SOUTH CAROLINA ENDANGERED SPECIES PROGRAM – PART I

FINAL COMPLETION REPORT
TO THE
NATIONAL MARINE FISHERIES SERVICE

September 1, 1999 through August 31, 2002

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INTRODUCTION

History

Section 6 of the Endangered Species Act (ESA) provides funding to the 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, National Marine Fisheries Service (NMFS) has responsibility for 12 threatened or endangered species that may occur 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 NMFS.

Species of concern

There are four species of sea turtles that occur in South Carolina waters. They include the loggerhead, Kemp's ridley, leatherback and green sea turtles. Although hawksbill 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. The 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. The status of juvenile and sub-adult loggerheads is unknown at this time. Leatherback, Kemp's ridley and green sea turtles also utilize coastal waters from April to November. The 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". To mitigate 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 state program is the best means of implementing recovery plan tasks with these other entities.

Activities

Four 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, and Information and Education.

ACKNOWLEDGMENTS

The authors would like to thank the following individuals for their assistance with our projects. Pilots Chris McIntosh, Bucky Harris and John Madden carried out their duties in a safe and efficient manner. John Coker assisted with the leatherback surveys and prepared the location charts for the leatherback sightings each week. Special thanks go to the many volunteers on the STSSN. Karen Swanson provided cheerful and valuable advice on graphics.

Study I: Technical guidance

Job 1: Section 7 Consultation

o Staff attended a national workshop on dredging in Jacksonville, Florida. Special emphasis was given to the process of setting dredging windows for the protection of threatened, endangered and other sensitive species. In the breakout session for the southeast region, Wildlife Diversity (WD) staff presented a chronology of events that took place in South Carolina, which led to the establishment of dredging windows for sea turtles.

o WD staff gave a briefing to the South Atlantic Fisheries Management Council staff on sea turtle biology and conservation as it may relate to cessation of nighttime trawling in federal waters.

o WD staff along with staff of the Marine Resources Division (MRD) attended and participated in a workshop sponsored by the Atlantic States Marine Fisheries Commission. The title was: "Working Towards Greater State/Federal Cooperative Efforts in Marine Endangered Species Management". The workshop also included defining elements of successful state/federal partnerships as one of its goals.

Job 2: Development Projects

o Several meetings and correspondence have continued with the US Army Corps of Engineers (USACE) regarding upcoming beach re-nourishment projects at Huntington Beach and Hunting Island State Parks. This required a Section 7 consultation between US Fish and Wildlife Service (USFWS), NMFS and the USACE and also included SCDNR involvement.

o The central coastal office of WD continued to assist the MRD with planning for the in-water survey. This included the preparation of the permit application for NMFS, tagging information and data collection protocols, training of staff on the various species of turtles that they will likely capture and how to identify each.

o WD staff prepared a justification to re-classify the loggerhead turtle from "threatened" to "endangered" on the state list. Although this is a true reflection of the biological status of the population in South Carolina, due to complications in the way our state Endangered Species Act is written, this request was withdrawn from SCDNR Board action.

o WD staff reviewed three permit applications for the NMFS permit office in Silver Spring, Maryland.

Job 3: TED Technology Transfer

o WD staff provided the NOAA/NMFS staff in St. Petersburg Regional Office and the Miami Southeast Fisheries Science Center with morphological data on 89 nesting loggerheads at Cape Romain NWR in order to re-design and enlarge the current Turtle Excluder Device (TED) openings. These data were acquired under a Section 6 ESA grant-in-aid from the USFWS.

o WD staff and the Office of Fisheries Management (OFM) MRD prepared official department comments on the NOAA/NMFS "Advance Notice of Intent to Publish Regulations" on the size of the TED openings. Official department comments on the NOAA/NMFS "Proposed Rule" to enlarge the size of the TED openings were also prepared in conjunction with staff of the OFM MRD. Staff attended the NMFS public hearings on the new TED rule in Charleston, SC and in Brunswick, GA.

o Information on TEDs was requested from individuals in New South Wales, Australia, and the relevant web sites were provided.

o Photos of a new TED, designed for scallop trawls in Queensland, Australia were received. These were forwarded to Georgia DNR and the OFM at SCDNR for possible use in the whelk trawl fishery.

o Assistance was requested from World Wildlife Fund in Surinam regarding measures that could be taken to stop the high mortality of leatherback turtles. The various designs for the leatherback TEDs were provided.

o WD and OFM staff made presentations at the TED workshop in Tampa, FL, sponsored by the Gulf and South Atlantic Fishery Foundation, Inc.

o Several meetings were held with staff of the OFM MRD to formulate options for sea turtle protection by South Carolina in 2002. This resulted in the next three activities.

1) A TED technology and enforcement workshop was organized and held at Ft. Johnson in Charleston. Participants included Georgia and South Carolina sea turtle biologists, SCDNR Marine Patrol, USCG, NMFS law enforcement personnel and a gear specialist.

2) A presentation was made to the Wildlife and Freshwater Fisheries Advisory Committee on the status of the loggerhead turtle and pending changes in the federal TED regulations.

3) WD and OFM staff coordinated dialogues between sea turtle volunteers and the South Carolina Shrimpers Association toward introducing legislation in the General Assembly to enlarge TED openings from 35" X 12" to 35" X 20" for all shrimp trawls in state waters. This state regulation would provide better protection

for sea turtles until the new federal regulations are implemented. Hearings were attended for both the Senate committee and House sub-committee. The legislation was signed by Governor Hodges and became law on 20 May 2002.

Job 4: Aerial Surveys for Leatherbacks (Procedure 5)

Weekly aerial surveys along the coast at 1.5 and 3.0 nm were flown again each spring in 2000, 2001 and 2002 to document the distribution and density of leatherback turtles. These flights are coordinated with Georgia DNR and, if possible, both state surveys are flown on the same day.

South Carolina surveys are made in a twin engine, high wing Aero Commander 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. The recorder sits front right and tallies data from two observers on a GPS unit as well as on data sheets. The two observers are seated in the right and left rear positions. Leatherbacks and other species are noted as “near” or “far” and “submerged” or on the “surface”. The locations of leatherbacks are mapped along the track lines. Data and maps were provided to the NMFS Regional Office and to staff in MRD after each flight.

The results of the surveys are shown in Figures 1- 6. We believe that the lower counts in 2001 may have been caused by low abundance of cannonball jellyfish. Without the concentration of food, the leatherbacks must have kept moving and did not pause to feed.

Because of mechanical problems with the twin-engine aircraft in 2002, the two surveys on 7 and 21 May were flown in a single engine aircraft that was unable to survey the outer line at 3.0 nm offshore because of safety concerns. The inner track line was flown in both directions and is depicted as hatched in Figure 6.

