

REVIEW AND APPROVALS

CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE

McBee, South Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1989

Ronald C. Snider
Refuge Manager

3-10-90
Date

Burt A. Gabriel
Refuge Supervisor Review

3/14/90
Date

Harold W. Benson
Regional Office Approval

3/21/90
Date

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CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE

McBee, South Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1989

U. S. Department of the Interior
Fish and Wildlife Service
National Wildlife Refuge System

INTRODUCTION

Carolina Sandhills National Wildlife Refuge overlies a portion of the Fall Line region of South Carolina which forms the transition zone between the Atlantic Coastal Plain and the Piedmont Plateau. In prehistoric times the coastal plain was covered by an ancient ocean into which drained rivers from adjacent mountainous regions. Silt and sand deposited along the coastline from these streams eventually was formed into a band of sand dunes which are today known as the Sandhills Region of North and South Carolina.

Human habitation of the Sandhills has probably existed for over 10,000 years. Before the arrival of European man, the region was sparsely populated by scattered indian tribes which came to be known as the Catawba Nation. Little information is available concerning the early history of European man in this area. Not until the 16th century was the area visited by explorers and for the next 150 years, the only people to visit the region on a regular basis were trappers and traders in search of furs and hides. Not until the mid-1700's did Europeans begin to establish permanent settlements in inland South Carolina.

Vast longleaf pine forests dominated the landscape of the sandhills when man first settled in this area. These supported major lumber and naval stores industries by the late 1800's. However, by the early 1900's these forests had been completely destroyed and farming became the predominant lifestyle in this region. Poor agricultural practices and deep infertile soils combined to spell the doom of this industry. The region was badly eroded and essentially a biological desert when acquisition for the refuge began in 1934.

The refuge was established by Executive Order Number 8067 dated March 17, 1939 under authority of the 1933 National Industrial Recovery Act and the Emergency Relief Appropriation of 1935. The United States Department of the Interior owns a total of 92,000 acres of which 45,586 acres are managed by the U. S. Fish and Wildlife Service as the Carolina Sandhills National Wildlife Refuge. The remaining area comprises the Carolina Sandhills Wildlife Management Area and is leased to the South Carolina Forestry Commission who manages it as the Sand Hills State Forest.

Elevations on the refuge range from 250 to 500 feet above mean sea level. The topography is characterized by gently rolling hills comprised of deep sandy soils with occasional outcroppings of red and kaolin clays. Uniquely, much of the flora and fauna found in the east side of the refuge is characteristic of those forms generally associated with the Coastal Plain while those of the west side could be expected to be associated with the Piedmont Plateau. The dominant forest type is longleaf pine with a scattered understory of turkey oak. Where clay outcroppings occur, longleaf is replaced by loblolly pine and bluejack oak is the most common understory species.

The eastern portion of the refuge drains into Black Creek and its tributaries. Water in these streams is clear but stained black due to the presence of organic acids. Flood plain swamps occur along some of the larger streams. Tributaries are similar except they are shallower and swifter. The western portion of the refuge drains into Lynches River and

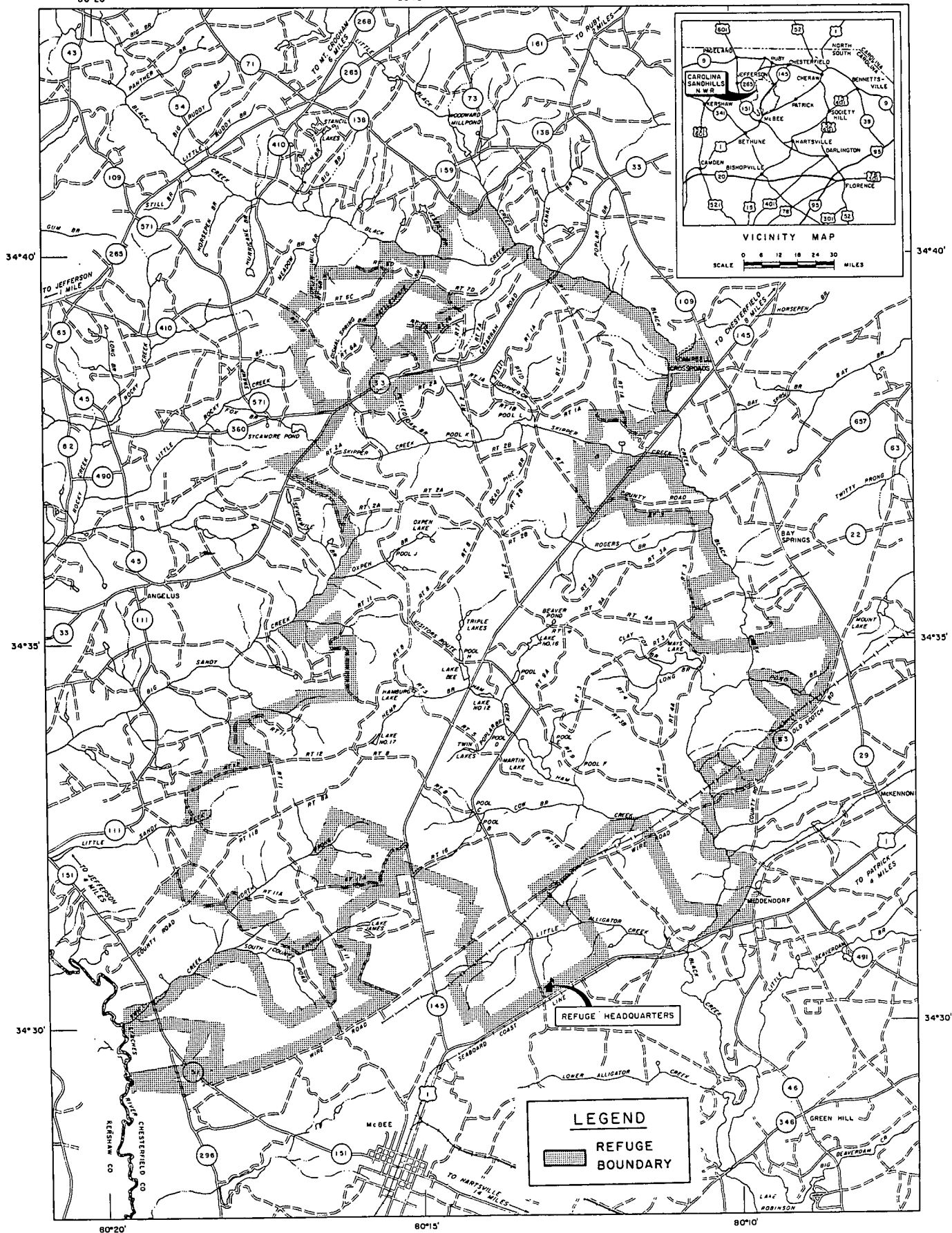
its tributaries. The tributaries of Lynches River are similar to those of Black Creek except that they are deeper and swifter. The mainstream of Lynches River originates in the Piedmont Plateau and in the vicinity of the refuge is characterized by slightly stained and turbid water and predominantly clay banks. Pocosin ecotones, swamp hardwood forests, and dense stands of evergreen shrubs border these streams producing some of the best wildlife habitat found on the refuge. Thirty small impoundments having dark, clear water have been constructed on these tributaries; most of these have been stocked with bass and bream. Edge and diversity have been added by the creation of many small fields scattered throughout the refuge.

CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR
80°20'

CHESTERFIELD COUNTY, SOUTH CAROLINA

UNITED STATES
FISH AND WILDLIFE SERVICE
80°10'



COMPILED IN THE DIVISION OF REALTY FROM
SURVEYS BY U.S.G.S.

ATLANTA, GEORGIA
REVISED: 12/86

JUNE, 1974

Scale 0 1320 2640 5280 10560 15840 21120 FEET
0 1/2 1 2 3 4 MILES

3° 30' N
100° 00' W

MEAN
DECLINATION
1974

4R-SC-275-404

A. HIGHLIGHTS

1. Hurricane Hugo hit South Carolina in the early hours of September 22, leaving a wide path of destruction across the state. Damages to refuge timber totaled \$155,350 (Sec. F.3.). The refuge was without electricity for eight days. Other than downed trees across roadways, there was very little damage to refuge facilities.
2. Carolina Sandhills National Wildlife Refuge marked its 50th Anniversary on March 17, 1989. The refuge staff invited the public to celebrate the 50th Anniversary with an open house and special events on May 20. (Sec. H.1.).
3. The raising of dog impoundment fees resulted in much local controversy. (Sec. H.17.).
4. The proposed land exchange with McLeod Farms, Inc. is still not final after two years. (Sec. C.1.).
5. Office Assistant Kay McCutcheon received the "Citizen of the Year" award from the McBee Lions Club. Kay is very active in the community and almost single-handedly runs the recreation department. (Sec. J.3.).
6. Range Technician Julius Loflin completed 30 years of service this year. Julius began his service career at the old Cheraw National Fish Hatchery just a few miles from here. (Sec. J.3.).
7. Louis Tate and Julius Loflin received a Special Achievement Award for their work in preparing public use facilities for the 50th Anniversary celebration. (Sec. J.3.).
8. The refuge's first FmHA project was completed in record time and ready for wintering waterfowl. (Sec. C.1.).

B. CLIMATIC CONDITIONS

The most significant climatic event to have occurred in this area, indeed in all of South Carolina, in 1989 took place on the evening and early morning hours of September 21st and 22nd when Hurricane Hugo roared through the state. The storm had lost some of its punch by the time it reached the refuge but it still had sustained winds of between 80-90 mph. Wind speed instruments at Sand Hills State Forest were destroyed by the storm. The refuge sustained only minor damages, most of which were to timber resources. The only structural damage was to an equipment storage shed (metal sheeting torn loose) and to Quarters 212 (gable vent damaged). Rainfall from Hugo was only 3.16 inches, very little for a hurricane of this magnitude.

Total recorded precipitation for the year was 53.28 inches, 6.76 inches more than our five year average of 46.52 inches. An analysis of Table 1. shows that most of the rainfall was received between March and September when 37.67 inches was recorded. Both the winter and summer quarters received less than normal amounts. The fall quarter barely exceeded normal. Only the spring quarter grossly exceeded the norm. There was no

significant frozen precipitation in 1989, but we did experience a late frost in early May which damaged a lot of trees and flowering plants, particularly the pitcher plants in the Oxpen area.

Table 2. presents temperature and relative humidity data. It was a relatively mild year with no significant extremes. Considering average temperatures, January was nearly 10 degrees warmer than in 1988 while August and December were nearly 10 degrees cooler. December was the coldest month with daytime temperatures rarely exceeding the 30's from the 17th through the 26th. Most ponds froze over and remained that way until warming temperatures arrived during the closing days of the year.



This was a common sight in the months following Hurricane Hugo. Every road on the refuge had numerous trees down. (89NR-1, 10/89, Robinson)

Table 1.
1989 Temperature and Relative Humidity Data

Month	Temperature Data				Relative Humidity			
	Average				Average %			
	High	Low	Max.	Min.	High	Low	Max.	Min.
January	59	39	74	25	98	54	100	22
February	60	40	82	16	97	59	100	16
March	67	45	84	30	99	58	100	20
April	75	51	93	31	100	36	100	22
May	82	57	94	42	100	37	100	24
June	90	69	98	64	100	52	100	31
July	90	71	98	62	100	60	100	39
August	88	70	99	63	100	64	100	40
September	85	66	91	60	100	59	100	38
October	78	53	88	34	100	44	100	22
November	68	46	84	22	99	43	100	22
December	49	30	70	15	91	47	100	20

Table 2. Monthly Distribution of Precipitation In Inches
Calendar Year 1989

	Amount	Normal*	Deviation
January	2.43	4.34	-1.91
February	3.55	4.03	-0.48
March	5.01	3.07	+1.94
April	6.69	1.98	+4.71
May	2.35	3.27	-0.92
June	7.10	4.34	+2.76
July	6.61	6.96	-0.35
August	3.56	6.85	-3.29
September	6.35	2.85	+3.50
October	3.22	3.44	-0.22
November	2.51	4.18	-1.67
December	3.90	1.21	+2.69
Totals	53.28	46.52	+6.76

* 5 year average: 1984-1988

Table 3. Five Year Distribution of Rainfall In Inches

<u>Year</u>	<u>Recorded</u>	<u>Deviation</u>
1985	51.18	+ 4.75
1986	36.21	- 10.22
1987	55.60	+ 9.17
1988	41.33	- 5.10
1989	53.28	+6.76
Five Year Average	-	47.52 Inches
Five Year Average Deviation	-	+ 5.36 Inches

C. LAND ACQUISITION1. Fee Title

We continued to wait through the year for congressional approval of the exchange of a 92 acre parcel of refuge lands along our southwestern boundary for a 143 acre parcel of an inholding known as the Rowe Tract located in the refuge's lower midsection. At the close of the year we had finally received verbal notification of the needed approval.

We were issued a caretakers agreement from the FmHA for a 125 acre tract of land along the Pee Dee River just east of Cheraw (now known as the Husband's Creek Tract) in anticipation of later fee title possession. Considerable development work was accomplished on this area during the year (see Section I. 1. for details).

Closing actions and deed recording were accomplished on the 4 acre inholding purchased from the Chesterfield County School Board last year.

