the Ramp 23/27 area has less ORV use. It should also be noted that with an increased use of signs and string, there is a higher compliance with enclosures.

In the past a relocation area located near mile 32 on Hatteras Island was maintained as a complete closure to traffic during the hatching period. This area was not used this year as most nests were not relocated or relocated nearby the original nest location. Based on recommendations made by the US Fish and Wildlife Service, an effort was made to leave nests in place.

Efforts were made to notify the public concerning 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 were given out with annual commercial fishing permits.

False Crawls

A total of ninety-eight false crawls were found during the 2000-breeding season (Table 5). Of these, forty (41%) were found in areas open to ORV use. Twenty-one false crawls (21%) were located in heavy day use areas such as lifeguard beaches and other sites serviced by parking lots. Eleven false crawls (11%) were on beaches adjacent to village development, and four (4%) were located in areas within one mile of a pier. It should be noted that the pier areas are also in the vicinity of village beaches, in Rodanthe, Avon, and Frisco, but were included in the pier data group. The remaining twenty-one (21%) were found on beaches which did not fall in the previous mentioned categories and thus had lower concentrations of human activity. The highest percentage of false crawls (85%) occurred on Hatteras Island.

Factors Influencing Nest Success

The dynamic nature of the seashore beaches affected many nests this year. Although spared of hurricanes this season, weather related events still took a toll on nests. Three low-pressure systems caused nest overwash, erosion, and sand deposition. On Memorial Day weekend storm tides inundated several early season nests. Two storms came back to back in late August and early September. Many nests were inundated at each high tide cycle. Eight nests on Hatteras Island and one nest on Ocracoke Island were completely lost to erosion. A total of ten nests received anywhere from 30 inches to 50 inches of sand deposition. The north beach nests of Hatteras Island received the most sand deposition. When inventories were attempted on these ten nests, eggs were not always located due to the depth of sand and thus hatch rates remained unknown. In cases where egg chambers were located, hatching occurred in only one nest. This particular nest was

covered by a foot of concrete like sand that hindered the emergence of some hatchlings found during the nest inventory. Nineteen trapped but energetic hatchlings released.

Incubation periods were often prolonged this year due to widespread cool temperatures. It is expected that lower temperatures will curtail egg development in late season nests, however ambient temperatures dropped earlier than normal especially in September and October. Most of the nests hatched later than the average 60 to 65 day period. Incubation periods extended several days to three weeks beyond estimated hatch dates. Two nests were known to have hatched during daylight hours, an uncommon occurrence. Low evening temperatures ranging between 50° and 55° F may have inhibited these hatchlings from emerging at night. Also contributing to cooler nest temperatures and prolonged incubation were the high frequency of rain during the summer and ocean overwash in the fall.

The park has little information on localized impacts of ghost crab predation. Though most hatching events took place without being monitored, three incidents of predation by ghost crab were observed.

Human Disturbance

It is unknown how often nesting attempts are aborted due to human disturbance. In the 2000 breeding season there was one reported incident where visitors disturbed a turtle. After spotting the animal from a vehicle, she was approached on foot. They said the turtle retreated into the ocean without laying eggs. Since there is an increase in many types of visitor use after dark, other cases of human disturbance likely occurred but went unreported. Beach campfires are common especially near the villages, day use areas, campgrounds and ORV ramps. These are a source of artificial light known to disturb nesting females and attract emerging hatchlings. Fires that were not permitted within Park regulations (relative to distance from dunes and tide line) were documented this summer. Numbers reveal the frequency of beach fires within the Seashore. Between June 24 and August 18, a total of 114 illegal campfires were documented on Hatteras Island and sixty on Ocracoke Island between July 1 and September 25. Campfire remains are a hazard to visitors as well as turtles. Large smoldering pits containing broken bottles were commonly left behind. Fireworks are sold locally and are commonly used, although illegal, on CAHA beaches. ORVs are permitted to operate on CAHA beaches after dark.

