

REVIEW AND APPROVALS

SANTER NATIONAL WILDLIFE REFUGE  
Summerton, South Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1989

Refuge Manager \_\_\_\_\_ Date \_\_\_\_\_

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Regional Office Approval \_\_\_\_\_ Date \_\_\_\_\_

## INTRODUCTION

The Santee National Wildlife Refuge is located in Clarendon County in the upper coastal plains region of South Carolina. The refuge was established in 1941 primarily to alleviate the loss of natural waterfowl habitat caused by the construction of hydro-electric power and navigational projects on the Santee and Cooper Rivers. Except for some 4,400 acres of fee title land, the refuge is superimposed on lands and waters of the 110,000-acre Lake Marion Reservoir which is administered by the South Carolina Public Service Authority (SCPSA).

The refuge is physically divided into four geographically separated management units containing 9,000 acres of open water, 1,445 acres of shallow freshwater marsh, 2,350 acres of timberland, 750 acres of agricultural lands, and 1,550 acres of early successional fields. The primary objective of Santee is to provide wintering habitat for some 8,000 Canada geese and 50,000 ducks annually. Special emphasis is placed on managing specific habitat for the wood duck. In addition, emphasis is placed on management of the red-cockaded woodpecker, an endangered species.

Included in the refuge is the 120-acre Dingle Pond Unit which is a designated Public Use Natural Area. This unit consists primarily of a Carolina Bay and as such is of local geological significance. The 163-acre Plantation Islands area and Little Pine Island are proposed for inclusion in the National Wilderness Preservation System. However, the proposal has not yet been signed by the president. Historic sites within the refuge and listed in the National Register include the Santee Indian Mound, the site of Fort Watson of Revolutionary War fame. This site is also listed in the South Carolina register of historical sites.

A fifty-year lease agreement between the USFWS and the SCPSA became effective in 1975. This lease completely altered the water boundary and changed much of the land boundary from the original lease. Provisions in the lease permitted the posting of mutually agreed upon boundaries which would become official refuge boundaries once officially surveyed. Both land and water boundary surveys were completed in 1985 and final approved maps from the SCPSA in 1986.

## INTRODUCTION

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A. HIGHLIGHTS

Good rainfall over the summer months make good crops. Pg. 17.

Personnel: 1 transferred, 1 promoted and 1 retired. Pg. 9.

Hurricane Hugo hits in September. Pg. 3.

Waterfowl increase a little. Pg. 23.

Partners for Waterfowl Tomorrow initiated. Pg. 46.

## B. CLIMATIC CONDITIONS

Normal climatic conditions for central South Carolina typically consist of hot humid summers and mild winters. Rainy seasons normally occur during late winter/early spring, late summer, and early fall. Annual mean temperature and precipitation based on a 30-year average is 63.5 oF and 46.36 inches, respectively.

This year precipitation totaled 54.85 inches, considerably more than last year's, 32.35 inches and occurred on 89 days. The refuge experienced good rain conditions but the lack of rain in May slowed down early growth of corn. Adequate rain in June and July brought both crops and native vegetation to maturity in good condition.

Temperatures during the entire year exceeded the average extremes for all months. The summer was hot at times with temperatures breaking 100 oF during June, July, and August, and exceeding 90 oF during three other months. Refer to Table 1.

Hurricane Hugo slammed ashore at Charleston on September 21 and the eye arrived at the refuge just after midnight (0030 on 22nd.) packing winds estimated at 100-120 mph in the eyewall. Despite these winds the refuge was spared any major damage to buildings and equipment.

Estimates put 25% (\$500,000) of the timber on the refuge as severely damaged or on the ground. The Visitor Contact station-headquarters received no physical damage to the structure and only limbs and a few uprooted shrubs and debris cluttered the yard. Minor roof damage (shingles), and an overhead door of the shop building had to be replaced. Approximately one half of the security fence at the shop complex was lost to falling trees and was replaced. A small metal storage building in the shop yard was destroyed when a tree fell across it. This structure will need extensive repairs or replacement. One pump house was completely demolished and was rebuilt.

The nature trail was practically clear-cut of trees and two of the three bridges/boardwalks were severely damaged.

The only active colony of red-cockaded woodpecker lost six of their nine cavity trees. Most of these broke off at the cavity.

Following the hurricane the Staff at Santee was mobilized to assist the Civil Defense Disaster Relief effort. Our heavy equipment and operator were assigned to the county and utilized in clearing roads, establishing landfills, etc. Our vehicles and personnel were utilized in reconnaissance, distribution, and transportation, and our generator was placed in a central location to assist in pumping and distribution of water.

The refuge shop and office were without electricity for 1 1/2 weeks which meant no lights or water and gasoline or diesel could not be pumped. When electricity was restored the staff started to clean up the refuge.



Hugo damage the shop roof. (Photo Bond)



--and what the wind did to a shop door. (Photo Bond)





If the hurricane winds didn't do it directly, falling trees did. (Photo Bond)



---and this is what they did to the gate to the shop area. (Photo Bond)





--and what it did to the forest around the shop. (Photo Bond)



The nature trail is under there somewhere. At year's end we still did not have it cleared. (Photo Bond)

Table 1. Climatological data on Santee Refuge, 1989

Month	Precipitation (inches)			No. Days Rain	Temperatures (oF)		Average		Lake 1st of Mth
	Total	30-yr Avg	-Avg -Avg		Max o F.	Min o F.	Max	Min	
JAN	2.23	3.44	-1.21		74	27	50	34	73.20
FEB	1.73	3.67	-1.94	8	87	20	59	35	73.50
MAR	5.50	4.66	-0.84	11	87	30	67	42	74.50
APR	4.47	3.51	-0.96	7	94	32	76	51	76.80
MAY	2.49	3.35	-0.86	5	98	38	84	60	75.20
JUNE	5.75	3.82	+1.93	13	104	67	90	67	76.00
JULY	10.24	5.65	+4.59	10	100	66	92	70	76.00
AUG	6.02	5.63	+0.39	12	101	63	93	71	76.20
SEP	5.00	4.32	+0.68	5	94	59	84	64	75.40
OCT	4.93	2.58	-2.35	5	87	39	77	51	75.60
NOV	1.95	2.34	- .39	6	86	27	67	41	75.10
DEC	4.54	3.38	-1.16	7	70	16	58	34	75.10

### C. LAND ACQUISITION

#### 2. Easement

The refuge is in the process of granting an easement to the Clarendon County Council for an existing road into an adjacent subdivision on Lake Marion. This will relieve the refuge of road maintenance and general aggravation. The road branches off the entrance road and runs about 1/4 mile along the southern boundary of the Bluff Unit adjacent to a large subdivision 1/4 mile south of the office/VCS. This situation has been shuffled back and forth for the past few years and should be finalized in 1990.

#### D. PLANNING

##### 5. Research and Investigation

###### a. 43525-I-1 - Migration and Survival of Canada Geese Wintering in the Atlantic Flyway, with Special Emphasis on the Carolinas.

Emphasis was placed on neck collar observations, which were conducted weekly from geese arrival in late October to their departure in March. Observations were reported to the Cooperative Wildlife Research Unit at Cornell University with as many as 26 collar readings obtained in one observation.

###### b. Furbearer Census

Refuge personnel, Assistant Manager Rauber, participated with the South Carolina Wildlife and Marine Resources Department in the annual statewide furbearer census. This ongoing study measures the frequency of occurrence of bobcat, raccoon, opossum, fox, etc. along established census routes in all 46 counties of the State. This study provides an index upon which population figures can be based and is further used to monitor population trends statewide.

The two permanent transect lines in Clarendon County are located on the refuge, one at Pine Island and one on the Bluff Unit. These lines each used 10 prepared one meter circles over a one mile distance. These circles are prepared one day and "read" the following morning. Information recorded was sent to the State Wildlife Department.

###### c. Acid Rain Station

The acid rain monitoring station installed on the Bluff Unit by NOAA in 1984 is still operational, but as reported in 1989, is operated by NOAA or their contractor.

###### d. Evaporation Station

In cooperation with the South Carolina Department of Health and Environmental Control, the refuge provides the site and the staff reads the instruments on an evaporation station, which is one of many they have in the general area. The staff takes daily readings on four thermometers, an anemometer, rain gauge and a device to measure evaporation. Biweekly rainfall samples are collected and bottled for laboratory analysis.



## E. ADMINISTRATION

### 1. Personnel

Ernest L. Rauber, Assistant Manager, retired December 30, 1989, after 27 years of service of which nearly 16 were at Santee NWR. Ernie has served on refuges in Tennessee, Arkansas and Florida. Bowing to his wishes for no fanfare, the staff had only a special lunch and presentation of his retirement plaque and a gift (tablesaw). The gift was financed by many coworkers around the Region as well as local friends and the refuge staff.