Refuge Manager Snider and Forester Robinson met with Charles Sibley of Evergreen Timber Company in June to discuss possible land exchanges. Regional Office Realty Forester Andy Eller visited the refuge in June to obtain data for possible land exchanges on three private tracts of land. Several different avenues of obtaining fee title to a number of refuge inholdings were explored during the year. However, no willing sellers could be located and efforts were postponed for the present.

D. PLANNING2. Management Plan

An amendment was written and approved for the refuge's Hunt Plan. The amendment clarifies which gates will be opened for public access during the various hunts.

4. Compliance with Environmental and Cultural Resources Mandates

Assistant Manager Cartlidge and Forester Robinson prepared an Environmental Assessment and Section 7 Evaluation for the McLeod Farms land exchange. (Sec. C.1.)

A preliminary cultural resources survey was done on the Husband's Creek tract (FmHA area) in preparation for water impoundment development. The survey was done by Dr. Michael Trinkley of the Chicora Foundation, Inc. of Columbia, SC. Trinkley located five prehistoric sites within the project area. All but one were outside the area of direct impact and only minor modifications to the project had to be made to exclude it. The age of the sites ranged from 4000 B.C. to around 1200 A.D.

6. Other

Two Partners for Waterfowl projects were initiated this year. Sonoco Products Company donated 1800 board feet of cypress timber from which the construction class at McBee High School fabricated 133 wood duck nest boxes. Refuge funds were utilized to obtain needed hardware, shields and poles. Distribution of these boxes began with Mr. John Horton receiving 13 boxes. Distribution to other local cooperating landowners will continue in '90.

A water control structure was purchased with \$2,000 allocated from regional Partners funds. This structure will be installed by Mr. Belton Laney in a bottomland hardwood slough along the Pee Dee River during the coming year when lower water levels will make installation more efficient.

E. ADMINISTRATION

1. Personnel

The staffing pattern and incumbents occupying these positions for Carolina Sandhills Refuge is as listed below:

Ronald C. Snider, Refuge Manager, GS-485-12, EOD 9/30/84, PFT
 Karen S. Cartlidge, Asst. Refuge Manager, GS-485-11, EOD 1/17/88, PFT
 John S. Hoffmann, Asst. Refuge Manager, GS-485-9, EOD 9/2/84, PFT
 David H. Robinson, Forester, GS-460-11, EOD 2/1/74, PFT
 Steven D. Lay, Forester, GS-460-7, EOD 5/22/88, PFT
 Kay W. McCutcheon, Office Asst., GS-303-6, EOD 3/20/72, PFT
 Tracie M. Watson, Clerk-Typist, GS-322-3, EOD 7/3/89, PFT
 T. Jack Oliver, Eng. Equip. Operator, WG-5716-11, EOD 1/10/77, PFT
 Louis Tate, Maintenance Mechanic, WG-4749-9, EOD 10/2/83, PFT
 Julius R. Loflin, Range Technician, GS-7, EOD, 8/14/88, PFT



Refuge Manager, Ronald Snider (89NR-2, 1/90, Cartlidge)



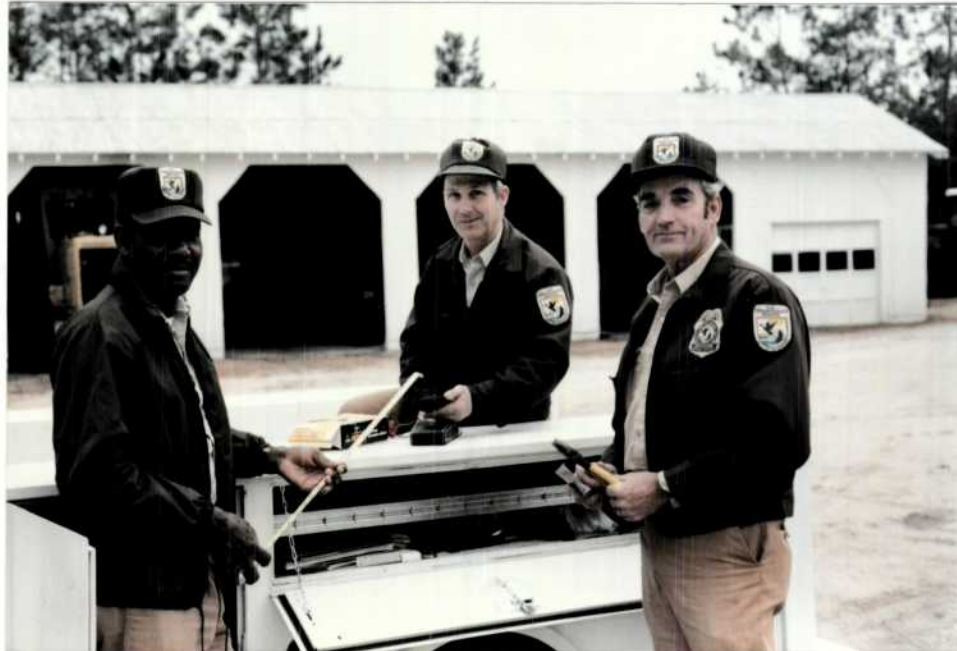
Office Assistant Kay McCutcheon and Clerk Typist Tracie Watson (89NR-3, 1/90, Cartlidge)



Assistant Managers Karen Cartlidge and John Hoffmann (89NR-4, 1/90, Watson)



Refuge Foresters Dave Robinson and Steve Lay (89NR-5, 1/90, Cartlidge)



Maintenance Mechanic Louis Tate, Range Technician Julius Loflin, and Equipment Operator Jack Oliver (89NR-6, 1/90, Cartlidge)

Biological Technician Eddie Taylor was terminated effective 3/25/89. Eddie had been hired on a temporary appointment to conduct goose collar observations and banding at Carolina Sandhills and Pee Dee Refuges. He proved to be a very capable and dependable employee.

Carolina Sandhills Refuge was authorized to hire a part-time clerk typist to assist with the additional clerical workload brought on by the retirement of the office assistant at Pee Dee Refuge in January. Tracie M. Watson was hired as a GS-3 Clerk Typist effective July 3, 1989 with a 24 hour per week tour of duty. Tracie was converted to a full time tour of duty effective October 8. She spends three days per week assisting with clerical functions at Carolina Sandhills Refuge and two days per week on these duties at Pee Dee Refuge.

Refuge Forester Steven Lay was promoted to the GS-7 level effective June 4, 1989.

2. Youth Programs

The YCC camp for 1989 was composed of three enrollees (two males and one female) with the enrollee originally assigned to the Pee Dee Refuge being reassigned to this station. The camp ran from June 5 through August 4 with enrollees having the 4th of July week off. While the first session went smoothly, the second session was plagued by absenteeism. Personal health problems and lack of enthusiasm for the job contributed to the absenteeism. However, one enrollee, Ronnie Black, performed superbly throughout the entire summer, often in excess of that which was expected of him. In spite of it all we did manage to accomplish quite a lot.

Projects accomplished were:

1. Picked up litter from along approximately 30 miles of major State and County roadways which pass through the refuge.
2. Removed understory vegetation from around red-cockaded woodpecker cavity trees in Compartments 2 and 7 totaling 160 acres. All cavity trees were also marked with white bands for easy identification.
3. Remarked twenty miles of exterior refuge boundary. This included removing brush from around all boundary signs and trees; replacing boundary signs; and repainting boundary trees.
4. Cleaned and repainted all refuge gates (45 in all) and marked same with reflective tape. Each gate has an average width of ten feet.
5. Overhanging tree limbs, dead and fallen trees, and understory vegetation were removed along the foot trail at Martins Lake.
6. The field markers from 89 new and existing fields were removed and replaced with new markers. These new markers were also fabricated by the YCC.
7. The water control structure and dams at Pools C and F and at Lake 17 were cleared of accumulated beaver debris and encroaching vegetation.
8. The decorative fence in the headquarters area was cleared of encroaching vegetation and additional bark was placed alongside and underneath it.
9. The boundaries of all the "No Hunting Zone"s and "Closed Area"s were reposted.
10. Approximately five miles of refuge roads (including a portion of the visitor's drive) was cleared of overhanging tree limbs and encroaching vegetation.

In addition, the enrollees completed several lesser projects around the shop and headquarters. All enrollees successfully completed a first-aid and CPR training course at the Chesterfield-Marlboro Technical College. The total appraised value for the YCC program was \$9,625.41 for a cost benefit ratio of 1:3.6.



YCC enrollees preparing for a days work. L to R, Ronnie, Max and Nicki (89NR-7, 6/89, Hoffmann)



YCC enrollees spruced up the headquarters area by edging and putting out more wood chips around the split rail fence (89NR-8, 7/89, Hoffmann)



Enrollee Ronnie Black assists Pee Dee's Wayne Singleton in putting in a Carsonite post for marking the boundary at Husband's Creek (89NR-9, 7/89, Cartlidge)

4. Volunteer Programs

Four new volunteers were recruited this year. Three of the four are from the Greenville area and travel to the refuge for working weekends. Carmie Cook, Randy Cockrill, and Ryan Cockrill have adopted the Woodland Pond Nature Trail and keep the trail trimmed back and in good shape. This first year they replaced the wooden stoplogs along the steep areas of the trail and hauled wood chips in to prevent erosion. They have also assumed responsibility for our bluebird box program. Both Carmie and Randy are computer programmers (mainframe) by profession and enjoy their work at the refuge. These three contributed a total of 62 hours this year.



Volunteers Randy Cockrill and Carmie Cook are from Greenville, SC. They have adopted the Woodlands Pond Nature Trail near Pool A as part of their volunteer service to the refuge. (89NR-10, 3/89, Cartlidge)

Bernard Stubbs of Cheraw has volunteered his time to keep tabs on waterfowl use and other happenings at the Husband's Creek tract. This area is approximately 30 miles from the refuge and difficult for the staff to monitor on a regular basis. Bernie visits the area at least once a week to record waterfowl use and other happenings. Bernie is also the County Coroner and quite a colorful character. He is known locally as the "Duck Man" and works enthusiastically with Ducks Unlimited and the State Waterfowlers Association.

5. Funding

Table 4. Funding Summary
 Carolina Sandhills and Pee Dee Refuges
 FY's 89 and 90

<u>FY</u>	<u>1261</u>	<u>1262</u>	<u>6860</u>	<u>8610</u>	<u>1120</u>	<u>1221</u>	<u>9120*</u>	<u>Total</u>
89	367900•	145700	35000	10215	6000	--	--	564815
90	356300••	151700	35000	9981	22000	5000**	89000	668981

•Total includes add-ons to base funding of 2,200 for contaminant study at Pee Dee; fire equipment needs totaling 40,700; and 4,000 for hiring of temporary to conduct goose collar observations.

••Total includes add-ons to base funding of 15,200 for a water quality contaminant study at Pee Dee Refuge.

*Presuppression fire funding includes \$27000-2 seasonals; \$21000-prescribed burning; \$1000-water tank; \$6000-equipment maintenance, roads, etc.; \$20000-tilt bed for Pee Dee transport truck; \$4000-ATV; and \$10000-winch.

**Allocation of \$5000 for drug enforcement work.

Looking at FY 90, the amount of funds available for discretionary purchases should be adequate. Total funding of \$668,981 will cover salaries projected at approximately \$423,000; set asides total \$141,181 (contaminants, fire equipment, quarters, drug enforcement, and farm bill activities); the amount remaining for fixed expenses and operations and maintenance projects is projected to be approximately \$104,800.

6. Safety

Carolina Sandhills held regular safety meetings covering a variety of topics related to work and personal safety. All refuge employees except Manager Snider completed a First Aid and CPR course at Chesterfield-Marlboro Technical College in Cheraw.

A safety inspection was conducted in September by Assistant Manager Cartlidge and Equipment Operator Oliver. All safety hazards were noted and it was estimated that it would take approximately \$3,000.00 to eliminate the majority of the safety hazards. Other problems inherent in

the structure of a building or facility will require some major construction and funding in the future. Safety signs, fire extinguishers, protective clothing, and a new bench grinder were purchased this year.

Seven staff members received ATV safety training sponsored by the ATV Training Institute. The training was held at Pee Dee Refuge.

The station had six reportable accidents during the year. They were:

- 3/24 Employee aggravated an existing back problem when lifting riser boards out of a water control structure.
- 6/9 A YCC enrollee stepped off the back of a truck and twisted her ankle.
- 6/12 A YCC enrollee was struck by a falling limb while trimming trees and sprained several fingers and punctured his hand.
- 7/13 A YCC enrollee became over heated while working out-of-doors and developed heat cramps.
- 7/24 An employee received a strained wrist after being struck by a tree limb while participating in ATV training.
- 9/13 An employee failed to release the tailgate while attempting to unload a dump truck. The truck overturned in the soft dirt of a newly constructed dike. The driver was not injured and there were only minor dents to the truck.

7. Technical Assistance

A cooperative agreement between the South Carolina Forestry Commission and the U.S. Fish and Wildlife Service gives the refuge the responsibility for providing technical assistance on wildlife matters to the staff of Sand Hills State Forest. Details of the cooperative program between the two agencies can be found in Section J.1.

In the fall, Assistant Manager Cartlidge began working with Dr. Bill Alexander of the Governor's School for Math and Science in Hartsville. Dr. Alexander is interested in providing research projects for the junior and senior high school students at the Governor's School. One student, Lee Ann Welch, decided to work on wood ducks. Ms. Cartlidge provided Lee Ann with computer printouts of the refuge wood duck data and is also assisting her with some computer analysis of the data. This is the first time the refuge has become directly involved with the Governor's School and we hope to develop this relationship further.