The first aerial survey in 2002 documented 58 leatherbacks, including some in three concentration areas. The NMFS closed, for two weeks, all South Carolina coastal waters out to 10 miles to shrimping unless the larger leatherback TEDs were installed. The concentrations seen in April were still present in May. Therefore the NMFS extended the requirement for leatherback TEDs until May 24th. As a result of high strandings in Georgia, a federal emergency rule requiring leatherback TEDs region-wide for 30 days was implemented that same day.

Although the Leatherback Contingency Plan has been criticized, we believe that it has worked well in South Carolina. The plan only needs a little “tweaking” to improve its effectiveness. The ability to see leatherbacks during aerial surveys is greatly influenced by sea state. The requirement for replicate surveys requires that there be good flight conditions within a short time interval. With frequent weather fronts producing wind or fog during the spring survey season, consecutive surveys

with good viewing conditions are rare. In addition, repeated surveys of the near shore survey line have always produced the same outcome in implementing the contingency plan. Therefore, we recommend that the requirement for duplicate flights be eliminated if the threshold of >10 leatherbacks per 50 nautical miles of track line is met. Duplicate flights should only be required if the numbers counted are near the threshold **and** there is some underlying circumstance (turbidity, sea state etc.) that may have affected the ability of observers to see leatherbacks in the water.

We also believe that the original leatherback TED works well. In 2002, there were 344 trawlers counted on the opening day of shrimping season. Leatherbacks were also seen in the vicinity of the trawlers. Despite this obvious interaction, only four leatherbacks stranded in the spring and some of them were not the result of drowning in trawls.

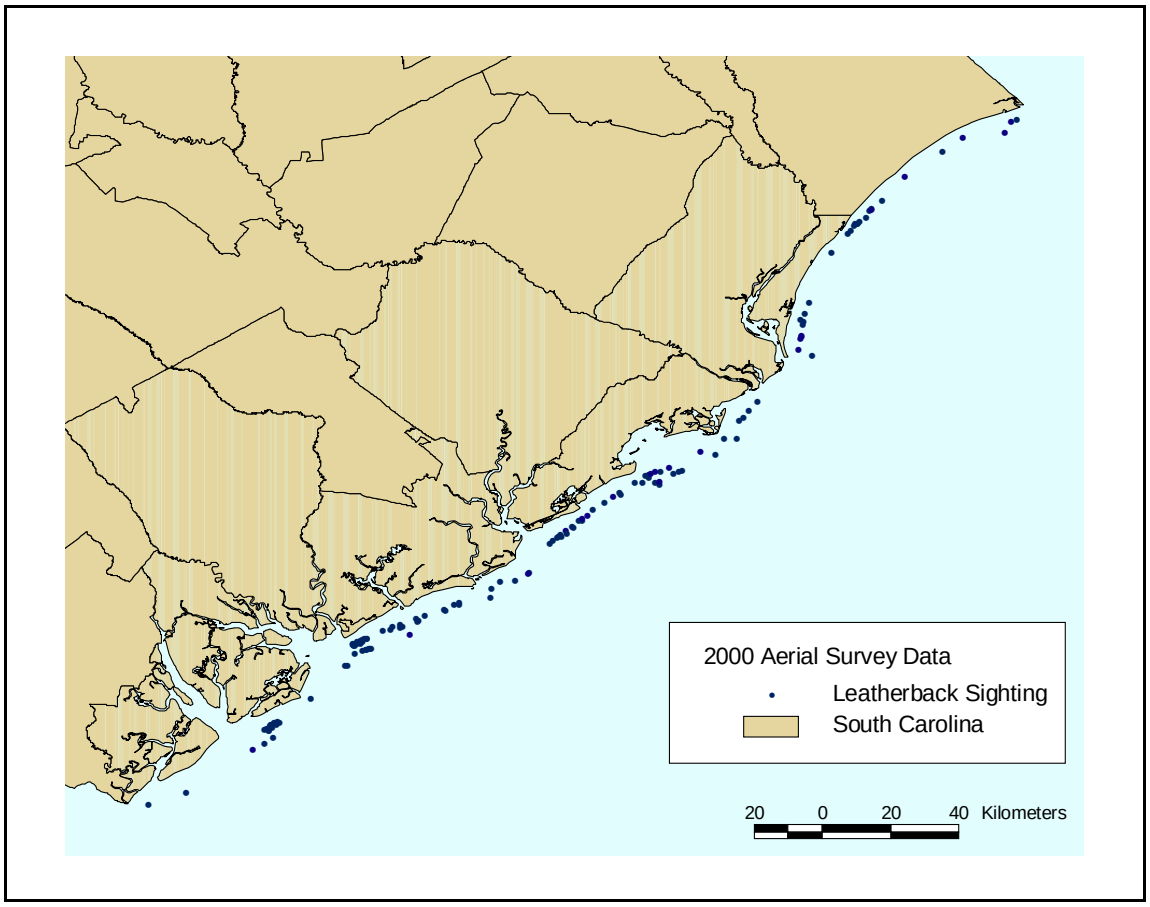


Figure 1. Locations of leatherback turtle sightings during six aerial surveys; n =137.

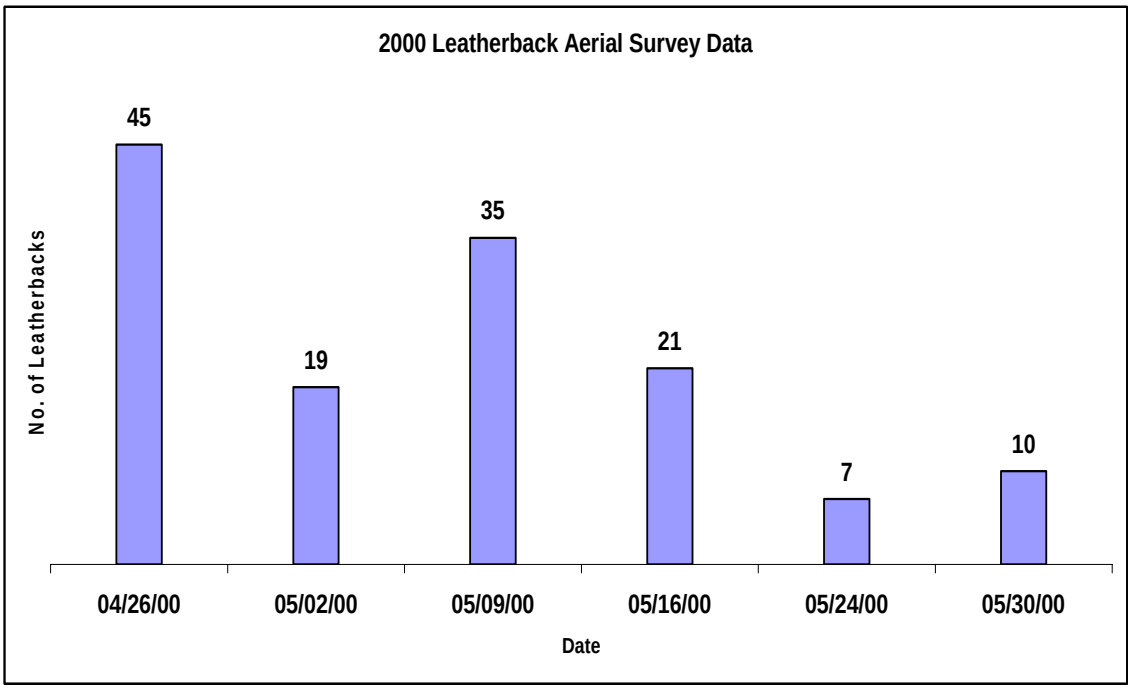


Figure 2. Number of leatherback turtles sighted during six aerial surveys.

