

SOUTH CAROLINA ENDANGERED SPECIES PROGRAM

FINAL COMPLETION REPORT TO NOAA FISHERIES

September 1, 2002 through August 31, 2007

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MARINE TURTLE CONSERVATION PROGRAM
SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES
WILDLIFE AND FRESHWATER FISHERIES DIVISION

INTRODUCTION

History

Section 6 of the Endangered Species Act (ESA) provides funding to states through Cooperative Agreements. States must show they have an “adequate and active” program for the conservation of endangered and threatened species. Under the ESA, the Department of Commerce, NOAA Fisheries (formerly NMFS) has responsibility for 12 threatened or endangered species that may be found in South Carolina waters: six species of whales, five species of sea turtles and the short-nose sturgeon. In 1984, South Carolina’s Department of Natural Resources (SCDNR) was the first to sign a Section 6 Cooperative Agreement with NOAA.

Species of concern

There are four species of sea turtles that inhabit South Carolina waters. They include the loggerhead (*Caretta caretta*), Kemp’s ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*) and green (*Chelonia mydas*) sea turtles. Although hawksbill (*Eretmochelys imbricata*) turtles have stranded in both North Carolina and Georgia, no record of this species in South Carolina has been verified in the past two decades. Endangered whale species are not included in any of the funded activities.

Problem and Need

Standardized aerial surveys over the past 20 years show a decline in the number of nesting loggerheads in South Carolina. However, in-water surveys along the southeastern coast of the United States indicate that the juvenile loggerheads are more abundant than they were 20 to 30 years ago. Leatherback, Kemp’s ridley and green sea turtles also utilize coastal waters from April to November. Threats to sea turtles in the marine environment are addressed in the Recovery Plans for these species, and many of the recovery tasks include the SCDNR as the “responsible agency”. Mitigation of factors impacting sea turtles in the coastal environment requires coordination and cooperation among various federal, state and local government agencies and private groups. The SCDNR Marine Turtle Conservation Program is the best means of implementing Recovery Plan tasks with these other entities.

Activities

Five studies are covered under this grant program: Technical Guidance, Sea Turtle Stranding and Salvage Network (STSSN), Movement and Habitat Use of Post-Nesting Loggerhead Sea Turtles, Information and Education and Foraging Habitat Delineation.

ACKNOWLEDGMENTS

The authors would like to thank the following individuals for their assistance with our projects. Pilots Steve Bogan, Owen Barker, Bucky Harris and John Madden carried out their duties in a safe and efficient manner. Special thanks go to all the participants, many on a voluntary basis, of the STSSN that make the network a success. Thank you also to Michael Coyne for the use of STAT on www.seaturtle.org. This program was used to generate the satellite tracking maps in this report.

The Principal Investigator has changed in July 2006 from Sally Murphy to DuBose Griffin. Sally Murphy retired and DuBose Griffin was hired as her replacement.

STUDY 1: Technical Guidance

Job 1: Section 7 Consultation

- By adhering to the “dredging window”, the US Army Corps of Engineers (Corps) completed dredging of Charleston and Georgetown ship channels in 2002 and 2005 without taking any sea turtles. In 2003, there was very warm fall weather, sea turtles were still present in the channel and three loggerheads were killed. Dredging was stopped until water temperatures dropped and turtles had moved offshore. Dredging windows are a successful management strategy when based on cooler water temperatures during winter months.
- A beach nourishment project for Horry County is scheduled for 2008. Use of a hopper dredge outside the months of December through March was planned. This necessitated meetings, emails, letters and phone conversations. The state of South Carolina is requesting that the Corps not use a hopper dredge in state waters outside the months of December through March.
- Two staff members attended the Recovery Teams Stakeholders' workshop in Silver Spring, Maryland.
- Staff reviewed a grant proposal for the NOAA Fisheries Permit Office.
- Two leatherback turtles were entangled in crab pot lines off Hilton Head Island in 2004. Local beach patrol staff were able to free them. As a result, the SCDNR Marine Resources Division sent out an emergency announcement to crabbers to remove one of the two floats on their lines. This appeared to prevent any further entanglements.
- Staff met several times with the Corps to discuss the upcoming dredging schedule for Folly Beach in 2005 and again in 2006. Budget constraints required nourishment during the sea turtle season. Impacts to turtles on the beach and in the water were discussed.
- Staff participated in a “partnering” meeting with the Corps and the Town of Folly Beach for their beach nourishment project in 2005. Other state and federal agencies were involved. Since a pipeline dredge is being used for this work, no impacts to turtles in the water were expected.
- Considerable time was spent by staff coordinating with the SCDNR Office of Environmental Management (OEM), US Fish and Wildlife Service (Service), SC Office of Ocean and Coastal Resource Management (OCRM) and the Corps on upcoming beach nourishment projects. These projects included Horry County, Seabrook Island, Edisto Island, Pawleys Island and the Isle of Palms.
- A staff member was invited to serve on the City of Isle of Palms Committee on Long-Term Beach Management, which addressed beach erosion and solutions for resolution. Effects on sea turtles in the water during nourishment projects were discussed. Four meetings were attended during this reporting period.
- Staff continued to address sand bag issues on the northern end of the Isle of Palms. Sand bags washing into the marine environment were a potential threat to sea turtles. Five

meetings were attended about this issue including a press release held by the SC Coastal Conservation League.

Recommendations: NOAA should consider writing a new Regional Biological Opinion on hopper dredge use along the South Atlantic coast to replace the current 1997 version. Since that time, new data and information is available on the abundance and distribution of sea turtles (primarily loggerheads) along the South Carolina coast and beyond. Additionally, it is recommended that NOAA discontinue assessing sea turtle or nontarget species bycatch (and whether or not it will jeopardize the continued existence of the species) annually on a fishery-by-fishery or project-by-project basis but rather look at the cumulative impact of all authorized activities together. Hopper dredge windows should continue to be a proactive management strategy.

Job 2: Development Projects

During this reporting period, many beach nourishment projects have occurred. They include Hunting Island State Park (twice), DeBordieu Beach, Surfside Beach, Huntington Beach State Park, Hilton Head, Edisto Beach and Folly Beach (twice). Sea turtle management of these has necessitated meetings, emails and phone conversations with the Corps and Service. This has required considerable time and correspondence between this office and other federal, state and local agencies.

Staff attended a public hearing on the proposed construction of a new pier on Edisto Island.

Recommendations: The Corps should abide by South Carolina regulations on take concerning nourishment during the sea turtle season (April 1 – November 30). This would reduce government costs for staff time (Corps, Service, OCRM, SCDNR and local/county governments) that is necessary to mitigate potential impacts from projects taking place during this time period.

Job 3: TED Technology Transfer

- A TED training workshop, sponsored by NMFS was held in Charleston, SC (2003). It was conducted by Dale Stevens from the Pascagoula Lab and was attended by biologists and marine patrol officers from South Carolina and Georgia.