On five occasions, egg chambers were disturbed or attempted to be disturbed. On Hatteras Island, humans disturbed four nest areas and broke eggs. On the Avon Village beach visitors observed an egg laying adult. When staff investigated the nest, two eggs were broken on the surface and two eggs were just below the surface separate from the nest chamber. In the another case a Biological Technician discovered a nest on the south beach with a fishing pole holder placed into the nest to mark it. Unfortunately this marker broke an egg and there were also footprints left by those who observed the nesting turtle. The two remaining disturbances involved people digging in the sand within closed turtle areas on Rodanthe and Avon beaches. Similarly on Ocracoke Island, humans disturbed the sand covering a nest. No damage to the eggs or hatchlings was

found. These sites were clearly marked with signs. In two separate occasions, signs posted to protect nests were removed and left scattered on the beach. In one instance, strategically placed poles used to help staff relocate nest cavities were removed.

As previously discussed, many but not all beach drivers respected marked turtle areas (See Nest Protection). In total, 130 sets of vehicle tracks were noted within closures, often along the tide line. This is likely a conservative number since observers were not present at all sites at all times. Additionally, some tracks could have washed away with rising tides. ORVs drove through areas where signs clearly marked established detours behind the closures or stated no through traffic. Most ORVs drove in front of the nest areas during periods of low tide. Signs could not be placed at the low tide mark, since they would wash away with each incoming tide and accompanying waves. Signs placed at the high water mark did state the surf line was closed at all tides. There were at least nine documented incidents of vehicles breaking through the posted areas well above the high tide line. Five incidents were documented of ORVs driving directly over nests. There were twenty-eight cases reported of property damage to signs, posts and twine.

Most pedestrians respected the posted areas. Sixteen incidents of human tracks were recorded. In addition to these reports, moderate foot traffic was found in an Avon nest area. A trail in the dunes exited into the nest closure. Another closure north of Ramp 34 received some foot traffic coming from the dunes.

Artificial lights appeared to have misdirected some hatchlings in the area south of Cape Point in the vicinity of Ramp 45 and 49. At nest #7A, approximately ten hatchlings were rescued as they crawled in the wrong direction apparently drawn by lights from Frisco and Hatteras villages. Some of these hatchlings used traces of old ORV tracks leading towards the lights although tire ruts had been mechanically smoothed when the closure had been enlarged in preparation for hatching. Some had also crawled outside the protection of the posted closure into an active ORV site. Hatchlings from nest #42 went in all directions except towards the ocean. Tracks of some ended in tire ruts outside the closure. A dead hatchling was found partially covered in a tire track 200 feet north of the nest. Artificial lighting from ORVs as well as village lights may have disoriented the hatchlings. Consequently, filter fences were erected around the nest sites in nearby locations in attempts to prevent such misdirection.

Dog/Cat Disturbance

Dog tracks were documented within closures on 12 different occasions. One of these dogs appeared to expose some eggs. Another dog attempted to dig into the nest cavity of a partially hatched nest. A leash law, carrying a \$100 fine, exists at CAHA. The regulation is not consistently enforced in all areas of the Park. Most dogs on the beach are not leashed or only leashed by their owners as Park vehicles approach. There were 22 separate incidents of cat tracks in turtle nest areas this year. Most were likely feral cats.

There was no evidence of disturbance, however it is not known if cats would prey upon turtle hatchlings given the opportunity.

Highway

A late May storm flattened areas of man made dunes along North Carolina State Highway #12 north of Buxton. This exposed areas of the beach to the nearby highway. North Carolina Department of Transportation erected over 1000 feet of sand fence to keep nesting sea turtles from crawling on to the busy road. Where their fencing supply ran out, CAHA erected 100' of additional fencing to close gaps.