Assistant Manager Cartlidge replied to a request from Dr. Joe Edmisten, a private ecological consultant, for plant and animal lists for the refuge. Dr. Edmisten was doing some consulting work for Cheraw State Park on their proposed golf course.

During November, timber inventory data for two loblolly pine stands was submitted to Dr Richard Field, continuing education coordinator at the University of Georgia. This inventory data will be discussed during the computer workshop for southeast region refuge foresters to be held in February 1990.

F. HABITAT MANAGEMENT

1. General

Pine forest communities are to be found throughout most of the 45,586 acres of the refuge. Although longleaf pine/turkey oak communities are most common, loblolly pine/bluejack oak communities are prevalent in those areas where clay outcroppings occur. Pond pine, gallberry, fetterbush, and sweetbay are found in association with the pocosin drains and wetter areas. Approximately 1,200 acres are in open fields and clearings with an additional 350 acres of man-made lakes and ponds.

2. Wetlands

Through the years, thirty lakes and ponds have been constructed by damming off various creeks and streams which pass through the refuge. In addition to stream flow, most of these impounded areas are also spring fed. They have an abundant supply of water even during periods of prolonged drought.

Several pools are managed as "semi" green-tree reservoirs. Water levels in Pools D, G, H, K and L were lowered in March to remove standing water from green timber growing along their shorelines. Water levels were dropped lower than in previous years to further stimulate woody shrubs for wood duck brood habitat. These areas were reflooded in November.

Honkers Lake remained at full pool throughout the year in an effort to drown out a stand of woolgrass in its shallower regions. The pool will remain flooded through 1990.

Martins Lake and Holdover Pond are potentially our best waterfowl areas. However, neither have realized their full potential in recent years, primarily due to declining waterfowl populations nationwide. Holdover was drained in April. By June the entire impoundment was covered with buttonweed (Diodia sp.). Although buttonweed is a fair waterfowl food, we had hoped for better results. However, in August smartweeds and beggarticks had appeared and we ended up with a good supply of waterfowl foods. The unit was reflooded in October.



Holdover pond in July after a late April drawdown. The pond was covered with buttonweed (Diodia). (89NR-11, 7/89, Cartlidge)



By August smartweeds and beggarticks had outgrown the buttonweed and we ended up with a good crop of waterfowl foods in Holdover. (89NR-12, 9/89, Cartlidge)

Martins Lake is our primary waterfowl area. In the previous two years we had attempted to produce Japanese millet around the edges of this lake with very poor results. This year the decision was made to back away from seeding and rely on production of natural foods. The lake was drawn down in April to about 1/3 full pool capacity. There was fair production of Cyperus sp. and Fimbristylis sp. along the shoreline and upper reaches of the lake. It was decided to leave the lake drawn down through the winter to facilitate complete dewatering in the spring.

This marks the second consecutive year for summer drawdown of Lake 12. The lake was drained in April with good results. However, during this second drawdown, significant amounts of woolgrass appeared. Woolgrass is an undesirable species and has no food value for waterfowl. This indicates that about two consecutive years of drawdown is the limit for this impoundment before undesirable vegetation begins to take over. Reflooding began in November but due to leakage problems in the structure, the pool only had an average depth of about 6-12 inches by the first of December. At that time, Lake 12 began to receive some use by mallards and wood ducks. The decision was made to leave the lake at this level until the spring of 1990.



Lake 12 after the second consecutive year of summer drawdown. Note the woolgrass (Scirpus cyperinus) in the center. Warty panicum is in the foreground. (89NR-13, 9/89, Cartlidge)

Middle Triple Lake was drained late in 1988 to permit oxidation and consolidation of the lake bottom and to permit repairs to the dam. Repairs were made to the dam and spillway during the summer. Beaver activity, combined with significant rainfall during the spring and summer, did not permit sufficient drying of the lake bottom. The beaver were finally removed and the lake will remain drained through the upcoming months to try and dry out the bottom.



The dam and spillway were repaired at Middle Triple Lake in January. Snider sets out to inspect the completed project. (89NR-14, 1/89, Cartlidge)

Pool E was drained late in 1988 to permit removal of debris from the water control structure and to replace the walkway leading to the structure. The walkway was completely removed and the area between the structure and the dam was backfilled with soil and stabilized. Plans call for reflooding this pool in February, 1990.



The walkway to the water control structure at Pool E was removed and fill added to provide a way to use equipment (versus hands) to clean out debris from in and around the structure. (89NR-15, 6/89, Cartlidge)

Pool C was drained in April for the first time since its construction in 1968. Fishing had become very poor and the water control structure had a lot of accumulated debris. Assisted by YCC, the refuge staff cleared the downstream channel and associated shoreline of standing timber, downed trees, and a large mass of roots and other vegetative matter that was obstructing the free flow of water from the lake. The pool was reflooded in October and stocked with bluegill and shellcracker fry in December.



Pool C was drained in April for the first time since 1968. Fishing had become very poor and we wanted to get the pool into better shape before restocking it. (89NR-16, 4/89, Cartlidge)



Pool C in September. There was excellent growth of a variety of moist soil plants. (89NR-17, 9/89, Cartlidge)

Pool A was drained in October and will be treated the same as Pool C in the coming year. As the water was going down a large bass (7+ lbs) became stranded in a hole. Range Technician Julius Loflin caught this one "bare handed". Although the bass was large, it was very lean, implying that there was not very much "fish food" in the pond. Looking back at the management history of this pond, we found that the pool had not been completely drained since it was constructed in 1964. The only record of fish stocking was in 1967 when 250 channel catfish were put in the pond. Guess the bass was doing real good, considering.



Range Technician Julius Loflin literally caught this 7+ lb. bass "bare handed" from Pool A. (89NR-18, 11/89, Cartlidge)

In March the Lake 17 water control structure was vandalized by removing several stop-logs. The lake was partially drained by this action. Since the lake had a bad aquatic vegetation problem, it was decided to proceed with a complete drawdown in an effort to control the vegetation. The remains of an old, rusted out iron grating were removed from the structure while the water was down. A good stand of Eleocharis developed on the lake bottom while it was dry. Reflooding began in October but had not been completed by the end of the year. The lake was stocked with bluegill and shellcracker fry in December.



Lake 17 water control structure. This iron grating was removed before the lake was refilled. (89NR-19, 5/89, Cartlidge)



Lake 17 soon after drawdown in May. This lake had not been drawn down completely since 1968. The fish population had declined in the last few years and there was a major aquatic weed problem. (89NR-20, 5/89, Cartlidge)



By August, Lake 17 was covered with almost a pure stand of Eleocharis. (89NR-21, 8/89, Cartlidge)

In April, it was discovered that the water control structure and culvert at Lower Twin Lake had become so badly plugged up that water would not flow through it. The lake had begun overtopping the dam at the emergency spillway. It took three men nearly three days to clear the structure. A platform and grating were constructed and installed on the structure and after several beaver were removed, the problem was solved.

3. Forests

In preparation for the revision of the refuge timber management plan, a timber inventory (cruise) was completed on the refuge during the year. An Omnitali microcomputer program was used for the computation of field data. A Husky Hunter field computer with Omnitali software was used to store field data and electronically transfer it to our personal computer. This system added greatly to the productivity and accuracy of our forest inventory. Approximately forty-nine (49) timber types were inventoried during the cruise with a total of nine hundred eighty-six (986) systematic random plots taken using a 10 BAF prism. Our timber cruise was completed with a confidence interval of 95 percent and an allowable error of 20 percent being obtained. Local volume tables were calculated for all pine plantations, natural longleaf pine stands, and loblolly pine stands. Growth data for all pine species (pulpwood and sawtimber) was also obtained. Total timber volumes on the refuge are as follows:

Pine pulpwood - 179,337 cords
 Pine sawtimber - 136,147,280 Board Feet (Scribner Rule)
 Hardwood pulpwood - 25,775 cords
 Hardwood sawtimber - 21,329,047 Board Feet (Scribner Rule).



Forester Lay storing field data into our Husky Hunter field computer. Data gathered for the revision of the timber management plan was transferred to the Dell PC at the end of each day. (89NR-22, 4/89, Snider)



Forester David Robinson taking height and form class measurements using a clinometer mounted on a Wheeler pentaprism unit. (89NR-23, 4/89, Snider)



Forester Steve Lay taking increment boring to determine growth projection. (89NR-24, 8/89, Robinson)

All timber management activities on the refuge during the year were accomplished in accordance with approved woodland habitat management prescriptions. Two pulpwood sales and one sawtimber sale were marked and sold during the year. In addition, five pine straw areas were sold. Pine straw sales were mostly conducted in longleaf pine plantations which had not been previously prescribed burned. The removal of pine straw in these areas helps to reduce the heavy accumulation of pine litter thereby reducing wildfire danger. Stumpage prices ranged from \$14.18 to \$16.84 per cord for pine pulpwood and \$152 per MBF for pine sawtimber. Pine straw prices ranged from \$113.53 per acre to \$282.42 per acre.



Box baler used on a straw sale. This type baler is used in unthinned plantations where tractor operation is limited. (89NR-25, 3/89, Cartlidge)



A completed bale. One man working 10 hours can bale 100-125 bales per day. (89NR-26, 3/89, Cartlidge)

While making a routine check of a pine sawtimber sale area (Compartment 13 - Mock Bunting Forest Products), Foresters Robinson and Lay noticed that an area already cut appeared to be sparsely stocked. Upon further investigation, it became apparent that a number of trees in the sale area had been illegally marked. The illegally marked trees were longleaf pine sawtimber and pole size trees. Evidence indicated that these trees had been marked later than the original marking in February.

The sale permittee, Bruce Mock, was contacted and met with Manager Snider and Forester Robinson. Mr. Mock did not admit to knowing anything about the illegally marked trees. He agreed to let the foresters remove the paint markings from the illegally marked trees. Paint was removed from 130 trees, with an estimated volume of 14,683 board feet. Stumps were measured from previously cut illegally marked trees and a volume of 2,921 board feet was recorded. Special precautions will be taken on future timber sales to prevent similar events from happening.



An illegally marked tree in a refuge timber sale. Notice the blue paint on the green vegetation. The original sale was marked in February before vegetation was present. (89NR-27, 5/89, Robinson)



Illegally marked trees on the sawtimber sale. The timber was originally marked as an improvement cut. Paint was later removed from the illegally marked trees. (89NR-28, 5/89, Robinson)

A refuge salvage and miscellaneous sale was advertised and sold to E.J. Dixon (D.J. Creed, Inc.) for \$9.00 per cord (mill tally). This sale consisted of trees which were dying or had died due to fire and insect damage or other natural causes. The majority of the salvage wood came from bark beetle infested trees.

On September 21, damaging winds from Hurricane Hugo struck Carolina Sandhills Refuge. Timber damage from Hugo was widespread throughout the refuge. The hardest hit area on the refuge was Lynches River bottom where a tornado associated with Hugo rampaged through the area causing extensive damage. An estimated 560,000 board feet of hardwood sawtimber and 65,000 board feet of pine sawtimber were destroyed in this area. Total damage on the refuge was estimated to be 1,000,000 board feet. Salvage operations are presently being conducted on the refuge to salvage this storm damaged timber.



Results of Hurricane Hugo. A tornado associated with Hugo rampaged through the Lynches River bottoms destroying an estimated 560,000 board feet of hardwoods and 65,000 board feet of pine. (89NR-29, 10/89, Cartlidge)

Refuge Forester Robinson traveled to Pee Dee, Santee, and Cape Romain Refuges to assess timber damages due to Hugo.

Approximately 184 acres of pine and pine scrub oak habitat located adjacent to active red-cockaded woodpecker colony sites were roller chopped using a crawler tractor (JD 750) and roller chopper. The roller chopper was used in the woodpecker colony sites in Compartments 3, 5, 7, 15 and 17 to knock down understory scrub oaks growing up around existing and potential cavity trees, leaving an open stand condition preferred by the woodpeckers.

Table 5.
Refuge Timber Sales - 1989

<u>Permittee</u>	<u>Comp't #</u>	<u>Sale #</u>	<u># Acres</u>	<u># Cords</u>	<u># Bd. Ft.</u>	<u>Revenue</u>	<u>Treatment</u>
Young Pulpwood SUP 38165	13 & 14	1-89	40	184	--	\$3,100	Thinning
Young Pulpwood SUP 38166	12 & 13	2-89	46	239	--	\$3,390	Thinning
Mock Bunting Forest Products SUP 38174	13	3-89	35	21	45,560	\$6,960	Improve- ment cut & thinning
E. J. Dixon SUP 59510	14	Salvage	30	43	--	\$383	Salvage & Misc.
Aubrey Mixon SUP 59525	20	Salvage	30	205*	113,830*	\$8,183	Salvage (Hugo)
D. J. Creed, Inc. SUP 59528	1	Salvage & Thinning	28	45		534	Salvage (Hugo)
TOTALS			209	205*	113,830*	\$22,550	
				552**	97,160**		
*Hardwood							
**Pine							

Table 6. Refuge Pine Straw Sales - 1989

<u>Permittee</u>	<u>Compt #</u>	<u>Sale #</u>	<u># Acres</u>	<u># Tons</u>	<u>Revenue</u>	<u>Treatment</u>
Robinson Trucking SUP 38160	1	1-88	62	341	\$7,500	Pine Straw Removal
Jerry Holder Pine Needles SUP 38163	8	1-89	246	675	\$31,275	Pine Straw Removal
Richmond Developmnt SUP 38164	8	2-89	109	439	\$20,102	Pine Straw Removal
Richmond Developmnt SUP 38169	16	1-89	133	385	\$15,100	Pine Straw Removal
Richmond Mulch SUP 38172	18	1-89	60	155	\$16,945	Pine Straw Removal
Robinson Trucking SUP 38178	1	1-88	7	38	847	Pine Straw Removal
TOTALS			617	2,033	\$91,769	

4. Croplands

Cooperative farmers Campbell McLeod and Randy Catoe continue to manage our lespedeza and corn crops. The refuge staff planted wheat for goose browse and to attract wildlife to viewing areas along the Wildlife Drive. A small acreage of rape was planted from seed obtained from Holla Bend NWR to see if geese will utilize this crop as browse. Cropland acreage this year was as follows:

Sericea lespedeza-----	264.3 ac.
Bicolor lespedeza-----	71.2 ac.
Japonica lespedeza-----	8.0 ac.
Corn-----	26.3 ac.
Wheat-----	27.0 ac.
Rape-----	7.0 ac.