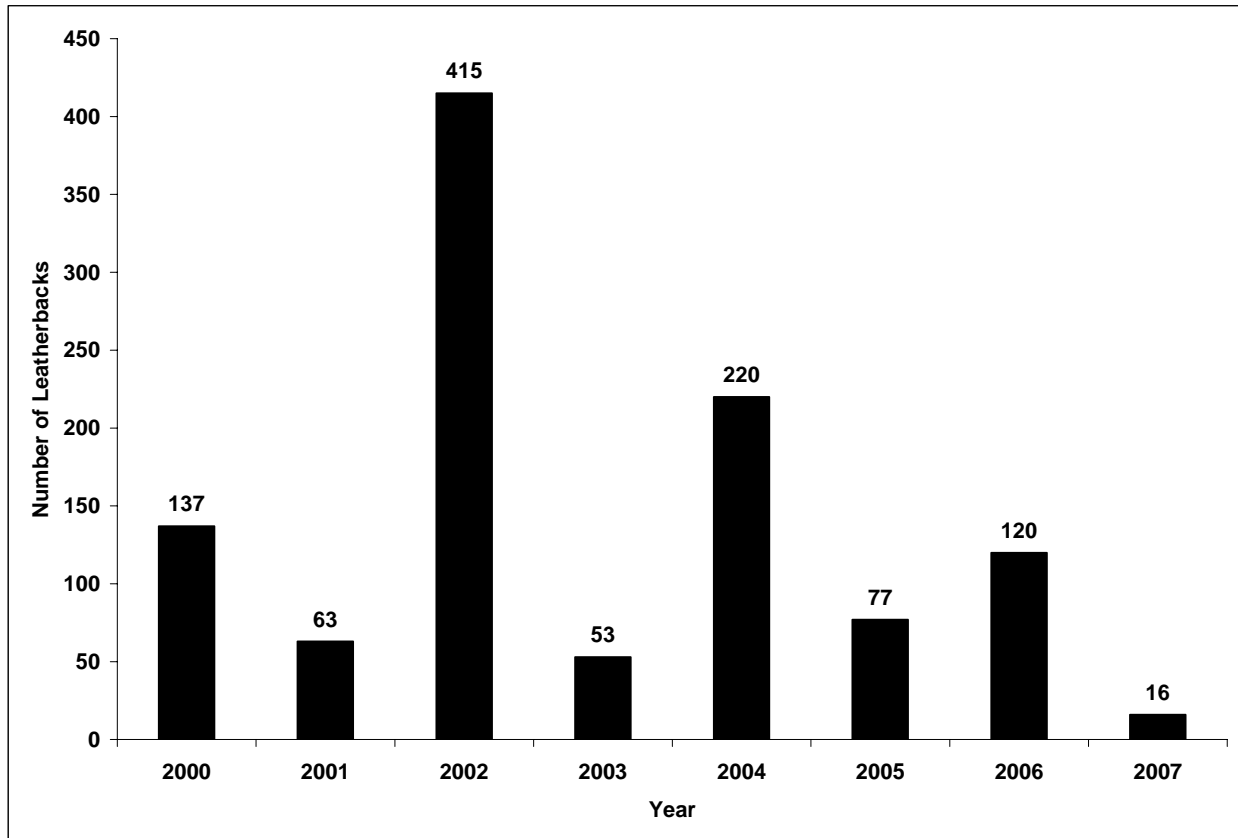
Recommendations: NOAA should continue to require leatherback TEDs in shrimp trawl nets and monitor their use using law enforcement. TEDs should also be required in all fisheries that use a trawl net along the eastern United States.

Job 4: Aerial Surveys for Leatherbacks (Procedure 5)

Weekly aerial surveys were flown along the coast at 1.5 and 3.0 nm again each spring (April – June) during this reporting period to document the distribution and density of leatherback turtles. Over the course of this period, a twin engine plane was not always available for flying the 3-mile transect line. In these instances, the 1.5 mile transect was flown twice. Surveys are flown at an altitude of 900 feet and a speed of 120 knots. The pilot sits front left and monitors the speed, altitude and ensures that the plane is on the track line. Recorder sits front right and tallies data from two observers on a GPS unit as well as on data sheets. Two observers are seated in right and left rear positions. Leatherbacks and other species are noted as “near” or “far” and “submerged” or on the “surface”. Additional opportunistic sightings of other wildlife are recorded to maximize staff time while on the survey and do not distract from sea turtle sightings.

Leatherback survey results are shown in Figure 1 (2003 – 2007). Although the number of observations is highly variable among flights, a mean of 18 leatherbacks were observed per flight during this reporting period (n = 27 flights). During the previous reporting period also shown in Figure 1 (2000 – 2002), a mean of 36 leatherbacks were observed per flight (n = 17 flights). However, this high number is due to a high year in 2002. If this year is removed, the mean number of observations returns to 18 per flight (n = 11 flights).

Figure 1. Spring leatherback aerial observations off the coast of South Carolina during 27 flights from 2003 – 2007 and 17 flights from 2000 - 2002.



A manuscript on the leatherback data from aerial surveys (1991-2003) was published in the journal *Chelonian Conservation and Biology*. This manuscript also contains data analyses on strandings, monthly aerial surveys for strandings, and the historical record for leatherbacks in South Carolina. A copy of this manuscript has been submitted with this report.

Recommendations: Aerial surveys for leatherbacks should continue to document the spatial and temporal abundance of this species. These flights also allow documentation of other sea turtle species which may help manage activities in nearshore waters that may impact sea turtles.

Job 4: Determine Residency Duration of Leatherbacks

- No activity. This project was not carried out because a permit was not obtained.

STUDY II: Sea Turtle Stranding and Salvage Network (STSSN) (Procedure 4)

Job 1: Stranding Surveys

Approximately 103 linear nm of nearshore water are surveyed by flying one mile offshore and parallel to the beach from the north end of Hilton Head Island to Murrells Inlet. The aircraft is flown at 900 feet and 120 knots. Tidal stage, Beaufort sea state, turbidity and current weather conditions are noted. Trawlers, bottlenose dolphins and any sea turtles are counted. The return leg is flown over the beach at 200 feet and 100 knots to document stranded sea turtles, marine mammals and other wildlife. Additional opportunistic sightings of other wildlife are recorded to maximize staff time while on the survey and do not distract from sea turtle sightings. The results of these surveys are shown in Table 1.

Additional aerial surveys were made on the opening day of shrimp season. Shrimp trawler counts were as follows: 10 June 2003 – 210, 17 June 2004 – 175 (two days after opening day) and 15 June, 2005 – 140. In 2006 and 2007, opening day was not flown.

Recommendations: Aerial surveys for stranded sea turtles in areas that are not covered by the public (i.e., undeveloped beaches only accessible by boat) should continue to provide complete coverage of sea turtle strandings in the state. This is an important long term dataset and surveys also provide a means to monitor the coast for changes related to erosion, sea level change and sand dune management. It also allows for the documentation of marine mammals during winter months.

Table 1. Aerial survey for strandings; September 2002 through August 2007.