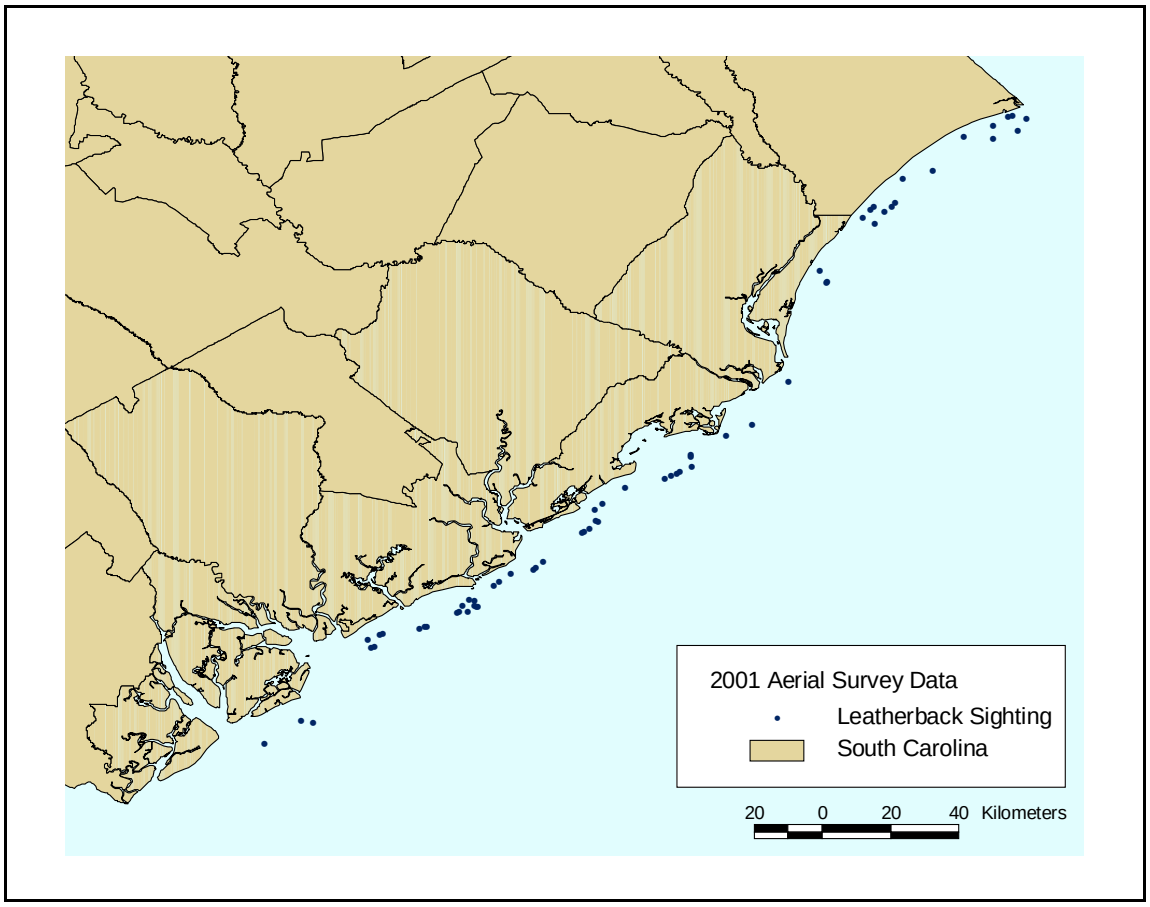


Figure 3. Locations of leatherback turtle sightings during five aerial surveys; n =63.

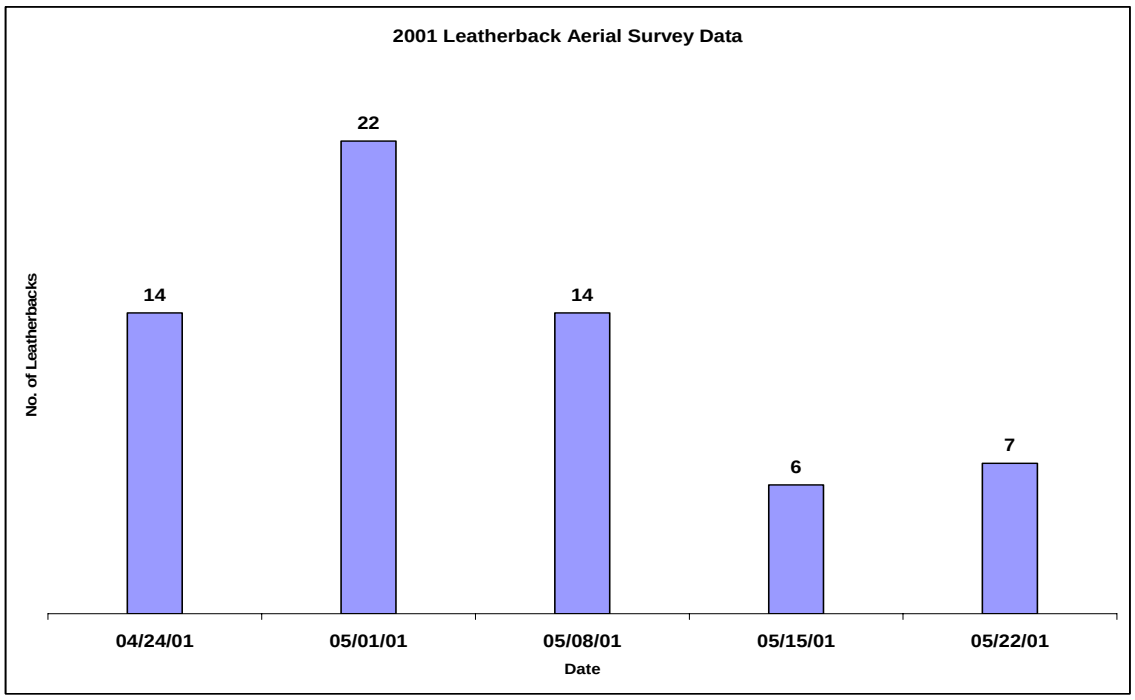


Figure 4. Number of leatherback turtles sighted during five aerial surveys.