Manager Bond presenting Ernie his retirement plaque. (Photo Gaymon)

Assistant Manager Gary C. Heet got the hots to move and as of September 10, 1989, is cooling off at Seney NWR. I really think he took a lateral transfer just to grouse hunt and trout fish.

Bobby Pearson, the refuge's youngest staff person (Tractor Operator) got a boost on his good long career with a promotion to WG-7 on December 17, 1989.

Table 2. reflects FTE'S as of the end of 1989. With Ernie's retirement his FTE was taken from Santee and put at the new (proposed?) Roanoake River NWR.

Table 2. Five Year Staff Pattern, Santee NWR

Year	Full-Time	Part-Time	Temporary	YCC	Volunteer
1989	6	0	0	2	2
1988	7	0	0	0	0
1987	6	0	1	0	5
1986	7	0	0	4	9
1985	7	0	1	5	12





(Photo Williamson)

5 6 3 2 1 4

<u>Name/Title</u>	<u>Grade</u>	<u>EOD</u>	<u>Status</u>
1. Glen W. Bond, Jr., Refuge Manager	GS-12	08/84	PFT
Gary C. Heet, Asst. Refuge Manager	GS-11	Trans.09/10	
2. Ernest L. Rauber, Asst. Refuge Manager	GS-09	Ret. 12/30	
3. Edward M. Stuckey, Range Technician	GS-07	06/62	PFT
4. Rufus Gaymon, Office Assistant	GS-06	08/78	PFT
5. John H. Johnson, Automotive Mechanic	WG-10	07/77	PFT
6. Bobby L. Pearson, Tractor Operator	WG-06	08/88	PFT

## 2. Youth Programs

The Youth Conservation Corps program was "on again" after being "off" last year. Although only two enrollees were authorized, Anthony Lawson and Walter Johnson, did some good work between June 5 and August 5. Some of their accomplishments were:

- a. Modification of 70 wood duck boxes where a horizontal piece of wood was place below the side of the box that opens on a pivot. This modification prevents eggs and nest material from falling out while the box is being check.
- b. Cleared and cleaned the Scott's Lake parking lots and shore adjacent to the lots in accordance with the Public Use Review Plan.

- c. Litter pickup.
- d. Cleared multifloral rose and brush from the bank in front of the office/VC.
- e. Assisted with grounds and equipment maintenance.

#### 4. Volunteer Program

Mr. Kenneth Penland of Bethesda, Maryland stopped by the refuge on October 19th and volunteered a week of his time toward assisting the refuge staff with clean-up operations associated with the Hurricane. On the 26th he departed Santee for Cape Romain to assist in the clean-up there. Who said Good Samaritans no longer exists?

And Mr. Gene Griffin occasionally keeps the visitor center open on weekends. There are so few visitors to the refuge most of the volunteers get bored and quit. I can't blame them.

#### 5. Funding

Total funding for the year ended up at \$294,000, an increase of 6.5% from 1988. Funds were added on for various maintenance projects and the Farm Bill, and funds were also transferred away. Refer to Table 3 for funding comparisons.

Table 3. Five Year FY Funding Allocations (\$1,000's)

Sub-Activity	1989	1988	1987	1986	1985
1120	1.0	0.5			
1260			229.6	229.6	300.0
1261	204.7	163.1			
1262	88.3	112.4			
1520				5.2	6.25
6860			3.0	3.0	3.0
TOTAL:	294.00	376.0	232.6	237.8	309.25

#### 6. Safety

Safety meetings were held monthly, except September. A variety of safety topics and films were covered. Vehicle and equipment safety as well as safe shop procedures were discussed at every meeting.

One staff member had a close call when he cut a thumb on the table saw. The cut was deep enough to require a couple of stitches.

No lost time accidents occurred during the year, and the stations total hours worked since a 1966 lost time accident now stands at 381,137 staff hours.

#### 8. Other

Jim Tisdale, temporary district supervisor, was given a familiarization tour of the refuge in February.

U. S. District Judges Tilley and Ward, middle district of North Carolina, were given a tour of the refuge during February. They showed a real interest in waterfowl as well as deer and turkeys. They can't help much in South Carolina, but maybe the time invested in them will pay off for the wild critters in North Carolina.

Bond and Heet attended law enforcement refresher held at Quincy, Florida. These refresher courses seem to get better each year.

Ernie Rauber was again asked and readily agreed to work the Canadian Breeding Ground Survey as well as the Brood Count Survey. He was away from the refuge for a total of about 2 1/2 months spanning spring and mid-summer.

A waterfowl meeting was held on May 31 at the refuge. In attendance were FWS personnel Jim Matthews, Associate Manager; Frank Bowers, Supervisory Biologist; Otto Florschutz, Biologist, and Gary Heet. South Carolina Wildlife personnel included Brock Conrad, Director Wildlife and Freshwater Fisheries Division; John Frampton, Chief of Game; Tommy Strange, Waterfowl Biologist; Bill Mahan, District Biologist, and Dave Baumann, Biologist. Also present was Dave Gordon, Delta Waterfowl and Wetlands Research Station, Atlantic Flyway Substation. The purpose of the meeting was to discuss the decline of the South Carolina Waterfowl population, and to exchange ideas on possible reasons, present management regimes, and future actions.

Biologist Florschutz visited the refuge again in June to conduct a waterfowl management review and then again in September to see the results of management practices.

Gary Heet spent much of July inspecting Farmers Home Administration properties in North Carolina and South Carolina and reporting his findings.

Bond and Heet attended a two-day Moist Soil Management Workshop hosted by the South Carolina Wildlife and Marine Resources Department in Georgetown, SC in August. These type of workshops bring together a lot of practical experience and application possibilities.

Ernie Rauber in anticipation of retirement at year's end attended the retirement seminar held in Atlanta in October. And true to his anticipation, he "hung it up" on December 30.

## F. HABITAT MANAGEMENT

### 1. General

Ongoing evaluation of habitat and land use was a priority item in 1989. The Moist Soil, Croplands, and Non-Forested upland Management Plan was followed during the year and resulted in substantial habitat improvement.-

### 2. Wetlands

#### a. Pine Island Unit

This unit is unique in that greentree reservoirs, moist soil habitat, and permanent open waters are present. The moist soil areas were disc'd in 1988 and examination of vegetation in September revealed a majority of desirable vegetative species. Moist soil areas were brought to summer elevation of 76.2' MSL in March. Summer elevations fluctuated moderately requiring periodic pumping and dewatering to maintain desired wetland conditions.

#### b. Dingle Pond Unit

The Dingle Pond Unit is a designated Public Use Natural Area. A single access road which traverses the unit on its southern extremity is maintained solely for management and maintenance access. The only other development is a low level dike and concrete water control structure used in past years to control water levels within the 290-acre pond. In more recent years the water control structure has been filled with a permanent plug allowing the pond to revert to its natural character as a Carolina Bay. As in previous years, pool levels in 1989 were dictated by precipitation and evaporation. This year, adequate rainfall kept up with evaporation and at year's end water was flowing four inches deep over the spillway.

#### c. Cuddo Unit

Six wetland management areas have been identified on the Cuddo Unit, and are connected to the main water source via a system of canals and water control structures. The main water source is a 48-inch reversible, high capacity, pump located at Black Bottom. From this location all impoundments and wetland areas can be inundated and dewatered. In addition, the Cuddo Unit contains permanent water and green timber reservoirs.

In 1989 the entire unit was managed as a single unit although there are several water control structures in the overall system. In January 1989 maximum water elevations of 76.0' MSL were maintained throughout the unit ensuring shallow inundation in green timber reservoirs and moist soil areas. With only minor fluctuation, this elevation was maintained through the winter and early spring months until drawdown was initiated during mid-March. A summer elevation of 74.5' MSL was maintained throughout the summer months until flooding was begun in mid-November.