Pelagic Observations						Beach (dead animals)				
Date	Cc	Dc	Lk	Tt	Trawlers	Cc Painted	Cc Unpainted	Lk	Tt	Comments
9/23/2002	13	0	0	6	71	1	2	0	0	Sargassum along entire coast
10/18/2002	1	0	0	0	82	0	1	0	0	
11/15/2002	6	0	0	33	70	0	0	0	0	no carcasses seen
12/21/2002	0	0	0	5	37	0	1	0	0	
1/14/2003	0	0	0	8	1	0	0	0	1	
2/14/2003	0	0	0	39	0	0	0	0	0	no carcasses seen
3/31/2003	0	0	0	5	0	0	0	0	0	no carcasses seen
4/17/2003	12	0	0	74	0	0	0	0	1	
5/20/2003	1	3	0	3	0	1	0	0	0	
6/18/2003	1	0	0	35	98	1	0	0	0	large loggerhead
7/16/2003	19	0	0	31	91	2	2	0	0	1 of these was dead in the water
8/14/2003	4	0	0	0	38	3	0	1	0	
9/22/2003	8	1	0	12	84	0	0	0	0	no carcasses seen
10/16/2003	8	1	0	3	56	0	0	0	0	no carcasses seen
11/14/2003	5	2	1	124	69	0	0	0	0	no carcasses seen
12/19/2003	0	0	0	0	37	0	0	0	0	no carcasses seen
1/11/2004	0	0	0	15	1	0	0	0	1	
2/13/2004	0	0	0	10	0	0	0	0	0	no carcasses seen
3/12/2004	0	0	0	2	0	0	0	0	0	no carcasses seen
4/21/2004	0	19	0	7	0	0	1	0	1	
5/14/2004	13	25	0	19	3	0	1	0	0	
6/17/2004	4	0	0	10	167	0	0	1	0	
7/15/2004	3	0	0	42	61	0	0	0	0	no carcasses seen
8/18/2004	11	1	0	37	77	0	1	0	0	1 possible turtle carcass on Morris Island
9/23/2004	5	0	0	3	91	0	0	0	0	no carcasses seen
10/19/2004	8	0	0	35	63	0	0	0	0	no carcasses seen
11/19/2004	4	1	0	177	46	0	0	0	0	no carcasses seen
12/21/2004	0	0	0	32	26	0	0	0	0	no carcasses seen
1/15/2005	0	0	0	2	1	0	0	0	0	no carcasses seen
2/13/2005	0	0	0	19	1	0	0	0	0	no carcasses seen
3/19/2005	0	0	0	15	0	0	0	0	0	no carcasses seen
4/12/2005	0	1	0	14	1	0	0	0	0	no carcasses seen
5/27/2005	4	0	1	16	1	0	0	0	0	Dead marine mammal and turtle (both unknown)
6/15/2005	7	0	0	26	116	0	0	0	0	dead turtle carcass (unknown)
7/16/2005	18	0	1	27	36	0	0	0	0	no carcasses seen
8/19/2005	28	0	1	29	34	0	1	0	0	
9/15/2005	3	0	0	27	68	0	0	0	0	no carcasses seen
10/21/2005	26	0	0	109	40	0	0	0	0	no carcasses seen
11/15/2005	10	1	0	64	44	0	0	0	0	no carcasses seen
12/20/2005	0	0	0	6	15	0	0	0	1	
1/16/2006	0	0	0	14	20	0	0	0	0	humpback carcass
2/17/2006	0	0	0	50	2	0	0	0	0	no carcasses seen
3/9/2006	0	0	0	14	0	0	0	0	0	no carcasses seen
4/14/2006	2	0	0	28	0	0	0	0	0	no carcasses seen
5/30/2006	11	0	0	15	51	0	0	0	1	
6/19/2006	11	1	1	26	26	1	0	0	0	
7/21/2006	1	0	0	29	25	0	0	0	0	no carcasses seen
8/14/2006	5	0	0	48	18	0	0	0	0	no carcasses seen
9/21/2006	1	0	0	3	30	0	0	0	0	no carcasses seen
10/24/2006	4	0	0	0	58	0	0	0	0	no carcasses seen
11/28/2006	30	0	0	0	37	0	0	0	0	no carcasses seen
12/21/2006	0	0	0	9	3	0	0	0	0	no carcasses seen
1/16/2007	0	0	0	4	0	0	0	0	0	no carcasses seen
2/20/2007	0	0	0	8	0	0	0	0	0	no carcasses seen
3/28/2007	0	0	0	33	0	0	0	0	1	
4/30/2007	27	1	1	127	0	0	0	0	0	no carcasses seen
5/17/2007	3	0	0	22	29	0	0	0	0	no carcasses seen
6/19/2007	1	0	0	24	0	0	0	0	0	no carcasses seen
8/27/2007	11	0	0	33	22	0	0	0	0	no carcasses seen
TOTAL	329	57	6	1608	1947	9	10	2	7	

Job 2: Stranding Data Reporting

- The 43-member volunteer STSSN continues to provide valuable data on the temporal and spatial distribution of sea turtle carcasses that wash ashore. Figure 2 shows the number of stranded sea turtles (n = 4504) during the history of the STSSN. Table 2 and Figures 3, 4 and 5 show the number of strandings by month and the species composition, respectively. As per the Emergency Response Plan of the NOAA, weekly totals by zone are tallied in an Excel file and emailed to the Southeast Fisheries Science Center in Miami each Monday. Stranding permits were sent out each season. Beginning in 2007, our stranding reports were submitted online through www.seaturtle.org. This online reporting system has been well received by South Carolina's STSSN.
- There were 734 reported strandings from January 2002 to November 2007 with 72 of these stranding alive. Out of the 662 dead strandings reported, approximately 149 appeared to have no apparent wounds or abnormalities, 135 indicated a boat strike (either ante or post-mortem), 91 were debilitated, 18 indicated fishery interaction, 17 showed evidence of a shark attack (either ante or post-mortem), one was entangled in crab pot buoy line, one was cold-stunned and 250 stranded for reasons that could not be determined.

Figure 2. Annual sea turtle strandings in South Carolina: January 1980 – November 2007.

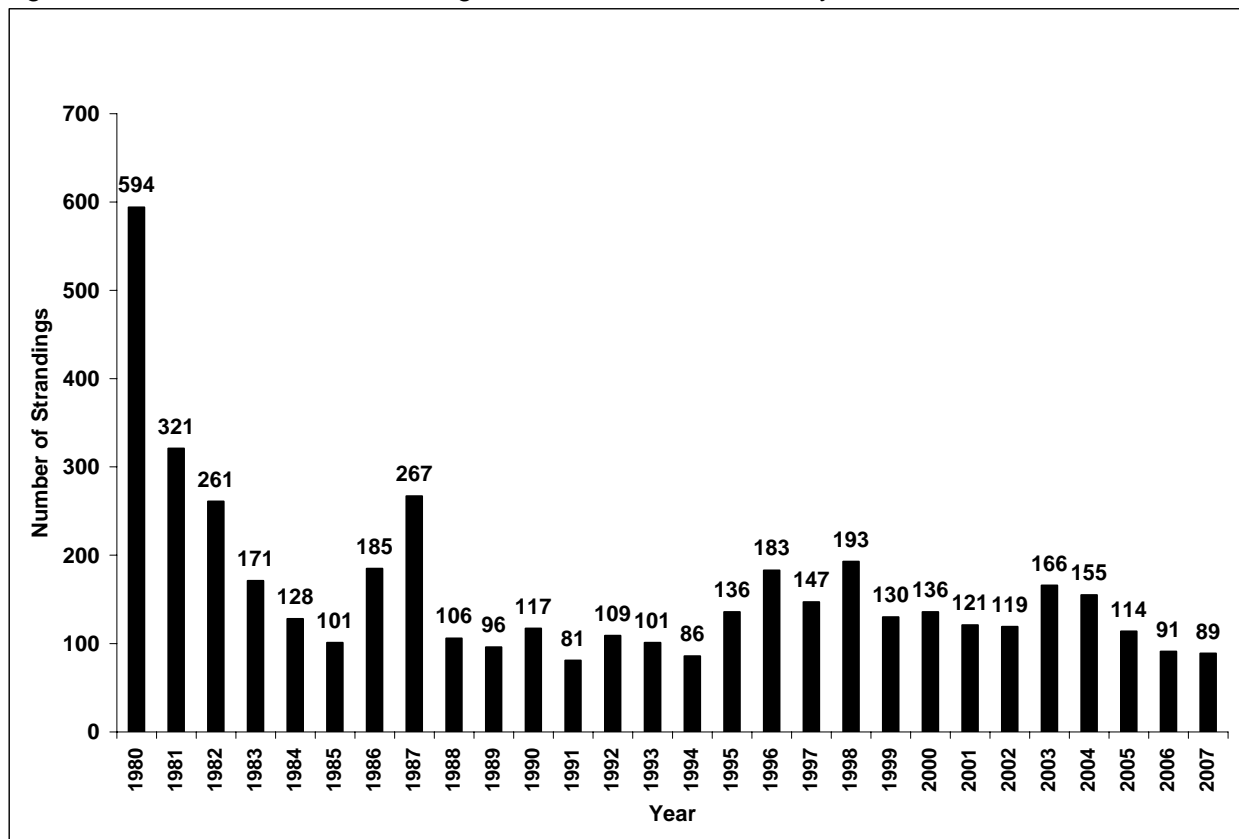


Figure 3. Number of strandings in South Carolina (all species) by month from January 2002 through November 2007.