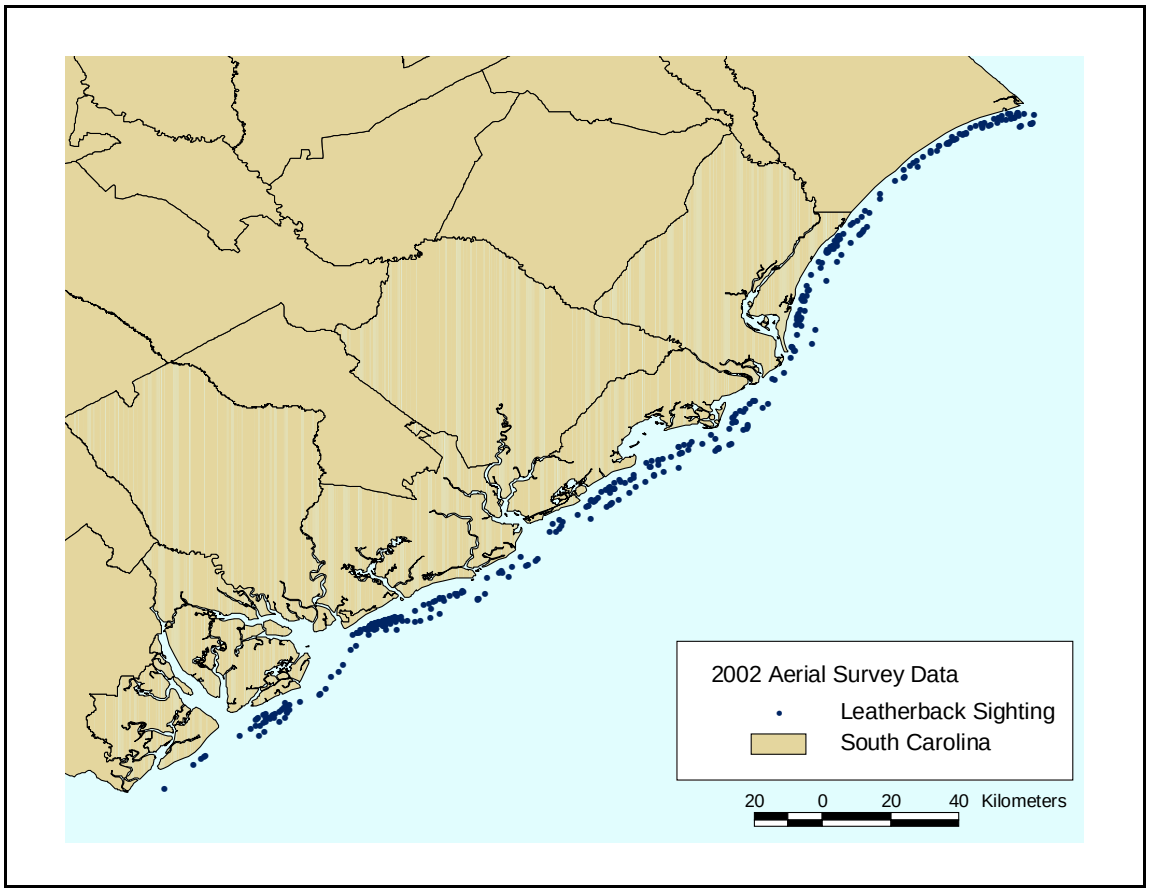


Figure 5. Locations of leatherback turtle sightings during six aerial surveys; n =415.

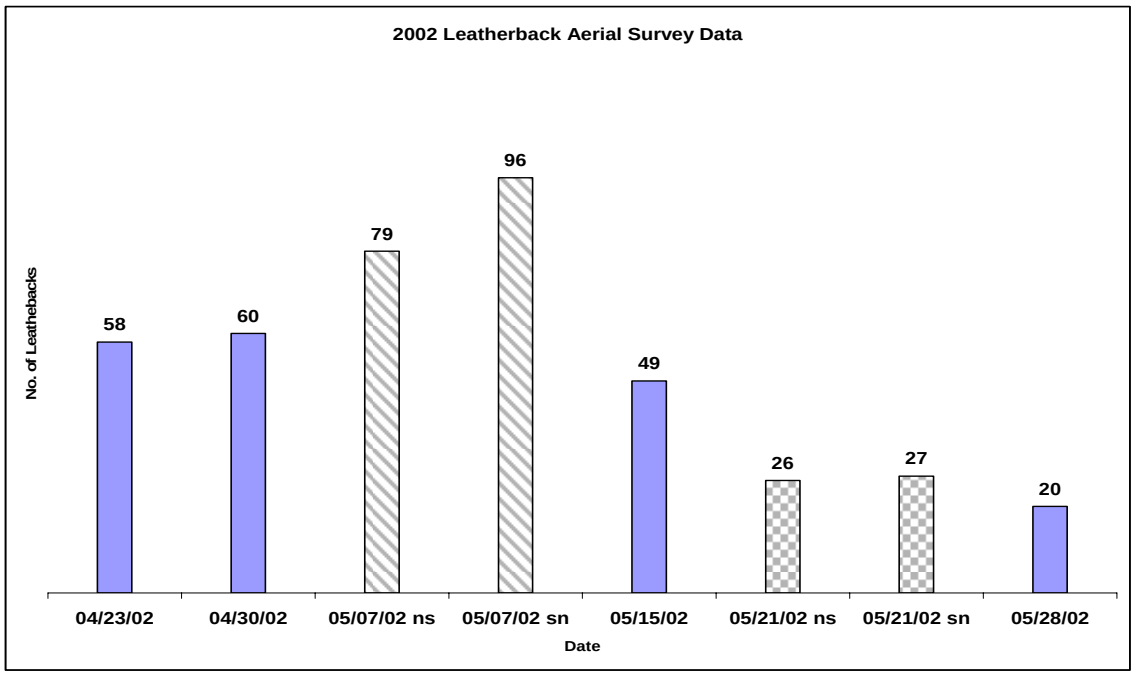


Figure 6. Number of leatherback turtles sighted during six aerial surveys. Surveys on 7 and 21 May were flown over the same track line.

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

Job 1: Stranding surveys

Approximately 103 linear nm of near shore 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. The results of these surveys are shown in Table 1.

Table 1. Aerial survey for strandings; September 1, 1999 – August 31, 2002.