Part 2 - Stranding Activity

In 2000, a record number of 332 stranded sea turtles were documented along shores of CAHA (Table 6, Chart 2). This surpasses last year's record of 226 strandings representing a 32% increase. Annual totals between 1996 and 1998 fell between 47 and 98 turtles. Strandings have risen on ocean beaches as well as inshore (soundside) beaches in recent years. This season, 245 turtles were recovered from the ocean beach and 87 on the soundside of the islands. Hatteras and Ocracoke Islands reported the highest numbers. Park wide, 254 (77%) were identified as loggerhead, 43 (13%) were green, 31 (9%) were Kemp's ridley and 2 unknowns.

Twelve turtles (4%) were alive when discovered. They were transported to Roanoke Island Animal Hospital. Veterinarians made health assessments and if possible the animals were later transported to holding tanks at the NC Aquarium. Network for Endangered Sea Turtles (NEST), a volunteer group based in the Nags Head area, cared for them until released. The majority of these live turtles were victims of hypothermia when sound water temperatures suddenly plummeted in response to cold fronts in late fall and early winter. Once recuperated, the U.S. Coast Guard released these animals in the Gulf Stream.

Three hundred and twenty turtles (96%) were dead when found. Though carcasses were found throughout the year, there were three definite peaks occurring in the spring and fall. The first occurred between 4/14 and 4/17, sixty-one sub-adult loggerhead turtles stranded on Ocracoke and Hatteras Islands. Due to the advanced stages of decomposition, the North Carolina Wildlife Resource Commission (NCWRC) could not determine cause of these mortalities. The second event occurred in a four-day period between 5/3 and 5/6. A total of 209 stranded sea turtles were documented on Hatteras Island. Of these 119 were found on National Seashore beaches between the villages of Rodanthe and Buxton. The remaining were located on Pea Island Wildlife Refuge. Except for four Kemp's ridley turtles, all were loggerhead. The vast majority were sub-adults. Gill net was entangled around four turtles. The National Marine Fisheries Service (NMFS) identified the net as being used in an offshore fishery targeting monkfish, *Lophius americanus*. Fishery biologists concluded that the northbound turtle migration encountered a "wall" of cold water off Cape Hatteras. This caused turtles to concentrate in the area and many became entangled in monkfish nets set off the coast. NMFS halted

all large mesh gill net fisheries until the migration ended. Fishery regulations are in place which should eliminate another such mass stranding next spring. CAHA staff has documented stranding events in the spring to early summer for approximately four consecutive years. The episode in 2000 however was the largest. The third peak was spread over a three-month period between October and December, where eighty sub-adults stranded primarily on the soundside. Surveys in the Seashore during this period were conducted by NCWRC who in cooperation with NMFS were monitoring the fall flounder fisheries impacts on sea turtles. This was in response to high numbers of strandings which occurred during the fall of 1998 and 1999. Similar to the past two years, most strandings during this period in 2000 were found on Hatteras and Ocracoke Islands. On October 27, 2000 NMFS closed specific areas of Pamlico Sound to gill nets due to the high numbers of reported strandings. Cold stunning was responsible for some of the strandings when water temperatures suddenly dropped beginning in mid November. Of the eighty strandings during this period, thirty-one (39%) were the endangered Kemp's ridley, twenty-three (29%) were green, twenty-five (31%) were loggerheads and one (1%) was unknown. Many of these turtles were necropsied by NCWRC. The vast majority appeared healthy at time of death. This was determined by looking at body fat reserves and quantity of food in the digestive track. A complete summary of stranding events occurring within North Carolina in 2000 is described in Appendix A.

Conclusions and Recommendations

Breeding Activity

Breeding activity was fairly active this season. Hatching success was known to have been impacted by three coastal storm systems, none of which included hurricanes. False crawls outnumbered nests. It is unknown how many nesting attempts were aborted due to natural causes or to human disturbances.

Narrow beaches are becoming increasingly common. The presence of the artificial dune lines along the Seashore inhibits natural overwash processes. Future storms and rising sea levels will eventually push back the man-made dunes, creating nesting habitat. Until then, beaches will only continue to erode towards the artificial dune line resulting in a decrease of suitable 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. This further emphasizes the need for NCDOT to build causeways or relocate the road whenever possible.