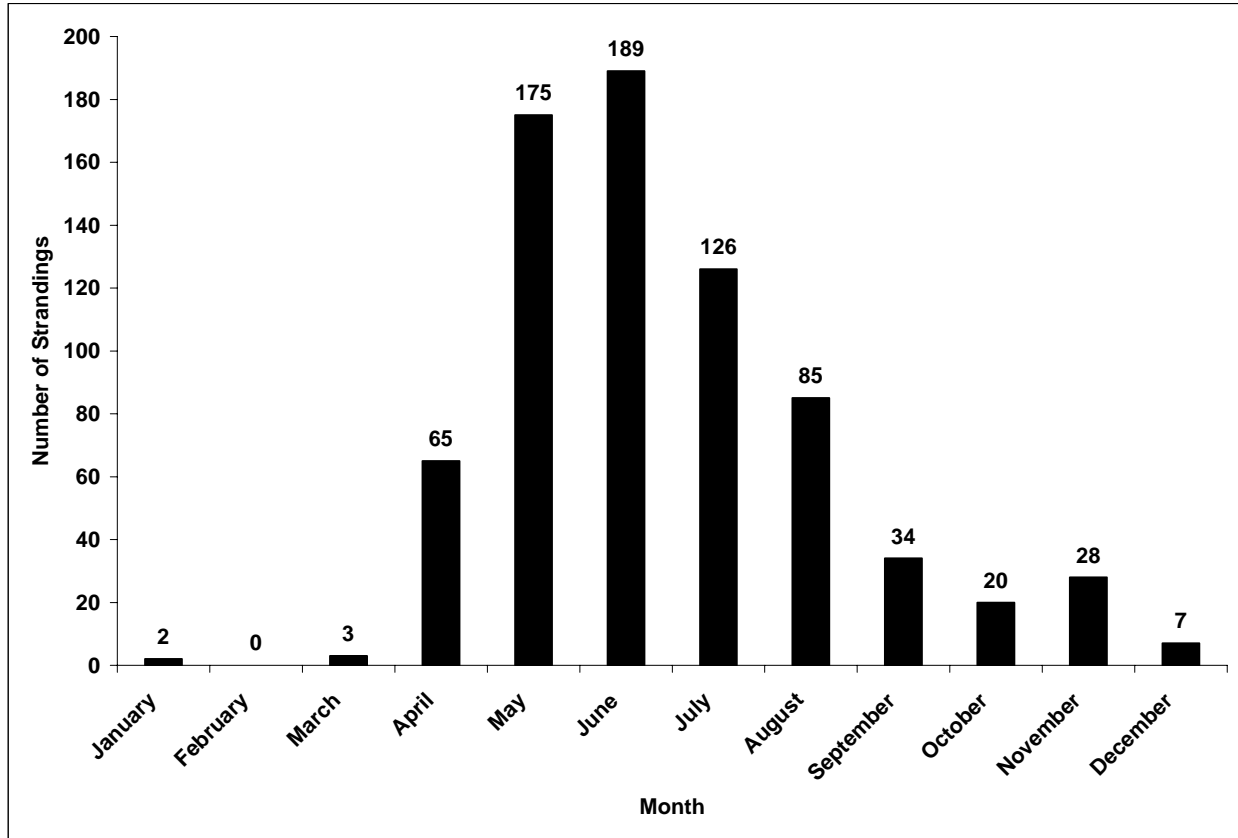


Figure 4. Total species composition of strandings in South Carolina for all years from January 2002 through November 2007.

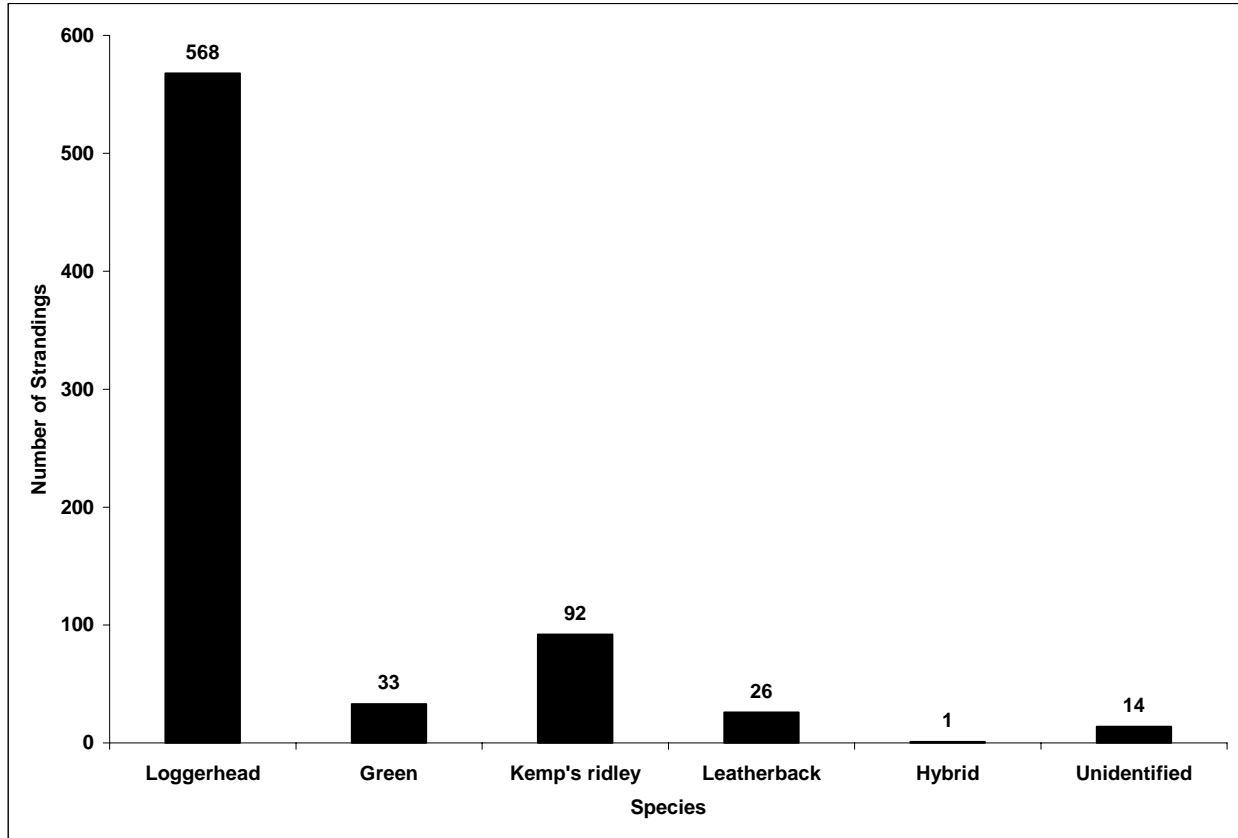


Figure 5. Species composition of strandings in South Carolina for each year from January 2002 through November 2007.