Timber Island Field can be and is managed separately from the remaining Cuddo Unit wetlands system. Having its own in/out pumps, the field was flooded at least 12 inches deeper than the main system in winter and drained in summer. During the summer, attempts to plant milo failed and finally 30 acres of mixed browntop and Japanese millet were planted. Good growths of desirable as well as undesirable moist soil plants were obtained with the plentiful summer rainfall in other areas of the 90-acre field.

d. Bluff Unit

This is primarily a farming unit where waterfowl foods are produced. In addition, there are two shallow ponds, Cantey Bay and Five-Pine Ponds, along with associated wetlands which provide excellent habitat for wintering waterfowl. Pool elevations during January were maintained at 76' MSL. However, fluctuating lake levels necessitated periodic pumping to maintain desired pool elevations. Spring drawdown was initiated in February and continued until summer pool of 73.0' to 74.0' MSL was reached. Even at these pool levels some acreage in Cantey Bay and Five-Pine Ponds remains inundated. Winter flooding of pools and wetlands was initiated in early November and continued until an elevation of 76.1' MSL was reached. At the maximum elevation of 77.0' MSL there are some areas within the dike that cannot be flooded.

Expansive beds of Hydrilla verticillata, a submergent aquatic plant generally considered a pest species on Lake Marion, was observed in all of Cantey Bay during the year. This species has expanded its local range on the lake in recent years, but only in the past three years has it been noted on the refuge in any significant amounts. Interesting to note was the utilization of these grass beds by wintering waterfowl. From the arrival of wintering waterfowl concentrations in late October and November the major use area was the grass beds.

Since the installation of a pumping structure on the Bluff Unit, we have realized the canal which supplies water to this pump needs to be lengthened, widened, and deepened to ensure an adequate water supply during periods of extremely low lake levels which is almost annually. With the existing setup, water supply at low lake levels cannot keep up with the pump and pumping operations are prolonged when pump rpm's are reduced.

Table 4. Bluff Unit, Pumping Time - Fuel Consumption

Month	Hours	Fuel
January		
February		
March		
April		
May		
June		
July	18.7	56
August	13	39
September		
October		
November	134	96
December	22.5	58
Totals	188.2	153

Table 5. Pine Island, Pumping Time - Fuel Consumption, 1989

Month	Hours	Fuel
January		
February		
March		
April	76	128
May		
June	29.1	228
July	9.3	28
August	2	6
September		
October		
November	96	231
December	33	100
Totals	114.4	384



Table 6. Cuddo Unit, Pumping Time - Fuel Consumption 1989

Month	Black Bottom		Timber Island Field					
	Hours	Fuel	#1 Hours	Fuel	#2 Hours	Fuel	#3 Hours	Fuel
January								
February					16	47		
March					8	23		
April	51	80			58	94		
May								
June								
July								
August								
September								
October								
November	153	288	146.5	216				
December	34	45	6.5	4				
Total	238	413	153		82	164		

### 3. Forests

Under permit No. SNT-0-1-38641 Winfield Shecut started salvaging pine timber in October after Hurricane Hugo came through in September. He had salvaged nearly all the pine saw timber by year's end but had hardly touched the pulpwood. It seems that after a short time of being downed, depending on the temperatures, pine logs get a condition called "bluestain". Lumber companies don't want it if bluestain is present even though the wood is as strong as ever. Thus, the harvesting of pine saw logs comes first, then pine pulpwood followed the hardwoods.



Salvaging saw logs on the Cuddo Unit after the hurricane damaged the trees. (Photo Bond)



Some areas of the refuge survived Hugo better than others. Much of the Bluff Unit was nearly "clearcut" as was Pine Island on the Pine Island Unit and the Plantation Islands area of the Cuddo Unit. From a waterfowl standpoint the real damage came when much of the bottomland hardwoods, water and willow oaks, turned bottoms up. This takes away mast which we could flood in winter and cavity trees for wood ducks in summer. It seems that the larger the tree the easier it fell. Contributing factors to the bottomland hardwood devastation were shallow root systems caused by a high watertable, moist soil and the tree still had a full set of leaves in September.

As noted under "Climate" the loss is estimated at \$500,000 or about 25% of the refuge timber.

With all the timber to be salvaged in Hugo's path, we were fortunate to even get a logger. Of course prices are rather poor - \$15/cord for pine pulpwood and \$7/ton for pine sawtimber. By year's end the refuge had timber receipts of \$41,494. Hardwood price will be considerably lower than that.

Forester David Robinson was down a couple of times to inspect the operations. Hugo sort of wiped out Dave's forestry management plan. Ironically, the areas we had so carefully thinned in the past were hit the hardest, unless they were small and had only been thinned once.

#### 4. Croplands

##### a. Bluff Unit

In Calendar year 1989 the Bluff Unit was force account farmed to corn and wheat/vetch mixture. In January fields 8A, 9, 14, 2, 9 and 11 were in wheat/vetch from fall of 1988 totaling 60.9 acres. This acreage was plowed under, using the turning plow, in early March for green manure. Corn was planted in these same fields in late March-early April with good success. Fish crows invaded as the corn broke the ground and 31 acres had to be replanted. Efforts to scare the crows away included such things as aluminum pie plates tied to six-foot stakes in the fields and flapping in the breeze; dead crows (don't ask how they died) tied to the same stakes when the pans failed; fake dead crowns (black cloth on the ground); and finally the sound of gunfire. Next year it will have to be gas cannon or chemical because they ate half of the 31 acres we replanted. And, too, we will plant the seeds deeper.

A long dry spell and below normal rainfall in May set the corn back some, but ample rains throughout the summer gave us a good corn crop, close to 100 bu. per acre where deer and crows didn't disturb.



As I say Santee Cooper manipulates the lake opposite what we want. Here we had already planted corn and then they "jack" the lake to maximum elevation. This is lake water in late March. (Photo Bond)



Good summer rains made a good corn crop as evidenced by ears five to six feet off the ground and 12 inches long. (Photo Bond)

In early November about 10 acres of corn were mowed in field No. 2 for early arriving waterfowl. The remaining corn in that field and others was mowed at the end of December.

Beginning in early September fields 1, 3, 4, 6, 7, 12 and 13 totaling 96 acres were disced and then planted to wheat in early October. Because of wet weather fields 12 and 13 as well as portions of fields 3, 6 and 7 could not be planted. The end result was that only 56 acres of wheat was available to waterfowl on the Bluff Unit. However, at year's end, it was proving to be four times the amount needed, because peak populations occur at that time and one could hardly tell where they had fed.

A fescue field between field 2 and Cantey Bay is kept mowed, but no known waterfowl use has occurred on its six acres.

b. Pine Island Unit

Pine Island consists of 869 acres of upland interspersed with marsh and moist soil areas. About 200 acres were kept open by mowing, burning, or disking. This year, October, 10 acres of winter wheat were drilled adjacent to moist soil areas. Apparently the soil was too moist and 98% of the seed rotted. For all practical purposes we wound up with 10 acres of disced ground and it was too late to do any good to replant by the time the situation was discovered. Your right, we didn't keep a very close eye on it. Our eyes were still on hurricane Hugo cleanup.

c. Cuddo Unit

In the distant past, over 1,000 acres were farmed on this unit, both cooperatively and force account. This year the acreage was less but the cooperative and force account methods were used.

Archie Stukes was the cooperative farmer and our agreement called for the refuge to furnish seed fertilizer, nitrogen and pesticides for the corn. He would furnish everything for soybeans and wheat with the wheat to be planted by November 1. Things got off to a bad start when fields were too wet to plant corn at the best time (late March) in this area. Of 90 acres planned, he was finally able to plant 51 in mid-April in Q4-6. The wetter areas, field Q3-9, were finally planted to milo in May, only 30 acres, and it was still too wet. The seed apparently rotted. With such a sparse stand, the areas were disced and planted to a mixture of Japanese and browntop millet in July. The millet went on to make a good crop, but the 51 acres of corn in Q4-6 suffered a "take over" by Johnson grass over about 25 acres. Thus, the field produced only about 40 bu. per acre. Normally, we get about 50 bu. to use for banding purposes, but "Hugo" came along just before harvest time and made it impossible to harvest any. The 51 acres were mowed in early December.

When Archie harvested wheat planted in 1988 he furnished us 30 bu. for wood duck banding.

With refuge agreement he planted 360 acres of soybeans and was supposed to plant 52 acres of wheat after harvesting some early soybeans. "Hugo" changed all that because it dealt Archie a \$250,000 uninsured loss to his farming equipment and buildings. Most of his soybeans went unharvested and the refuge staff wound up planting 24 acres of wheat in field Q3-5.

#### 9. Fire Management

Fire fighting tools, minor equipment and associated supplies were inspected during the year and found to meet regional criteria with one exception.

As in previous years, pre-suppression and suppression agreements were in effect with the South Carolina Forestry Commission during calendar year 1989. The logistics for handling a major fire are contained in the Station Fire Plan.