CAHA is reducing the number of nests relocated due to potential human disturbances. Though compliance was fairly good, there were still a significant number of drivers who disregarded the posted closures. Violations were most common in high ORV use areas where closures temporarily restricted through traffic. Many closures had to be maintained longer than expected due to prolonged incubation periods. Nests in high visitor use sites need to be more closely monitored to protect eggs and hatchlings. This aspect has improved with a Biological Science Technician working throughout the nesting season. Closures in certain sites may need to be modified or enlarged to better serve their

purpose. Law enforcement presence needs to increase. Efforts made to educate the public through the media should continue. In the 2000-breeding season, four press releases about the sea turtle program were issued to local and regional newspapers. Related articles were printed in the North Carolina Beach Buggy Association's newsletter and *Coastwatch*, a North Carolina Sea Grant publication. Though great efforts were made to keep sport fishermen abreast to closure status, no attempts were made to contact commercial fishermen using the beaches.

Nighttime activities potentially impacting breeding activities need to be continually examined at CAHA. These include beach driving, village light pollution and campfire activity.

Stranding Activity

For the past several years, turtle mortality has been high at CAHA compared to other North Carolina sites. Stranding numbers were at a record high in 2000. Many strandings on the soundside likely go unreported due to limited accessibility. NCWRC North Carolina Stranding Network volunteers were of great assistance to park staff, especially during mass stranding events. Efforts to document threatened and endangered sea turtle strandings need to continue. Sick and injured animals are rescued and often successfully rehabilitated. Valuable information is collected and made available to other Federal and State agencies responsible for the protection and recovery of these species.

Special thanks is given to the North Carolina Beach Buggy Association (NCBBA) for financial support. Funds provided by the NCBBA permitted the National Park Service to hire two Student Conservation Assistants (SCA) for the turtle nesting season and purchase needed equipment for the turtle monitoring season.

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APPENDIX A

North Carolina Sea Turtle Stranding Summary

In 2000, the sea turtle stranding network reported 838 strandings, representing a 38% increase over 1999's record total of 605. The majority of the strandings were found in Dare (n = 429), Carteret (n = 153), Hyde (n = 109), Brunswick (n = 68) and Currituck

(n = 57) counties. All other coastal counties reported less than 15 strandings. Year 2000 strandings were comprised of 596 loggerheads, 134 green turtles, 89 Kemp's ridleys, 17 leatherbacks and two unidentified species. Year 2000 green turtle total represents a staggering 58% increase over 1999's record total of 85. Conversely, Kemp's ridley strandings decreased by 27% from 1999's total of 122.

Thirty-two percent (n = 271) of this year's strandings occurred in inshore areas, while the remaining 68% (n = 567) were found on ocean-facing beaches and in nearshore waters. Over half (n = 102) of the strandings reported in Carteret County were found inshore. Dare and Hyde Counties came in a distant second and third with 80 and 53 inshore strandings respectively. All other coastal counties reported fewer than 20 inshore strandings.

This fall, North Carolina Division of Marine Fisheries (NCDMF) issued a proclamation that required all commercial fishermen who wished to participate in Pamlico Sounds fall flounder gill net fishery to obtain a permit that included special provisions to reduce sea turtle mortality. The provisions reduced the maximum allowable yardage of large mesh gill net to 3,000 yards per fishing operation. They also required fishermen to carry NMFS certified observers aboard their vessels and submit weekly reports to NCDMF that specified the pounds of flounder landed, and number of turtles caught and their condition (e.g., alive, fresh dead, decomposed carcass). The permits, in turn, allowed fishermen to set gill nets with mesh sizes of 5 inches or greater inside a pre-established gill net restricted area (GNRA), which encompassed the southeastern portion of Pamlico Sound, from September 15 - December 15, 2000.