Corn and wheat production this year was sufficient for our needs. No sericea seed was harvested this year because of low production attributed to late spring frosts and extremely low seed prices. Some of the bicolor and japonica fields were harvested, but production was poor. A good stand of rape was obtained. We will monitor wildlife use of this crop to see if it is a useful crop.

6. Other Habitats - Fields

The refuge has some 90 fields and clearings totaling 1200 acres. Most are permitted to remain fallow, producing wild native grasses and other herbaceous plants. Management generally consists of occasional mowing or burning to reduce invading woody species. Food plots and strips are planted in several fields to benefit dove, quail, turkey, deer and other wildlife. Several of these fields along the Wildlife Drive serve to draw wildlife out into the open for visitor observation. Table 7 summarizes 1989 management activities.

Table 7.
Summary of Management Practices
for Open-Fallow Fields - 1989

<u>Practice</u>	<u># of Fields</u>	<u>Total Acreage</u>
Burned	8	130.1
Mowed	24	69.2
Food Plot Strips	<u>21</u>	<u>85.3</u>
Totals	53*	284.6

* Several fields received more than one type of treatment.

9. Fire Management

In accordance with an approved fire management plan and a prescribed burning plan, prescribed burning is used on Carolina Sandhills Refuge to accomplish the following management objectives:

- 1) To provide the necessary habitat for maintaining a diversity and abundance of natural fauna with emphasis on endangered and threatened species;
- 2) To reduce the potential for wildfires by reducing the amount of fuel accumulation on the forest floor; and
- 3) To demonstrate how fire management can effectively be used in wildlife management.

The current beneficial effects of prescribed burning as a management tool on Carolina Sandhills Refuge are:

- 1) Wildlife habitat improvement - increasing the quantity and quality of browsable plants and shrubs, and maintaining an open forest condition favorable to the endangered red-cockaded woodpecker and other wildlife species.
- 2) Wildfire suppression - reducing the potential for wildfires by reducing the amount of fuel accumulation (fuel reduction).
- 3) Hardwood control - controlling undesirable species of hardwoods (scrub oaks) in longleaf pine stands.
- 4) Control of brown spot needle rust on longleaf pine seedlings.
- 5) Seed bed preparation for longleaf pine regeneration sites and increased germination of understory plant and tree seeds.
- 6) Improved working conditions for individuals engaged in management and harvest activities.
- 7) A safer environment with greater opportunity for the visiting public to achieve their objectives whether consumptive or nonconsumptive.

During the 1989 burning season, approximately 4,299 acres of woodlands and 156 acres of fallow fields were prescribed burned in timber compartments 3, 4, 5, 6, 8, and 9. Approximately 3,887 acres of the total acres were prescribed burned using aerial ignition. Aerial burning has been used on the refuge for the past seven years. Aerial ignition was contracted for with the South Carolina Commission of Forestry at a cost of \$4.00 per acre.

All firebreaks (permanent and plowed) used in prescribed burning operations were replowed with a recovery plow, fertilized, and seeded with a mixture of bahiagrass, lovegrass, and sericea to help prevent erosion and provide habitat diversity.

Under the terms of a contract agreement, the S. C. Commission of Forestry is responsible for wildfire suppression on the refuge and is paid \$0.76 per acre for wildfire detection and suppression. When needed, refuge personnel serve as a back-up force with refuge fire equipment. During the year, one wildfire occurred on the refuge. This fire burned a total of

seven acres and was started from a private landowner's fire which spread onto the refuge. The fire caused minimal damage and was suppressed by the S.C. Forestry Commission.



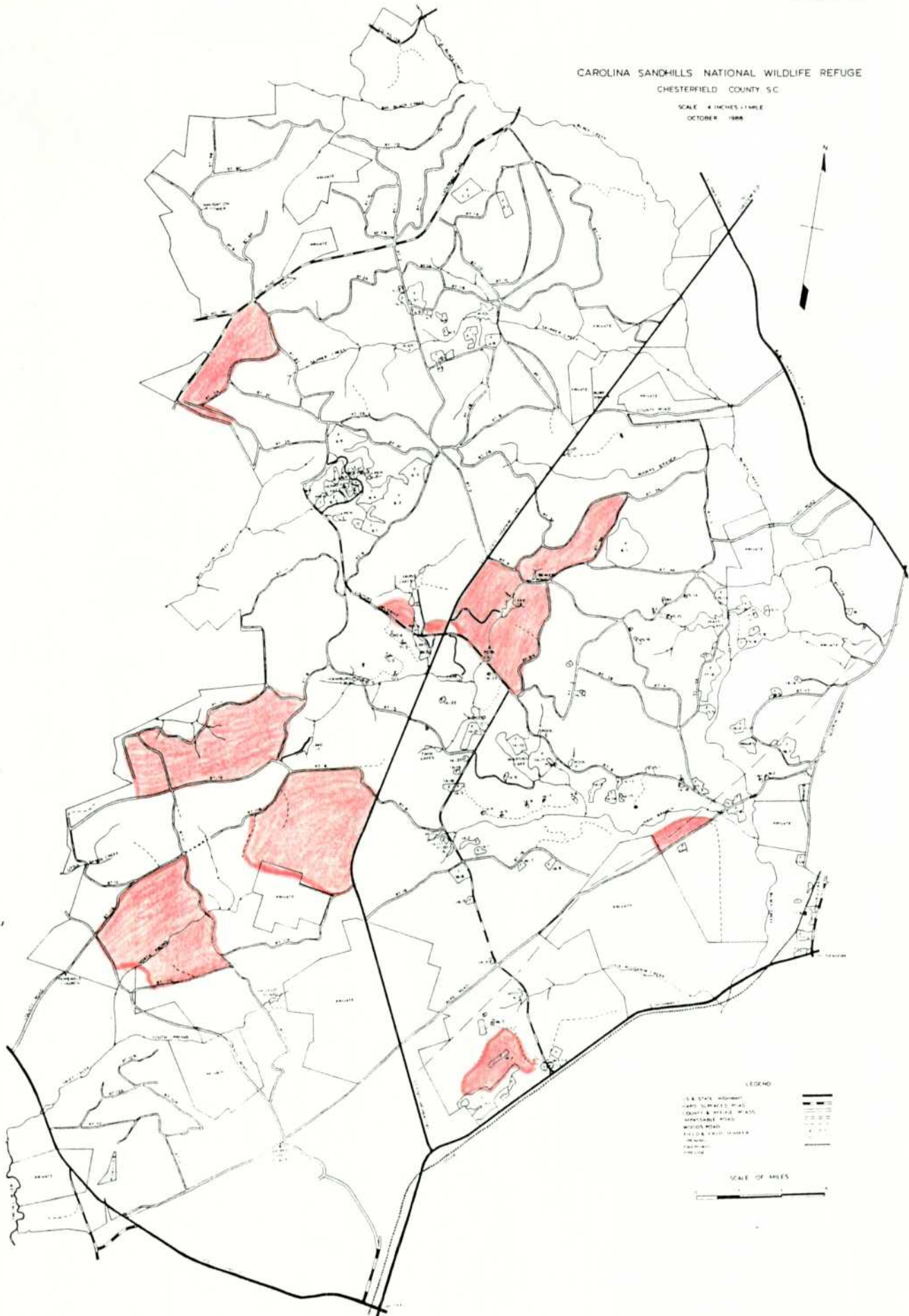
Range Technician Julius Loflin setting a strip head fire to control dense hardwood understory. (89NR-30, 3/89, Cartlidge)



A strip head fire used to control scrub oak encroachment in upland pine stands. (89NR-31, 3/89, Cartlidge)

CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE
CHESTERFIELD COUNTY, S.C.

SCALE 4 INCHES = 1 MILE
OCTOBER 1988





Vegetation emerging during the spring following a late winter burn on the seepage slope at Oxpen. This area is burned annually for the benefit of the pine barrens treefrog and the endangered pitcher plants. (89NR-32, 4/89, Cartlidge)

10. Pest Control

Carolina Sandhills Refuge again cooperated with the annual U.S. Forest Service gypsy moth pheromone trapping program. Two traps were placed on the refuge; one at the refuge headquarters, and the other at Lake Bee recreation area. These traps were checked bi-weekly by the refuge foresters from June 1 through September 1. No gypsy moths were discovered.

Scattered occurrences of black turpentine, ips, and ambrosia beetle attacks were discovered over the refuge during the year. These attacks are especially heavy in Compartment 6. A wildfire occurred in this area in 1984; scorched trees have become stressed and susceptible to beetle attacks. These infested trees, along with other dying trees on the refuge which were located close to access roads were marked for cutting and removal. No pesticides were used.

Cooperative farmers did not apply any pesticides this year. The refuge staff treated approximately six acres of winter wheat and fallow fields with Roundup for Johnsongrass control. K-Mart brand wasp and hornet spray was utilized by the staff while checking wood duck boxes. The spray was used only as needed to prevent insect stings.

12. Wilderness and Special Areas

A Research Natural Area made up of 554 acres of longleaf pine-scrub oak habitat (S.A.F. #71) was established on the refuge in 1970. This was done in response to the Federal Committee on Research Natural Areas's efforts to include as many S.A.F. types as possible in the RNA network. This area is heavily covered with turkey oak, with lesser amounts of blackjack and bluejack oak interspersed. Scattered throughout the area are a few small longleaf pines.

Climax vegetation for S.A.F. #71 is longleaf pine, therefore management practices are limited to those which encourage development of this species. No management practices were carried out on this area in 1989.

Many other areas which are unique to the refuge have been plotted on compartment maps and were afforded special management consideration and protection during the year.

G. WILDLIFE

1. Wildlife Diversity

Carolina Sandhills National Wildlife Refuge lies within that physiographic region of North and South Carolina known as the "Sandhills". Extending from North Carolina to Georgia, this area is comprised of a ridge of rolling sandhills along the fall line between the Atlantic Coastal Plain and the Piedmont Plateau. Because of its location on this fall line, the refuge has a variety of plants, animals, and habitat types characteristic of both regions.

One hundred ninety species of birds, 42 species of reptiles and 25 species of amphibians are known to be present on the refuge. Although mammals are numerous there has never been a survey that documents the number of species. In 1989, a gopher tortoise (Gopherus polyphemus) was located along the Visitor's Drive in the vicinity of Martins Lake Recreation Area. It is not known if this individual represents a range extension (this is the first record for the refuge) or if it had been released by a refuge visitor.

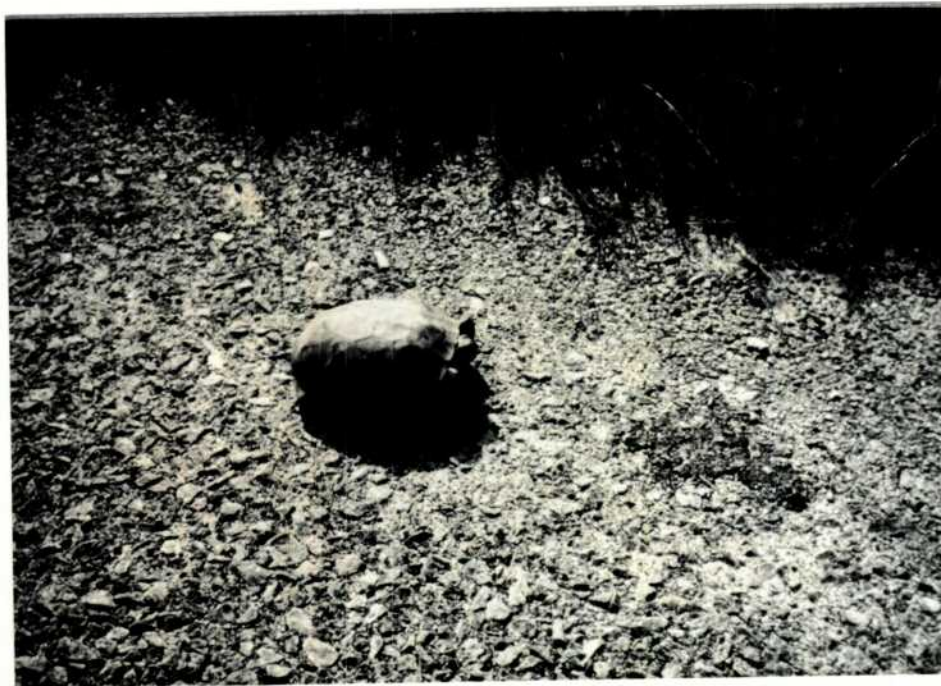
The refuge has an abundance and diversity of plant life representative of both the piedmont and the coastal plain. A few plants, such as sundews, pitcher plants, Well's pixie moss, and white wicky are rare and endangered.