	Pelagic						Beach			
Date	Cc	Dc	Lk	Tt	Trawlers	Comments	Cc Painted	Cc Unpainted	Tt	Comments
1999										
9/23	1			7	182					No carcasses seen
10/15	0			0	76		1			
11/18				21	125	2 rafts sea ducks. 1 flock gannets	1 Male		1	
12/16				10	49					No carcasses seen
2000										
1/14					1					No carcasses seen
2/17				2	7					Dead beaver
3/17										No carcasses seen
4/20	9	32		39	9					No carcasses seen
5/12	17	29		49	116		1			
6/9	16	10		43	125		1	1		
8/1	14		1	12	65	July flight postponed.				No carcasses seen.
8/18	Flight cancelled						1			
9/20	7			49	164					No carcasses seen.
10/13	9			43	96					No carcasses seen.
11/22				60	81					No carcasses seen.
12/12				62	101				1	Old known carcass.
2001										
1/11				70					1	Old known carcass.
2/16				13	2					No carcasses seen.
3/23				18						No carcasses seen.
4/13		2		21					1	2 shad nets.
5/18	3	3		27			1			
6/16	5			37	15					No carcasses seen.
7/11	7			6	114		1	2		2 old Cc carcasses.
8/17	20			29	75					No carcasses seen.
9/21	7			22	79					No carcasses seen.
10/17	4			31	127					No carcasses seen.
11/16	1			12	47					No carcasses seen.
12/15	3			121	76				1	
2002										
1/11				4	44					No carcasses seen.
2/15				2	0					No carcasses seen.
3/15	2	9		19	3					No carcasses seen.
4/19	6	29		20	6					No carcasses seen.
5/17	3	5		2	145					No carcasses seen.
6/18	Flight cancelled									
7/19	1			20	58			2		
8/15	6	2		45	58	3 unidentified marine mammals in Beaufort River.				No carcasses seen.

Job 2: Stranding Data Reporting

Spring Training Workshops were held at Ft. Johnson each year for both stranding network and nest protection volunteers.

On Saturday, April 15, 2000, there were 73 volunteers present. Dr. Michael Helfert, SCDNR climatologist, created a great deal of interest and questions with his presentation on weather conditions projected for the upcoming turtle season. Volunteers were updated and trained on changes in reporting and gathering data.

On May 5, 2001, 64 were in attendance. Bruce Hecker, director of husbandry and operations, gave news from the S. C. Aquarium. Al Segars, DNR veterinarian, presented a video and summary of the first year of the MRD in-water

sea turtle study. Ray Rhodes, MRD economist, introduced a project to determine how much the sea turtle volunteers' time was worth.

On April 25, 2002 there were 80 in attendance. New members of the stranding network were given instructions on data gathering and reporting. DuBose Griffin (Graduate School, College of Charleston), Phil Maier (MRD), Mark Dodd (Georgia DNR) and Joan Seithel (WD) gave presentations.

The 40-member volunteer STSSN continues to provide valuable data on the temporal and spatial distribution of sea turtle carcasses that wash ashore. As per the Emergency Response Plan of the NMFS, weekly totals by zone are tallied in an Excel file and emailed to the Southeast Fisheries Science Center in Miami each Monday (Table 2). At their request an edit of the 1999 stranding data set was completed and sent to the Southeast Fisheries Science Center.

The strandings in May of 2001 were almost the same as in 2000 despite the fact that there was a winter kill of the white shrimp crop and no trawling was allowed in either federal or state waters. During the winter of 2001, there was a mysterious die-off of loggerhead turtles in Florida. The spring migration of turtles heading north coincided with higher numbers of emaciated animals stranding in May 2001. After the spring migration made its way through, strandings remained at more typical levels. While this hypothesis is conjecture, it is the only plausible one to explain the May 2001 strandings in the absence of shrimp trawling. When state waters opened to shrimping on 25 June, 267 trawlers were counted on an extra survey flight. Fifteen turtles stranded the last week of June 2001. High numbers of strandings continued to come ashore during July with 28 the first two weeks and 12 the second half of the month.

More disturbing in 2001 was the unprecedented number of adults, especially nesting females (Figure 7). If the few of "unknown" sex were females, which are the most likely, then 38% of the strandings were adult females. This is the highest number of adult females that have ever stranded in one month in South Carolina. Furthermore, if we compare the number of adults that stranded two weeks prior to and two weeks after the opening of state waters to shrimping

Table 2. Number of strandings by month, year, and species.

September, 1999 - August, 2002													
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
1999	1	1	2	7	25	29	30	21	5	5	5	0	131
2000	0	0	0	8	22	49	28	17	6	2	4	0	136
2001	0	1	1	4	21	29	40	15	7	0	1	2	121
2002	0	0	1	17	27	26	20	7	1				99

1999 by Species													
1999	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
LOGGERHEAD	1	1	1	4	13	21	27	14	5	5	2	0	94
GREEN	0	0	1	0	0	2	0	0	0	0	2	0	5
KEMP'S RIDLEY	0	0	0	2	6	4	3	7	0	0	0	0	22
LEATHERBACK	0	0	0	1	6	0	0	0	0	0	1	0	8
UNIDENTIFIED	0	0	0	0	0	2	0	0	0	0	0	0	2
TOTAL	1	1	2	7	25	29	30	21	5	5	5	0	131

2000 by Species													
2000	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
LOGGERHEAD	0	0	0	5	20	45	20	12	4	1	3	0	110
GREEN	0	0	0	0	0	0	2	1	1	1	0	0	0
KEMP'S RIDLEY	0	0	0	1	0	3	4	4	1	0	1	0	14
LEATHERBACK	0	0	0	2	2	0	0	0	0	0	0	0	4
UNIDENTIFIED	0	0	0	0	0	1	2	0	0	0	0	0	0
TOTAL	0	0	0	8	22	49	28	17	6	2	4	0	136

2001 by Species													
2001	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
LOGGERHEAD	0	0	1	2	13	26	29	11	4	0	0	2	88
GREEN	0	0	0	0	2	1	1	0	0	0	1	0	5
KEMP'S RIDLEY	0	1	0	1	5	1	8	3	1	0	0	0	20
LEATHERBACK	0	0	0	1	0	0	0	0	0	0	0	0	1
UNIDENTIFIED	0	0	0	0	1	1	2	1	2	0	0	0	7
TOTAL	0	1	1	4	21	29	40	15	7	0	1	2	121

2002 by Species													
2002	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	TOTAL
Loggerhead	0	0	1	14	18	19	16	6	1				75
Green	0	0	0	1	4	2		1					8
Kemp's Ridley	0	0	0	1	3	1	2						7
Leatherback	0	0	0	1	1	3							5
Unidentified	0	0	0	0	1	1	2						4
Total	0	0	1	17	27	26	20	7	1	0	0	0	99

from 1990 to 2001, this year is 62.5% higher than any number observed during the previous decade. Staff spent considerable time in data analysis to justify the use of an emergency regulation by SCDNR to require leatherback TEDs, but no action was taken.