The implementation of the Pamlico Sound fall flounder fishery permitting system stemmed from National Marine Fisheries Service's (NMFS) enactment of an emergency closure of the sound's fall flounder gill net fishery in December 1999 after 85 strandings were reported in the GNRA. Although the closure took effect when the fishing season was nearly over, it led to the issuance of a federal Incidental Take Permit (ITP) for the 2000 fall flounder gill net season. The ITP issued to NCDMF by NMFS under the authority of Section 10 of the Endangered Species Act, authorized the limited take of sea turtles by the fishery inside the GNRA. Prior to receiving take authorization, NCDMF had to develop fishery management measures that would reduce sea turtle mortality by 50% from the level reported in Pamlico Sound during the fall of 1999. Additionally, the ITP required NCDMF to provide adequate law enforcement in the GNRA to ensure compliance of permit provisions by fishermen and implement an observer program that covered at least 5% of the fishery. It also established maximum limits of observed live takes, observed lethal takes, and strandings for each sea turtle species that, if exceeded, would result in the closure of the fishery. The fishery was closed in the GNRA on October 27 because the maximum limit of observed lethal takes of green turtles was exceeded. Unfortunately, fishermen were allowed to continue to set gill nets inside the GNRA with mesh sizes just under 5 inches. Moreover, they were able to fish outside the GNRA without any restrictions.

A total of 70 strandings (28 green turtles, 25 loggerheads and 26 Kemp's ridleys) were reported inside Pamlico Sounds GNRA from September 15 - December 15. This total excludes all live, cold-stunned turtles. Twenty of the strandings were found prior to the closure. Fifty-nine occurred after the closure (between October 28 and December 15). Of these 24 were found prior to North Carolina's first cold snap, which occurred around November 18th. It is very likely that a portion of the remaining 35 strandings found between November 18 and December 15 died from sudden exposure to cold water.

During the latter part of November and December 20 live cold-stunned turtles were recovered by the stranding network. One green turtle and one loggerhead died shortly after they were recovered from the beach. A loggerhead found with a single mesh of gill net wrapped loosely around its neck was euthanized after it was discovered that avian predators gouged out both eyes. Four cold-stunned juvenile green turtles accompanied a gill net captured green turtle recovered earlier in the fall to EPCOT's Living Seas facility in Florida after achieving full recovery at Roanoke Island Aquarium (RIA). All five turtles will remain in Florida over the winter and be brought back to North Carolina for release in the spring. Four juvenile loggerheads, two green turtles and two Kemp's ridleys are currently in holding at the RIA. Another three immature loggerheads and two juvenile green turtles are being held at the Pine Knoll Shores Aquarium. All seven loggerheads will be released in the Gulf Stream as soon as weather conditions improve. The remaining Kemp's ridleys and green turtles will stay at their respective holding locations for the time being.

We would like to thank everyone involved with the NC sea turtle stranding network for your extraordinary efforts in collecting stranding data and timely reporting of stranding events. Last year's unprecedented stranding numbers have gained the attention of all state and federal agencies involved with fishery and sea turtle mortality issues. Now more than ever it is critical for the stranding network to continue the level of coverage of ocean-facing and inshore beaches that is currently in place in order to successfully identify the leading sources of sea turtle mortality in NC.

Special thanks go to NC Marine Patrol, Cape Hatteras National Seashore staff, Cape Lookout National Seashore staff, National Marine Fisheries Service staff, Beaufort Lab., Keith Rittmaster with the NC Maritime Museum in Beaufort, and Karen Sayles for transporting live cold-stunned turtles to holding facilities and helping with rehab. efforts. The Network for Endangered Sea Turtles (sea turtle volunteer group covering the northern outer banks) was extremely instrumental in transporting live-stranded turtles recovered from Dare and Hyde County beaches and also provided considerable assistance with rehab. efforts at the Roanoke Island Aquarium.

