

REVIEW AND APPROVALS

CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE  
McBee, South Carolina

ANNUAL NARRATIVE REPORT  
Calendar Year 1999

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1/23/01  
Date

**CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE**

**McBee, South Carolina**

**ANNUAL NARRATIVE REPORT**

**Calendar Year 1999**

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

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## 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 rivers from adjacent mountainous regions drained. Silt and sand deposited along the coastline from these streams eventually 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 more than 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. Europeans did not begin to establish permanent settlements in inland South Carolina until the mid-1700's.

Vast longleaf pine forests dominated the landscape of the Sandhills when European man first settled in this area. These supported major lumber and naval store 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 lands within the Sandhills region were 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 U. S. Fish and Wildlife Service manages 45,348 acres as the Carolina Sandhills National Wildlife Refuge.

Elevations on the refuge range from 250 to 500 feet above mean sea level. The topography is characterized by gently rolling hills and deep sandy soils with occasional outcroppings of red and kaolin clays. Uniquely, much of the flora and fauna found on the east side of the refuge is characteristic of those forms generally associated with the Coastal Plain while those on the west side are 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 blue jack 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. 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 in the vicinity of the refuge. It is characterized by slightly stained and turbid water with 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. Habitat diversity has been increased by the creation of many small fields scattered throughout the refuge.



# CAROLINA SANDHILLS NATIONAL WILDLIFE REFUGE

CHESTERFIELD COUNTY, SOUTH CAROLINA

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
80°20'

UNITED STATES  
FISH AND WILDLIFE SERVICE  
80°10'

34°40'

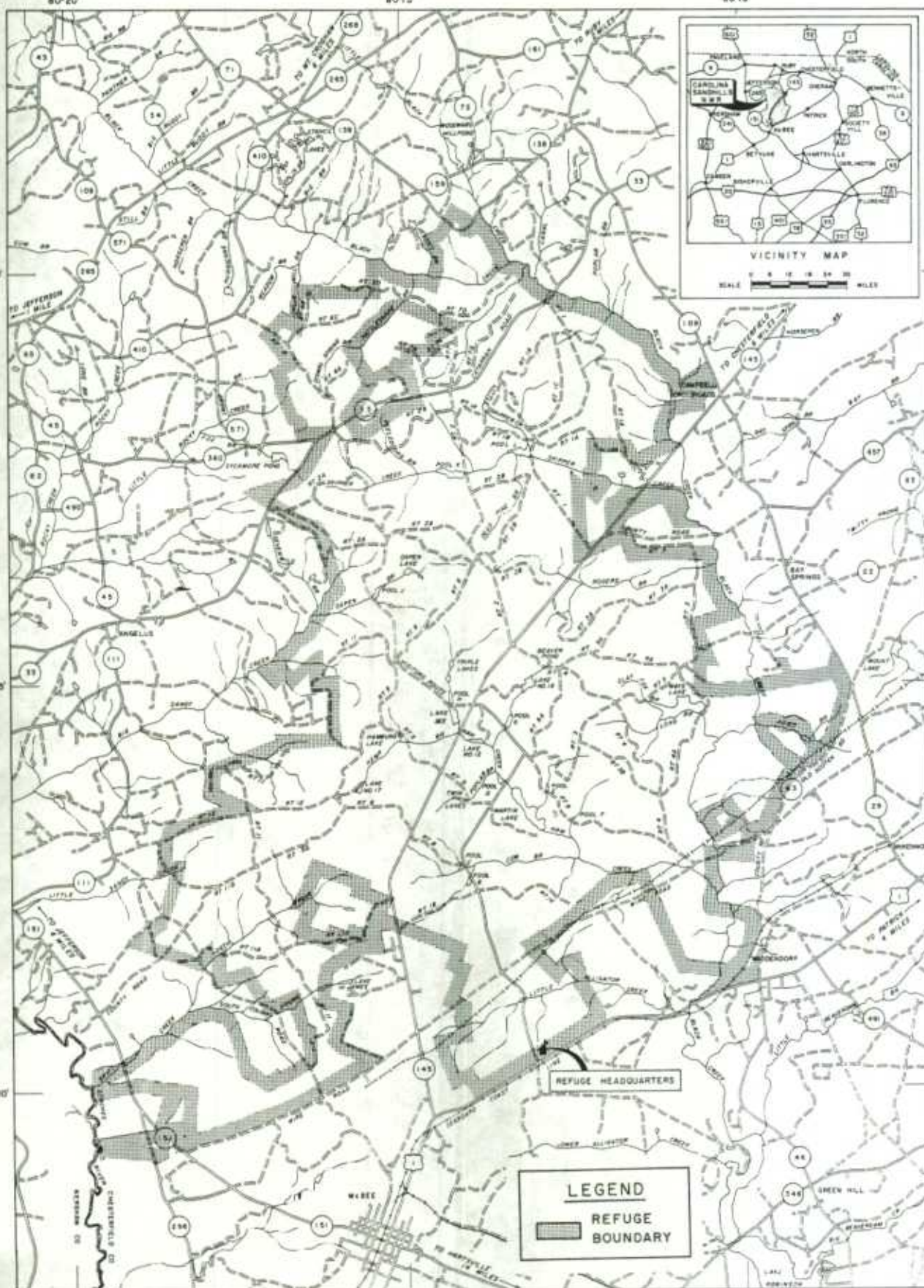
34°35'

34°30'

34°40'

34°35'

34°30'



COMPILED IN THE DIVISION OF REALTY FROM  
SURVEYS BY USGS

ATLANTA, GEORGIA  
REVISED: 12/86

JUNE, 1974

Scale 0 1000 2000 3000 4000 5000 FEET  
0 1 2 3 4 5 MILES

MEAN  
DECLINATION  
1974

4R-SC-275-41



#### **A. HIGHLIGHTS**

- Refuge receives the 1999 Forest Conservation Award from the South Carolina Wildlife Federation. (F.3)
- The first-ever park ranger and refuge biologist positions are filled at the refuge. Park Ranger Kay McCutcheon and Refuge Biologist Laura Shiver give both programs a tremendous boost. (E.1)
- Refuge outreach efforts expand with numerous programs presented throughout the area. (H.1)
- Refuge experiences a record red-cockaded woodpecker nesting season with 93 nests and 198 chicks banded. (G.2)
- Refuge staff conduct the largest red-cockaded woodpecker translocation to date. Thirteen birds were trapped in one night and were taken to Daniel Boone National Forest in Kentucky. (G.2)
- Refuge staff provides assistance and equipment on numerous details throughout the year to other refuges, the Regional Office, Washington Office, and major project fires. (H.1,F.9,I.8)
- Partners for Fish and Wildlife Agreements are signed with four local landowners restoring 176 acres of longleaf pine on private lands. (C.3)
- Patricia McCoy fills vacant Office Assistant position. (E.1)
- USGS-BRD conducts first-ever refuge aquatic and reptile and amphibian surveys. (D.5)
- Although Lake Bee Dam has been repaired, three other dams on refuge lakes fail. (I.3)
- Refuge loses Engineering Equipment Operator Jack Oliver after 22 years to retirement and Forestry Technician Greg Askins to Lower Suwannee NWR.

#### **B. CLIMATIC CONDITIONS**

Calendar year 1999 started out relatively normal for temperatures and rainfall but the refuge was still feeling the effects of the drought begun in 1998. In May, the dry weather returned and the refuge was deficient in precipitation amounts. No relief came until September when Hurricanes Dennis and Floyd brought over nine inches of rain to the area. If it weren't for the hurricanes, the refuge would have been severely behind in annual precipitation that could have affected prescribed burning efforts in Calendar Year 2000. A summary of 1999 climatic information is contained in Table 1 on the following page.



Table 1. Temperature, Relative Humidity and Precipitation CY 1999						
Month	Minimum Temp	Maximum Temp	Avg Temp	Minimum RH	Avg Rh	Total Rainfall
January	14	79	49	21	73	5.33
February	20	77	49	16	68	2.25
March	25	81	50	16	61	3.71
April	36	90	65	21	67	5.43
May	44	92	69	24	68	1.16
June	54	101	75	23	76	3.95
July	62	104	81	30	77	1.61
August	59	105	81	24	72	2.92
September	42	94	71	27	77	9.76
October	32	86	61	33	82	2.32
November	27	80	56	0*	74	2.44
December	22	73	46	18	74	2.05
<b>Yearly Averages/Total</b>	<b>36</b>	<b>89</b>	<b>63</b>	<b>21</b>	<b>72</b>	<b>42.93</b>

### C. LAND ACQUISITION

#### 2. Easements

As anticipated, this station acquired two additional FSA conservation easements early in the year. The first of these was a 179-acre easement on the Wiggins Tract in Marion County; the second was a 105-acre easement on the Odom Tract in Marlboro County. This station now administers ten conservation easements in six northeastern South Carolina counties encompassing a total of 1,051.15 acres. Additionally we possess a 210-acre fee title tract located in Marlboro County that was deeded to the refuge by the Farmers Home Administration.

Refuge Manager Lanier, Assistant Manager Hoffmann, and Private Lands Biologist Joe Cockrell from the Charleston Ecological Services Office visited the two new easements in March. After discovering that the timber on the Odom tract in Marlboro County had been marked for cutting, the owner, Mr. E.B. Odom, Jr., was informed that cutting timber from conservation easements was not a permitted activity. This information was not well received and Mr. Odom sought congressional intervention in an effort to have this restriction removed from his contract.