In 2002, there were 344 trawlers counted on May 15th, the opening day of the shrimping season. By the 17th, the number had dropped to 145. There were 7 stranded sea turtle carcasses recorded in the two weeks prior to the opening and 19 in the two weeks after the opening. However, this season is turning out to be the lowest stranding total since 1994. The stranding data for September 1, 1999 through August 31, 2002 are shown in Figures 7 and 8.

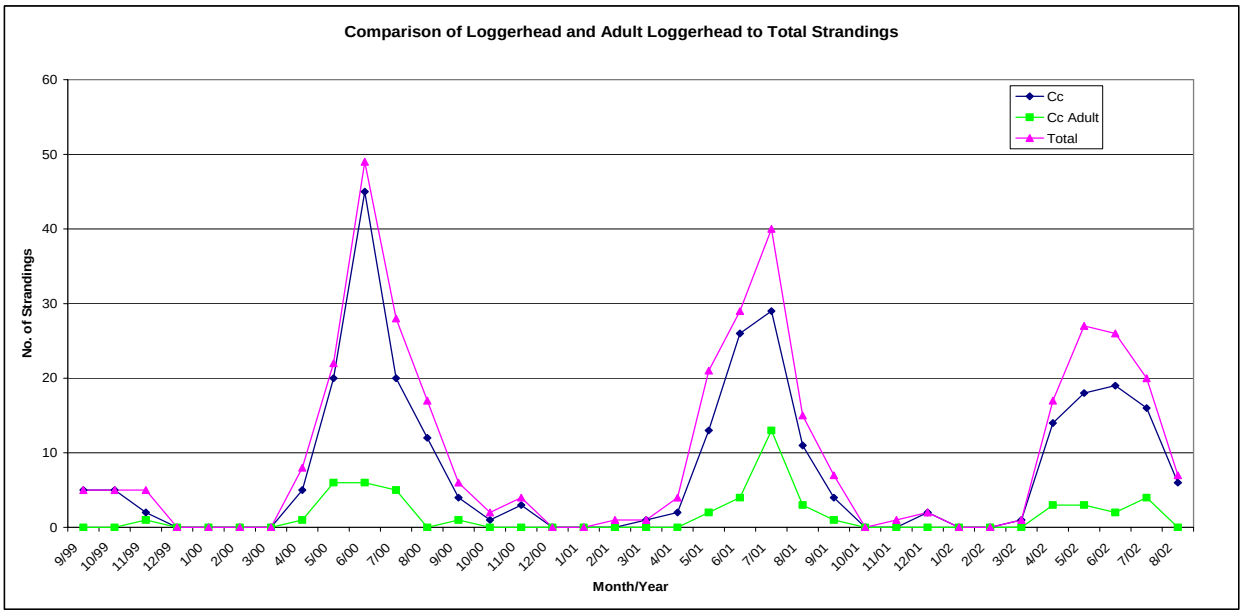


Figure 7. South Carolina loggerhead turtle strandings: September, 1999 – August, 2002.

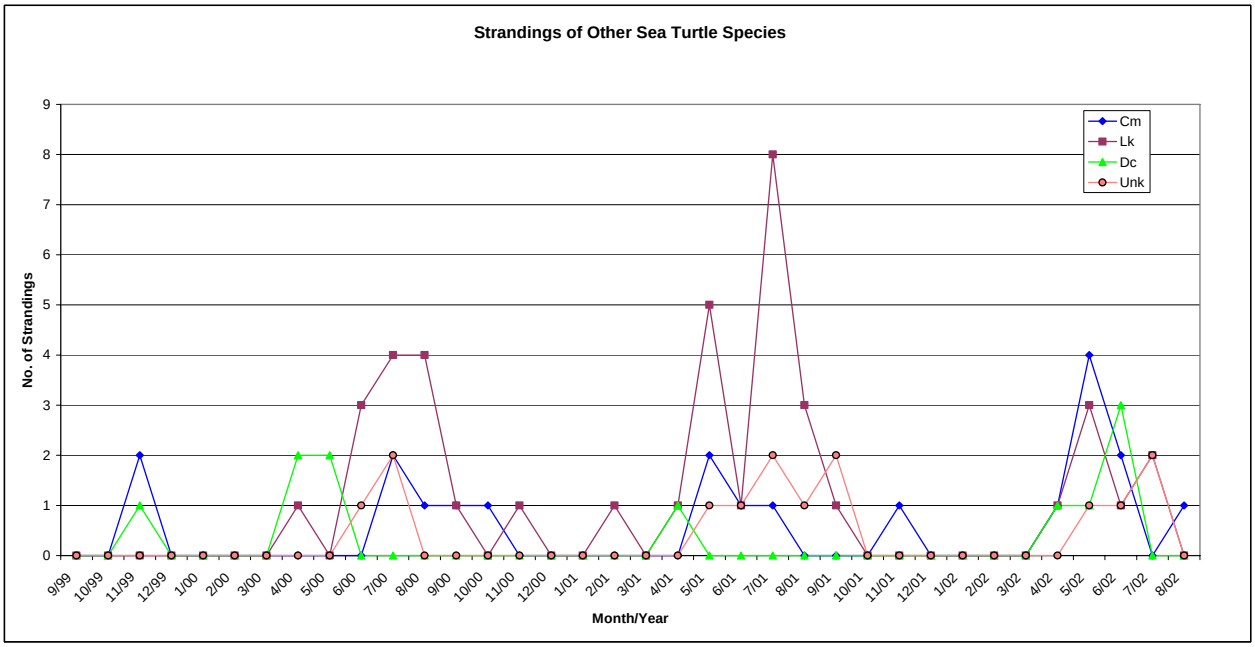


Figure 8. South Carolina sea turtle strandings: September, 1999 – August, 2002.

Job 3: Necropsy

Post mortem exams were performed on 78 carcasses from September 1, 1999 through August 31, 2002. The biological data are presented in Table 3, the mortality data are presented in Table 4 and data on whether the deaths were chronic or acute are presented in Table 5. Staff also provided necropsy expertise

to the South Carolina Aquarium when their adult male green turtle “Calhoun” was found dead in the Great Ocean Tank.

Table 3. Biological data from necropsy results.

September 1999 - August 2002

Species	Male	Female	Sex Undetermined	Adult	Juvenile	Total
Cc	16	36		16	35	**52**
Lk	3	12		0	17	**15**
Dc	2	4	1	1	6	**7**
Cm	2	2		0	4	**4**
Total	**23**	**54**	**1**	**17**	**62**	**78**

Table 4. Mortality data from necropsy results.