No prescribed burning, as such, was done in refuge timber stands in 1989. However, during the course of burning stubble fields on February 13 at Cuddo, the cooperative farmer inadvertently let fire escape into adjacent wooded areas. Upon inspecting the fire, staff personnel determined that the fire posed a threat of damage to refuge hardwoods and put the fire out with assistance from the South Carolina Forestry Commission and cooperative farmer Stukes. The fire burned an estimated 132 acres of mixed hardwoods/pine.

#### 10. Pest Control

Staff personnel applied minor amounts of Rodeo to aquatic vegetation at the Bluff Unit banding site. In addition, small amounts of Pramitol, a soil sterilant, was applied to the banding slope in an effort to eradicate vegetation. Our major pest control effort was chemical to control such species as Johnsongrass and Bermudagrass. Roundup was sprayed at 3 qts. per acre on 68 acres on the Bluff Unit in fields 3, 4, 6, 7 and 9 and on the Cuddo Unit on 72 acres in fields Q3-5 and 6.

The cooperative farmer was permitted to apply approved chemicals for the control of noxious plant species on agricultural lands. Classic and Canopy were applied to 350 acres of soybeans with target species being cocklebur, sicklepod and Johnsongrass. The sicklepod was so thick, even after control attempts that soybeans were hard to find.

Only token control of fire ants was undertaken this year. Staff personnel treated individual mounds around the headquarters complex with Ortho fire ant killer, which did little more than move the individual colonies with only about a 50% kill success. We have yet to come up with a treatment that successfully kills the colony. Throughout the refuge this species is very prolific with some areas containing as many as 100 - 150 mounds per acre.



Manager Bond and Asst. Mgr. Rauber held South Carolina license for pesticide application.

## 12. Wilderness and Special Area

The 615-acre Dingle Pond Unit is a designated Public Use Natural Area. This area, being a Carolina Bay, is of both local and State geological significance. Because of this designation development and management of this unit is minimal.

## G. WILDLIFE

### 2. Endangered and/or Threatened Species

#### a. The American Alligator

The American alligator was removed from the endangered species list in 1987 and reclassified as threatened due to similarity of appearance with other species. This reclassification permits more liberal management of the species by the South Carolina Wildlife and Marine Resources Department statewide. Under new guidelines, the American alligator can be legally removed under strict guidelines which prevents or minimizes the useless slaughter of these animals considered to be nuisance or dangerous. Under the present guidelines, alligators can be removed only by a team of authorized persons who attempt to trap and relocate those "gators" which pose a problem to residential areas. If capture cannot be accomplished the animals are dispatched.

Peak populations during 1989 remained unchanged at an estimated 200 . However, use days were down by 5% to 84,650. No population census was conducted during the year. Consequently, population estimates were based on casual observations. As reported in previous years, numbers decrease during the summer months when impounded waters were pulled down leaving only shallow impoundments and canals. It is during this time that "gators", particularly the larger ones, slip across dikes and levees into deeper water and shallow coves along the shoreline of Lake Marion. These animals normally return to the refuge with the fall flooding of impoundments and canals. Probably 95% of the refuge population is found on the Pine Island and Cuddo Units.

#### b. Southern Bald Eagle

The status of the Southern Bald Eagle remained unchanged in 1989. Observations during the year increased significantly over 1988 with monthly reported sightings. A peak of ten was reported in November with the majority of these sightings reported on the Bluff and Pine Island Units. The peak is 40% above that reported the previous year.

The annual eagle survey was conducted on January 5, 1989. This survey is conducted annually by air and in addition to the refuge, covers Lake Marion from the Rimini railway trestle east to the Lake Marion Dam.

Survey lines are flown along the shorelines and over cypress snags which occur in the open water. A total of thirteen eagles were observed and reported. This is the largest number of birds ever reported on this survey and is a 77% increase over 1988. Needless to say this caused a stir of enthusiasm among state biologist and coordinators.

No known nesting occurred on the refuge this year, but an eagle's nest on the refuge was first observed on December 21, 1988 and from general appearance and size appeared to be a new nest. The nest, located on the Pine Island Unit, was first observed from the air while flying the waterfowl survey, and periodic inspection of the site revealed two adult eagles tending the nest. However, they did not produce any young and even egg laying could not be confirmed. When hurricane Hugo ripped through the area, the nest was blown away, but the tree remains. At the end of the year there was evidence the eagles were in the area, and their new nest, if they have one, hasn't been found. In addition to this nest, staff personnel observed an active nest on their eagle survey which had two adult eagles in the nest. This nest is located Southwest of the refuge in a snag over open water of Lake Marion. A third eagle was observed on an osprey nest and may or may not be an attempt by the eagle to utilize this for nesting purposes.

c. Osprey

The Osprey was observed throughout the year with a peak of ten reported during the summer. Though peak numbers remained unchanged, use days increased by 23% to 1,182.

Numerous nest's occur in dead cypress snags off the refuge and are used annually. This year a pair finally nested on the platform in Cantey Bay that Bond and Stuckey put up three years ago. Apparently, nesting habitat is plentiful or little demand exists. The nesting in 1990 may be the opposite since h. Hugo took out much of the nesting habitat. There may be a fight for our platform in 1990 with the lose of natural nesting sites. It survived Hugo in fine shape.

The species was observed on all units of the refuge with larger numbers reported at Pine Island and the Bluff Units.



After three years, osprey used the platform that Bond and Stuckey constructed on abandoned utility line pole. (Photo Bond)

d. Peregrine Falcon

No peregrine falcons were observed at Santee during calendar year 1989, but have been observed in past years.

e. Red-cockaded Woodpecker

Continued monitoring of the red-cockaded woodpecker (RCWP) colony at Pine Island indicates that the colony was active in 1989. This was the only active colony on the refuge, but since Hugo their existence is in doubt. None have been seen since the hurricane and as noted in Section B. six of nine cavity trees were eliminated by Hugo. Of the three remaining trees, one looks very good as a possible nesting cavity. The other two trees appear to be unused for the past several years. Of course what looks good or bad to me may not be so for the birds.

3. Waterfowl

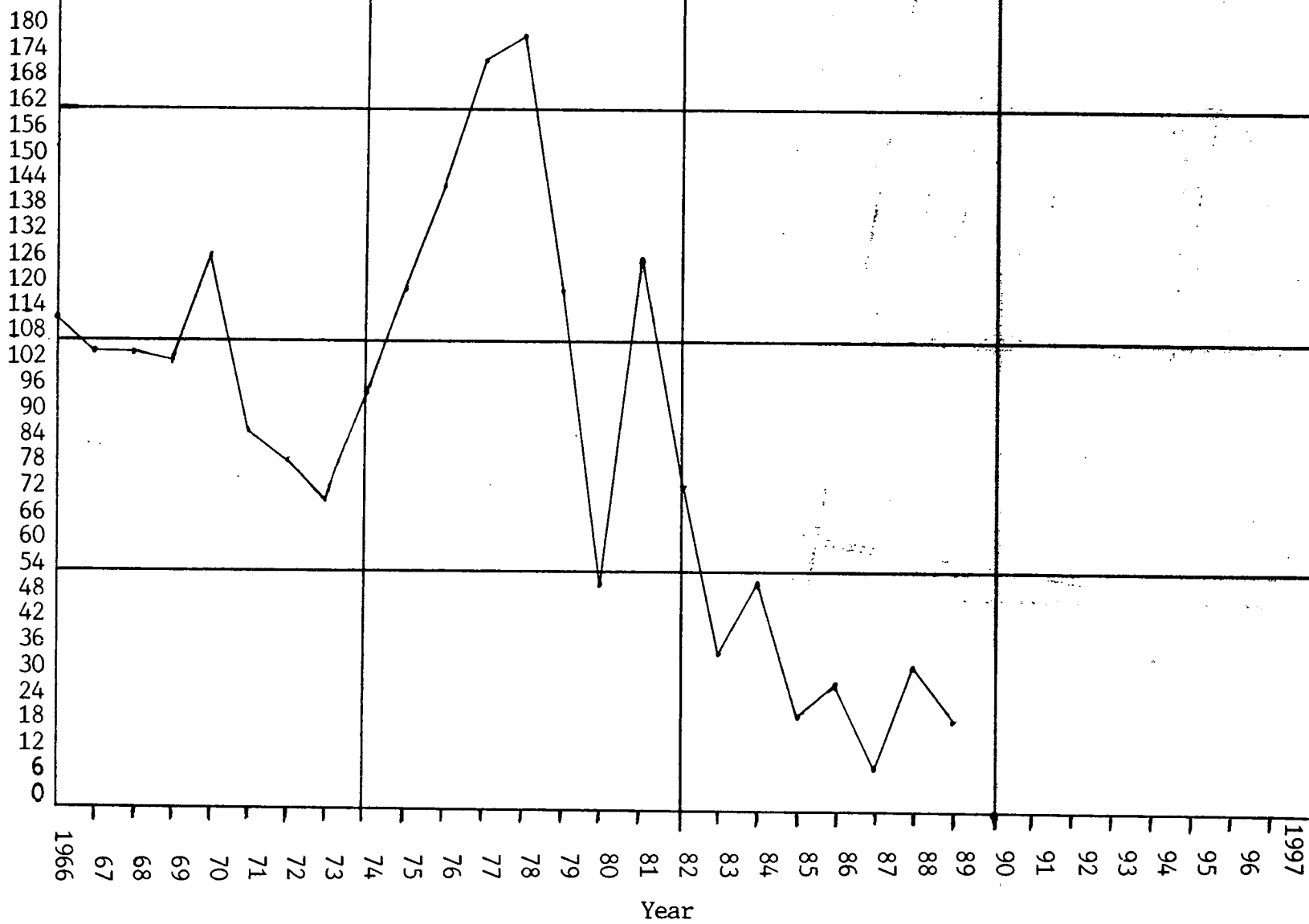
Population figures have fluctuated dramatically during the past 10 years. However, the general trend in peak waterfowl populations is downward. This year ducks, geese and swans increased while coots remained about the same. Swans do not occur in significant numbers so any population changes are of little concern in the overall waterfowl picture.