On the first visit to the Wiggins Tract, it was discovered that the new owner, Ricky Godbolt had created a system of trail and roads within the easement. He was informed that this was in violation of the terms of his easement deed and that such activity would have to cease. He agreed to this and stated that he was unaware that such activity was not permitted. Plans to post this easement during the summer with YCC assistance had to be postponed due to a staff member's illness. This is the only easement that has not been posted.

The on going beaver saga associated with the Godwin tract continued during 1999. Beaver activity on this easement has backed up so much water that several off-site problems have developed. Problems include flooding of a drain field that caused the septic tank to overflow and loss of timber from flooding on an adjacent landowner's property. A special use permit was issued to a licensed animal damage control biologist hired by the landowners to trap and remove beaver from the easement.



Another beaver problem developed on the Henry C. Quick, Jr. tract in Dillon tract in August. We were notified by an USDA-APHIS biologist that a colony of beaver had moved onto this easement and were backing up water, causing two state and county owned highways to be flooded out. The biologist was granted a special use permit to trap and remove beaver from the easement and to breach the beaver dam in order to remove water from the roadways. Also regarding this property, we were notified in July by Mr. Don Butler of their intention to sell this tract. He was attempting to negotiate a contract with the Boy Scouts for use as a camping area. Mr. Butler was informed that camping could only be permitted in the non-easement portions of the tract.

#### **D. PLANNING**

##### **4. Compliance With Environmental and Cultural Resources Mandates.**

Regional Archeologist Richard Kanaski visited the refuge on October 29th. Archeologist Kanaski inspected two buildings at the Ruby House that have been scheduled for demolition. He also looked at the Shaw family cemetery and homestead sites.

##### **5. Research and Investigations**

The following is a summary of research projects conducted by US Forest Service staff under the direction of Joan L. Walker, Research Plant Ecologist.

\*\*\*\*\*  
One Master's thesis by Mary James (University of North Carolina at Chapel Hill) was published based on research conducted on the refuge.

All research projects conducted on the refuge focus on the ecology and management of longleaf pine/wiregrass habitats. Two major research topics are currently being addressed: a) roller-chopping effects - understanding the effects of roller-chopping on ground layer vegetation; and b) biology of native sandhills plants - understanding reproduction and growth patterns of wiregrass and other native herbaceous species. Most of this research is entering its final stage and is winding down. The ultimate goal of these studies is to provide land managers in the Sandhills region with information to guide development of ecologically sound and effective management practices.

Summaries of research projects conducted or completed in 1999 are provided below. Publications and presentations are also listed.

##### **Research Area 1: Roller-Chopping Effects**

###### ***1. Project Title: Prescribed fire and mechanical treatments to restore pre-settlement structure in longleaf pine forests: effects on midstory reduction and ground layer restoration***

This long-term study, which began in 1995, evaluates the effects of burning and roller-chopping on 1) midstory hardwood reduction for red-cockaded woodpecker habitat improvement and 2) recovery of native understory species that constitute natural biodiversity and provide fine fuels for continued prescribed fire. In 1998, USFS staff completed the second and final census of hardwood and wiregrass growth in experimental research plots treated with roller-chopping and fire in 1997. Preliminary results indicate that all chopping and burning combinations led to



minimal mortality of wiregrass. Hardwood stem height was influenced by the time (season) of chopping treatments. Mortality of canopy longleaf pine trees in roller-chopped plots was 3.2 %. Results from a companion study on the effects of roller chopping on dwarf huckleberry (*Gaylussacia dumosa*) suggest that this species recovers quickly following chopping treatments. In another study, USFS staff found that frequent fires are necessary following chopping to maintain low hardwood stem abundance and heights. These findings are consistent with long-term field observations made by CSNWR staff. A final report summarizing results from all roller-chop studies was prepared in 1999. This area will be reserved for the next couple of years and will then revert to standard management.

#### Research Area 2: Biology of Native Sandhills Plants

##### **1. Project Title: The distribution and abundance of legumes in the Carolina Sandhills**

The overall objective of this study is to examine the factors that regulate the distribution of native legumes in the Carolina Sandhills. Specifically, the two-year study will address three questions: 1) how does legume distribution vary according to soil texture? 2) how does legume distribution vary according to soil nutrient levels?; and 3) how does pine straw litter affect legume germination, establishment, and early seedling growth? Results from this research will provide important baseline data for both restoration ecologists and land managers working in the longleaf pine/wiregrass ecosystem of the Carolina Sandhills.

##### **2. Project Title: Micro environmental variation between understory patch types in a longleaf pine ecosystem**

This study was designed to test the idea that wiregrass may serve as a "nurse plant" by creating unique microsite conditions beneficial to the establishment and growth of certain species. If true, the distribution and abundance of wiregrass may play an important role in structuring vegetation in longleaf pine stands. Work in 1998 focused on characterizing the physical conditions in three patch types: wiregrass, turkey oak (*Quercus laevis*), and dwarf huckleberry (*Gaylussacia dumosa*). Establishment success of seeds in these patch types was tested in 1999.

#### Additional studies/projects

##### **1. Project title: Floristic inventory of Carolina Sandhills National Wildlife Refuge**

USFS technician, Randy Mejeur, added many new species to the refuge plant species list in 1999. As of August 10, 1998, over 600 species had been identified on the refuge. Randy is planning to complete and publish his checklist in the next year or two.

##### **Determining the Effects of Turkey Oak and Pine Needle Exudates on the Germination of *Aristida tuberculosa* and *Aristida stricta***

Steve Franks (University of Georgia) collected turkey oak leaves and longleaf pine needles from the refuge for research looking at the effects of these two trees on the germination of two species of *Aristida*. This will be a multi-year study.



### ***Stress tolerance of Aristida stricta.***

Jason West (University of Georgia) collected approximately 10,000 Aristida stricta (wire grass) seeds which will be used in a greenhouse experiment to address the stress tolerances of different populations. Research will be conducted to determine if there are physiological differences between populations in the North (Aristida Stricta) and populations in the South (Aristida beyrichiana) and between populations on mesic versus xeric sites.

### ***The relationship between flying squirrels and nest success of Red-cockaded Woodpeckers.***

Dr. Susan Loeb (USFS Researcher) continued a multi-year project to determine the affect of flying squirrels on red-cockaded woodpecker nest success.

### ***Root and soil resource interactions of oaks and longleaf pine at Carolina Sandhills NWR.***

Jason West (University of Georgia) continued with his research in a two year study to determine the below ground function of important sandhill tree species and wiregrass. Six sites have been established, three on frequently burned and three on unburned sites. On the burned sites, wiregrass fine root dynamics are being monitored.

Information from this research will allow greater understanding of the below ground dynamics of the sandhill ecosystem, especially with respect to the woody species in both frequently burned and fire suppressed habitats.

### ***Determine the factors that limit the distribution of native leguminous species in the sandhills.***

Mary James (University of North Carolina at Chapel Hill) conducted research in order to determine the factors that limit distribution of native leguminous species in the sandhills.

### ***Air Quality Monitoring.***

The refuge entered a long-term agreement with the South Carolina Department of Health and Environmental Control, Division of Air Quality (DHEC). Under this agreement DHEC will install an ambient air monitoring site at the Ruby House to monitor fine particulate (PM2.5) air pollutants.

### ***Carolina Power and Light.***

The refuge entered into an agreement allowing the Carolina Power and Light Company to sample refuge waters for a baseline contaminants study. Fish will be collected and analyzed two times per year and analyzed.

### ***Plant Species Diversity and Relative Abundance.***

The refuge issued Chisolm Beckham (Coker College) a one-year permit to study the effects of disturbance on plant species diversity and relative abundance. Plots will be placed in growing season burn, dormant season burn, and roller chopped area.



### ***Herpetological and aquatic survey.***

John Seginak and Mary Freeman, USGS, conducted a herpetological and aquatic survey of the refuge. A total of 61 reptiles and amphibians were found and 25 fish species were also identified.

### **6. Other**

Refuge Manager Lanier toured North Carolina Wildlife and Resources Commissions Sandhills Game lands and attended a meeting chaired by Ecological Services Red-Cockaded Woodpecker Biologist Pete Campbell, concerning joint research needs for the refuge, Fort Bragg, and Sandhills Game lands.

Assistant Manager Hoffmann prepared a new station Trapping Plan.

Project Leader Lanier and Refuge Manager Frisk met with Anson County Economic Development Director Steve Leary to discuss plans to seeking funding for an environmental education center at Pee Dee NWR.

## **E. ADMINISTRATION**

### **1. Personnel**

The staffing pattern and incumbents occupying these positions for Carolina Sandhills Refuge is as depicted in the following chart:



Refuge staff (back row, left to right): Olson, Hoffmann, Parker, McLain, Lanier, McClelland, and Mason. (front row, left to right): Robinson, McCutcheon, McCoy, and Housh. (NR-99-2, Fogo).