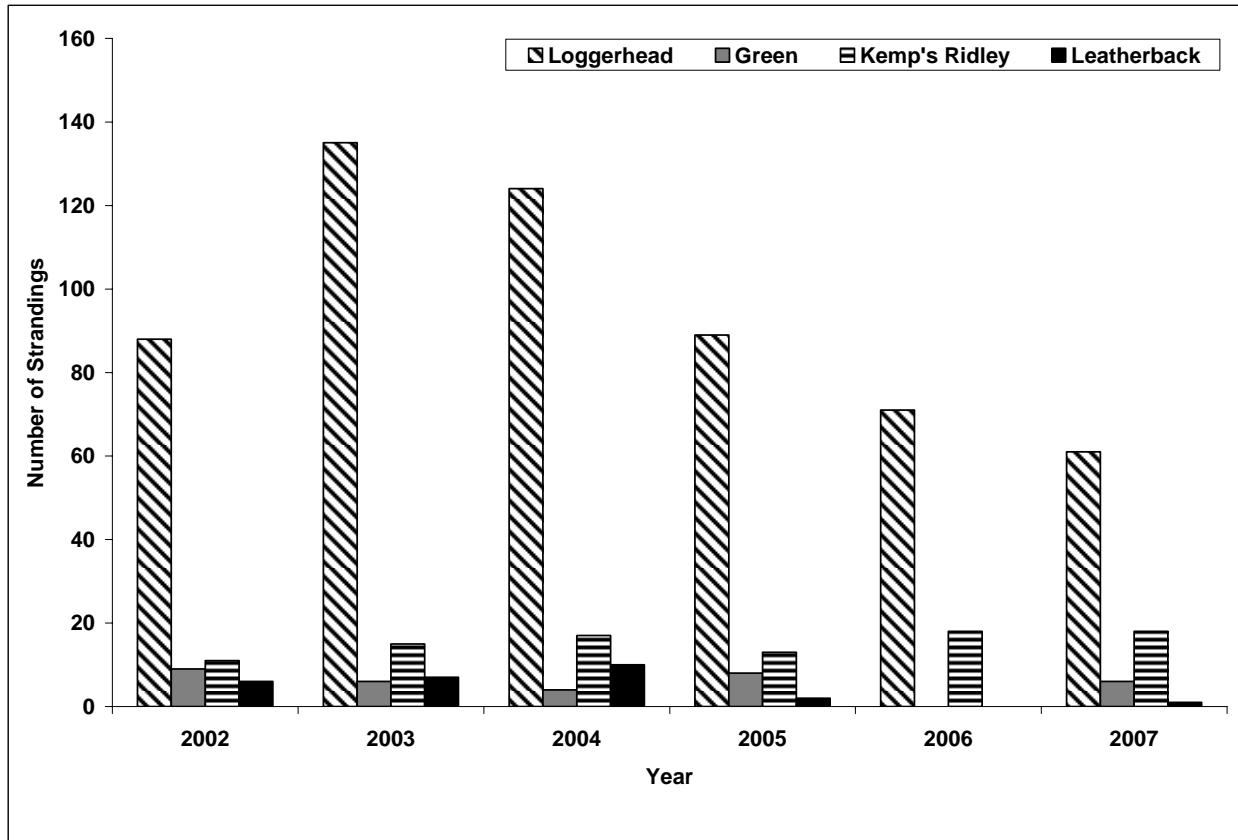


Table 2. Number of strandings in South Carolina by month and year from January 2002 – November 2007.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2002	0	0	1	17	27	28	21	7	7	7	1	3	119
2003	2	0	1	6	44	33	28	31	8	5	7	1	166
2004	0	0	0	22	40	39	19	14	5	6	8	2	155
2005	0	0	0	3	25	39	17	14	7	0	8	1	114
2006	0	0	0	10	20	26	25	6	3	0	1	0	91
2007	0	0	1	7	19	24	16	13	4	2	3		89
Total	2	0	3	65	175	189	126	85	34	20	28	7	734

- A manuscript on the “Value of Volunteers Time” has been published in *Chelonian Conservation and Biology*. It documents the time spent by the STSSN members as well as those volunteers active in nest protection. A copy of this manuscript has been submitted with this report.
- Staff attended a three-day STSSN meeting in Atlanta, Georgia (2003) and a four-day STSSN meeting in Shepherdstown, West Virginia (2004) to discuss concerns and issues relative to the network in the Northeast and Southeast regions.
- Staff also attended a two-day workshop hosted by Georgia DNR and St. Catherine’s Island to compare data with other stranding coordinators and veterinarians in the Southeast on the number and distribution of debilitated sea turtle strandings in 2003.
- Spring Training Workshops were held in Charleston, SC each year for both stranding network and nest protection volunteers. Dates and attendance were as follows: 25 April 2003 – 66, 16 April 2004 – 69, 15 April 2005 – 80, 21 April 2006 – 87 and 20 April 2007 – 110. New members of the stranding network were given instructions on data gathering and reporting. Programs presented included an update on the SC Aquarium Sea Turtle Rescue Program and satellite telemetry of juvenile loggerheads captured in the SCDNR in-water project. Staff of the Service, Corps and SCDNR gave presentations. One SCDNR presentation reviewed current STSSN procedures and the new online stranding database. One-on-one training was provided during site visits for volunteers who could not make the meeting.
- Staff provided a training session to the Hilton Head Beach Services personnel on sea turtle standing data collection in 2006. There were 12 in attendance.
- The SCDNR Marine Turtle Conservation Program web site (created in 2003) contains a new STSSN Identification Guide to aid volunteers in the identification of sea turtle species, sex determination and common injuries (<http://www.dnr.sc.gov/seaturtle/ht/stssnguide.pdf>).

Recommendations: NOAA should consider an online system for sea turtle strandings so that weekly updates are no longer necessary and opportunities for data entry error are reduced.

Job 3: Necropsy and Rehabilitation

Post-mortem examinations were performed on 121 carcasses from September 2002 through August 2007. Biological data are presented in Table 3; mortality data are presented in Table 4; and suggested causes of acute mortality are presented in Table 5. Staff also provided post-mortem expertise to the SC Aquarium Sea Turtle Rescue Program whenever one of the turtles under their care died.

Table 3. Species composition, sex ratio and life stages from post-mortem examinations on sea turtles that stranded in South Carolina from September 2002 – August 2007.

Species	Male	Female	Undetermined	Adult	Immature	Unknown	Total
Loggerhead	25	60	2	11	76	0	87
Kemp's ridley	8	12	1	0	21	0	21
Leatherback	1	6	0	5	1	1	7
Green	2	2	2	0	6	0	6
Total	36	80	5	16	104	1	121

Table 4. Mortality data from post-mortem examinations on sea turtles that stranded in South Carolina from September 2002 – August 2007. Two of the 121 sea turtles could not be rated.

Year	# Stranded	# Examined	# Rated	# Acute Mortality	# Chronic Mortality
2002	18	5	5	5	0
2003	166	34	33	21	12
2004	153	32	32	13	19
2005	113	15	15	3	12
2006	91	12	12	7	5
2007	70	23	22	13	9
Total	611	121	119	62	57
Percent		19.8%	98.3%	52.1%	47.9%

Table 5. Suggested cause of death for acute mortality from post-mortem examinations on sea turtles that stranded in South Carolina from September 2002 – August 2007.

Year	# Acute Mortality	Healthy Animal/ No Apparent Injury	Boat Strike	Fishery Interactions	Shark	Unknown
2002	5	2	3	0	0	0
2003	21	9	9	2	1	0
2004	13	8	4	0	1	0
2005	3	0	1	1	1	0
2006	7	2	3	2	0	0
2007	13	8	3	1	0	1
Total	62	29	23	6	3	1
Percent		46.8%	37.1%	9.7%	4.8%	1.6%

As part of the STSSN, live stranded sea turtles requiring rehabilitation are taken to the SC Aquarium Sea Turtle Rescue Program facility. During this reporting period, 72 sea turtles have stranded alive (64 loggerheads, five Kemp’s ridleys, two green and one leatherback). There were 33 female, 10 male and 29 in which the sex was not determined. Ten were adults, 61 were immature and one was unknown (leatherback). Suggested causes of these strandings are: 42 were debilitated, 13 were struck by a boat, five were entangled in or had ingested fishing hook/line, five were entangled in commercial crab pot buoy line, three were suffering from shark bites, two were cold stunned with American alligator (*Alligator mississippiensis*) bite wounds on the carapace, one had wounds from a sting ray barb and one was unknown. Of these, two were returned to the ocean, 14 died on site or en route to a facility, 14 were euthanized and 42 were admitted to a rehabilitation facility for care (40 of these 42 were admitted to the SC Aquarium Sea Turtle Rescue Program). Of these 42, 22 have been released, 18 have died and two are still undergoing treatment. Some of the debilitated turtles were involved in a special toxicology and immunology study by researchers from the National Institute of Standards and Technology and the Marine Biomedicine and Environmental Science Center at the Medical University of South Carolina.