A very mild January and February were recorded with high temperatures in the sixties and high seventies. The waterfowl dispersed almost immediately. From a peak of 18,000 ducks in January, only 2,000 remained at end of February. By early March all had departed the refuge but a few stragglers and resident wood ducks.

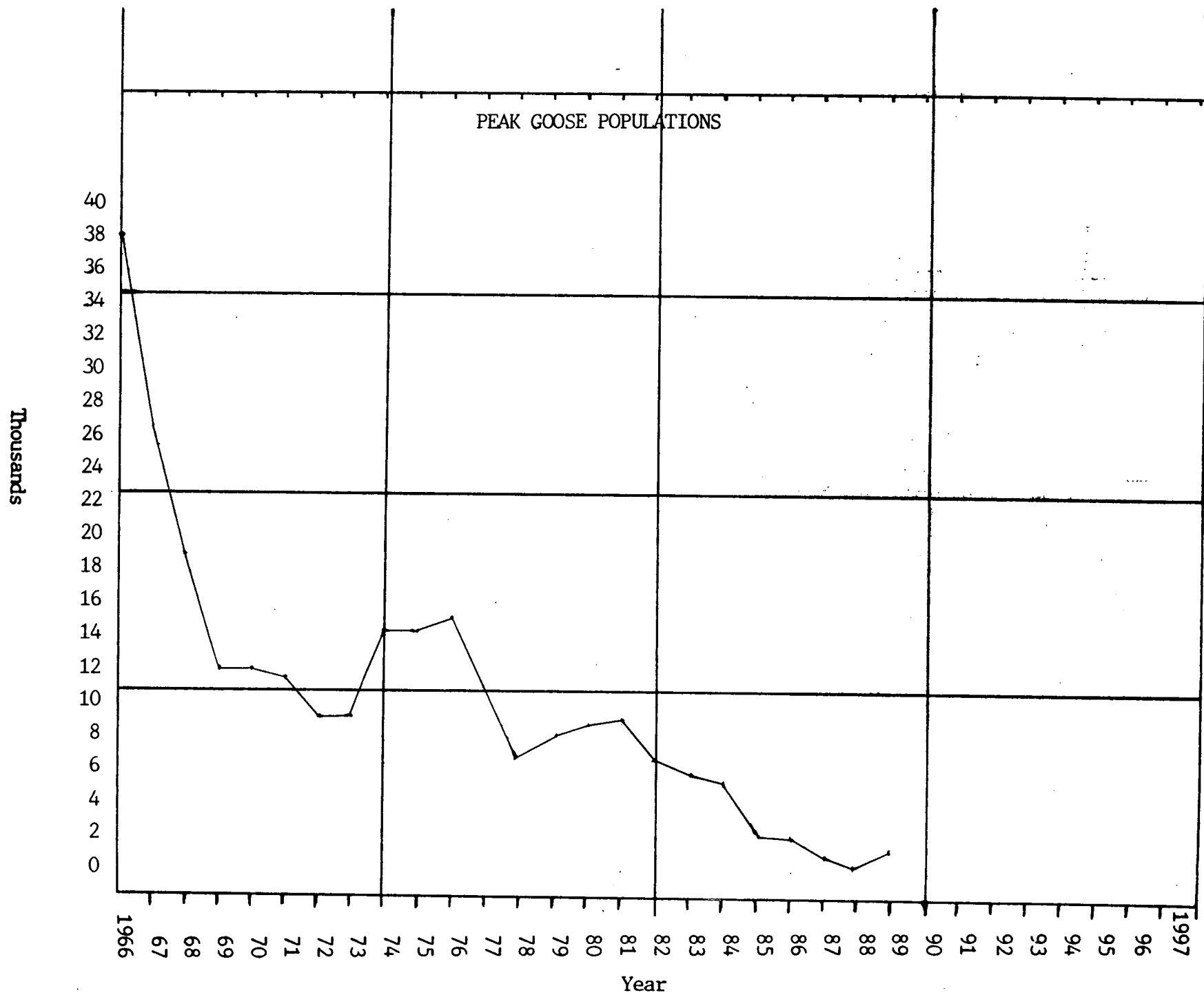
The fall migration was almost spectacular with waterfowl numbers well above those reported in 1988.

Thousands

PEAK DUCK POPULATIONS







a. Ducks

Ducks peaked at 19,000 during January. This figure represents a decrease of 19,000 birds from the peak reported the previous January. As in prior years the mallard was the predominant species with a peak of 9,000. Ring-necks peaked at 2,900 during January to become the second most abundant species followed by green-winged at 2,200. The black duck, a priority species, peaked at only 1,500 during the same period. Of the sixteen species of ducks reported at Santee this year, five species increased and 11 decreased during the month of January.

Though smaller in size, the Bluff Unit supported the vast majority of the waterfowl in 1989. The peak of 17,000 was recorded in December. Cantey Bay, Cantey Bay Pond, and Five-Pine Pond served as loafing and feeding areas. In addition, the shallows along the shoreline of the unit provided excellent cover and food. With cold fronts, which moved through the area, concentrations of mallards, blacks, and other dabblers utilized corn fields while divers remained on the open waters of Cantey Bay. The warming weather along with the ending of the waterfowl hunting season, resulted in dispersal of the birds. The fall migration was almost spectacular with a peak of 17,000, as noted above on this unit in December. It was interesting to note that the majority of divers and dabblers extensively utilized grass beds in Cantey Bay, apparently preferring those areas to the manipulated corn fields of the unit. The mild temperatures may have contributed to this change in feeding patterns.

The Dingle Pond Unit is a designated Public Use Natural Area. Because of its size and physical character, Dingle Pond has never contributed significantly to the overall waterfowl management program at Santee. This unit, however, provides an abundance of excellent wood duck brood habitat. A peak of 161 birds was observed on Dingle Pond in January. This peak included small numbers of wood ducks, black ducks, green-winged teal, mallards and ring-necks. In past years the eastern portion of Polly Cantey Bay has supported minor concentrations of, teal, ringnecks, wood ducks, mallards, and black ducks. However, with boundary line changes, a boundary line hunting situation has developed which has effectively eliminated waterfowl use of this area.

Pine Island has been set aside as a wetland management area. With the capacity to manipulate and maintain water at desired elevations, the unit consists of flooded shallow pools, expanses of open wetland areas, and flooded timber, thus providing a diversity of habitat for both divers and dabblers. With this management regime waterfowl use of the unit has improved in recent years but in a disproportionate amount to development. Waterfowl use of the area in 1989 was concentrated along the shoreline and the open waters of the Pasture probably because of beds of aquatic grass. Small numbers of ringnecks utilized the Pine Island Pool and minor numbers of mallards, black, wood ducks, and G. W. Teal utilized shallow flooded wetlands. The majority of divers, however, were to be found in the open waters and wood ducks in general preferred the flooded timber. Peak use

of the area was reached in January with 5,400 birds, including mallards, black duck, ring-neck, mergansers, G. W. teal, bufflehead, widgeon, and pintails reported.