September 1999 – August 2002

Year	No. Stranded	No. Necropsied	No. Rated	No. Acute Mortality	No. Chronic Mortality
1999	15	3	3	2	1
2000	136	26	23	19	4
2001	121	28	26	20	6
2002	98	21	21	16	5
Total	370	78	73	57	16
		21.1%	93.6%	78.1%	21.9%

Table 5. Analysis of acute mortalities.

September 1999 - August 2002

Year	No. Acute Mortality	Healthy Animal/ No Apparent Injury	Boat Strike	Rec. Fish	Shark	Unknown

1999	2	2	0	0	0	0
2000	19	13	2	1	0	3
2001	20	15	3	0	0	2
2002	16	10	4	0	0	2
Total	57	40	9	1	0	7
		70.2%	15.8%	1.8%	0.0%	12.3%

Rehabilitation

The two loggerhead "floaters" that were picked up in August 2000 for rehabilitation required a great deal of staff time. They remained in the Animal Holding Facility of the South Carolina Aquarium from August until January. Aquarium and DNR veterinarians and staff assisted Dr. Dave Owens in performing two laparoscopies on each turtle to assess their initial condition and to determine if they were ready for release. They were driven to Florida and released into the ocean at Sebastian Inlet on 11 January 2001. A more detailed account appears in the August-November, 2000 issue of *Loggerheadlines.* Several newspapers in South Carolina carried the story. The story also appeared as an article in *The National Fisherman* since two shrimp fishermen in Beaufort County had rescued one of the turtles.

Two loggerheads and one Kemp's ridley were taken in for rehabilitation at the Sea Turtle Hospital in Topsail, North Carolina and a loggerhead died at the South Carolina Aquarium before it could be transported. Another loggerhead was held briefly in the South Carolina Aquarium then transported to the Marine Science Center at Daytona Beach, Florida for rehabilitation.

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

One of the nesting female loggerheads that had been instrumented with satellite transmitters in the previous grant cycle was still sending location data during the 1999 reporting period and is included here.

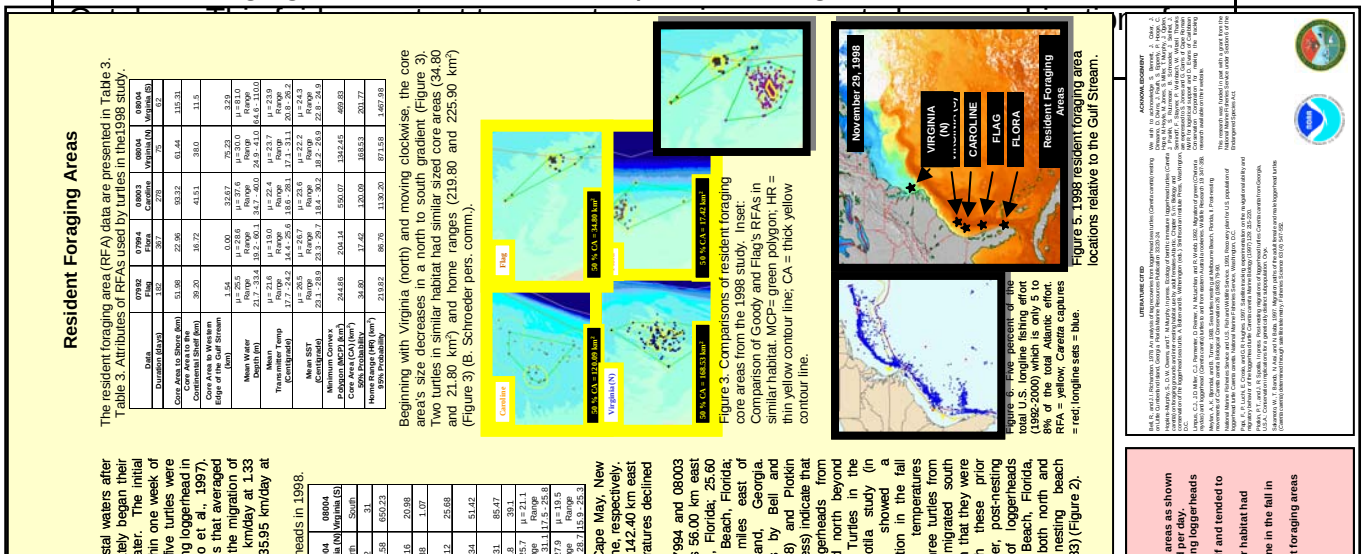
Number 07994 (Flora) a false crawl turtle, stayed near Cape Island for two weeks. A location class 3 (within 150 meters) placed her on the beach at 1:00am on 27 July. By that evening she was about 12 miles south of Cape Island. She continued south and was about 10 miles east of Daytona on 6 August. In late August 1998 she arrived in the area of the Oculina Banks off of Stuart, Florida where location data were received on Flora until October 9, 1999, almost 15 months.

A graduate student at the University of Charleston with experience in GIS was hired as a summer intern to assist with the analysis of the data on the five nesting loggerhead turtles that were instrumented in 1998 under the previous grant. Considerable time was spent on analysis of these data. Both oral and poster presentations were made at the 22nd Annual Symposium on Sea Turtle Biology and Conservation in Miami. The abstract for the oral presentation is provided as well as the entire poster presentation.

Comparison of resident foraging areas utilized by loggerhead turtles (*Caretta caretta*) from a South Carolina nesting beach using GIS and remote sensing applications

DuBose Griffin and Sally Murphy.

Five adult female loggerhead turtles were instrumented with Telonics ST-14 satellite transmitters on Cape Island, Cape Romain National Wildlife Refuge, South Carolina in 1998. Resident foraging areas were located on the Continental Shelf, both north and south of the nesting beach, at distances of approximately 285 - 871 km. Four turtles provided useful data from which to characterize and compare these habitats. We used the Minimum Convex Polygon (MCP) and Kernel Density Estimates (KDE) to determine core (50%) and home ranges (95%). MCP resident foraging area sizes ranged from 204 – 1,342 km^2. KDE core area sizes ranged from 17 - 201 km^2 with home ranges varying from 87 - 1,468 km^2. The size of the home range and core area may be related to habitat quality. Mean water depth was between 25.5 and 81.0 m. Sea surface temperatures in which the loggerheads were found ranged from 18.2ºC to 30.2ºC; the transmitter temperatures ranged from 14.4ºC to 31.1ºC. Mean temperature in which the loggerheads were found varied by 4.9ºC. One turtle had a northern (fall) and a southern (winter/spring) resident foraging area. This turtle remained in its northern resident foraging area until seasonal temperatures began to decrease in late



Deviation in proposed study

Due to a mis-communication with Service Argos, Inc., the necessary funds for satellite time and data processing were not invoiced to be obligated in time from the grant that was ending. Therefore, there were insufficient funds in this grant to conduct the study in 2001.