Biologist Laura Shiver banding  
RCW chicks. (NR-3-99, Staff)



**Table 2. Staff – Carolina Sandhills Refuge**

Name	Position Title/Grade	EOD	Position Type
Scott Lanier	Project Leader, GS-13	10/27/97	PFT
Rolf E. Olson	Deputy Project Leader, GS-11	3/30/98	PFT
John S. Hoffmann	Asst. Refuge Manager, GS-9	6/10/96	PFT
David H. Robinson	Forester, GS-11	2/1/74	PFT
R. Gregory Askins	Forestry Technician, GS-7 Transferred 2/99	10/19/92	PFT
Laura A. Shiver	Biological Technician, GS-5 Wildlife Biologist, GS-5	5/10/98 9/12/99	TFT PFT
Kay W. McCutcheon	Park Ranger, GS - 9	3/20/72	PFT
T. Jack Oliver	Engineering Equip. Oper., WG-11 Retired 1/17/99	1/10/77	PFT
Randall W. McLain	Engineering Equip. Oper., WG-8	12/26/93	PFT
James McClelland	Engineering Equip. Oper., WG-8	9/17/95	PFT
S. Douglas Mason	Engineering Equip. Oper., WG-8	11/12/95	PFT
Michael Housh	Fire Management Officer, GS-9	11/12/96	PFT
Patricia McCoy	Office Assistant, GS-5	3/31/97	PFT
Richard Meyers	Student Trainee (Wildlife), GS-5	6/8/98	PFT
Mark A. Parker	Forestry Technician, GS-5	1/31/99	TI
Brian E. Bush	Forestry Technician, GS-5	2/28/99	TI

Engineering Equipment Operator Jack Oliver retired on January 17, 1999. Jack had 22 years and one week of service with Carolina Sandhills NWR.



Mark Parker reported for duty as a GS-5 Forestry Technician (intermittent) on January 31, 1999. Brian Bush reported for duty as a GS-5 Forestry Technician (intermittent) on February 28, 1999. Both of these employees will be working with Fire Management Officer Housh.

Former Office Assistant Kay McCutcheon was selected to fill the new GS-9, Park Ranger position on June 6, 1999.

Patricia McCoy was selected to fill the GS-5 Office Assistant position vacated by Kay McCutcheon on November 1, 1999. Patricia previously held the position of Office Automation Clerk (GS-4) on a 1,040 hour appointment.

S. Douglas Mason was promoted from the Forestry Technician, GS-5 position to the vacant Engineering Equipment Operator, WG-8 position on October 10, 1999.

R. Gregory Askins transferred to Lower Suwannee and Chassahowitzka NWR on January 3, where he will be working as a Forestry Technician. Greg's position will remain vacant until additional funding can be obtained.

Project Leader Scott Lanier was promoted to a GS-13 on June 6, 1999.

Laura A. Shiver was hired as the station's first Wildlife Biologist GS-5/7/9 on September 12, 1999. Laura had been working on the refuge since May 10, 1998, as a temporary Biological Technician.

Student Trainee Richard Meyers worked on his masters thesis this year and will return to the refuge in 2000 for his next work detail.

Table 3. Number of Employees				
FY	FULL TIME	PART TIME	TEMPORARY	TOTAL FTE'S
99	11.0	0	1.0	12.0
98	11.0	0	2.5	13.5
97	10.0	0	2.1	12.1
96	10.0	0	1.1	11.1
95	9.0	0	1.1	10.1
94	8.0	0	1.2	9.2
93	7.0	0	1.2	8.2
92	8.0	0	1.2	9.2
91	7.0	0	1.2	8.2
90	10.0	0	1.8	11.8

## 2. Youth Programs

Four YCC enrollees (David Dixon, John Gering, Michael Nicholson, and Christopher Stancil) and one youth leader (Paul Roberts) were selected for this year's eight-week program.

Major projects accomplished by these enrollees included the following:

- Cleared, marked and posted boundaries on two conservation easements and fifteen miles of boundary on the refuge.
- Rehabilitated the Lake Bee Picnic area, Quarters 1, Ruby House, and Woodland Trail.
- Repainted all the refuge gates and sign posts.
- Helped move the boneyard to a new location.
- Cleared understory vegetation from around RCW cavity trees in four compartments of the refuge and painted and tagged these cavity trees.
- Maintained shop and office grounds.
- Planted 5,000 wiregrass seedlings on the Lake Bee Dam.



YCC enrollee John Gering assisting Equipment Operator McClelland with repairs to Quarters One porch (NR-4-99, McCutcheon).

Enrollees were provided environmental education while performing their daily activities by their supervisors. Topics discussed included forest and wildlife resource management, endangered species management, and the role each plays in longleaf pine ecosystem management.

#### **4. Volunteer Programs**

The refuge volunteer program continues its steady growth. During calendar year 1999, over fifty individuals contributed 1,800 hours as volunteers.

One of the more notable activities was our second annual South Carolina Wildlife Federation Workday held in early December. We were thrilled to have twenty students and two teachers from West Florence High School join the fifteen volunteers recruited by the Wildlife Federation. This group worked on trail clearing, RCW cavity tree raking, and trail maintenance projects. The West Florence group was very enthusiastic and their teachers were interested in scheduling future work projects and activities.





S. C. Wildlife Federation Workday 1999. (NR-5-99, McCutcheon).

South Carolina Wildlife Federation members John and Kathy Garton make regular weekend visits to the refuge to complete volunteer projects and have adopted our bluebird box program.

Brian vanEerden assisted the refuge staff in drafting grant proposals, completing vegetation analysis, and plant identification for special areas and helping conduct environmental education programs.

Student interns Mike Martin and Amy Pearson were a tremendous asset to several refuge programs. They participated in all management activities and provided assistance on several maintenance projects and outreach activities.

Refuge volunteers also assisted with the MAPS bird banding station and RCW nest checks, banding, and fledge checks. They helped maintain our native plant garden and helped to clear and surface a new interpretive trail near Pool A.

Efforts are being made to recruit more local volunteers through presentations to civic groups, news releases, and exposure through off-site exhibits (such as the Pee Dee and Palmetto Sportsman Classics). The staff is also actively encouraging local scout groups to accomplish merit badge requirements by completing service projects on the refuge.

West Florence High School student volunteers assisted with the Pee Dee Sportsman's Classic.  
(NR-6-99, McCutcheon).



## 5. Funding

Monies allocated for FY 1999 included several special projects in addition to our normal 1261 operations and 6860 expenses for sales categories. Special monies were received for road repair caused by heavy flooding during the El Nino rains (\$248,400) and other road repair funds (\$39,500). Funds for Lake Bee dam repairs (\$46,909) and Hurricane Fran repairs (\$17,435) were carried over from last year.

Table 4. (below) provides a summary of funding received during FY 1999 and Table 5. (on the following page) gives details of our FY 2000 allocation picture.

Table 4. Funding Allocation – FY 1999									
Description/ Subactivity	1971	1261	1262	1983	*****	6860	9251	9263	Totals
Initial Allocation		355,400				35,000			390,400
Daniel Boone NF Agreements	8,700								8,700
Ecosystem Add (LL Restoration)		19,100							19,100
RCW Biological Expertise		30,000							30,000
Volunteers		1,200							1,200
Co-op Student		2,400							2,400
Rehab shop For Hazardous Materials			14,000						14,000
Build Fire Cache			36,000						36,000
YCC Enrollees			9,100						9,100
Replace Wire Road Bridges			132,200						132,200
Rehab Tates Trail			3,000						3,000
Road Repairs					277,935				277,935
Refuge Office				525,000					525,000
Refuge Shop				500,000					500,000
Fire-Staff & Admin Costs							74,200	23,200	97,400
Fire-Helicopter Costs							25,000		25,000
Fire-equip Maint/NUS								12,000	12,000
Fire-seasonal Staff								31,500	31,500
Totals	8,700	408,100	194,300	1,025,000	277,935	35,000	99,200	66,700	2,114,935



Table 5. Funding Allocation – FY 2000									
Description/ Subactivity	1971	1261	1262	1983	*****	6860	9251	9263	Totals
Initial Allocation		355,100	48,800			35,000	69,400		508,300
Daniel Boone NF Agreements	8,700								8,700
Ecosystem Add (LL Restoration)		19,100							19,100
RCW Biological Expertise		30,000							30,000
Volunteers		800							800
Co-op Student		16,000							16,000
YCC Enrollees			9,100						9,100
Replace Wire Road Bridges					405,500				405,500
Road Repairs					94,900				94,900
Refuge Office				525,000					525,000
Refuge Shop				500,000					500,000
Fire-Staff & Admin Costs								36,300	36,300
Fire-Helicopter Contract							25,000		25,000
Fire-equip Maint/ NUS							10,800		10,800
Fire-seasonal Staff								33,000	33,000
Totals	8,700	421,000	57,900	1,025,000	500,400	35,000	105,000	69,300	2,222,300

\*\*\*\* 2961, 2962, 2850, 2855

## 6. Safety

While securing the refuge after the completion of our primitive weapons deer hunt, Engineering Equipment Operator McClelland was involved in a vehicle accident at the intersection of Wire Road and South Carolina Highway 145. James received only minor injuries but the refuge vehicle was declared a total loss.

The refuge holds periodic safety meetings in conjunction with our staff meetings. Safety concerns in both the home and workplace are discussed at these meetings. There were no lost time accidents during the report period.

## **7. Technical Assistance**

Equipment Operator McClelland assisted at Ace Basin NWR with Hurricane Floyd repairs and cleanup.

Equipment Operator McLain was detailed to the Bankhead Complex in Alabama to combat wildfires.

McCutcheon assisted the S.C. Interagency Coordination Center in Columbia as a support dispatcher for overhead team support during Hurricane Dennis (August 30 - September 5) and Hurricane Floyd (September 17 - 19). She also served as a coach/instructor for D - 310 (Support Dispatcher) training in Asheville, NC (September 12 - 17).

Biologist Laura Shiver and Pee Dee Manager Dan Frisk trapped a juvenile female red cockaded woodpecker and relocated it to an active cluster at Pee Dee NWR. Park Ranger Kay McCutcheon and Pee Dee Biologist Laura Fogo assisted with this operation.

Park Ranger McCutcheon assisted Alligator River FMO Tom Crews by providing instruction of three units of an S-260 (Fire Business Manager) course held in Columbia, NC.