With the continual decline in overall waterfowl numbers, use of the Cuddo Unit during 1989 declined proportionately. Duck numbers peaked at 13,000 with a major use area being the Nelson's Cut area. Ringnecks, widgeon and mallards composed the majority. Major concentrations of birds were observed on Black Bottom and the shoreline inlets of Potato Creek. Minor numbers of ringnecks, and wood ducks utilized Black Bottom Impoundments, Still Creek, and Cattle Guard Wetlands. Gator and Goose Pen Ponds received only minor use and that was primarily roosting. Shallow impoundments within Timber Island Field were used by dabblers including mallards, blacks, teal, pintail, and a few shovelers. However, once natural and supplemental foods were depleted these ducks abruptly moved to other areas. Green timber reservoirs 1 and 2 received only minor use by wood ducks and blacks ducks, and insignificant use was reported in winter wheat and corn fields.

b. Geese

Canada Geese peaked at 775 during mid-February. This was a small decrease from the previous year, and the overall lowest number ever to be reported at Santee NWR. Though temperatures remained in the 50's to 70's throughout much of January and February wintering concentrations did not disperse until the last week of February. By early March only 250 birds remained on the refuge and these had departed by the middle of the month. The first birds (14) of the fall migration were observed on September 6 with nineteen Canadas reported on the Bluff Unit. These could have been locals but by October 5 they numbered 40 and steadily increased until there were 1,170 on the refuge at year's end. Use by snows (blues) and white fronts is insignificant since there are rarely more than 10 of each during the year.

Historically, the Bluff Unit has wintered the majority of geese at Santee. With the mild weather the birds preferred the shallow open waters of Cante Bay, both loafing and feeding in grass beds. Winter wheat fields, B-3 and 7 received good use and manipulated corn fields were used considerably. With low lake levels, which persisted throughout the winter, exposed mud flats and shallow areas offered excellent loafing areas and seldom were birds observed off the unit. Though optimum habitat conditions existed, a combination of factors including summer like weather, low lake levels, and the presence of the grass beds, effectively altered both feeding and loafing patterns. It should be noted that for the third consecutive year, geese were in Cante Bay. When you speak of peak numbers and concentrations of geese in 1989 you are, at best, referring to rather small numbers. A peak of 750 birds utilized the Bluff in February, and even this number seems large by comparison with the peak of 350 which occurred in mid-December 1988.

Only minor use of the Pine Island Unit was reported during the year, though winter browse was available. The birds preferred the open waters

and mud-flats of "The Pasture". At no time were more than 250 geese observed, and that was only for a short period of time when birds interchanged between the several units.

Up to 210 Canada geese utilized the Cuddo Unit during January. However, only minimal use was made of green browse and corn fields, and geese preferred the shorelines of Black Bottom and Nelson's Cut. . At no time during the year were the birds noted on the open waters of Lake Marion. Small numbers were observed in Timber Island Field, but when natural and supplemental foods were depleted, they retired to the shorelines and open water of Black Bottom and Nelson's Cut where they remained. Though there was an abundance of green browse and adequate corn available for fall flights, only once were the birds observed in the fields, Q3-5 and Q4-6.

c. Swans

Swans, though a curiosity, are of minor significance in the overall waterfowl picture at Santee. The species has occurred in small numbers for eight consecutive years and continue to be of interest to visiting groups. The 1989 peak of 37 occurred during December and were found on all Units except Dingle Pond.

d. Coots

Coots peaked at 1,600 during December which is a decrease over the previous year. Even though the species occurs on all units of the refuge, the number is so small as to be insignificant. Larger numbers were known to be present in the area and on several occasions up to 6,000 birds were observed rafted in the open waters of Lake Marion some two miles southwest of the Bluff Unit where most refuge use occurred.

4. Marsh and Water Birds

Habitat management for this category of birds is incidental to the overall management objective and programs at Santee, and unless significant environmental changes occur, populations of marsh and water birds will fluctuate only moderately from year to year. As a general rule these species occur on all units of the refuge. However, abundance and frequency of observation is determined primarily by availability of wetland habitat which is a factor controlled largely by lake levels and impounded waters.

Of the six species of herons known to occur at Santee, only four were observed during the year. The black-crowned, and yellow-crowned night herons were conspicuously absent from the refuge. This is the fifth and sixth years respectively that these have not been reported. All of the four heron species observed, great blue, tricolor, little blue and green backed were seen in modest numbers. A small rookery of great blue herons was observed at the head of Black Bottom Impoundment and though this rookery contains only seven nest, it may well be the beginning of a new larger rookery.

The pied-billed grebe was observed on all units during cool and cold weather months.

Minor fluctuations were observed in the number of rails with a stable number of use days recorded for both the king and Virginia rail.

For the third consecutive year concentrations of up to 500 cormorants were observed on the refuge. The birds showed up in late October and remained on and around the several refuge units through December. The peak of 500 did not change from 1988.

Other birds in this group were present, but not seen nesting and they were not present in such exceptional numbers as to be noted here. Such birds included white ibis, the egrets and anhinga.

#### 5. Shorebirds, Gulls, Terns and Allied Species

As with the marsh and water birds, habitat management for this group of birds is incidental to overall refuge programs. However, it should be noted that factors directly affecting the presence or absence of these species, primarily lake levels, are controlled by the South Carolina Public Service Authority. Species diversity and numbers occurring on the refuge are normally in direct proportion to the amount of exposed shoreline and mud flats present.

Noticeably absent were the large concentrations of gulls including 600 herring, ring-billed, Bonaparte's and laughing gulls which were present on the refuge last year. They were present, but not in large numbers. Common snipe were numerous around the flooded moist soil areas, particularly on the Pine Island Unit. Only minor fluctuations were noted in this species group and that so small as to be insignificant.

#### 6. Raptors

##### a. Hawks

Hawks commonly observed during the year included the northern harrier, Cooper's, red-tailed, red-shouldered, and the American kestrel. Less frequently encountered were the sharp-shinned, and broad-winged hawks. These species occurred on all units of the refuge with larger concentrations reported at Cuddo and the Bluff Units. Nesting does occur on the refuge, but no nesting or population surveys were conducted during the year. As in previous years, overall peak numbers occurred during the fall and winter months. Generally, populations remained stable with only minor fluctuations in numbers.

The peregrine falcon, bald eagle and osprey are addressed elsewhere.

##### b. Owls

The four species of owl which occur at Santee are year-round residents and

include the barn, barred, great-horned and screech owl. These birds being nocturnal are heard more frequently than seen. However, daylight observations and the frequency of calls tend to indicate stable numbers. Screech owls (12) nested in structures intended for wood ducks, especially on the Cuddo Unit.

#### 7. Other Migratory Birds

Mourning dove peaked in December. As in previous years, small numbers were observed on the refuge throughout the year and nesting was observed on all units. Small numbers of birds were observed utilizing fields manipulated for waterfowl during the winter months and agricultural fields were favored for feeding and loafing in the spring.

The annual dove census was conducted in June by staff personnel. The number of birds observed and calls recorded on both routes 0530 and 0601 were near those reported in 1988. Both routes are well away from the refuge.

A dove hunt was conducted on the Cuddo Unit during September. (Section H.8.a.).

#### 8. Game Mammals

The State of South Carolina prescribes a hunting season for eleven species of mammals. Of these eleven species, ten occur on Santee. Three of the ten species which occur on the refuge, gray squirrel, raccoon, and opossum, were hunted in 1989.

The Bluff and Dingle Pond Units each supported small populations of white-tailed deer. However, the larger more diverse Cuddo and Pine Island Units supported the major concentrations. It was on the latter two units that deer hunting was cancelled because of hurricane Hugo. Hunting is restricted to primitive weapons. Other hunting activity was restricted to the Cuddo Unit. (Section H-8.)

Other mammals for which there is a prescribed state season include rabbit, mink, muskrat, otter, skunk and fox. None of these were hunted or trapped on the refuge.

The muskrat is present, but its numbers are so small as to be insignificant.

In addition to the gray squirrel, the eastern fox squirrel is also present on the refuge. The fox squirrel, though not listed as either endangered or threatened, is of state significance and concern due to relatively small numbers statewide. This species is also far from abundant on the refuge and we are concerned that hunters might remove some fox squirrels along with grays during the September hunt. A fox squirrel was seen on the Pine Island Unit and one was seen on two occasions on the Bluff Unit this year.

The river otter was observed in small numbers on all units throughout the year. Evidence of their presence is more frequently observed than the otter themselves. A population estimate, based on observation, was placed at 25.

Both the red and gray fox occurred on the refuge and peaks of 40 and 50 respectively were estimated. The species were observed on all units of the refuge with the larger numbers found on the Cuddo Unit.

The raccoon is probably the most abundant game mammal on the refuge. An estimated 250 is the maximum present.