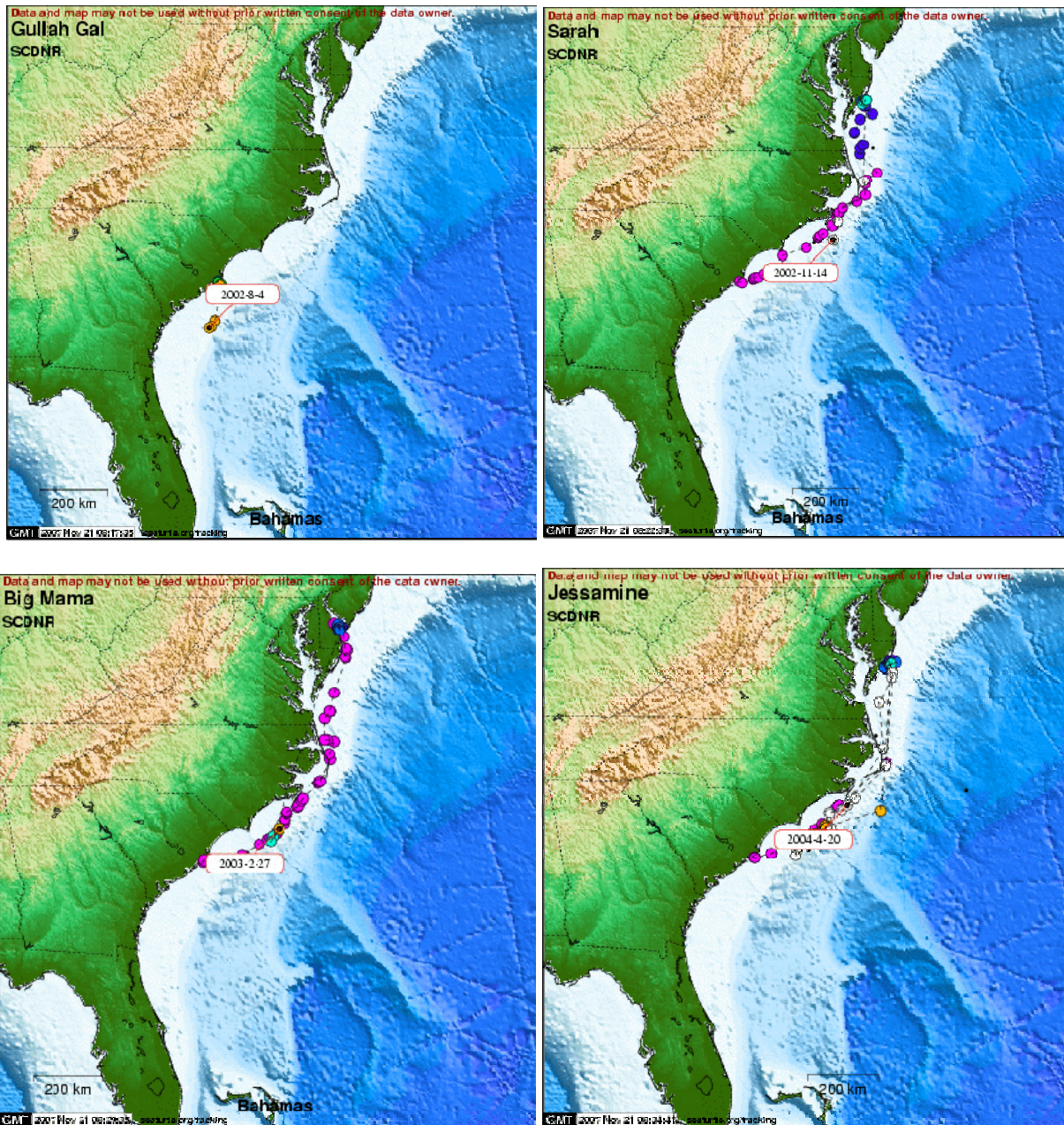
Recommendations: The SC Aquarium Sea Turtle Rescue Program has proven to be an important facility for the care and rehabilitation of injured and sick sea turtles. Support for this program should continue to be a priority to the SCDNR Marine Turtle Conservation Program, the Service and NOAA.

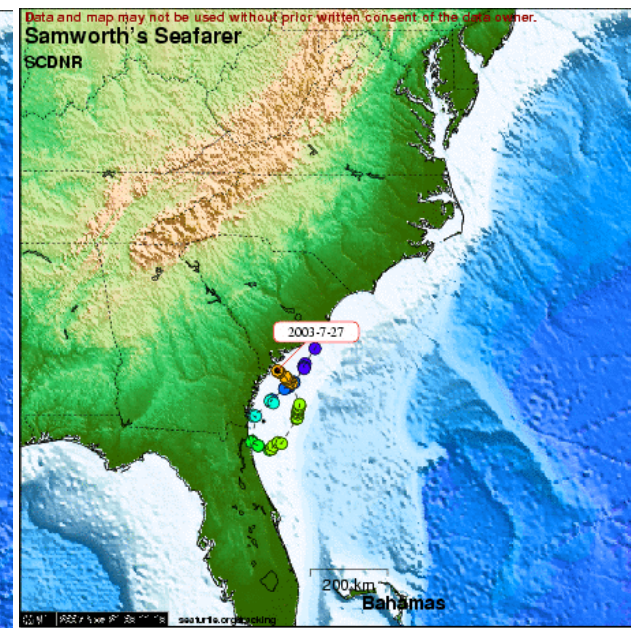
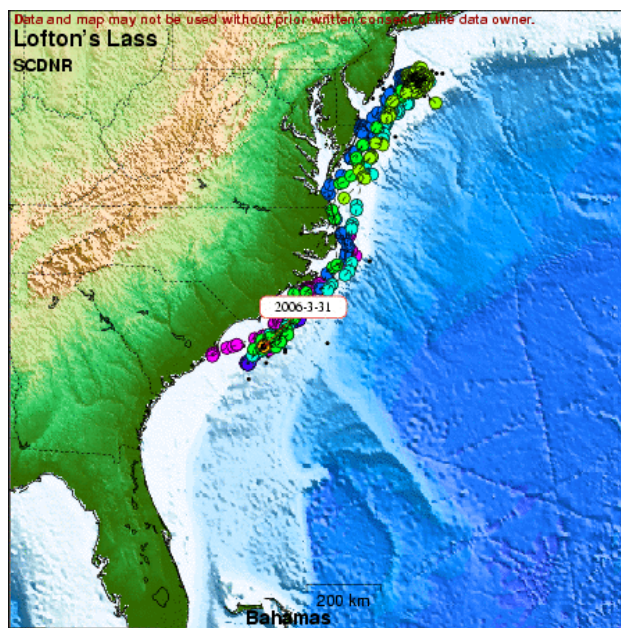
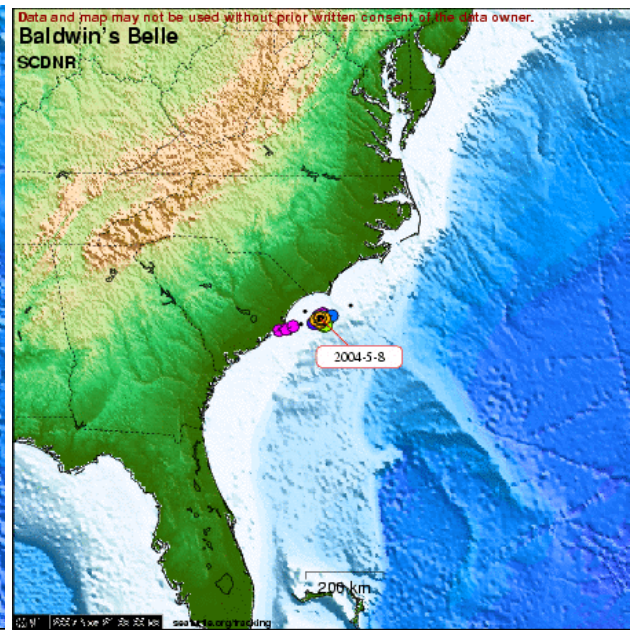
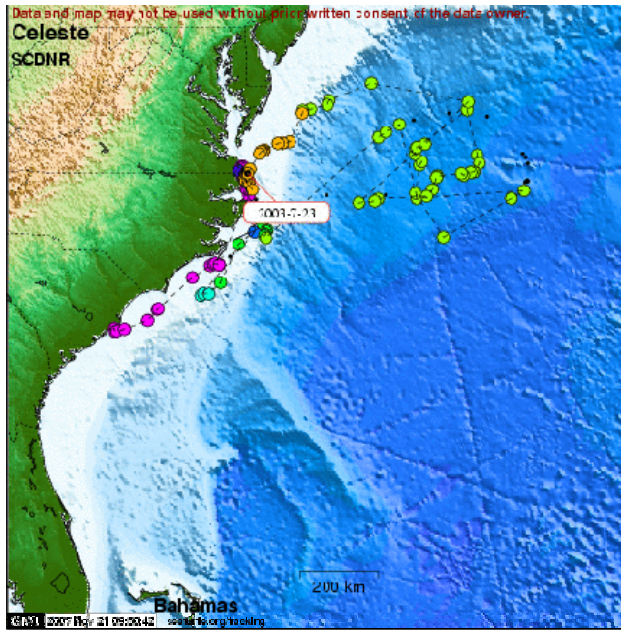
STUDY III: Movement and Habitat Use of Post-Nesting Loggerhead Sea Turtles in South Carolina (Procedure 6)