Assistant Manager Hoffmann assisted Private Lands Biologist Laura Fogo of Pee Dee NWR with her FAS conservation easement files and advised of possible ways to handle certain problems which had developed.

Engineering Equipment Operators Doug Mason and Randy McLain assisted Piedmont NWR with making repairs to several of their dams.

## **8. Other**

Project Leader Lanier, Deputy Project Leader Olson, Forester Robinson, and Biological Technician Shiver attended the annual meeting between the Service and the S. C. Forestry Commission in November. RCW Recovery Coordinator Ralph Costa, and Ecological Services Biologist Lori Duncan also attended along with representatives of the S. C. Forestry Commission and S. C. Department of Natural Resources. RCW management efforts and issues were discussed along with other coordination topics.

## **F. HABITAT MANAGEMENT**

### **1. General**

Carolina Sandhills Refuge is located in the longleaf pine/wiregrass community (Longleaf Pine Ecosystem) which is characterized by longleaf pine and turkey oak on the upland sites. Longleaf pine is replaced by loblolly pine on the more fertile sites where clay outcroppings occur. Pine pocosins are found in association with wet sites, where pond pine, gallberry, titi, redbay and sweetbay are the predominant species. Numerous branch heads and their tributaries drain into either Black Creek on the east side of the refuge or Lynches River on the west side. Bottomland hardwood and associated species found along Black Creek are typical of those species found in the Coastal Plain region. Lynches River hardwood species and their associates typify those species found in the Piedmont bottomland region.



Table 6 presents a summary of the habitat types found within the 45,348 acres of Carolina Sandhills Refuge. Approximately 94.6 percent of the refuge is forested.

<b>Table 6. Summary of Habitat Types Carolina Sandhills Refuge</b>	
Habitat Type	Acreage
<b><u>Non-Forested Areas</u></b>	
Fields	1,265
Openings	182
Roads	673
Pools and Lakes	277
Pipelane (Gas)	6
Sub-Total	2,447
<b><u>Forested Areas – Total</u></b>	42,901
<b>Total All Habitats</b>	45,348

## **2. Wetlands**

Refuge Biologist Shiver met with Regional Biologist Bob Noffsinger to conduct vegetative transects on the waterfowl impoundments. He reported good plant response and a lot of good waterfowl food plants.

## **3. Forests**

Carolina Sandhills Refuge has long been heralded as a premier demonstration site for good longleaf pine management in the Southeast. In recent years, the refuge has played an increasing role in public and private efforts to conserve and restore the longleaf pine ecosystem throughout the Southeast. These efforts were officially recognized by the South Carolina Wildlife Federation in their naming of Carolina Sandhills Refuge as the "Forest Conservationist of the Year" for 1999. This award was presented to refuge staff members at the Federation's 35th Annual Conservation Awards Banquet.

Refuge Forester David Robinson with  
"1999 Forest Conservationist of the Year"  
award. (NR-99-7, McCutcheon)



The forests on Carolina Sandhills Refuge are managed in accordance with a Forest Habitat Management Plan and annual compartment habitat management prescriptions. This year annual compartment prescriptions for Compartments 7, 12, 14, and 18 along with appropriate red-cockaded woodpecker foraging analyses were prepared, submitted and approved. Management activities for 1999 were conducted in Compartments 5, 9, 10, 15 and 16. Timber sales conducted during the year included four pine pulpwood sales and three pine salvage/miscellaneous sales. The pine pulpwood sales were conducted in longleaf and loblolly pine plantations and thinned by operator select. Four additional operator select sales were sold during 1999, but the harvest and payment on these sales will not occur until next year (2000). The three pine salvage/miscellaneous sales were conducted as a result of bark beetle infestation (ips and black turpentine beetle). This infestation was the result of lightning strikes and hot spots in areas prescribe burned. The miscellaneous areas were thinnings in association with the salvage cutting.

This year, four of our sale contracts required a specified amount of clay (yards) and gravel (tons) to be delivered, hauled and spread on timber access roads within the sale areas. The clay was provided by the refuge from clay pits near the sale areas.

Under a Memorandum of Understanding Agreement with the South Carolina Forestry Commission, approximately 144 acres of slash pine converted lands were planted to containerized longleaf seedlings in Compartments 1 and 5. Refuge personnel planted an additional 14 acres of containerized longleaf seedlings in Compartments 6, 11 and 14.



Hand planting with containerized longleaf seedlings by S. C. Forestry Commission contractor. (NR-8-99, Robinson).

Approximately 79 acres of four-year-old longleaf pine plantations were treated with the herbicide Velpar ULW to control the competing hardwoods in the plantations. This was the second year this herbicide was used to control hardwoods in longleaf pine plantations and proved to be very successful. A proposal for herbicide application using Velpar ULW for hardwood control in red-cockaded woodpecker cluster sites was prepared, submitted and approved for Carolina Sandhills and Pee Dee Refuges.





Longleaf area before Velpar application (NR-99-9, Robinson)



Longleaf plantation after Velpar application (NR-99-10, Robinson)

Table 7. below provides a summary of timber sale activity during calendar year 1999.

Table 7. Timber Sale Activity - 1999							
COMP #	SALE #	# ACRES	CORDS (PINE)	BD FT (PINE)	REVENUE	TREATMENT	PERMITTEE/ SPECIES
16	16-1-97	120	1,370 (1)	--	\$14,075	Thinning	Canal Wood/Dillon Longleaf & Loblolly
Refuge Wide	Salvage	20	99	9,390	\$2,312	Salvage/ Misc	D. J. Creed
5	5-1-98	433	2,336 (2)	-	\$46,309	Thinning	Stone Container Longleaf
10	10-1-98	90	705 (3)	-	\$18,276	Thinning	Canal Wood/Dillon Longleaf
9 & 15	9,15-98	161	1,207 (4)	-	\$23,021	Thinning	Canal Wood Lumberton, Longleaf & Loblolly
Refuge Wide	Salvage	15	-	10,240	\$1,111	Salvage	D. J. Creed
1	Salvage	15	118	-	\$1,894	Salvage	D. J. Creed
Totals		854	5,835	19,630	\$106,998		

- (1) Plus hauling and spreading 3,500 yards clay and 1,200 tons gravel.
- (2) 3,000 yards clay and 1,400 tons gravel.
- (3) 540 yards clay and 420 tons gravel.
- (4) 675 yards clay and 510 tons gravel.



#### **4. Croplands**

The refuge cooperatively farmed 2,557 acres through the 1998 crop year. Because most refuge soils are deep, sandy and prone to drought, farming on the refuge is difficult at best. For this reason it is hard to find anyone who is willing to farm on the refuge. The one farmer who had been row cropping corn and soybeans opted out of the program at the completion of the 1998 crop year because the cost/benefits ratio was not in his favor. There was no row cropping carried out on the refuge in 1999.

Cooperative farmer Bobby McLeod cultivates 38.7 acres in bicolor lespedeza with the refuge receiving 25 percent of the hulled and scarified seed. For 1999, this amounted to 800 pounds valued at \$1.50/lb or \$1,200. This was sold back to the farmer for in-kind services in the form of plowing, planting and fertilization of 31 acres of wheat for turkey, deer and goose browse. The other cooperative farmer A. C. McLeod, Jr. manages a 67-acre bicolor lespedeza field with the refuge receiving 25 percent of the hulled and scarified seed. For 1999, this means the refuge was credited with 1,500 pounds of seed, a decrease of 150 pounds from the previous year. This was also sold back to the farmer in exchange for in-kind services. Mr. McLeod double disked and applied agricultural lime to 100 acres in the refuge's four dove management fields. Refuge staff later planted these fields in small grains.

#### **5. Grasslands**

Strips of switch grass have been planted in several of our field openings to furnish food and cover for upland small game species. Switch grass is a native warm season grass with low maintenance requirements, needing only to be burned or bush-hogged periodically. Native warm season grasses were a natural component of the sandhills ecosystem before the exclusion of fire and intensive pine stand management. Re-establishment of these grasses will receive increased emphasis in our future management decisions.

#### **6. Other Habitats-Fields**

Four fields totaling 100 acres were managed for mourning doves. These were planted with grain sorghum (milo), brown top millet, sunflower, and Egyptian wheat. Limited hunting was permitted during the early dove season. Strips of milo were also planted in most of our many field openings to provide food for dove, quail, and turkey. Wheat seed received from Resource Management, Inc. was planted in several small fields near our goose concentration areas and along the wildlife drive to provide browse for geese, turkey and deer.

#### **9. Fire Management**

Prescribed burning is a very important habitat management tool utilized on Carolina Sandhills Refuge. The objectives of our burning program include:

- reducing wildfire hazards through fuel reduction
- maintaining habitat diversity in fire maintained ecosystems
- maintaining and restoring habitat for endangered and threatened species of plants and animals such as the red-cockaded woodpecker, and
- assisting in the restoration of the longleaf pine/wiregrass community and hardwood control in upland pine stands.



During the 1999 burning season 11,533 acres of woodlands and fields were prescribed burned on the refuge using both aerial and ground ignition techniques. The majority of the burned acreage, over 90 percent, is treated using aerial ignition. This was the second year of an exclusive use helicopter contract that was awarded to PJ Helicopters of Red Bluff, CA.



Prescribed burning 1999. (NR-11-99, Robinson).

Of the 11,533 acres that were burned in 1999, 11,400 acres were agency-owned acres. Memorandum's of Understanding were signed with two owners of refuge inholdings allowing the refuge to conduct prescribed fire activities on their lands (a total of 153 acres). These landowners were Mr. Kenneth Segars and Mr. James Eakes.