#### 10. Other Resident Wildlife

Other resident wildlife include wild turkey, bobwhite quail, and bobcat. Turkeys are increasing in their range, and the population on the Cuddo Unit is thinning. Fewer birds were observed this year than last and the flocks are smaller. Turkeys were not reported this year at the Pine Island Unit.

Bobwhite quail were present on all units of the refuge. Habitat management naturally favors quail in summer by providing habitat diversity, food, water, cover, and lots of edge. But in winter a lot of their habitat is flooded.

Bobcat also occurred on all units of the refuge, and litters of three young each were observed on the Bluff and Cuddo Units. It is not uncommon to see a bobcat in daytime on the refuge.

ANNUAL REPORT FORM  
WOOD DUCK BOX PROGRAM INFORMATION  
YEAR 1989

Total Boxes Up 66

Total Usable Boxes 66

Use by Wood Ducks  
of Usable Boxes 52

Number of Success-  
ful Boxes  
(Wood Ducks) 33

Use by Other Ducks  
of Usable Boxes 0

Period Checked April, May, June, July, August  
(Month)

Use by Other Wild-  
life of Usable  
Boxes 13

\*Total Wood Ducks  
Hatched 290

Wood Duck Broods  
Produced 33

\*\*Wood Ducks  
Surviving to  
Flight Stage 145

Plans for Next Year (Indicate Number)

10 More Boxes

         Fewer Boxes

         No Change

         Entrance Holes  
Created in Trees

10 boxes will be placed on Dingle Pond and other boxes will be moved  
from non-use areas to high-use areas.

-----  
\*Unless you can actually count egg shells, just multiply successful boxes  
by 10.

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

\*\*\*Be sure and document periods that boxes were checked for use and repair.



## 12. Wildlife Propagation and Stocking

A total of 66 wood duck nesting boxes were located on the Bluff, Pine Island, and Cuddo Units. Of these, 52 boxes were used by wood ducks.

New cypress boxes were placed in 1989, replacing the Tom Tubbs plastic ones.

## 16. Marking and Banding

The banding quota this year was 400 preseason wood ducks.

Pre-season wood duck banding began June 1 and continued to September 20. An extra effort was made to reach our quota of 400. Unfortunately, we fell 54 ducks short and ended up with a total of 346. Efforts at baiting continued year round with corn and wheat. Our sole capture method was use of a rocket net at one site, namely Cantey Bay Pond on the Bluff Unit.

## H. PUBLIC USE

### 1. General

Permits were again issued to thirteen residents of the Cantey Bay Sub-division for ingress and egress through Cantey Bay during the boating closure, November through February. In an effort to minimize disturbance to wintering waterfowl utilizing the bay, all boats are required to navigate at no-wake speeds along the extreme eastern shore of the bay. In addition, a memorandum of understanding is in effect which restricts activities such as pier lights, fires, shooting, and other disturbances along the shoreline during the designated closure.

Twenty Golden Age Passports and no Golden Access Passports were issued during the year. This is a decrease from 1988.

A total of 61,052 refuge visits were reported in 1989. This is a 48% decrease over 1988. Much of this can be attributed to the hurricane and the associated decrease in fishing on the lake.

### 4. Interpretive Foot Trails

The Wright's Bluff Wildlife Trail was utilized throughout the year, until hurricane Hugo in September, for both guided and self-guided tours. The trail is the only one of its type in the local area and serves a wide variety of community organizations and the general public.

### 6. Interpretive Exhibits and Demonstrations

The interpretive exhibits at the head of the Wright's Bluff Wildlife Trail and the exhibit room at the Visitor Contact Station (VCS) are the only such facilities at the refuge. During the summer the trail head exhibit was demolished in accordance with the Public Use Review Plan. The exhibit

had deteriorated, was outdated and most of the information was a duplicate of that in the VCS. Total visits to the VCS were 1,970. A tabulation of recreational outputs is contained in Table 8.

Table 8. Santee Refuge recreational Outputs, 1989				
Recreation	Visits		Activity Hours	
Outputs	1987	1988	1989	1989
Wildlife Consumptive				
Hunting	1,202	1,452	202	622
Fishing	66,283	45,219	29,031	87,093
Non-Consumptive				
Foot	12,103	14,674	10,051	10,051
Vehicle	6,969	10,209	6,699	3,349
Boat	446	515	442	974
Photography	0	16	3	12
Totals	87,003	72,085	46,428	101,921

#### 8. Hunting

Four game species including squirrel, dove, raccoon, and opossum were hunted during 1989. All hunts were conducted in accordance with state regulations with the exception of length of season. Our season was within, but shorter than the State season.

##### a. Dove Hunt

The dove hunt was conducted on the Cuddo Unit September 2 -30 and as in years past participation was light; so was dove population. A total of 83 hunters hunted 198 hours and killed 1 dove. The hunt was not supervised and hunters checked themselves in and out. Of course the hunt was "naturally" stopped when hurricane Hugo hit on the night of September 21.

##### b. Squirrel Hunt

The squirrel hunt was held on the Cuddo Unit September 15-30, and was conducted in the same manner as the dove hunt. No squirrel hunters were encountered or logged at the volunteer check station.

##### c. Deer Hunt

All deer hunts scheduled at Santee during the month of October were cancelled due to the extremely hazardous condition of the woods and the potential for a fatal accident. Many contacts were made both in the office and in the field relative to the closing and all seemed to approve.

#### d. Raccoon and Opossum Hunt

Raccoon and opossum were hunted February 20-March 1 on the Cuddo Unit. A total of 58 raccoons were harvested by 119 hunters in 424 hours of hunting. No opossum were reported in the harvest.

#### 9. Fishing

A total of 29,031 fisherman visits were estimated in 1989. This is a decline from 1988, and could be attributed, in part, to the increase in non-resident state license fees, but mostly due to hurricane Hugo. However, local fishermen and marina operators who have fished Lake Marion over the years are quick to point out the decline in quality of fishing due to conditions such as heavy infestation of aquatic weeds in some of the more productive fishing areas, the extremes in lake elevations during the year, economics, etc. We will just have to wait and see what the long term brings.

Interior ponds, impoundments, and canals were open to fishing March through October. However, low water, dense aquatic vegetation, and the inconvenience of dragging boats over dikes and through shallow areas combined to hold this activity to a minimum. Fishermen encountered in these areas prior to spring drawdown reported excellent catches of bream, crappie, bass, and catfish. The major fishing at Santee is done in sloughs, bays, and open waters of Lake Marion where access is generally unobstructed and the larger boats can navigate. The shoreline of Scott's Lake (a part of Lake Marion) was used extensively by local anglers during the spring. As the year progressed, the drop in fishing was especially apparent in this area. Excellent catches of catfish, white bass and an occasional striped bass were landed along this shore.

#### 11. Wildlife Observation

Wildlife observation opportunities at Santee include the area around the visitor contact station, Wright's Bluff Wildlife Trail, Indian Mound-Fort Watson site, and approximately 50 miles of refuge roads open to foot traffic and bicycles March through October. Most of the 1,970 visitors recorded at the visitor contact station also visited the Indian Mound and wildlife trail. In addition, tours were given to four groups representing 113 individuals. Other guided tours to conservation groups were conducted on specific units of the refuge throughout the year.

#### 17. Law Enforcement

Occasional night patrols were made on all units but no serious illegal activities were encountered. A big help is the fact that four of the local state game wardens have 24-hr. access to all the refuge units.

No violations were written during the year, but several warnings were made involving water vehicular trespass, swimming and trespassing in a closed area.

Vandals broke into the Bluff Unit pumphouse sometime during the weekend of June 3. They smashed all the gauges on the diesel engine which cost nearly \$300 to repair. Hurricane Hugo blew the entrance sign to the Dingle Pond Unit out of its frame. Before refuge staff could put it back, someone stole it.

## I. EQUIPMENT AND FACILITIES

### 1. New Construction

The security fence at the shop was severely damaged during the hurricane and a contract for repairs was awarded to the Ridgeway Fence Company for \$2,500. Repairs were completed on the 23rd of October.

Underpinning of the office/vcs was done with treated plywood overlaid with treated lattice. The underpinning should prevent pipes from freezing this winter in addition to making the building more attractive. In the past, cold wind could blow through with only pilings to stop it and water, electric and air conditioning lines were visible to the public. Range Tech Stuckey had the lead on this job.



Underpinning of office/VCS was done entirely by staffers Stuckey (mastermind) and Pearson with Heet supervising. (Photo Heet)



After -- a good job.