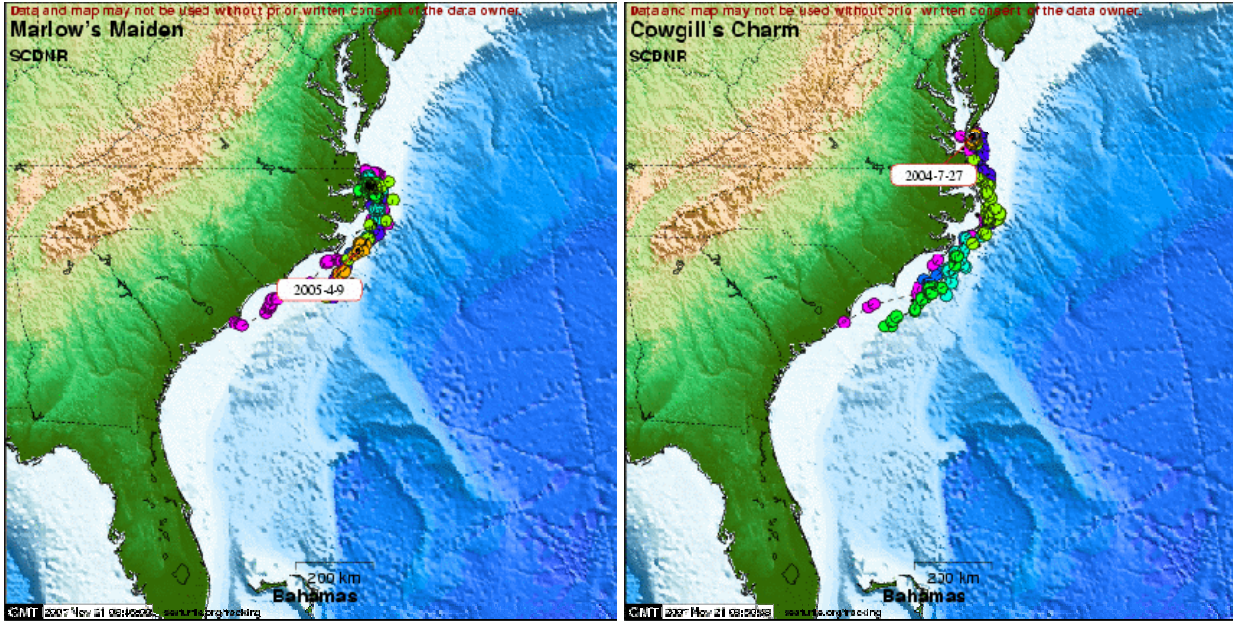
Staff attached satellite transmitters to 10 adult nesting loggerheads at Cape Island, Cape Romain National Wildlife Refuge. Five were attached in July 2002 and five in July 2003. Seven of the turtles headed north, two went south and one went east. Resident foraging areas for the northern turtles include Delaware Bay, the southern tip of Assateague Island, Virginia and near the coast at the North Carolina/Virginia border. In late October, the northern turtles had moved south of Cape Hatteras to areas off the coast of Cape Fear. The turtle that moved east maintained its position throughout the year as did the turtles that traveled south. In 2003,

unusual cold water along the east coast affected the migratory behavior of the turtles. Figures 6a – j show each migration and the location of the resident foraging area. All turtles can be viewed on www.seaturtle.org/tracking. A manuscript titled “Standardized home range of resident foraging adult female loggerheads (*Caretta caretta*): special management zone recommendations” is in preparation for all 15 loggerheads that have been satellite instrumented since 1998. It will also include data on five loggerheads from Wassaw Island, Georgia for a total of 20. It was submitted to the Marine Ecology Progress Series journal and is undergoing major revisions after significant changes were suggested by reviewers.

Figures 6a-j. Migration routes and resident foraging areas of 10 adult nesting females from South Carolina.

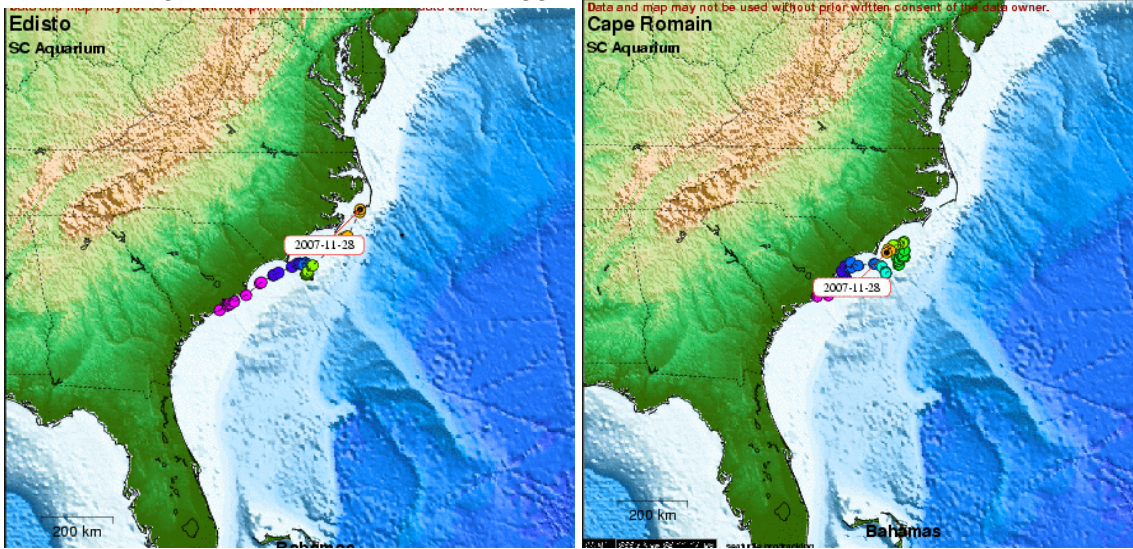






During this period, two adult male loggerheads were also admitted to the SC Aquarium Sea Turtle Rescue Program. Both were found to have a flipper entangled in a commercial crab pot buoy line. At the time of their release, each was fitted with a satellite transmitter. Figures 7a-b show the recent migration for each male.

Figures 7a-b. Migrations of two adult male loggerheads released after rehabilitation.



Recommendations: NOAA should begin to use tracking data to justify more comprehensive fishery regulations in state and federal waters off the Mid-Atlantic States. These waters are important foraging habitat where adult loggerheads are spending approximately 80% of their life.