Under the terms of the agreement with the SC Forestry Commission, the Commission is responsible for the detection and suppression of wildfires on the refuge. During the year one wildfire was detected and suppressed on the refuge. The fire was the result of a reburn from a prescribed fire that was conducted on March 23rd. The reburn occurred during an extended dry period in early April and was detected and suppressed by refuge and S. C. Forestry Commission staff on April 12th.

Several of the refuge staff attended fire related training in 1999. Course dates, titles and attendees are listed in Table 8 on the following page.

Table 8. Fire Training and Conferences - 1999				
Employee Name	Course Name	Begin Date	End Date	Course Location
Mason	InterService Engine Training	03/22/99	03/24/99	Savannah Coastal NWR
McClelland	InterService Engine Training	03/22/99	03/24/99	Savannah Coastal NWR
Housh	FMO Meeting/ Firebase Workshop	08/04/99	08/06/99	Atlanta, GA
Housh	Smoke Management Workshop	09/27/99	09/30/99	Tampa, FL
McLain	Prescribed Fire Planning and Implementation	10/16/99	10/22/99	NCTC Shepherdstown, WV
Housh	S-205, Fire Operations in the Urban Interface	10/25/99	10/28/99	Okefenokee NWR
McLain	S-231, Engine Boss	10/28/99	10/29/99	Okefenokee NWR
Housh	Helicopter Managers Workshop	12/6/99	12/10/99	Hiawassee, GA
Housh	Terra Torch Training	12/15/99	12/15/99	Carolina Sandhills NWR
Mason	Terra Torch Training	12/15/99	12/15/99	Carolina Sandhills NWR
McClelland	Terra Torch Training	12/15/99	12/15/99	Carolina Sandhills NWR
McLain	Terra Torch Training	12/15/99	12/15/99	Carolina Sandhills NWR
Parker	Terra Torch Training	12/15/99	12/15/99	Carolina Sandhills NWR
Robinson	Terra Torch Training	12/15/99	12/15/99	Carolina Sandhills NWR

Refuge staff were again quite active in interagency fire assignments. These assignments are listed in Table 9. below.

Table 9. Interagency Fire Details - 1999						
Employee	Position	Begin	End	# Days	Incident	Location
McLain	Engine Boss	03/01	03/05	5	FMSIA	Francis Marion NF
Parker	Engine Crewmember	03/01	03/09	9	FMSIA	Francis Marion NF
Bush	Engine Crewmember	03/05	03/09	5	FMSIA	Francis Marion NF
McLain	Engine Boss	04/06	04/16	11	FMSIA	Francis Marion NF
Bush	Engine Boss	04/18	04/26	9	FMSIA	Francis Marion NF
McClelland	Engine Crewmember	04/18	04/26	9	FMSIA	Francis Marion NF
Housh	Helicopter Manager	05/13	05/21	9	Brown Fire	Everglades NP
Mason	Helicopter Crewmember	05/13	05/21	9	Brown Fire	Everglades NP
Housh	Helicopter Manager	05/26	06/16	22	Friendly Fire	Osceola NF
McLain	Engine Boss	09/08	09/14	7	Bankhead Complex	Bankhead NF
Housh	Helicopter Manager	11/15	11/21	7	Blood Mtn. Fire	Chattahoochee NF
Housh	Helicopter Manager	11/22	11/26	5	Delany Mtn. Fire	Cherokee NF
Total Days Committed				107		

### 13. Farm Service Agency (FSA) Conservation Easements

There were no restoration or enhancement activities conducted on any of our conservation easements during the year nor were there any maintenance practices carried out.



## **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 comprises a ridge of rolling sandhills located along the fall line, lying between the Atlantic Coastal Plain and the Piedmont Plateau. Because of its location of 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 to document the number of species occurring here. The presence of representatives of both Piedmont and Coastal Plain species on the refuge provides an abundance and diversity of plant life found in few other areas of the state.



Pine barrens gentians, one of the over 700 plants identified on the refuge (NR-99-12, McCutcheon)

Numerous plants found on the refuge are listed on state and/or federal endangered species lists (i.e., sundews, pitcher plants, Well's pixie moss, and white wicky).

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

### **2. Endangered Species**

#### **a. Red-cockaded woodpecker**

The refuge supports a population of approximately 140 clusters of red-cockaded woodpeckers (RCW), making it the largest population within the refuge system, and combined with the 40+ clusters on the adjacent Sandhills State Forest, the sixth largest population in existence.

In 1999, the refuge located a total of 93 nests, with twenty of those nests found in artificial cavities. This is the largest number of nests ever recorded on the refuge. Nineteen new cavity trees were located this year.



Mark Ploski from Mississippi Sandhill Crane Refuge provided nest monitoring and banding assistance for three weeks and David Richardson from Noxubee Refuge spent a week helping out with banding of red-cockaded woodpecker chicks.



RCW chick with color bands attached.  
(NR-99-13, Price)

Nests were monitored and all nestlings were banded with USFWS aluminum bands and a unique combination of color bands. Color banding plays a critical role in location of suitable juvenile birds for possible translocation to other sites or to augment single bird clusters. Using a refuge maintained database, the refuge staff is able to locate birds of a known age and sex based on color band information for future RCW relocations. A total of 200 juvenile RCW's was banded this year. Nestlings were banded at 4-10 days and sexed at seventeen days.

Thirteen red-cockaded woodpeckers (five juvenile males and eight juvenile females) were trapped the night of September 27. These birds were translocated to Kentucky the next day where they were released on the Daniel Boone National Forest. Along with the refuge staff and personnel from the Daniel Boone National Forest, staff of South Carolina Department of Natural Resources, Sandhills State Forest, Noxubee Refuge, and Pee Dee Refuge assisted in the translocation effort. This was the largest translocation of RCWs ever accomplished in one night. As of December, five of the ten birds were roosting in known areas and their movements were being monitored. Additionally, one of the female birds translocated in 1998 was reported to be a breeding female in 1999.

One juvenile female RCW was translocated to Pee Dee Refuge one November 7. She was placed in a cluster with the one remaining male on the refuge. Unfortunately, the female has not been seen since her release.

The refuge continued to install artificial RCW cavities this year using cavity inserts. The refuge installed fourteen inserts in 1999. Inserts were installed to enhance clusters with few cavities or with dilapidated cavities. There were no new recruitment clusters established this year.

RCW habitat management practices are designed to promote open stands of longleaf pine with little or no midstory. To create and maintain this habitat type, the refuge uses forest thinning, prescribed burning, roller chopping and hand clearing of hardwood understory. In 1999, 804 acres were thinned, 11,553 acres were prescribed burned, 144 acres were roller chopped, and all cavity trees in Compartments 7, 12, 14 and 18 were cleared around by hand, repainted with white bands and all new trees were painted and tagged with metal numbered tags.





RCW area before roller chopping (NR-99-13, Robinson)



Roller chopping in RCW area (NR-99-14, Robinson)



RCW area after rolling chopping (NR-99-15, Robinson)

### **b. Eagles**

Refuge impoundments are too small to regularly attract eagles, but occasional sightings are made. Intern Pearson reported seeing a bald eagle at Pool D in June. Biologist Shiver completed the annual Bald Eagle Survey in January. No eagles were sighted.

### **c. Pine Barrens Treefrog**

The pine barrens treefrog is currently listed as a state threatened species and is a candidate for federal status. The refuge supports numerous colonies of this species and is the second largest concentration of these frogs in the state. Prescribed fire is used on all known frog bogs to control plant succession, the greatest threat to the treefrogs' existence.

### **E. Plants**

Although no federally listed plant species are known to occur on the refuge, there are several which are candidates for listing:

white wicky (*Kalmia cuneate*)

Well's pixie-moss (*Pyxidanthra barbulata* var. *Brevifolia*)

sweet pitcher plant (*Sarracenia rubra*)

Michaux's milkvetch (*Astragalus michauxii*)

Most of these species are on the state's list of threatened and endangered species. Researchers found a population of *Orbexilum lupinellum* on the refuge, which is the first record of this plant in the state.

### **3. Waterfowl**

From the mid 1970's through the 1996-97 migratory season, the waterfowl population overwintering on the refuge had been on a steady decline. Numbers were up during 1997-98 and have remained steady this year with an increase in Canada geese, ringnecks, black ducks and hooded mergansers as seen in Table 10.

<b>Table 10. Peak Populations Common Wintering Waterfowl</b>								
<b>Species</b>	<b>92-93</b>	<b>93-94</b>	<b>94-95</b>	<b>95-96</b>	<b>96-97</b>	<b>97-98</b>	<b>98-99</b>	<b>99-00</b>
Canada Goose	58	103	70	75	35	120	46	200
Mallard	15	75	75	35	202	117	202	70
Black Duck	2	9	12	2	0	0	2	6
American Widgeon	40	10	20	6	0	67	25	0
Wood Duck	600	600	600	600	600*	600*	600*	600*
Green winged Teal	3	10	6	6	0	36	20	26
Hooded Merganser	7	13	9	6	3	4	10	20
Ringnecks	71	32	32	8	0	100	10	100
*Estimated number of wood ducks due to the difficulty in surveying this species								



The status of the resident wood duck population on the refuge is uncertain because only a percentage of the nests were checked in 1997/1998 and in 1999, we made changes to our wood duck box program to bring the program into compliance with Service guidelines. All plastic Tom Tub boxes were removed from refuge impoundments. The wood duck box program on the refuge had an inventory of 165 boxes in 1998; there are now 65 boxes remaining.

#### **4. Marsh and Water Birds**

Limited habitat for marsh and water bird species is found on the refuge. The best habitat for these birds is created during the drawdown of our lakes and ponds when bottoms are exposed.