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1/4/01

Table 1. 2000 Sea Turtle Nests at Cape Hatteras National Seashore

Species	# of Nests
Loggerhead	77
Green	4
Leatherback	3
Total	84

Table 2. Relocated Nests at Cape Hatteras National Seashore in 2000				
			Total for CAHA	
	Relocated nests		24	29%
	Non-relocated nests		60	71%
	Total		84	
			HATTERAS ISLAND	
	Relocated nests		21	34%
	Non-relocated nests		41	66%
	Total		62	
			OCRACOKE ISLAND	
	Relocated nests		3	14%
	Non-relocated nests		19	86%
	Total		22	
			BODIE ISLAND	
	Relocated nests		0	0%
	Non-relocated nests		0	0%
	Total		0	

Chart 1. Cape Hatteras National Seashore Sea Turtle Nests 1987-2000

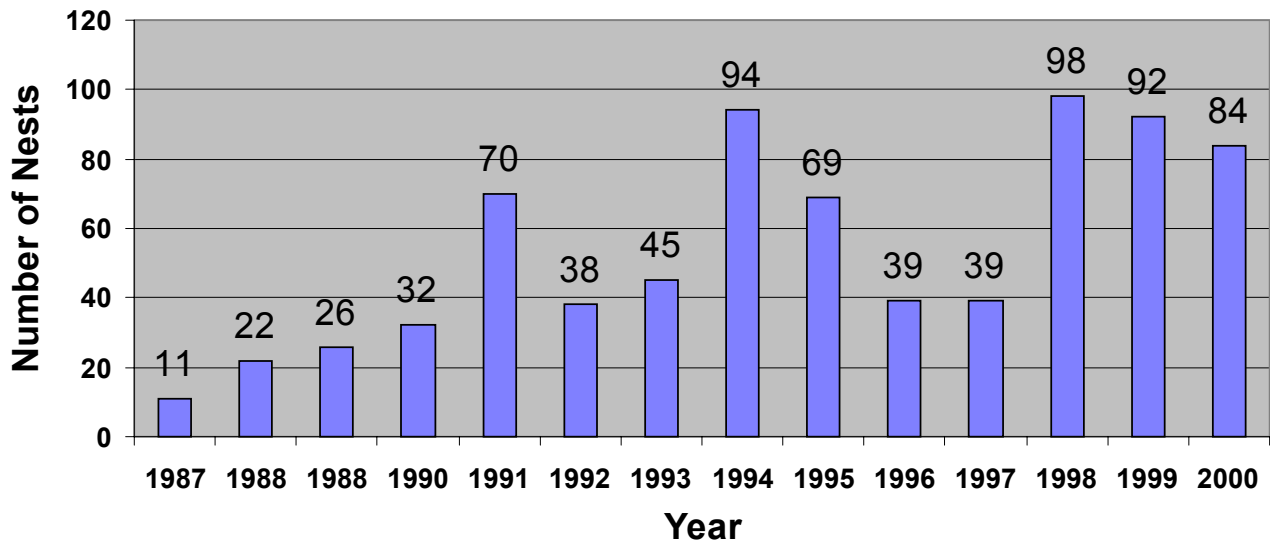


Table 3. Sea Turtle Nests 1987-2000

1987	1988	1988	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
11	22	26	32	70	38	45	94	69	39	39	98	92	84

Table 4. Hatch Success at Cape Hatteras National Seashore in 2000

	# of Nests	Hatch Success (%)
Relocated Nests	24	78
Non-Relocated Nests	60	53
Total Nests	84	62

Table 5. Number of False Crawls by Area Type at Cape Hatteras National Seashore in 2000

			# of	
	Area Type		False Crawls	
	ORV use		40	
	Day use		21	
	Village		11	
	Pier		4	
	Other		21	
	Unknown		1	
	Total		98	
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				
Pier- areas within one mile on either side of a pier				
Other - beaches on which there is not a high volume of human activity				
Unknown-false crawl was documented, but site is unknown				

Table 6. Sea Turtle Strandings at Cape Hatteras National Seashore 1996-1999

Year	Stranding Totals	Species Composition*					Location	
		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

*

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

Strandings

Chart 2. Sea turtle strandings at Cape Hatteras National Seashore