STUDY IV: Information and Education (Procedures 7 and 8)

Job 1: Public Information

- The newsletter, *Loggerheadlines*, was expanded to include news from the network and the region. In 2006, the format was changed from a printed word document to an actual newsletter format. The newsletter was also made available on the web site. There were three issues each year in 2002, 2003, 2004 and 2005. In 2006 and 2007, the newsletter was scaled down to two issues per year. During this reporting period, 13 issues of *Loggerheadlines* were produced. The newsletter has a readership of ~180. It is also sent to the entire SCDNR and 16 newspaper editors across the state. In addition to the stranding, necropsy and nesting news, success stories from the season, as described by volunteers and regional stories were included.
- We are pleased to announce that the South Carolina Marine Turtle Conservation Program now has an official web site. The site provides extensive information about the program, news and events, and research. It also provides resources to the South Carolina volunteers as well as links for the tracking studies. A web site for the program was developed and continues to be updated and improved. This web site not only educates the public about sea turtles in South Carolina and our program, it also contains a page with volunteer resources. This page provides support for our 43-member STSSN network.
- Staff has assisted with coordination for the release of 22 rehabilitated sea turtles during this period. These releases have attracted a variety of media including the National Geographic Channel, SC ETV and local television and newspapers. These releases generate public awareness and interest in sea turtles. Six of these turtles released were fitted with satellite transmitters.
- Staff appeared on the ETV's "Your Day" program to discuss sea turtles and other coastal species.
- A radio interview on sea turtle conservation was made on the statewide NPR stations in conjunction with Clemson University.
- A staff member was interviewed for a segment of the SCDNR TV show that appears monthly on all SCETV stations.
- Editing was completed on a chapter to appear in the book "Biology and Conservation of the Loggerhead Turtle" which was published by Smithsonian Press.
- Staff provided a briefing to the South Atlantic Fisheries Management Council on sea turtle biology.
- Staff discussed collaborative projects with the curator of the Bermuda Aquarium.
- One trip was made to Boston to inspect text and graphics for a new display on loggerhead turtles at the New England Aquarium.

- Slide presentations were an ongoing activity during the entire grant cycle. Some groups were repeat requests each year which is noted in parentheses. Presentations were given to the following groups:
 - Marine Biology Class at the University of Charleston (3)
 - Seabrook Island Natural History Club
 - Kiawah Island Turtle Patrol Members (3)
 - Camp Wildwood (5)
 - Huntington Beach State Park
 - Sewee Environmental Education Center
 - Mount Pleasant Garden Club
 - Isle of Palms Sea Turtle Project (2)
 - Porter-Gaud School
 - Camp Fun-da-Mental
 - ACE Basin Nature Camp
 - Fishing Clubs (2)
 - Callawassie Island Nature Club
 - Spring Island Homeowners
 - South Carolina Herpetologists Conference
 - National Estuarine Research Reserve
 - Kaleidoscope Summer Camp
 - Coastal Carolina Adventure
 - SCDNR MRD Public Event Series
 - SCDNR Conservation Districts' Staff
- Staff worked with SCDNR graphics in Columbia to design a variety of items to promote the program (hats, visors, t-shirts, coozies, eye glass retainers, magnets, floating magnets, pens, and water bottles).
- Staff participated in the SCDNR MRD Open House. Preparation took approximately two weeks. Two presentations and one poster were prepared. Our booth consisted of educational items, video displays, promotional freebies (mentioned above) and a live sea turtle borrowed from the SC Aquarium. A seminar was given on our program. Over 1000 people attended the open house.
- Promotional items were prepared for SCDNR Public Outreach staff who attended the Palmetto Sportsmen Classic (Columbia, SC), the Charleston Boat Show (Charleston, SC) and the Southeastern Wildlife Exposition (Charleston, SC). The expo is attended by approximately 40,000 people.
- Promotional items were handed out at the 27th International Sea Turtle Symposium in Myrtle Beach, SC. The Symposium was attended by 1300 people from 90 countries.
- Staff worked with the SCETV to assist them with development of a documentary on sea turtles in South Carolina.
- One SCDNR News Release was issued on one of the loggerheads that was admitted to the SC Aquarium Sea Turtle Rescue Program.

Job 2: Exchange of Scientific Information

- The manuscript titled “Recent occurrence, spatial distribution and temporal variability of leatherback turtles (*Dermochelys coriacea*) in nearshore waters of South Carolina” was published in Chelonian Conservation and Biology.
- The manuscript on the “Value of Volunteers Time” was published in Chelonian Conservation and Biology. It documents the time spent by the STSSN members as well as those volunteers active in nest protection.
- An article titled “GIS Estimates Composite Home Range Size for Loggerhead Sea Turtles” was published in ArcUser Magazine.
- The manuscript titled “Standardized home range of resident foraging adult female loggerheads (*Caretta caretta*): special management zone recommendations” is in preparation for all 15 loggerheads that have been satellite instrumented since 1998. It will also include data on five loggerheads from Wassaw Island, Georgia for a total of 20. It was submitted to the Marine Ecology Progress Series journal and is undergoing major revisions after significant changes were suggested by reviewers.
- A College of Charleston graduate student completed a study entitled, “Analysis of Stranded Loggerhead Sea Turtles (*Caretta caretta*) in North and south Carolina Using Mitochondrial DNA and Stranding Records” by Kristen T. Mazzarella, Al Segars, Sally R. Murphy, Joseph M. Quattro and Thomas Greig. A copy of this thesis has been submitted with this report.
- Staff participated in the 24th Symposium on Sea Turtle Biology and Conservation (San Jose, Costa Rica) by chairing a session on Assessment and Monitoring and by co-authoring a poster, the 25th Symposium on Sea Turtle Biology and Conservation (Savannah, GA) by chairing a session on Nesting Beaches and by co-authoring a poster, the 26th International Sea Turtle Symposium (Crete, Greece) by co-authoring one oral and two poster presentations, the 27th International Sea Turtle Symposium (Myrtle Beach, SC) by chairing the Special Carolina’s Plenary session, giving one presentation and serving as the meeting’s Program Coordinator.
- Staff attended the following meetings:

Protected Species Committee of the Atlantic States Marine Fisheries Commission
(Charleston, SC)

GADNR endangered species biologists and staff from the Southeast Regional Office and Silver Spring Headquarters to discuss mutual concerns regarding Section 6 Cooperative Agreements and Section 10 research permits (Savannah, GA)

SC Aquarium husbandry unit to discuss the use of the Service’s Bears Bluff Laboratory facilities for late term rehabilitation care (Charleston, SC)

Atlantic States Marine Fisheries Commission’s Protected Species Committee
(Providence, RI)

Atlantic States Marine Fishery Commission dealing with Section 6 Endangered Species

Act funding by NOAA Fisheries (Baltimore, MD)

NOAA meeting with all states that have an active section 6 Cooperative Agreement. A PowerPoint presentation on the South Carolina program was presented (Silver Spring, MD)

- Staff at SCDNR hosted a one-day workshop on satellite telemetry. Project design and technical needs were discussed. Staff from University of South Carolina - Beaufort/Pritchards Island project, GADNR and staff from the SCDNR in-water project were in attendance.
- Staff attended the Fort Johnson Marine Science Seminar on Leatherback Sea Turtles (Charleston, SC). Staff met with presenting speaker, Dr. Scott Eckert, over lunch prior to the seminar to discuss research and data.
- Award-winning conservation writer, Dr. Carl Safina, spent several days with staff participating in various aspects of the sea turtle program.
- Staff hosted a seminar at SCDNR for a visiting colleague from Costa Rica, Randall Aruiz. Randall spoke about shark finning and TED compliance in waters off Costa Rica and how it related to compliance issues in the United States.
- Staff attended the GADNR post-nesting annual workshop in Brunswick, Georgia.
- Staff participated in conference calls about the Northern Florida/Georgia stranding event.
- Staff traveled to Cape Canaveral, FL to participate in the male loggerhead satellite telemetry project.
- Staff met with SCDNR Region IV law enforcement officers to brief them on issues that they may face during the 2007 sea turtle nesting season.
- Staff visited the cutterhead dredge being used for the Folly Beach nourishment project for educational purposes.
- Staff assisted the SC Aquarium with flipper and PIT tagging all sea turtles to be released.
- During this reporting period, staff submitted one three-year final report, 10 semiannual progress reports and 60 SCDNR monthly reports.

STUDY V: Foraging Habitat Delineation (Procedure 8)

- No activity. Staff were unable begin this project because of prior commitments.