Great blue herons feed in most impounded areas and nest on a few ponds, notably Pool K. Green herons are found on almost all impoundments and nest throughout the refuge. Summer vagrants include great egrets and the occasional little blue heron. Pied-billed grebes may be found almost year-round.

Great blue herons are often seen near several refuge ponds.  
(NR-99-16, Price)

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**

The refuge agreed to take part in the International Shorebird tracking effort being conducted by the Manomet Science Center. The first survey will be completed in 2000.

In most years very little suitable habitat for these species can be found on the refuge. Only when an impoundment is drawn down in summer does habitat exist for these species outside of the killdeer, which use our farm fields.

#### **6. Raptors**

The following species are known to nest on the refuge: red-tailed hawks, red-shouldered hawks, American kestrels, turkey vultures, barn owls, screech owls, great horned owls, and barred owls. We also suspect that sharp-shinned and Cooper's hawks nest on the refuge.



although no nests have been confirmed. There were also many sightings of a pair of Northern harriers at Martin's Lake and Oxpen.

The osprey is an occasional refuge visitor. Random sightings of osprey at various impoundments occurred during the year.

#### **7. Other Migratory Birds**

Volunteer Dr. Bill Alexander conducted the Breeding Bird Survey on June 15 with assistance from McCutcheon and Intern Martin. A total of 46 species were recorded and 397 individual birds were noted on the survey.

A Christmas bird count was conducted on January 4 with six people participating. A total of 1579 individual birds of sixty-three species were observed.

The mourning dove call-count survey was conducted by Shiver and Intern Mike Martin this year. Thirty-six doves were heard in Chesterfield County and 59 were heard in Marlboro County.

For the sixth year in a row, the refuge had two designated fields open to dove hunting. Hunts were held on Thursday afternoons of each week of the first state season. Several hunters took advantage of the opportunity, and numerous favorable comments were received.

#### **8. Game Mammals**

The state of South Carolina classifies 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 are believed to be present on the refuge. However, bears are extremely infrequent visitors. Only deer, opossum, rabbit, and raccoon are hunted.

Refuge staff participated in a year-long fox squirrel sighting survey sponsored by the state. All fox squirrel sightings were recorded and submitted quarterly to the state coordinator.

#### **10. Other Resident Wildlife**

A herp/fishes survey was conducted on the refuge by Donald White, John Seginak, Kelly Irwin, Kurt Bogenrieder and Mary Freeman of the U.S. Geological Survey. Thirty-five reptile species and 26 amphibian species were recorded. Thirty-six fish species were recorded.

Refuge Biologist Shiver conducted a 2-mile furbearer survey on the refuge for the S.C. Department of Natural Resources. The survey indicates no statistically significant changes in scent station visitation for any species between 1997 and 1999. The bluebird nest box program was carried out this year by Shiver. Results of the survey showed that the population is stable. No young birds were banded this year.

Refuge staff participated in a quail and turkey brood survey and a fox squirrel sighting survey over the summer. All sightings were recorded and sent to the state coordinator.

#### **11. Fisheries Resources**

The following lakes were stocked with bass this spring: Pools A, B, C, E, H, J, K, L, Lake 16, Hamburg Lake, Honker's Lake, May's Lake, Oxpen 1, Oxpen 2, Oxpen 3, Upper and Lower



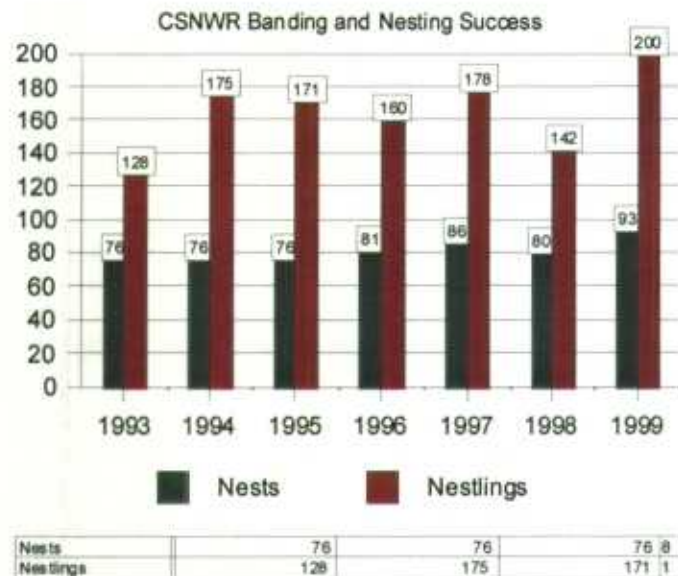
Twin Lakes. All fish were provided by the Cheraw State Fish Hatchery. Bluegill had been stocked in these pools in the fall of 1998.

## 16. Marking and Banding

Banding quotas this year were 125 for wood ducks. Funnel-type traps were used at two sites (Lower Triple and Pool D). This year, three wood ducks were banded.

The refuge began color banding red-cockaded woodpeckers (RCW) in 1993. In 1999, a total of 200 RCW nestlings were banded. Refer to Figure 1. below for a summary of the last seven year's nesting seasons.

**Figure 1. Banding of RCW Nestlings**



## H. Public Use

### 1. General

More than 79,000 visitors utilized the refuge during 1999. Increased use by outdoor recreationists such as bicyclist and hikers was noted again this year. Most visits were related to non-consumptive uses. Wildlife observation and related activities continue to be the most popular non-consumptive activities.

Hunters participating in the refuge's deer hunting programs and fishermen using refuge lakes and ponds in the spring and early summer top our consumptive use list.

The refuge filled its first-ever public use position with the hiring of former Office Assistant Kay McCutcheon as the new park ranger in June. We hope to schedule a Public Use Review in the near future to help us better plan, coordinate and accomplish our public use activities.

A new sand blasted entrance sign featuring the red-cockaded woodpecker was purchased and erected at the intersection of U. S. Highway 1 and the wildlife drive. A similar but smaller sign

was erected at the entrance to the Lake Bee Recreation Area. McCutcheon spent three weeks in the Washington Office working on the 1998 Annual Volunteer Report.



New refuge entrance sign featuring the red-cockaded woodpecker (NR-99-17, McCutcheon)

## 2. Outdoor Classrooms - Students

The refuge staff continued efforts to maximize environmental education programs within manpower constraints this year. Talks or programs were given to the groups listed in Table 11 below.

Table 11. Programs Presented in 1999		
OFF-SITE PROGRAMS	# Of Participants	Grade Level
Columbia Audubon Society	75	Adults
Plainview Elementary (Career Day)	275	1st-7th
McBee High School (Career Day)	125	9th-12th
Emmanuel Christian Academy	12	Preschool
Hartsville Rotary Club	50	Adults
Francis Marion University (Career Fair)	100	College Seniors
Central High School Agric. Science	125	9th-12 <sup>th</sup>
Hunter Safety Education-CP&L	18	5th-10 <sup>th</sup>
<b>TOTAL</b>	<b>775</b>	
ON-SITE		
Emmanuel Christian Academy	29	5 <sup>th</sup>
Landowner Tour (w/ Stone Container)	15	Adults
Clemson University Satellite Entomology Teacher Workshop	35	Adults
Faith Christian Academy	25	6 <sup>th</sup>
<b>TOTAL</b>	<b>104</b>	



In addition to the on-site programs, many local colleges and other groups visit the refuge several times each year for self-guided tours. Dr. Bill Alexander of the S. C. Governor's School for Science and Mathematics brings his science and photography classes to the refuge on a regular basis. A Botany professor from UNCC (University of North Carolina at Charlotte) makes at least one visit to the refuge each quarter with his classes as does Biology professor, Dr. Julia Krebs of Francis Marion University in Florence.

#### **4. Interpretive Foot Trails**

Seventeen members of the S. C. Wildlife Federation, along with twenty-one students and adults from West Florence High School spent a Saturday in December working on volunteer projects with McCutcheon. The group completed needed trail clearing and improvements to the 2-1/2 mile Tate's Trail (including construction and placement of portage bridges for areas of the trail that are seasonally flooded). They also hand-cleared areas of the new longleaf interpretive trail and raked and cleared around several red-cockaded woodpecker cavity trees in areas scheduled for dormant season burning.

Work continued on completion of the longleaf pine interpretive trail. This project was approved by the Fish and Wildlife Foundation for challenge grant funding in 1998. This 1/4-mile loop trail will begin and end at a point across the wildlife drive from the terminus of the Woodland Pond Trail.

Work on the longleaf pine interpretive trail by boy scout volunteers (NR-99-18, McCutcheon)



#### **5. Interpretive Tour Routes**

The Carolina Sandhills Wildlife Drive (nine miles - paved) continues to receive a lot of use from visitors driving the Wildlife Drive to look for deer, turkey, and other animals. Use of the wildlife drive (and other areas) by outdoor recreationists is continuing to increase. Local bike riders take advantage of the challenging "rolling hills" several times each week.

#### **6. Interpretive Exhibits/Demonstrations**

Calendar Year 1999 was another banner year for the refuge's outreach efforts. McCutcheon serves as the station's outreach coordinator and also is a member of the Savannah-Santee-Pee Dee Ecosystem Outreach Committee. Several recent additions to our outreach initiatives were continued, including staffing a Fish and Wildlife Service exhibit at both the Pee Dee Sportsman's Classic in late January and the Palmetto Sportsman's Classic in March, along with the presentation of over twenty interpretive programs during the year. Requests for staff participation in area festivals and events increased during 1999. We made every effort to



participate when possible. A refuge exhibit set up at the Chicken Strut festival in nearby Bethune was very well received with over 500 individuals stopping by for information.