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

Staff attached satellite transmitters to five new adult female loggerhead turtles at Cape Island, Cape Romain National Wildlife Refuge on the night of 7 July 2002. Four of the turtles headed north and one went south. 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. The signal was lost from the southbound turtle about 30 miles east of Wassaw Island, Georgia soon after she left the nesting beach area.

Maps of the turtles' movements are prepared and updated by the Caribbean Conservation Corporation and can be viewed on the Internet at http://www.cccturtle.org/sat-sc-2002.htm

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

Job 1: Public Information

o The newsletter, *Loggerheadlines*, was expanded to include news from the network and the region. The final issue in 1999, in addition to the stranding, necropsy and nesting news, included a report on the impacts of Hurricane Floyd. We also included a list of publications and sea turtle web sites that the stranding network members could access for additional information.

o Three issues of *Loggerheadlines* were produced during 2000. In addition to the stranding, necropsy, rehabilitation and nesting news, information on the leatherback aerial and MRD "in-water" surveys was included. We also included a summary of the morphometrics data on nesting turtles at Cape Romain, as well as regional news.

o Three issues of *Loggerheadlines* were produced during 2001. In addition to the stranding, necropsy, rehabilitation and nesting news, information on the leatherback aerial surveys and the second year MRD "in-water" surveys was included.

o Two issues of *Loggerheadlines* were produced during 2002 on this grant cycle with color photos included as part of the format. The newsletter is sent to a readership of 185.

o Slide presentations were an ongoing activity during the entire grant cycle. Some groups are repeat requests each year. Presentations were given to the following groups:

Girl Scout Troop in Beaufort
Graduate biology class at the University of Charleston (twice)
Undergraduate marine biology class at the College of Charleston
University of Georgia wildlife techniques class (three times)
Charleston Natural History Society
Coastal Carolina University summer sea turtle biology class
Camp Wildwood (three times)
Special teachers at the South Carolina Aquarium
Women in the Environment for the Women's Center in Charleston
Kiawah Island Turtle Patrol members

o A presentation was also made to the Marine Advisory Board. It included an update on strandings and the status of the nesting population. This presentation was done jointly with the PI of the MRD In-water Survey.

o One hatchling, believed to be a hybrid between a loggerhead and green turtle was given to the South Carolina Aquarium for observation and educational display. Two additional hatchlings were given to Riverbanks Zoological Park in Columbia for educational display.

o Staff coordinated the release in Florida of two loggerhead turtles that had been rehabilitated at the South Carolina Aquarium. This included obtaining permits from Georgia and Florida state agencies, obtaining transportation and editing news releases for both the aquarium and the SCDNR public relations staff.

o Staff coordinated a "Name the Turtles" contest with the South Carolina Aquarium to select names for the five 2002 satellite instrumented turtles.

o Considerable staff time was spent reviewing plans and graphics text for a loggerhead display at the New England Aquarium.

o Staff attended a special workshop organized by the Pew Ocean Commission and provided a tour of SCDNR facilities to a group of commission members and support staff.

Job 2: Dissemination of Scientific Information

o A semi-annual report was prepared and submitted for the last six months of the previous grant. A Final Report was prepared and submitted for the previous grant, which included the time period from 1 September 1996 to August 31, 1999. Six semi-annual reports were prepared and submitted during this grant cycle, September 1, 1999 to August 31, 2002.

o Three biologists attended the 20th Symposium on Sea Turtle Biology and Conservation at Orlando, Florida. A poster was presented by the principal investigator. The title of the poster was "Contributions by the South Carolina Department of Natural Resources to the History and Growth of the Sea Turtle Symposium".

o The principal investigator, along with Dr. Dave Owens, prepared and presented an oral presentation for the Special Session Workshop on the Biology of the Loggerhead Sea Turtle at the 20th Symposium. The title was "Ecology of Benthic Immatures and Adults on Foraging Grounds - Atlantic".

o The principal investigator, along with Dr. Dave Owens and Tom Murphy, co-authors, prepared a written chapter for the proceedings of the Special Session Workshop on the Biology of the Loggerhead Sea Turtle. The title is "Ecology of Benthic Immatures on Foraging Grounds and Inter-Nesting Habitat Use by Adult Females - Atlantic." After revisions based on reviewers' comments, the title is now "Ecology of Benthic Immature Loggerhead Turtles (*Caretta caretta*) on Foraging Grounds and Inter-Nesting Habitat Use by Adult Females - Atlantic."

o The principal investigator, in collaboration with the scientific party of the MRD in-water study, presented three posters at the 21st Symposium on Sea Turtle

Biology and Conservation in Philadelphia, PA. Several WD and MRD biologists also attended the symposium.

o The University of Charleston student intern gave an oral presentation at the South Carolina Fisheries Workers Association meeting and won the Best Student Paper award. The presentation was based on analysis of the satellite telemetry data during 1998-99.The title was, "Comparison of Resident Foraging Areas Utilized by Loggerhead Turtles (*Caretta caretta*) from a South Carolina Nesting Beach Using GIS and Remote Sensing Applications."

o Four biologists attended the 22nd Annual Symposium on Sea Turtle Biology and Conservation in Miami. An oral presentation was given. The title was, "Comparison of resident Foraging Areas Utilized by Loggerhead Turtles (*Caretta caretta*) from a South Carolina Nesting Beach Using GIS and Remote Sensing Applications", by DuBose B. Griffin and Sally R. Murphy.

o A poster presentation was also presented at the 22nd Annual Symposium on Sea Turtle Biology and Conservation in Miami. The title was, "Characterization of Internesting Habitat, Migratory Corridors and Resident Foraging Areas for Loggerhead Turtles (*caretta caretta*) from a South Carolina nesting Beach Using GIS and Remote Sensing Applications" by DuBose B. Griffin and Sally R. Murphy.

o Dr. Colin Limpus gave a special seminar in March 2000 to over 80 people, including sea turtle volunteers, University of Charleston faculty and students and SCDNR staff. He also gave a nighttime presentation to approximately 200 members of The Aquarium Society. Dr. Colin Limpus also gave a special seminar in March 2001 to SCDNR and NOS staff and University of Charleston faculty and students on his research in Queensland, Australia. Staff time was also spent writing a Memorandum of Understanding (MOU) between the SCDNR and the Queensland Parks and Wildlife Service for the future exchange of information and cooperation between the two "sister states" in all aspects of sea turtle research and management

o The second Turtle Expert Working Group (TEWG) report was reviewed for comments prior to publication. The permit for the National Marine Fisheries Service was also reviewed for the Permit Office. Comments were given on one of the chapters in the upcoming book on the Biology of the Loggerhead Turtle.

o The principal investigator participated in the NOAA 2002 Priorities and Planning Workshop in Washington, DC.