John B. Nelson of the SC Heritage Trust Program located a plant species on the refuge which had not been recorded before in the state. The plant, Rhynchospora oligantha, was located in the Oxpen Lake hillside bog area. The plant is normally found on boggy prairies in southern Mississippi and the Florida panhandle.

As in prior years, most management activities were designed to meet the requirements of a broad spectrum of plants and animals.



This lupine (Lupinus perennis) was discovered near Field 14-2 in April. (89NR-33, 4/89, Cartlidge)



Assistant Manager Hoffmann found this gopher tortoise strolling down the wildlife drive near Martins Lake. This is the first record of this species on the refuge. It is not known whether the tortoise got here on its own or had a little help. (89NR-34, 8/89, Hoffmann)

2. Endangered Species

a. Red-cockaded Woodpecker

There are approximately one-hundred and twenty-two (122) red-cockaded woodpecker (Picoides borealis) colonies on the refuge. This is the largest number of colonies found on any Region 4 refuge, and is based on a special survey conducted in 1984.

The red-cockaded woodpecker was first put on the endangered species list in 1974. A continuing effort is made by the refuge staff to provide for optimal habitat and protection for this species. Forest management techniques include reconnaissance, prescribed burning, roller chopping, and the hand removal of brush growing adjacent to cavity trees. All these activities are used together to create and maintain an open forest condition, which the bird requires.

Over 40,000 acres provide for nesting and foraging habitat for the woodpecker. Each year approximately twenty percent of the refuge is surveyed to determine the status of existing trees, and to locate new trees. All live pine trees containing cavities and cavity starts in Compartments 2 and 7 were located and mapped. Measurements taken at each tree included its diameter, height of the cavity, number of cavities in use, woodpecker utilization, and information about nesting. A total of 164 cavity trees, and 15 starts were found. Each cavity tree was tagged and banded, and the undergrowth cleared away. Start trees were mapped, but were not tagged or banded. Afterwards tree information data was input into the computer for statistical analysis.

Compartments 2 and 7 had been previously surveyed in 1979 and 1984. Table 8. presents a comparison of the three surveys.

Table 8. Red-cockaded Woodpecker Cavity Tree Survey
Carolina Sandhills National Wildlife Refuge

Compt. #	# Cavity Trees Available 1979	# Cavity Trees Available 1984	# Cavity Trees Died 1984-89	# New Cavity Trees 1984-89	# Cavity Trees Available 1989	% Change 1984-89
2	61	61	*8	8 (38 active; 23 inactive)	61	0
7	54	47	*3	4 (17 active; 31 inactive)	48	+ 1.2

* An additional number of trees died during Hurricane Hugo.

Damage caused by Hurricane Hugo accounted for approximately 80-100 cavity trees destroyed on the refuge, or about ten percent of the total available. The woodpeckers utilize older trees with heart rot, and this condition leaves the tree vulnerable to damage from high winds. Tree destruction was scattered over the entire refuge, with only one colony being severely impacted.



An active red-cockaded woodpecker cavity tree in an area rolled-chopped and prescribe burned. Notice scrub oak understory in background which has not been roller-chopped. (89NR-35, 5/89, Robinson)

b. Pine Barrens Treefrog

Carolina Sandhills Refuge supports the second largest concentration of pine barrens treefrogs in the state. Approximately ten colonies of this state listed species are found on the refuge with ninety percent of the known colonies found in Chesterfield and Marlboro Counties. Since plant succession is the greatest threat to the continued existence of this species, prescribed fire is used on all known "frog-bogs" on the refuge on a regular basis.

c. Eastern Cougar

No cougar sightings were made on the refuge during the year, however, an adjacent landowner reported sighting a long tailed cat in the Black Creek area.

d. Plants

White wicky (Kalmia cuneata) and Well's pixie moss (Pyxidanthera barbulata var. brevifolia) are two plant species present on the refuge that are under review for addition to the Federal List of Threatened and Endangered Species. Sweet pitcher plant (Sarracenia rubra jonessii) is also listed on South Carolina's Endangered and Threatened List.

White wicky is found in the open pocosin ecotone along Rogers Branch. Well's pixie moss is found scattered throughout the refuge along sandy ridge tops. Sweet pitcher plant occurs in acid seepage bogs and drains. All three species benefit from fire and are in peril due to loss of habitat through natural succession or human disturbance. An active and aggressive prescribed burning program has helped to promote these species.

3. Waterfowl

Wintering waterfowl populations peaked at this station in 1976-77 and have declined steadily since then. Table 10 shows that the 1988-89 season was not significantly different from the previous year. Table 9 shows the peak populations over the last four years. Mallards and black ducks have shown a steady and significant decline in peak numbers, while widgeon numbers have increased. The wood duck population has remained fairly steady. Goose numbers tend to fluctuate, but represent an overall decline. Although some management practices have changed slightly over the years (in particularly a decrease in the acreage of hot foods such as corn), the overall refuge habitat is good and could certainly support a much larger population of wintering waterfowl than is using the refuge. The steady decline in refuge waterfowl populations is simply a symptom of the overall decline in waterfowl populations in the Atlantic Flyway combined with changes in use patterns within the flyway.

As has been the case historically, most use took place at Martins Lake with only incidental use elsewhere. Wood ducks were present throughout the year and were to be found in, on, or around all refuge wetlands.

Attempts were made during the 88-89 waterfowl season to band and neck collar Canada geese. In addition, surveys were run from November through March to observe collared birds for Rich Malecki's study. To assist in these efforts, Eddie Taylor was brought on board as an intermittent Biological Technician. Taylor and Assistant Manager Hoffmann endeavored throughout the winter season to capture and band geese at Martins Lake, Cheraw State Fish Hatchery, Cheraw State Park and a private pond near the State Park. Both walk-in traps and rocket nets were used. All efforts failed as the geese simply would not feed on the net sites nor approach the walk-in traps.



This walk-in trap from Pee Dee NWR was set up at the Martins Lake banding site in hopes of catching a few geese for collaring. We never saw a goose come near the trap. (89NR-36, 1/89, Cartlidge)

The refuge has a resident goose population of about 30 birds. Although these birds were generally found utilizing the Martins Lake area, they were seen from time to time on Pool D, Lake 16, Lake Bee, and Honkers Lake. During the '89 nesting season, several pair attempted to nest at Pool D, Pool G, Triple Lakes and Martins Lake. Only the pair at Martins was able to produce any goslings, and of those, only one made it to flight stage.

Table 9. Peak Populations: Common Wintering Waterfowl

<u>Species</u>	<u>1976-77</u>	<u>84-85</u>	<u>85-86</u>	<u>86-87</u>	<u>87-88</u>	<u>88-89</u>
Canada Geese	2,000	350	225	250	230	185
Mallard	5,500	275	200	70	89	49
Black Duck	600	70	75	12	17	5
G. W. Teal	500	30	25	50	52	35
A. Widgeon	2,500	100	100	102	130	160
Wood Duck	3,500	600	650	600	600	600
H. Merganser	150	12	5	20	15	5

Table 10. Five Year Summary: Wintering Waterfowl Use Days

<u>Season</u>	<u>Canada Geese</u>	<u>Other Geese</u>	<u>Ducks</u>	<u>Coots</u>	<u>Total</u>
1984-85	16,289	40	164,451	367	181,147
1985-86	19,378	0	145,601	0	164,979
1986-87	23,895	0	199,878	30	223,803
1987-88	16,775	0	103,061	0	119,836
1988-89	15,664	0	103,517	30	119,211

4. Marsh and Water Birds

Limited habitat for these species is to be found on this station. Most is created during the drawdown of our lakes and ponds which expose their bottoms. Even these fail to attract significant numbers. Great blue herons feed in most impounded areas throughout the year. Green-backed herons, cattle egrets, little blue herons, and great egrets occasionally utilize the refuge during the summer and fall months. Pied-billed grebes may be found throughout the year. Anhingas and double-crested cormorants are frequently found feeding in some of our deeper impoundments, though not in large numbers.

5. Shorebirds, Gulls, Terns, and Allied Species

Suitable habitat for these species does not exist on the refuge so few if any sightings were made. A few killdeer were seen from time to time on the dams of Mays and Honkers Lakes. The new impoundments on the Husband's Creek Tract (FmHA) in Cheraw provided somewhat better habitat and a handful of shorebirds were seen there during fall migration.

6. Raptors

An osprey was observed on several occasions at Martins Lake by Assistant Manager Hoffmann in April. Hoffmann also spotted an immature golden eagle in the Pool K area of Skipper Creek in November. No other unusual raptor sightings were made during the year.

The following species are known to nest on the refuge: red-tailed hawk, red-shouldered hawk, American kestrel, turkey vulture, barn owl, screech owl, great horned owl, and barred owl. In addition to these sharp-shinned and Cooper's hawk are suspected to nest on the refuge but no nests have been confirmed.

Northern harriers hunt the many fields scattered throughout the refuge, particularly those in the Oxpen unit. Most of this activity takes place during the winter months. However, at the close of the report year few harriers had been observed.

Table 11. ANNUAL NARRATIVE REPORT FORM
WOOD DUCK BOX PROGRAM INFORMATION

REFUGE: Carolina Sandhills

NESTING YEAR: 1989

	<u>NUMBER</u>	<u>PERCENT</u>
Total Usable Boxes	<u>109</u>	
Estimated Boxes Used By Wood Ducks	<u>41</u>	<u>38</u>
Estimated Boxes Used By Other Ducks	<u>0</u>	<u>0</u>
Estimated Boxes Used By Other Wildlife	<u>37</u>	<u>34</u>
Estimated Wood Duck Broods Produced	<u>31</u>	
Estimated Total Wood Ducks Hatched**	<u>217</u>	
Estimated Wood Ducks Surviving To Flight Stage*	<u>124</u>	<u>57</u>

Plans for next year (indicate number):

X more boxes (See remarks)

 fewer boxes

 no change

Remarks: Twelve additional wooden boxes were erected. Five in Pool K and seven in Pool L. Several "Hugo" damaged boxes need to be replaced and several more ponds could use additional boxes. The estimate of wood ducks to flight stage is obtained by multiplying the number of successful boxes by four. When this figure is compared to the actual count of eggs hatched, the resulting survival rate is 57%. The actual survival rate on the refuge is unknown.

*If survival rate is other than 50%, please explain rationale in remarks section.

** This figure is based on an actual count of egg membranes found in nest boxes in August/September.

7. Other Migratory Birds

Assistant Manager Hoffmann ran the mourning dove call count survey for Chesterfield and Marlboro counties in May. This survey was part of a nationwide program conducted by the Office of Migratory Bird Management, Laurel, Maryland.

Mr. Bill Hilton of York, South Carolina had scheduled the 1989 Christmas Bird Count for December 20, however, icy road conditions required that it be postponed until January 3, 1990. Results of the 1988 Christmas Bird Count totaled 57 species and 1,275 individuals. No unusual species were observed.

8. Game Mammals

The state of South Carolina lists the following species as game mammals: white-tailed deer, black bear, bobcat, red and gray fox, mink, muskrat, opossum, otter, rabbit, raccoon, skunk and gray and fox squirrel. All, with the exception of muskrat, are believed to be present on the refuge. Only deer, opossum, rabbit and raccoon are hunted.

An examination of deer harvested during refuge hunts and chance observations of the herd indicate that the deer population is in good health and free of disease or parasites. Body fat appeared to be good on those deer examined. In spite of this, several deer were found dead from unknown causes during the year. The "hot spots" were the Pool K-Pool L-Oxpen area and Martins Lake. Although none of the deer were fresh enough for a necropsy, there was no obvious evidence of hemorrhagic disease.

This season we increased the bag limit from one to two antlerless deer per hunt. This was in response to the Area Biologist's suggestion that we needed to remove more does from the herd. Nearly 60% of the deer harvested in '89 were less than 2.5 years old and most (123 out of 196) were does.

10. Other Resident Wildlife

The U.S. Fish and Wildlife Service in cooperation with the South Carolina Wildlife and Marine Resources Department initiated a wild turkey restocking program on the refuge in 1982. Frequent sightings of wild turkey are made throughout the refuge. It appears that the flock is doing well in spite of numerous reports of poaching by local hunters. In 1988 we began recording fewer birds per sighting and only 17 poults were observed. At the same time we began receiving reports of turkey sightings off of the refuge. This trend continues through 1989; only 21 poults were observed and the average number of birds per sighting was 3.1. The largest number seen during any one sighting was 10 birds. Previous to 1988 it was not uncommon to see groups of 20 or more. This could mean any number of things: heavier predation, poor reproduction, poor habitat conditions, or dispersal to surrounding areas. A more thorough look would be required to determine the cause of the decline in sightings.

Assistant Manager Hoffmann did the annual furbearer scent station survey for the S.C. Wildlife and Marine Resources Department in October. Results were fair with gray fox and bobcat dominating.

Black bear are thought to be present on the refuge. However, no bear have been seen since 1983. A bear scat was found on the refuge in 1988 but it is believed to have been left by a transient animal. There was no evidence of bears on the refuge in 1989.