## **7. Other Interpretive Programs**

Refuge staff led three Night Prowl tours and provided interpretive talks for National Wildlife Refuge Week. Attendance at these refuge outings is on the increase and we expect to expand these offerings to meet the demand.

Refuge personnel attended several career day functions during the year. Numerous tours of both Carolina Sandhills and Pee Dee refuges were also given to foresters, biologists, fire specialists, and reporters from other refuges, Department of Defense facilities, U. S. Forest Service, State agencies, and private concerns.

Work is continuing on improvements planned for the Lake Bee Recreation Area. Materials have been received for a combination boardwalk/handicapped fishing pier. Our plans are to use this area for fishing rodeos and other special events. Work will be completed in CY 2000 along with a short boardwalk/observation area along the lake edge focusing on the Atlantic white cedar bog area. We also hope to purchase and erect interpretive panels in the Lake Bee area. The public restrooms in this area were reworked to make them handicapped accessible. New fixtures and partitions were installed and both restrooms were repainted. Two picnic shelters in this area were also repainted in 1999.

## **8. Hunting**

Approximately 44,000 of the total 45,348 acres within the refuge were open for some type of hunting during 1999. Public hunting for white-tailed deer, hog, turkey, quail, woodcock, mourning dove, raccoon, opossum, and rabbit was permitted. Except for the turkey hunt, quotas were not established for the taking of these species. Open seasons were as follows:

White-tailed deer	Archery	October 4-8
	Primitive Weapons	October 18-22
	Modern Guns	November 4-5 & November 17-19
Bobwhite Quail		November 25-March 1 (Wednesdays & Fridays Only)
Woodcock and Rabbit		Incidental-when the state seasons for these species coincided with the refuge quail season
Mourning Doves		September 9-30 (Thursdays only)
Raccoon and Opossum		February 7-16 (Night hunting only)
Hog		Incidental-during deer hunting season

The refuge hosted its first ever youth dove hunt on September 13. Participation was minimal this year but should increase next year.

The bag limit for deer remained unchanged, i.e., the same as the State regulations: unlimited number of bucks plus two antlerless deer. For the third consecutive year, hunters were permitted to take an unlimited number of hogs as an incidental species. One hog was taken in 1999. All deer and hogs had to be checked at the check station prior to being removed from the refuge; all antlerless deer had to be tagged. Only those deer taken during the first modern gun hunt were aged; this was considered to be a large enough sample to represent the age structure of our population. Tables 12 through 14 depict the year's deer harvest results.



Table 12. Summary of 1999 Deer Harvest Results				
		Harvest		
Hunt Type	Hunt Days	Bucks	Does	Total
Archery	5	0	1	1
Primitive Weapons	5	17	9	26
Modern Gun	5	134	134	268
<b>Totals</b>	15	151	144	295

Table 13. Weights and Ages of Harvested Deer by Sex (1999)*							
Age**	# Does Taken	Avg. Weight	% Does/ Age Class	# Bucks Taken	Avg. Weight	% Bucks/ Age Class	Avg. Pts
½	17	44	68	8	54	32	0
1-1/2	7	64	22	25	95	78	3
2-1/2	9	76	39	14	105	61	4
3-1/2	12	93	43	16	119	57	6
4-1/2	8	87	62	5	128	38	6
5-1/2+	15	94	75	5	145	25	7
Totals	68			73			

\*Data collected from first modern gun hunt.

\*\*Some deer were not aged due to broken jaw bones. Some jaw bones were not pulled at hunters request

Table 14. Summary: Comparison of Deer Harvest Results on Refuge Hunts 1990 – 1999				
		Harvest		
Year	# Hunt Days	Bucks	Does	Total
1990	14	75	75	150
1991	14	123	94	217
1992	14	122	133	255
1993	14	130	100	230
1994	15	201	160	361
1995	14	162	145	309
1996	15	230	146	376
1997	15	152	121	273
1998	15	116	123	239
1999	15	151	144	295

Table 14 shows a comparison of total deer harvested on the refuge from 1990 -1999. The harvest numbers increased in 1999 from last year. There was a good hunter turnout this year.

The refuge hosted its sixth annual spring gobbler hunt on April 3 -7. This was a quota hunt with 125 permits issued by lottery. There were 217 applications submitted. Hunting was permitted from sunrise until 1:00 p.m. and a two-gobbler limit per hunter was imposed. Thirteen birds were harvested this year with an average weight of 15 lbs. and average beard length of 7 inches.



Successful turkey hunter (NR-99-19, McCutcheon)

Dove hunting was permitted on two designated dove fields on Thursday afternoons from September 9 through September 30. These hunts were popular with many hunters obtaining their twelve bird limit with little difficulty, especially on the first hunt.

The raccoon and opossum hunt was held on February 8-17. Twenty-seven raccoons were harvested. No opossums were taken.

#### **9. Fishing**

Fishing continues to be one of the refuge's primary recreational pursuits. In support of this activity, the Cheraw State Fish Hatchery has stocked several of our ponds with largemouth bass and bluegill bream. Good catches of both were often reported in the spring.

#### **12. Other Wildlife Oriented Recreation**

The annual Carolina Sandhills Christmas Bird Count was conducted on January 3rd in accordance with National Audubon Society guidelines. Six participants in two groups recorded 63 species and 1,679 individual birds.

#### **17. Law Enforcement**

The major portion of our law enforcement effort was centered on two events - hunting (fall and winter) and pine straw theft (spring and summer). The long deer season (September - January)



on adjoining private land requires constant patrols. Dog trespass seems to be an everyday occurrence during the hunting season. The popularity of longleaf pine straw for landscaping continues to cause problems.

Project Leader Lanier, Deputy Project Leader Olson, and Engineering Equipment Operator James McClelland conducted refuge law enforcement efforts during 1999. Pee Dee NWR manager Dan Frisk graduated from FLETC in October and handled most of the hunts at Pee Dee NWR after his graduation.

Table 15 below summarizes the Notice of Violations and warnings issued during 1999.

<b>Table 15. Violations – CY 1999</b>				
NOV/WARNING	VIOLATION	DATE	OFFICER	OUTCOME
NOV	No hunting license or big game permit.	11/17/99	McClelland	Paid
NOV	Loaded/uncased weapon.	11/19/99	Olson	Paid
Written Warning	Trespass in a closed area.	10/18/99	Olson	N/A
Written Warning	Trespass in a closed area.	10/18/00	Olson	N/A
Written Warning	Block Road Access.	10/21/00	Olson	N/A
Written Warning	General Trespass.	10/30/99	Olson	N/A
Written Warning	Speeding	11/2/99	McClelland	N/A
Written Warning	Block Road Access.	11/4/99	Olson	N/A
Written Warning	Loaded/uncased weapon.	11/4/99	Olson	N/A
Written Warning	Loaded/uncased weapon.	11/4/99	Olson	N/A
Written Warning	Block Road Access	11/5/99	Olson	N/A
Written Warning	Refuge Specific Hunting Regulations.	11/17/99	McClelland	N/A
Written Warning	Loaded/uncased weapon.	11/18/99	Lanier	N/A
Written Warning	Block Road Access.	11/18.99	Olson	N/A
Written Warning	Loaded/uncased weapon.	11/19/99	Olson	N/A
Written Warning	Loaded/uncased weapon.	11/19/99	Lanier	N/A
Written Warning	Loaded/uncased weapon.	11/19/99	Lanier	N/A

Refuge Officers Lanier, Olson, and McClelland attended the first in-service refresher training at Quincy, Florida.

On January 15, Refuge Officers Lanier and Olson participated in a spot lighting detail at Pee Dee NWR and surrounding area with officers from the North Carolina Wildlife Resources Commission, Law Enforcement Division. The following day, Officers Lanier, Olson, and McClelland participated in a waterfowl detail with Special Agent Allred and the North Carolina Wildlife Resources Commission, Law Enforcement Division.

Refuge Forester Robinson assisted Special Agent Allred in the investigation of a timber trespass in North Carolina.

In August Refuge Officers Lanier and Olson met with Senior Resident Agent Bennett, Captain Lambert, Lieutenant Brothers, and Sgt. Caulk from the North Carolina Wildlife Resources Commission, Law Enforcement Division to discuss this years hunts at Pee Dee NWR.

On September 2, Refuge Officers Lanier and Olson met with District Captain McIntyre of the South Carolina Department of Natural Resources Law Enforcement Division to explore the possibility of conducting joint law enforcement details on the refuge.

On June 23, Forester Robinson found a person camping near the new office site. Refuge Officers Olson and McClelland responded and found a transient camp. The camper was on a protest walk from Texas to Washington, D.C.

Refuge Officer McClelland assisted Bon Secour NWR with law enforcement over the Fourth of July weekend (July 1-6).

The no hunting zone was expanded to include the proposed new office site.

A Decoy Deer Plan and Check Point Plan were completed and forwarded to Special Agent Rayfield for U.S. Attorney approval on August 18.

Refuge Officers Lanier, McClelland, and Olson qualified with their pistols at Ace Basin NWR on December 1.

## **I. EQUIPMENT AND FACILITIES**

### **3. Major Maintenance**

Stop logs were placed in the Lake Bee water control structure on June 17. Water is finally being collected behind the dam. To date, the final inspection of the dam by the Denver Engineering office has not occurred.

The restrooms at Lake Bee were completely reconditioned with new paint, partitions, and appliances installed. Both restrooms are now handicapped accessible. The picnic shelters were also repainted.

Engineering Equipment Operators Mason and McLain spent two weeks assisting Piedmont NWR repair several dams. Heavy equipment from Carolina Sandhills NWR was loaned to Piedmont NWR for three months.

The well at the Ruby House was repaired and brought up to state (Department of Health and Environmental Control) standards. This project cost \$1,500. The Ruby house had a new door and window installed and vinyl siding (cost \$7,000) put on it. Interior walls in Quarters 1 were repainted and the screened porch was replaced with an open porch with railings.

Work started on moving and cleaning up the bone yard.



#### **4. Equipment Utilization and Replacement**

Black and white peeper scope cameras were replaced with color cameras. This will be beneficial in sexing red-cockaded woodpecker chicks.

Other equipment purchases during 1999 included a new wire-fed welder for \$2,400, a new hay rake for preparing refuge roads for burning costing \$2,023, a new John Deere mower (\$5,408), new sandblown signs for the entrance to the refuge headquarters and the Lake Bee Picnic area (\$3,000), a new Marden Industries roller chopper for \$5,500, and a Terra Torch (\$8,132).

In addition, the refuge purchased two fire plows (one for the refuge and one for Pee Dee NWR) at a total cost of \$18,450.

Improvements to existing equipment included the installation of an air conditioner in our Galion road grader for \$3,200. The refuge also traded in an Alamo boom-ax for a smaller Hardee brush cutter that is better suited for our maintenance projects. Total cost was \$10,400.

#### **6. Computer Systems**

Computer purchases during 1999 included two Dell Dimension XPS T500 desktops, one Dell Dimension XPS T450, and one Dell Optiplex GX1. The three Dell Dimensions were purchased with partial Y2k funding obtained through the Regional ADP office (approximately \$640 each unit) and the Optiplex unit was purchased with monies made available by Refuges ADP staff. This funding covered only the CPU for the three Dimension units. David Cheatham coordinated the purchase of the Optiplex unit at a cost of approximately \$1,450. We utilized monitors and other peripheral equipment on hand with these new computers. Because we took full advantage of Y2k special funding opportunities, we now have our computer operations in pretty good shape.

We currently have eight computers with at least pentium type processors and adequate RAM memory. During CY 1999, we upgraded our AutoCAD software and the software for our fire weather station. If funding permits during FY 2000, we hope to upgrade our word processing, spreadsheet, and database software to current standards.

When the new refuge office is completed (hopefully within the next 1-1/2 years), we plan to set our computers up on a "peer to peer" networked system. This will allow the staff to better share peripherals (printers, scanners, etc.) and access shared information and applications.

### **J. OTHER ITEMS**

#### **1. Cooperative Programs**

As in past years, the S. C. Commission of Forestry provided wildfire protection during the first period of operation. Commission personnel also planted containerized longleaf seedlings on 144 acres in slash pine conversion areas. Both activities were provisions of the Memorandum Agreement between the S. C. Commission of Forestry and the U. S. Fish and Wildlife Service enacted in 1991 with the transfer of fee title lands to the Commission.

### **3. Items of Interest**

Lanier, Olson, Robinson, and Shiver; along with Lori Duncan of the Charleston ES office and RCW Recovery Coordinator Ralph Costa represented the Service at the annual meeting with the S. C. Forestry Commission. Discussions with Commission personnel and S. C. Department of Natural Resources centered on RCW management efforts and issues and other coordination topics.

Refuge staff including Lanier, Olson, Robinson, Housh, and Shiver met with Stanley Rikard, Jim Olsen, and Tim Marston from the Fort Jackson Military Base to discuss red-cockaded woodpecker, forestry, and fire management issues.

Training and/or travel completed by refuge staff members during the year is listed below and on the following pages:

#### **Hoffmann**

Computer Support for Field Stations, NCTC (October)

#### **Housh**

Fire Management Officer Meeting, Atlanta, GA (August)  
Region 4 GIS Conference, Cookeville, TN (August)  
Smoke Management Workshop, Tampa, FL (September)  
Fire in the Urban Interface Training, Okefenokee NWR, (October)  
Engine Boss Training, Okefenokee NWR, (October)  
Helicopter Managers Workshop, Hiawasee, GA (December)  
Terra Torch Training, McBee, SC, (December)

#### **Lanier**

Annual Law Enforcement Refresher, Quincey, FL (March)  
SSPD Ecosystem Meeting, (February)  
IMPACT Training, NCTC, (March)  
SSPD Ecosystem Meeting, Asheville, NC. (June)  
Enhancing Longleaf Ecosystem Values in an Economic World, Whiteville, NC. (June)  
SSPD Ecosystem Team Meeting, Orangeburg, SC. (September)  
Ecosystem Team Meeting, Atlanta, GA (October)  
Partners in Flight Meeting, Raleigh, NC (October)  
Regional Office Detail, Atlanta, GA, (November)

#### **Mason**

Aerial Ignition Device Training (January)  
Piedmont Heavy Equipment Detail (July)  
Terra Torch Training, McBee, SC, (December)

#### **McClelland**

Annual Law Enforcement Refresher, Quincey, FL (March)  
Aerial Ignition Device Training (January)  
Bon Secour NWR Law enforcement Detail (July)  
Hurricane Floyd Cleanup Detail, Ace Basin NWR, (September)  
Terra Torch Training, McBee, SC, (December)



**McCoy**

Financial Fundamentals, NCTC, (November)  
Acquisitions Procedures Course, Atlanta, GA (November)  
Procurement Procedures, NCTC, (December)

**McCutcheon**

Southern Area Dispatchers Workshop (January)  
Washington Office Detail (April)  
SSPD Ecosystem Meeting, Asheville, NC. (June)  
Public Use Workshop, Okefenokee NWR (June)  
Instructor D-310 Support Dispatcher, Asheville, NC (September)  
Instructor S-260 Fire Business Management, Columbia, NC (December)

**McLain**

Aerial Ignition Device Training (January)  
South Carolina Certified Burners Course (January)  
Piedmont Heavy Equipment Detail (July)  
Prescribed Fire Planning and Implementation Training, NCTC (October)  
Fire in the Urban Interface Training, Okefenokee NWR, (October)  
Engine Boss Training, Okefenokee NWR, (October)  
Terra Torch Training, McBee, SC, (December)

**Olson**

Annual Law Enforcement Refresher, Quincey, FL (March)  
Aerial Ignition Device Training (January)  
SSPD Ecosystem Meeting, (February)  
SSPD Ecosystem Meeting, Asheville, NC. (June)  
Supervision the Next Step, NCTC, (December)

**Parker**

Terra Torch Training, McBee, SC, (December)

**Robinson**

Aerial Ignition Device Training (January)  
Enhancing Longleaf Ecosystem Values in an Economic World, Whiteville, NC. (June)  
Fire in the Urban Interface Training, Okefenokee NWR, (October)  
Forest Herbicide Workshop, Myrtle Beach, SC, (November)  
Terra Torch Training, McBee, SC, (December)

**Shiver**

Wildlife Disease Workshop, NCTC (January)

#### 4. Credits

The various sections of this narrative were written and/or compiled by those persons listed below:

Mike Housh - Sections B; F.9

David Robinson - Section F.1,3

Kay McCutcheon - Sections E. 4; H. 1-7 and 10-16; I.6

Laura Shiver - Section F. 2,10,12; G; H. 8,9

John Hoffmann - Sections C; E.6 & 7; F.4-6,13

Scott Lanier - Sections A;K

Rolf Olson - Introduction, Section D; E. 1-3,5,8; H. 17; I. 1-5; J

Office Assistant McCoy and Park Ranger McCutcheon were responsible for typing, final scrutiny, and assembly of this report.



## K. FEEDBACK

1999 ended my second full year as project leader of the Carolina Sandhills/Pee Dee NWR cluster/complex. In many ways, this year was a banner one for refuge accomplishments at both stations. Refuge Manager Dan Frisk will address the accomplishments at Pee Dee in that annual narrative. However, at Carolina Sandhills, I feel that this refuge is finally getting some of the recognition that it sorely deserves. The refuge has long been a leader in the management of longleaf pine and the endangered red-cockaded woodpecker, thanks to the tireless efforts of the staff, and this year the refuge received the 1999 Forest Conservation Award from the South Carolina Wildlife Federation. The staff was also successful in pulling off the single largest red-cockaded woodpecker translocation to date. The refuge has emerged as the major donor population for North and South Carolina. These are just two of many outstanding accomplishments achieved by the staff for which they can be very proud.

I also feel, for the most part, we have successfully used the cluster/complex situation to both stations' advantage. Nearly every staff member from both stations has participated in projects at each station. In many ways, I feel that both staffs are starting to think a little more collectively, although we are still spread pretty thin. Unfilled vacancies at both stations are causing many important projects to go undone. The inability to fill the full-time forestry technician position at Carolina Sandhills has placed a tremendous burden on Refuge Forester Dave Robinson. The forestry staff at Carolina Sandhills not only serves the cluster, but the entire ecosystem as well.

Several staff members were able to take on new responsibilities and grow in new positions this year. Laura Shiver and Kay McCutcheon filled the first-ever refuge biologist and park ranger positions. Doug Mason left his career seasonal forestry technician to fill an equipment operator slot. Part-time Office Automation Clerk Patricia McCoy became our new office assistant. All of these folks have made tremendous contributions to their respective programs and in some cases have the responsibility of developing a first time ever refuge program. Other staff members who did not change positions were able to take advantage of good training opportunities throughout the year.

1999 was a very productive year. Problems and hurdles were met at each refuge, both internal and external. However, both staffs faced them and took them on, making 1999 a year of accomplishment and expansion.