11. Fisheries Resources

Fish reproduction on the refuge is poor due to acid water conditions. District Fisheries Biologist Rick Eager has been working on management recommendations but these had not been received by the end of the year. The refuge manages most of the ponds on the refuge by stocking bass, bream and catfish.

12. Wildlife Propagation and Stocking

On April 12th, Millen NFH delivered 2,000 largemouth bass fingerlings to Pool L and 750 to Lake Bee. Bream and shellcracker were stocked in Lake 17, Pool C and Lake 16 in December. Cheraw State Fish Hatchery provided the stock free of charge.

15. Animal Control

Since the re-introduction of beaver onto the refuge in the early 40's, the population has significantly increased to the point that control is necessary. In 1989 a total of 14 beaver were removed from five impoundments as follows: Lower Triple Lake - 1; Middle Triple Lake - 6; Lower Twin Lake - 3; Pool E - 2; and Lake 17 - 2.

16. Marking and Banding

No wintering waterfowl were banded this year as per Regional Office instructions. Although the summer wood duck banding quota was set at 100 birds, only 57 were banded. This was the first year since 1985 that we had not met or exceeded our quota. There appeared to be numerous wood ducks in the area but they would not come in to the bait. No Canada geese were banded or collared in the 1988-89 season in spite of considerable efforts on our part.

Goose collar observations during the final months of the 1988-89 waterfowl season were made by temporary employee Eddie Taylor. Taylor was able to determine that there were approximately 230 geese in the area and that they moved around between about six different local ponds, both on and off the refuge. Most collar observations were made on Martins Lake and Walters Pond (off refuge). The Cheraw State Fish Hatchery and State Park received only incidental use. Orange/white collars were seen most frequently, followed by yellow/black collars.

Observations during the first part of the 1989-90 season were made by Assistant Manager Hoffmann and Range Technician Loflin. Martins Lake, the Oxpen Lakes, Lake Robinson, Cheraw State Park and Fish Hatchery, and Walters Pond were checked weekly beginning in September. This year only those populations in which complete collar codes could be read were recorded and reported. It was not until the final week of November that any collared geese began to appear. By the close of the year, four collared geese had been observed.

H. PUBLIC USE

1. General

On May 20th, the staff celebrated the Refuge's 50th Anniversary with an open house and picnic. Although the event was well publicized, public participation was disappointing. Several interpretive programs including a bird walk, wildflower walk, wood duck banding demonstration, and red-cockaded woodpecker program were provided. The day's activities were followed by a picnic for the staff and invited guests. Sand Hills State Forest was also involved in the festivities since they were celebrating their 50th Anniversary this year too.

It is estimated that over 27,760 visitors participated in public use activities on the refuge during 1989.

New signs were ordered and received for the Wildlife Drive. Tate, Loflin and Cartlidge installed the signs for the 50th Anniversary celebration. We ordered, received and installed the signs in a little over four months. The National Sign Shop is to be commended for their efforts in getting the signs done in time for the celebration.

2. Outdoor Classrooms - Students

The refuge has no environmental education program. Several groups utilized the refuge facilities for educational purposes during the year. Hartsville Junior High School brought seventy-two 8th graders out on March 3rd. Assistant Manager Cartlidge and Office Assistant McCutcheon spoke briefly to the group before they went out on the refuge.

Two second grade classes totaling forty students from Petersburg Elementary School in Pageland toured the refuge on May 11th. Their teacher had been given a brief orientation by Office Assistant McCutcheon prior to their visit.

A field botany class from Davidson College visited on May 15. The twenty-nine students in attendance were led by their instructor. No refuge staff were involved. This group returned on June 16 for a wildflower/plant identification field lab.

Refuge brochures and an orientation guide developed by Office Assistant McCutcheon were provided to teachers from Ruby Elementary School. These teachers accompanied 128 children ranging from child development classes (4 year olds) through third graders on a tour of the refuge on May 26th.

6. Interpretive Exhibits/Demonstrations

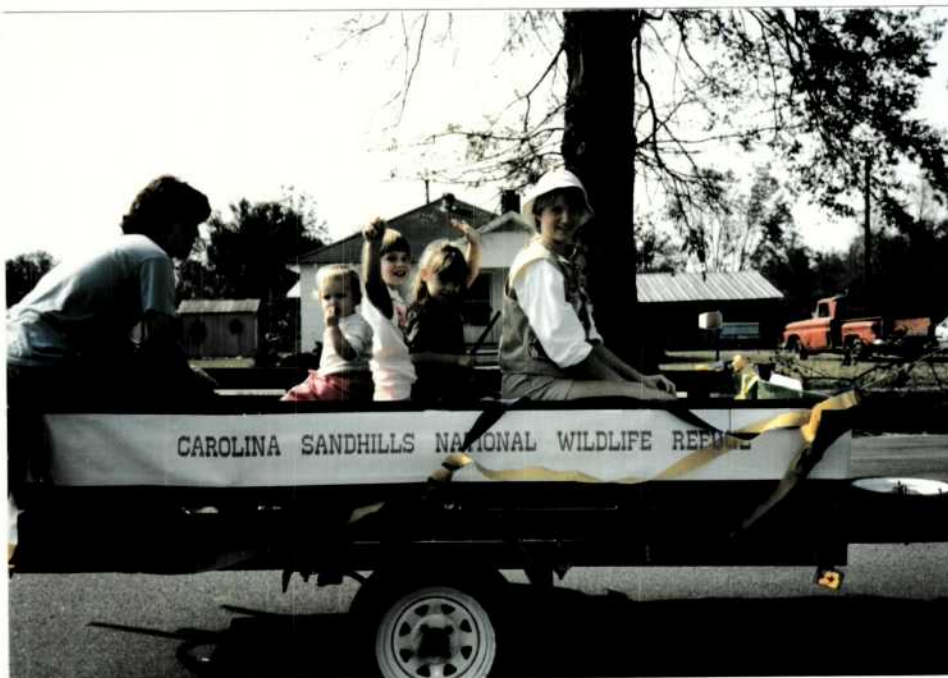
Interpretive panels are located along the wildlife drive near Lake Bee and in the Headquarters office. An information panel is located at the Headquarters entrance to the drive. It is estimated that some 2250 people viewed these exhibits.

Exhibits and information were provided at one of the picnic shelters at Lake Bee for the 50th Anniversary Open House. Some 125 people looked at the exhibits and asked questions.

On October 7th, the refuge sponsored a float in the McBee Fall Festival parade. Cartlidge and McCutcheon decorated the small utility trailer and refuge family members rode on the float.



McCutcheon and Cartlidge decorated the small utility trailer for the McBee Fall Festival Parade in October. (89NR-37, 10/89, McCutcheon)



Refuge family members and friends rode on the float and tossed goodies to the crowd. L to R: Tracie Watson, Kayla Watson, Rebekah Farmer, Amy Almond, Cathy Clark, and Kati McCutcheon. (89NR-38, 10/89, McCutcheon)

7. Other Interpretive Programs

Several interpretive activities were provided at the 50th Anniversary Open House. Two guest interpreters provided expert information on birds and wildflowers. The interpretive programs provided were:

Bird Walk by Dr. Charles McRae	4 participants
Wildflower Walk by Dr. George Sawyer	15 participants
Bird Banding Demonstration by Asst. Mgr. Hoffmann	12 participants
Red-cockaded Woodpecker Talk by Foresters Robinson and Lay	12 participants



Dr. George Sawyer of Coker College in Hartsville points out some interesting plants along the shoreline of Lake Bee. The Wildflower Walk was part of the refuge's 50th Anniversary Open House. (89NR-39, 5/20, Robinson)



Assistant Manager Hoffmann explains how to age a wood duck to refuge visitors during the 50th Anniversary Open House. (89NR-40, 5/89, Cartlidge)

Two programs were provided to off-refuge groups during the year. On October 27th Assistant Manager Cartlidge presented a program on the refuge system and family outdoor activities to the Lamar Elementary School Parent Teacher Organization. One hundred fifty students, teachers, and parents attended. On November 30, Office Assistant McCutcheon spoke to the 4th, 5th, and 6th grade gifted students at McBee Elementary School. Seventeen students were presented a program on endangered species.

Teachers of third grade students at McBee Elementary School borrowed slide shows about the refuge system and endangered species. These slides, along with other handouts on wildlife resource management supplemented their study of wildlife refuges and endangered species. Approximately sixty students viewed these slide shows.

8. Hunting

Approximately 44,000 of the 45,586 acres which make up the refuge were opened for the taking of white-tailed deer, bobwhite quail, mourning dove, raccoon, opossum, and rabbit during five designated hunts.

The hunts were as follows:

White-tailed Deer	Archery	Oct. 16 - 21
	Primitive Weapons	Oct. 30 - Nov. 3
	Modern Gun	Nov. 15 - 17
Bobwhite Quail, Mourning Dove, Woodcock, Rabbit		Nov. 23 - Dec. 31
Raccoon & Opossum		Mar. 1 - 10

The most popular hunts are the deer hunts. A regulation change in 1989 permitted hunters to take two antlerless deer per hunt instead of one, plus the State bag limit (no limit on antlered deer). Only antlerless deer were required to be checked and tagged during the archery and primitive weapons hunt, so there is no actual data on the total number of deer taken during these hunts. Hunters are required to check all deer during the modern gun hunt. Tables 12 through 14 provide a five year summary for each of the hunts.



Refuge hunters harvested a total of 196 deer during the 1989 season. Several good size bucks like this one were taken, but the majority of the deer harvested were does. (89NR-41, 11/89, Unknown)



Louis Tate "locks in" a deer to remove the jawbone. Louis invented this "contraption" to make jaw bone collection safer and easier. (89NR-42, 11/89, Unknown)

Table 12. Summary: Primitive Weapons Deer Hunting
1985-89

Year	Hunter		Harvest			HD/ Deer	HH/ Deer	HH/ Day	Days/ Hunt
	Days	Hours	Bucks	Does	Total				
1985	983	7,864	10	13	23	43	342	8.0	5
1986	944	7,552	9	14	23	41	328	8.0	5
1987	734	5,868	7	4	11	67	533	8.0	5
1988	1,353	10,824	13	16	29	47	373	8.0	5
1989	1,646	13,168	8	19	27	61	488	8.0	5
Total	5,660	45,276	47	66	113	--	--	--	-
Avg.	1,132	9,055	9	13	23	53	413	8.0	5

Table 13. Summary: Archery Either Sex Deer Hunting
1985-89

Year	Hunter		Harvest			HD/	HH/	HH/	Days/
	Days	Hours	Bucks	Does	Total	Deer	Deer	Day	Hunt
1985	490	3,920	3*	1	4	123	980	8.0	6
1986	629	5,032	3*	4	7	90	719	8.0	6
1987	734	5,868	7	4	11	67	533	8.0	6
1988	698	5,584	1	2	3	233	1861	8.0	6
1989	549	4,392	4	1	5	110	878	8.0	6
Total	3100	24,796	18	12	30	-	-	-	-
Avg.	620	4,959	4	2	6	124	994	8.0	6

Table 14. Summary: Modern Weapons Either Sex Deer
Hunting 1985-89

Year	Hunter		Harvest			HD/	HH/	HH/	Days/
	Days	Hours	Bucks	Does	Total	Deer	Deer	Day	Hunt
1985	2,200	17,600	37	45	82	27	215	8.0	3
1986	3,009	24,072	65	63	128	24	188	8.0	3
1987	2,481	19,850	113	70	187*	13	106	8.0	3
1988	2,313	18,504	62	43	107	22	173	8.0	3
1989	3,293	16,344	61	103	164	20	161	8.0	3
Total	13,296	106,370	338	324	668	-	-	-	-
Avg.	2,659	21,274	68	65	134	21	169	8.0	3

* Four deer not sexed.

Efforts to track hunter participation during the quail, etc. hunts were made incidental to other refuge activities, thus actual data is not available. However it is believed that participation was very low and success poor.

The raccoon hunt drew a significant number of hunters. It is estimated that there were 102 hunter days with 45 raccoons taken. These figures are considerably lower than the 285 hunter days and 125 raccoon taken in 1988. There was no evidence of any opossum taken. The decline in participation is felt to be related to the fact that South Carolina law does not permit the selling of pelts after March 1. The dates of the hunt will be changed to February 15-24 in 1990 to better accommodate the hunters wanting to sell their pelts. Hopefully this change will increase participation.

9. Fishing

Nineteen of the refuge's ponds and lakes were open for sport fishing from March 1 through September 30. Year round fishing was permitted at Lake Bee and at the landings on Lynches River and Black Creek. Boat ramps are

provided at Martins Lake, Lake Bee, Lake 16 and 17, and Mays Lake. Only electric trolling motors are allowed.

Most areas received only moderate use. Pool J had a good stock of bream, bass, and warmouth, but a severe weed problem made fishing difficult. The actual number of people who participated in this activity is difficult to determine and annual public use figures are only estimates. It is estimated that 6,000 people fished on the refuge this year.

Refuge visitor Donald Rogers caught a 10 lb. bass in Pool J on the second day of fishing season. Mr. Rogers grew up on the refuge (his father was a refuge employee for twenty-eight years) and spends a great deal of time trying to catch the big ones.



Refuge visitor Donald Rogers holds a 10 lb. bass caught in Pool J on March 3. (89NR-43, 3/89, Cartlidge)

12. Other Wildlife Oriented Recreation

A special use permit was issued to the Chesterfield County Coon Hunters Association to conduct a U.K.C. Coonhound Field Trail on the refuge on February 4th. The permit was limited to four casts of four dogs each. However, no casts used the refuge that evening.

A special use permit was issued to Mr. James Crook for the purpose of training bloodhounds for the Sheriff's Department. He was allowed to use that portion of the refuge north of County Road 33 from May 1, 1989 through May 1, 1990.

14. Picnicking

Once again the Lake Bee facilities had substantial use during the year. The area was popular with local families as well as out of town visitors. An estimated 3400 visitors used the facilities.

17. Law Enforcement

In 1987, the Chesterfield County Sheriff's Department organized a multi-jurisdictional task force comprised of federal, state, county and local law enforcement agencies. The purpose of the task force is to combat the ever increasing drug problem in the county. Refuge Manager Hoffmann represented the refuge at the monthly meetings.

Officer Hoffmann provided the Chesterfield County Sheriff's Department with source information on the infra-red surveillance equipment that was displayed at the Service's law enforcement refresher in Tallahassee.

Pilot/Agent Ted Curtis, Agent George Hines, and Forester Robinson did an aerial reconnaissance of the refuge in June searching for marijuana. Ground support was provided by Agent Charles Bazemore and Refuge Officers Jack Oliver and John Hoffmann. Two suspicious areas were located from the air but proved to be old, inactive sites. In July, Sheriff's deputies and SLED agents located a fairly large and well camouflaged plot just off the refuge near Mays Lake.

Of special concern to local law enforcement agencies was the increase in Satanic activity which was evidenced in this area during the year. No evidence of any such activity was found on the refuge, but there was in nearby McBee. Of particular concern to law enforcement personnel was the fact that many Satanic practices are constitutionally protected since Satanism is considered to be a religion.

Our infamous pine straw case of 1987 still has not been fully adjudicated. Only one of the three individuals responsible has been before the judge and served time. Another died before he was to have appeared in court. The third was apprehended on the State Forest during the year for pine straw theft, but was released before anyone realized that there was an outstanding federal warrant for his arrest.

Changes to refuge hunting regulations were submitted to the Regional Office for approval and inclusion into 50 CFR. The changes concerned hunting along roadsides, hunter orange requirements, and transporting loaded firearms in vehicles.

Table 15. Violations - CY 1989

<u>Violation</u>	<u># Cases</u>	<u>Collateral</u>	<u>Disposition</u>
No big game permit	1	\$100	Pending
Hunting in safety zone	1	\$100	Pending
Excessive speed	4	\$ 50	2 paid, 2 pending
Loaded weapon in vehicle	1	\$ 50	Paid
	9	\$100	Pending
Fishing out of season	4	\$ 50	Pending
Littering	1	\$ 50	Paid
Vehicular trespass	9	\$ 25	3 Paid, 6 Pending
After hours trespass	8	\$ 50	3 Paid, 5 Pending
General trespass	2	\$ 50	Pending
No hunter orange	2	Received warning letter	
No hunter safety certification		Received warning letter	
No fishing license	1	\$ 70*	Paid
Altered fishing license	1	\$118*	Paid

*Cases referred to State Game Wardens

Several controversial issues arose this year. In early summer we announced that dog impoundment fees would go up from \$10 to \$15. In addition, owners would receive a notice of violation on the second offense rather than the third. We explained our impoundment procedures about holding dogs for three days and then turning them over to the county dog pound if the owner had not claimed the dog in that time.

On September 6, shortly after the article appeared in local papers, Manager Snider was invited to appear before the Chesterfield County Council to answer questions regarding our new regulations concerning impounded dogs. After 1.5 hours of discussion the council decided to table the issue. Numerous hunters were present along with the news media. Several more articles appeared in local newspapers and the regional office received a congressional inquiry on the issue.

On September 12, District Supervisor Matthews met with congressional representatives and hunters. At that time he made several concessions including issuing warning letters on the second offense instead of a violation notice, the refuge would hold dogs five days instead of three, and that hunters could pick up dogs along county and state maintained roads running through the refuge.

After all the controversy, the county declined to accept any more dogs at their pound. We then made arrangements with the Humane Society shelter in Florence to take the dogs that were not claimed. So far we have only had to take two dogs to the shelter. The impoundment fees were raised to cover the refuge's increased cost of catching and feeding these animals.

The increased impoundment fees seem to have had little impact as illegal hunting with dogs is just as rampant as ever. Most dogs owners have trained their dogs not to come to anyone but them, making catching dogs very difficult if not downright dangerous.

Later in the year, another controversy arose over a gate off refuge road RT 3 that the refuge has kept locked for a number of years. Members of some local dog hunting clubs influenced a county commissioner and subsequently the county administrator into demanding that the gate be left open. The county's rationale for demanding that the gate be opened was submitted to the regional realty division and the regional solicitor. Their ruling was that the county had no legal basis for their demands. A letter was sent to the county administrator explaining this ruling. To date, nothing else has been heard concerning this matter.

I. Equipment and Facilities

1. New Construction

Two impoundments were constructed at the Husband's Creek Tract. However, before construction could begin the area first had to be mowed and then disked twice to remove shrubs and other vegetation. The main drainage ditch was cleared of trees and silt. After all this was done, work began on two low level dikes. A water control structure and culvert were installed in each dike. The lower structure had a flap gate on the upstream side to hold any flood waters backing up into the unit. The tops of the dikes were leveled and seeded with grass and wheat. Unfortunately soon after completion, the Pee Dee River flooded and backed water over both dikes. There was some damage to the sides of the dikes and the upper water control structure was completely silted in on the downstream side. Repairs will be made as soon as soil conditions allow.



A flap gate was installed on the water control structure of the lower impoundment at Husband's Creek. When the river floods, any backwater will be held in the impoundment. (89NR-44, 9/89, Cartlidge)



The upper dike at Husband's Creek was completed in late September. (89NR-45, 9/89, Cartlidge)



On October 3 the Pee Dee River flooded and covered the newly constructed dikes. (89NR-46, 10/89, Snider)

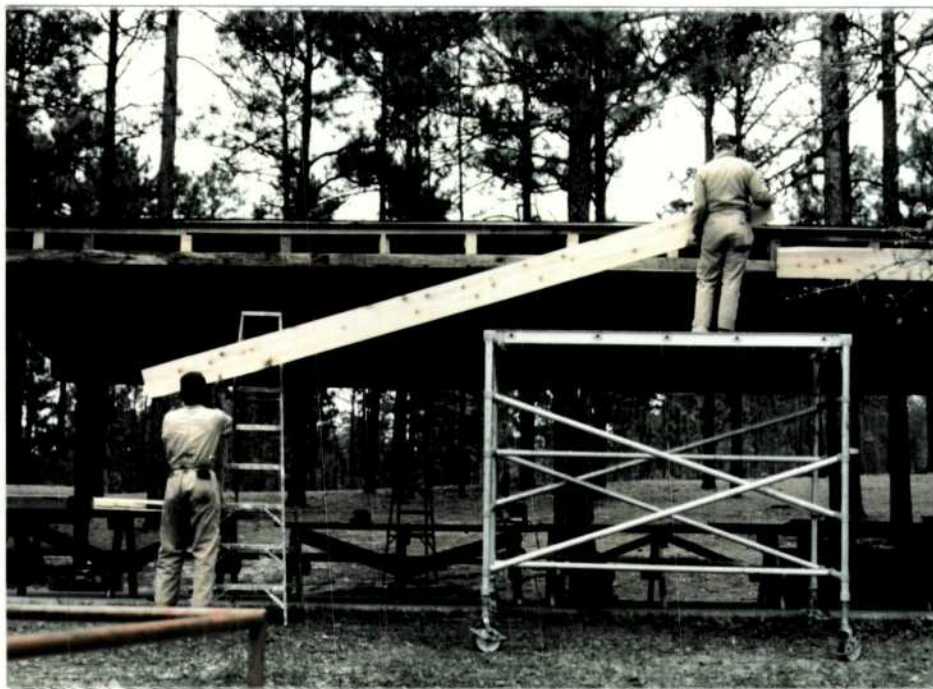


When the river receded, surprisingly little damage has occurred. The toe's of both dikes had some erosion and the downstream side of the upper dike (shown here) had silted in and covered the outlet pipe. (89NR-47, 10/89, Cartlidge)

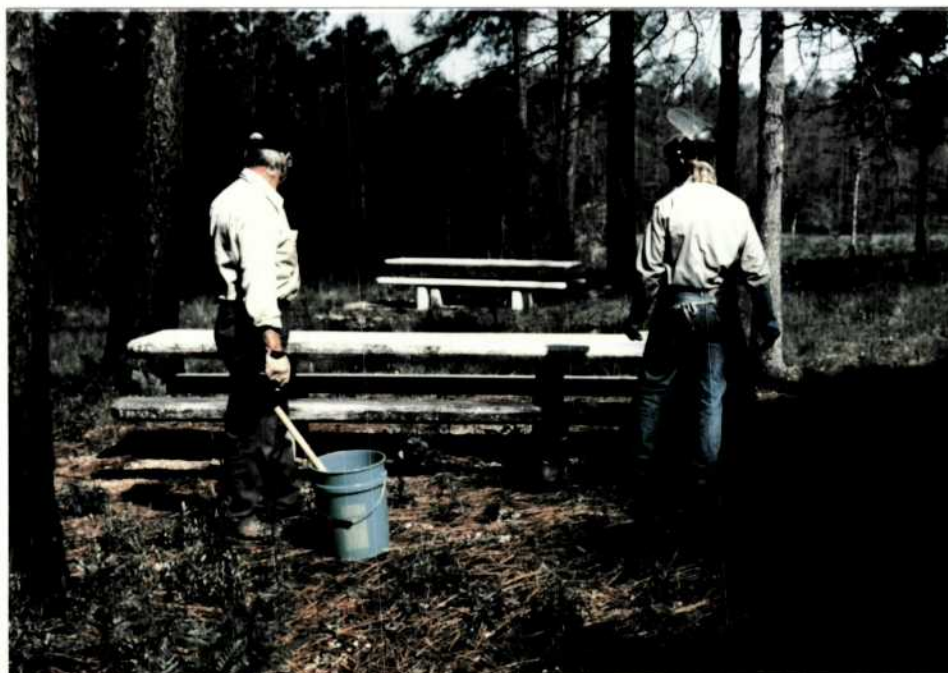
2. Rehabilitation

The windows and doors in Quarters 212 were replaced under contract to McBee Vinyl of McBee, SC. Work included installing new vinyl frame insulated windows and insulated doors and storm doors to the residence to improve energy efficiency. The contractor worked on the project from June 12th through July 1. On July 13th, Todd Rainwater, Regional Office Engineering, met with the contractor for a post construction inspection. The resulting "punch" list was taken care of and all work completed on July 28th.

Extensive rehabilitation work was done at Lake Bee Recreation Area this year. Rotted soffits were replaced on two picnic shelters and the painted surfaces cleaned and repainted. The restrooms were painted inside and out and new light fixtures installed. Employees Louis Tate and Julius Loflin had the responsibility for this work. They did such a good job they received a special achievement award for their work. The Sand Hills State Forest put their staff and pressure cleaner to work at Lake Bee and cleaned all of the concrete picnic tables. Employee Jack Oliver rebuilt the grills in two of the picnic shelters. After all the work was done, Lake Bee looked better than it had in a long time. Hopefully in the near future we will have funds to work on the parking areas and entrance road.



Louis Tate and Julius Loflin put a lot of hard work into repairing the picnic shelters at Lake Bee. (89NR-48, 4/89, Cartlidge)



The Sand Hills State Forest supplied a few hands to spruce up the Lake Bee Recreation Area for the 50th Anniversary Open House. In no time they had the picnic tables looking like new with the help of their pressure cleaner. (89NR-49, 5/89, Cartlidge)

The dam and spillway at Middle Triple Lakes was reworked. Specifically trees and brush were removed from the dam and spillway, the top of the dam was widened and resurfaced, and the spillway surface was reshaped. The water control structure was cleaned out and the platform repaired.

3. Major Maintenance

There were no major maintenance projects this year other than those listed elsewhere.



The crew spent a considerable amount of time salvaging firewood for the shop. There will be no shortage of firewood for the next few years. (89NR-50, 10/89, Robinson)

4. Equipment Utilization and Replacement

Major equipment purchases for the year included the following:

- (1) 1989 Dodge Dakota pickup with utility bed, received on 9/11/89, cost - \$10,898.87
- (2) Equipment trailer, Hudson Bros., 22 ft. with tilt deck, received 3/20/89, cost - \$6,049.00

Two other items were gotten off surplus property or received in trade.

- (1) Ford Tractor, model 1100, diesel (used) w/ Woods mower, model RM 59 (new) and disk harrow, model 12200 (used). (These items were received in trade for a JD subsoiler, a 1967 Case tractor, a JD grain drill, a fertilizer spreader, a rotary hoe, and a spike toothed drag harrow, all surplus to our needs.)

- (2) 1970 Pettibone forklift, model US 3354-1, diesel, 6000 lb capacity, transferred from U.S. Navy on 1/12/89.



This Pettibone forklift was received off Navy surplus. After a few minor repairs and a new battery, it ran pretty good and filled a real need in our equipment fleet. (89NR-51, 1/89, Snider)

5. Communications Systems

Due to lightning damages to the lowband base station at Pee Dee NWR, the lowband base unit located at the Sandhills headquarters was sent to Pee Dee to replace the damaged unit. At years end, we were operating off of highband portables at refuge headquarters to transmit through the Ruby Tower repeater unit. We hope to purchase a small highband base unit for the headquarters early next year.

An older base radio and antennae that we used at our hunt check station was sent to Cape Romain along with a porta-mobile unit. Hurricane Hugo destroyed their radio system.

6. Computer Systems

Staff use of our computer systems continues to increase as more members become familiar with their operation and capabilities. Our system has proved invaluable in handling many routine office tasks as well as analyzing management data. We utilized a program to handle the deer hunt drawing at Pee Dee. Some difficulties were experienced with this program. Plans have been made to modify the program to better suit our needs for the coming season. The regional red-cockaded woodpecker data program has been modified by Assistant Manager Cartlidge to better handle our annual

survey data. Cartlidge also wrote data programs for handling our fields information and our performance evaluations. We are currently reviewing various programs which will help us record, process and print needed refuge maps.

7. Energy Conservation

Quota allocations for this station for the use of electricity, gasoline and mileage driven were exceeded during FY 89 (Electricity by 35%; gasoline by 3%; and mileage by 28%). Considering the additional responsibilities and new program initiatives that have been added to this station in the last few years, it is amazing that we came close to meeting these quotas. The fact that we exceeded the mileage quota by 28% and only exceeded the quota for gasoline used by 3% would indicate that the majority of our vehicles are fuel efficient.

J. OTHER ITEMS

1. Cooperative Programs

A memorandum of agreement exists between the U. S. Fish and Wildlife Service and the S. C. Commission of Forestry which allowed the Service to reimburse the Commission for wildfire protection (46,000 acres) and prescribed burning by aerial ignition on the refuge for fiscal year 1989. The total itemized invoice for these activities was as follows:

a. Fire Protection	
(46,000 acres @ \$0.76 per acre)	\$34,960.00
b. Prescribed Burning (aerial ignition)	
(3,887 acres @ \$4.00 per acre)	<u>15,548.00</u>
Total	50,508.00

A lease agreement executed in 1939 between the U. S. Fish and Wildlife Service and the S. C. Forestry Commission leases approximately 46,000 acres of Interior-owned land adjacent to the refuge to the S. C. Forestry Commission. This land, known as the Sand Hills State Forest, is managed as a multiple use area. The Forestry Commission is allowed to utilize all timber receipts on the state forest in carrying out their management activities. All management activities with emphasis on endangered species are monitored by the refuge forester. Proposed annual work plans and timber prescriptions are reviewed to insure compliance with the lease agreement.

The S.C. Forestry Commission has been actively seeking to break the lease agreement and gain fee simple title to the Sand Hills State Forest. The U.S. Fish and Wildlife Service has agreed to allow the Commission to pursue the transfer under certain stipulated conditions. The Commission through the Legislature is presently seeking to obtain the 46,000 acre State Forest. The Service has informed the Commission that it would have to prepare an environmental assessment. Conservation groups will likely oppose the transfer of federal land to a state agency.

The annual work plan and compartment prescriptions for Compartments 15 and 29 on the State Forest were reviewed by the refuge manager and forester. A reconnaissance check of proposed timber sales on the State Forest was made by Forester Robinson. Specific goals for red-cockaded woodpecker management which included roller chopping in colony areas and prescribed burning were included in the plans. Actions to achieve these goals were carried out by State Forest personnel as prescribed. The annual work plan and prescriptions had been previously approved by the Service at the joint annual meeting between the Service and the S.C. Forestry Commission held at the Sand Hills State Forest headquarters. Refuge Supervisor Jim Matthews, Refuge Manager Snider, Assistant Manager Cartlidge, and Refuge Forester Robinson represented the Service at this meeting.

During a check of two advertised sawtimber sales on the State Forest for compliance with approved annual prescriptions, Forester Robinson found the sale areas (which included a red-cockaded woodpecker colony site) to be heavily marked. Robinson contacted and met with State Forest Director Forrest Murphy on the sale sites to discuss the matter. Mr. Murphy agreed that the areas were marked too heavily and agreed to remove paint from a number of trees in the sale areas and colony site. Director Murphy stated that he would take the necessary steps to assure that future sales would not be heavily marked. Forester Robinson checked a later advertised sale on the State Forest and found the area to be adequately marked as prescribed in their timber management prescription.

Refuge Foresters Robinson and Lay assisted John Nelson of the S.C. Wildlife and Marine Resources Department in locating areas on the refuge suitable for conducting a sampling of longleaf pine communities. The study is being conducted in coordination with the Nature Conservancy and will provide comparative data on longleaf pine communities in the Southeast. In conjunction with this study, John Nelson, along with two professors from the University of Georgia and five Japanese vegetative scientists from Yokohama National University, visited the refuge and collected field data along with grass and flower samples for the study.

2. Other Economic Uses

Economic uses of the refuge include pine straw baling and timber harvesting. Information on bid invitations issued and sales made for these products is found in Section F.3 (Forests). The only other money collected at Carolina Sandhills Refuge is a \$15/dog impoundment fee charged to dog owners when they pick up dogs that have been captured on the refuge. Total monies collected for this purpose in CY 89 were \$390.00.

3. Items of Interest

Assistant Forester Lay attended a Longleaf Pine Workshop in Southern Pines, NC on January 5th and 6th.

Assistant Project Leader Cartlidge and Assistant Manager Hoffmann attended a one-day training session in Columbia, SC on January 17. The topic was "Self Esteem and Peak Performance" presented by Career Track of Colorado.

Maintenance Mechanic Louis Tate and Engineering Equipment Operator Jack Oliver traveled to Hatchie NWR on January 30 to pick up a Case tractor which was used as a trade-in for a smaller Ford tractor and several implements.

All station law enforcement officers attended a forty hour in-service law enforcement refresher training course in Tallahassee, FL in March.

Larry Davis of Cape Romain NWR picked up corn, Japonica (lespedeza) seed, and wood duck boxes for his refuge in March.

Regional Office surveyors were here on March 7, 8, and 9 to complete the survey of the McLeod property involved in the land exchange.

Lang Elliot of Nature Sound Studios was on the refuge March 31 through April 2, and again on July 10th, to record "nature" sounds. He was particularly interested in recording the pine barrens treefrog.

Assistant Manager Hoffmann attended an eight hour training seminar on "Team Management" in Columbia, SC on May 11. The seminar was presented by Clemson University.

Don Sturkey, photographer for the Charlotte Observer, visited the refuge to take photographs for an article on Carolina Sandhills Refuge for our 50th Anniversary Celebration. Unfortunately the article did not appear until after our open house.

Office Assistant Kay McCutcheon attended LSP computer training in the regional office the week of May 1 through 5.

On May 10 through 12, Foresters Robinson and Lay attended a Forest Inventory Workshop held at the University of Georgia, Athens.

District Supervisor Matthews was on the refuge May 23 and 24 for a familiarization visit.

Office Assistant Kay McCutcheon was on a local radio talk show on May 11 to present information about our 50th Anniversary Open House activities.

Snider and McCutcheon completed a DOS computer course at Chesterfield Marlboro Technical College in July. The course totaled twelve hours of classroom instruction.

Foresters Robinson and Lay and Clerk-Typist Watson completed a DOS computer course at Chesterfield Marlboro Technical College in October. Mr. Robinson and Ms. Watson also completed a Wordperfect course at this same institution in October.

Clerk-Typist Tracie Watson attended a GSA Fedstrip seminar in Columbia, SC on July 26.

District Supervisor Matthews was on the refuge August 23 and 24 for a refuge inspection.



On September 28, just one week after Hurricane Hugo hit, refuge staff delivered a 12' x 24' portable building, a tractor, an air compressor, a portable fuel tank, and miscellaneous office and cleaning supplies to Cape Romain NWR. Cape Romain literally lost everything to the hurricane. (89NR-52, 9/89, Cartlidge)

Forester Robinson visited both Santee and Cape Romain refuges in October to assess timber damages and set up salvage operations. The SC Forestry Commission out of Walterboro provided an overflight of Bulls Island.

Equipment Operator Jack Oliver took annual leave on October 4th to go to the Charleston area to help with cleanup after the hurricane. His church sponsored the work day.

Manager Snider met with Dean Carson of the SC Forestry Commission on October 19 to discuss the EA for the proposed land transfer.

All station law enforcement personnel traveled to Columbia, SC on October 26 to requalify with their firearms.

On September 30, Office Assistant McCutcheon along with former employee Olin Morrison, his wife Katherine, and a co-worker of Mr. Morrison's traveled to Cape Romain Refuge to deliver supplies and a tanker of water. Mr. Morrison was signed on as a refuge volunteer so that he could utilize the refuge truck tractor to deliver a 3500 gallon tanker of water donated

by local farmer Kemp McLeod. Olin assisted the Cape Romain staff with the pressure cleaning of a refuge storage building and refuge vehicles. He also used his substantial mechanical abilities to get a couple of pieces of refuge equipment up and running. Mrs. Morrison and Kay spent their time cleaning and organizing a portable building to be used for the temporary storage of tools and as a temporary office.

During November several staff members worked at Cape Romain. McCutcheon and Watson were down on the 10th and helped clean the Dominick House on Bull's Island. Julius Loflin worked security at the headquarters compound from the 5th through the 12th. Watson was back down on the 18th to work as dispatcher, cook, etc. through December 2nd.

Assistant Manager Cartlidge attended the Non-Game Workshop in Atlanta from the 14th through the 16th of November.

On November 29th Assistant Manager Hoffmann attended a one day training course in Columbia on "Assertive Management Techniques".

Office Assistant Kay McCutcheon was honored by the McBee Lions Club at their annual Christmas Party on December 8th. Kay was named the 1989 "Citizen of the Year" and was presented with a plaque which now hangs on the wall next to her desk. Kay was honored for her long time work with the youth recreation program in McBee as well as for her contributions as a library and school volunteer.

Assistant Manager Hoffmann was named Zone Chairman for Zone II-A of District 32-C of the South Carolina Lions Clubs. In this capacity, Mr. Hoffmann is responsible for coordinating the activities of seven area Lions Clubs.



Range Technician Julius Loflin received his 30-Year Length of Service pin and certificate in October. Julius began his Service career at nearby Cheraw Fish Hatchery. (89NR-53, 10/89, Cartlidge)



Maintenance Mechanic Louis Tate and Range Technician Julius Loflin received Special Achievement Awards for their rehab work at Lake Bee and other work in preparation for the 50th Anniversary Celebration. (89NR-54, 8/89, Cartlidge)



4. Credits

Sections F.3 (Forests), F.9 (Fire Management), and J.1 (Cooperative Programs) were written by David Robinson. Section G.2 (Endangered Species) was written by Steve Lay. Karen Cartlidge authored Sec. A (Highlights), Sec. D (Planning), Sec. E (Administration), Parts 2, 3, 4, 6, and 7, Sec. G.11 (Fisheries Resources), Sec. G.12 (Wildlife Propagation and Stocking), all of Sec. H (Public Use) except parts 8 (Hunting) and 17 (Law Enforcement), Sec. I.2 (Rehabilitation), Sec. I.3 (Major Maintenance), and Sec. I.4 (Equipment Utilization and Replacement). Sections E.1 (Personnel), E.5 (Funding), I.7 (Energy Conservation) and Sec. J. 2 (Other Economic Uses) were written by Kay McCutcheon. John Hoffmann produced the remaining sections except Sec. C (Land Acquisition), Sec. F.4 (Croplands), Sec. I.5 (Communications), Sec. I.6 (Computer Systems), and Sec. K (Feedback) which were written by Ronald Snider. Cartlidge, Hoffmann, Robinson, and McCutcheon provided input for Sec. J. 3 (Items of Interest).

Editing was accomplished by Cartlidge and Snider. Kay McCutcheon provided the final scrutiny of the text and was responsible for typing and assembly of this report.

K. FEEDBACK

It has been a challenging year, with the added emphasis on outside programs such as Partners for Waterfowl, conservation reserve, and FmHA easements. Especially when you add Hurricane Hugo to the stack. The staff of this refuge has responded in their usual fashion by accomplishing a mountain of work in limited time, under difficult circumstances! I certainly appreciate these efforts and commend each and every one for doing more than their share.

I am pleased with the progress our staff has made in the efficient use of our new computer system. This system has assisted us in accomplishing necessary work with higher efficiency and timeliness. Foresters Robinson and Lay made excellent use of the equipment in conducting a complete inventory of our timber resources. The inventory was completed in about four months. Without the use of our computer system the same inventory would have taken at least a year. Assistant Manager Cartlidge has shown particular proficiency in producing helpful databases utilizing R-Base. These databases were utilized for recording and analyzing fourteen years of wood duck nest box data, management of our fields, wetlands, and red-cockaded woodpecker cavity trees. R-Base was also utilized to record and print our annual performance evaluations, and annual pesticide applications. The deer hunt applications and drawing were also done by computer. A program is presently being developed by Cartlidge which will act as our library catalog. We are searching for a program which will enable us to produce, catalog and manipulate refuge maps. Office Assistant McCutcheon has found the wordprocessing capabilities very helpful in her daily secretarial and budgeting duties.

Although much progress has been made in the efficient use of computer systems regionwide, there are still many daily and repetitive tasks that could be made more efficient and timely by the use of computer systems. It seems to me that it would be worthwhile if the region were to invest in a position set aside strictly to produce database programs in R-Base and other regionally used programs to simplify and speed the completion of many of the forms and reports that are utilized by everyone. This person could also produce special applications as requested by the various stations.