(Photo Bond)



A boat launching ramp at Log Jam Landing on Cuddo was completed. Cement logs that were cast ten years ago were used for the lower part of the ramp, and new concrete was poured for the upper part of the ramp. The new ramp which is 20 ft. by 60 ft., replaces an old unusable one.



Assistant Manager Heet supervises (watches?) John Johnson in construction of a new boat ramp for the public. The old one is in the foreground. (Photo Heet Rauber).



After. Pipe marks one corner and some rip-rap is needed. (Photo Bond)



The Indian Mound parking lot was given a face lift. An old split rail fence that was constantly being vandalized was replaced with 40 upright sections of utility poles that were placed four feet apart, three feet tall, and ends cut at a 45 degree angle.



It was a constant headache to keep the rail fence at the Indian Mound intact because of vandals. The round C 3 sign is a guide for tours of historical Clarendon County. Vandals got it too. (Photo Bond)



So we replaced the rail fence.

(Photo Bond)

Larry Davis, Outdoor Rec. Planner for Cape Romain NWR, installed a photographic display in the conference room during January. Larry does ORP work at Santee as well as at Cape Romain.

Modification of one of the two diesel engines obtained from Mattamuskeet was completed and replaced pump motor #2 at Timber Island Field on the Cuddo Unit.

Fabrication of belt guards for the four pumps at Cuddo, which have been needed for quite some time, were fabricated on site. Belt guards on the Bluff and Pine Island pumps were contract jobs done several years ago. Design and fabrication were done by Auto Mechanic Johnson.

## 2. Rehabilitation

Staff personnel repaired pump enclosures, damaged by the hurricane, on all off the units. The enclosure over the Timber Island Field #2 pump at Cuddo had to be completely rebuilt.

The old access canal along the eastern side of the Cuddo Unit, once used for flooding the Cuddo impoundments was completely clogged with trees by hurricane Hugo, severely restricting water flow. This created flooding conditions in the State owned Potato Creek Impoundment resulting in inundation of a section of a state highway. In order to alleviate the problem staff personnel dug a short (30-ft) canal directly to the lake and plugged the main canal which no longer served refuge purposes. This has eliminated the refuge's responsibility for flooding conditions.

A new power unit was installed at TIF #2 pump on the Cuddo Unit. When put in service, it was noted that the pump was not functioning properly. Upon inspection it was determined that a new shaft and propeller were needed. These were installed by the refuge staff.

The 3-point hitch for the planter/rotera was completely rebuilt.

Reflooring of the low-boy trailer received priority attention. The new oak timbers were sized and treated and after old timbers were removed from the bed, the new ones installed.

Reflectors were installed on all refuge gates during the period in an effort to minimize the possibility of a potential accident. The yellow gates were painted brown in accordance with the Public Use Review Plan.

The caterpillar D-8 was taken to the shop for repairs to the pony motor, blade clutch and steering clutches.

### 3. Major Maintenance

Landscaping around the office/vcs took up some time when the staff severely trimmed the multiflora roses and camellias. A large brushy area behind the leaflet dispenser was removed and Bermuda grass planted. The brushy area was composed mostly of cultivated plants. Also, changes were made in the parking lot "I" when wax myrtles were removed and replaced by river birch. Two pecan trees were planted where large oaks had died and been removed. The southernmost of these pecans, for the record, is the variety "Desirable" and the other one is an unknown dug elsewhere on the refuge.





Multiflora rose and other brush blocked visitors view at the office/VCS. (Photo Heet)



After a good trim. (Photo Bond)



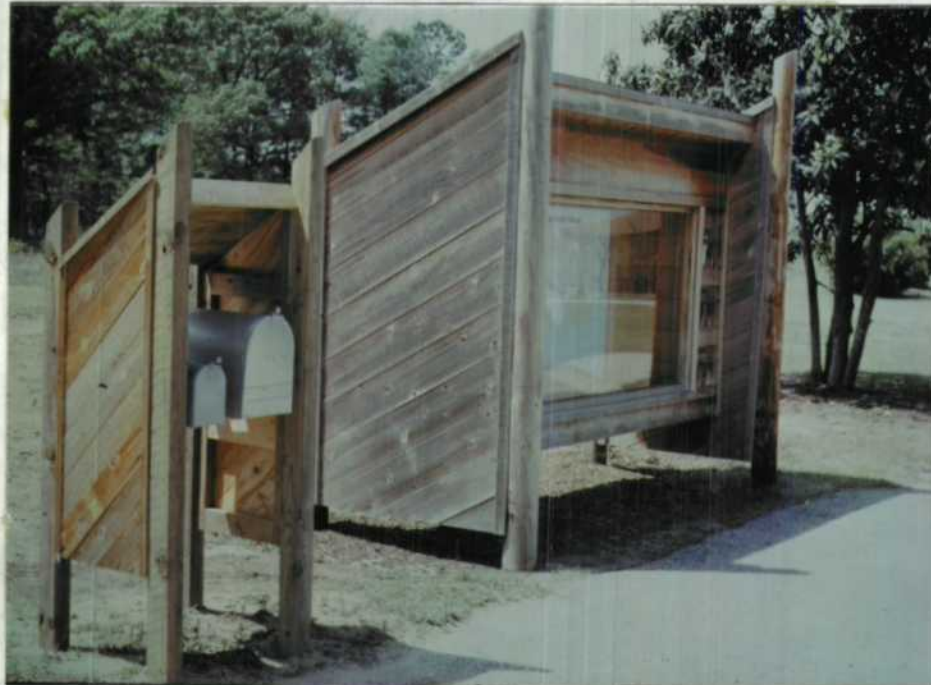


Before Wax myrtle bushes were removed from the office/VCS parking lot. (Photo Heet)



and replaced with river birch. (Photo Bond)





In accordance with the Public Use Review Plan staff member Eddie Stuckey built and install a cover stand for the refuge mail boxes.  
(Photo Bond)

Most maintenance involved replacing seals, alternators, bearings, tires, batteries, gaskets and gauges on vehicles such as pickups, tractors and implements.

#### 4. Equipment Utilization and Replacement

Vehicle #6, a Chevrolet pick-up truck and vehicle #87, a GMC 2.5-ton dump truck were placed on loan to Cape Romain NWR which lost all its equipment during the hurricane of September.

Our excavator and an operator were loaned to Orangeburg NFH during the period to assist in the removal of a sizeable Island of floating debris which had lodged itself against the main dam and threatened to clog the main water control structure. Three days were sufficient to remove the obstruction.

A Ford 4140 diesel tractor was obtained from TVA excess property.

Property excessed included a lawn edger, jon boat and a riding lawnmower. The State of South Carolina picked up the former two items and the Navy picked up the latter.

An annual equipment audit was completed and all items of property were accounted for.

All equipment was utilized during the year. The Cat. D-8 and TD-15 dozers were used for clearing dikes and roads after Hugo. The motorgrader maintained some 50 miles of refuge roads and the excavator and backhoe were used on many projects including WCS replacement, dike work, and tree removal and planting as well as placing rip rap.



## OTHER ITEMS

### 1. Cooperative Programs

The following programs were conducted on a Cooperative basis during the year:

- a. Furbearer Census. (Section D-5.b)
- b. Mourning Dove Coo-Call Count. (Section G-7).
- c. Gypsy Moth Survey was conducted in conjunction with and at the request of the U. S. Forest Service.
- d. Evaporation station for South Carolina Department of Health and Environmental Control was initiated. (Section D-5,d)
- e. Manager Bond inspected six potential sites for development under the Partners for Waterfowl program. In addition to these, numerous calls relative to the program were taken in the office. From interest generated a full crew could be kept busy full time for months. We definitely need some handout material and printed guidelines to give to landowners. Assisting Mgr. Bond was Bob Dodd and Roger Banks of the Charleston Ecological Services office.

One of the Partners projects was completed for Ray Weston, Jr. after approval. This 10.4 acre impoundment, only two miles from the refuge as a duck flys, is supplied by two artesian flow wells and contains about half and half willow oak flats and open farmland.



Auto mechanic Johnson constructing small dike for a Partner for Waterfowl project on lands of Ray Weston, Jr. (Photo Bond)



Another Partners project was started for Bill Griffin but was rained out before completion. We will have to wait for drier weather next year.

f. The winter eagle survey. (Section G-2)

3. Items of Interest

- A new cleaning contract was effective October 1.
- A refuge revenue sharing check in the amount of \$23,993 was presented to Clarendon County in April.
- An article on the refuge was featured in the Field Trip Section of the South Carolina Wildlife Magazine.



I don't know how many times he had worn the shirt before, but one day we noticed his duck had no head. Surely a collector's item. (Photo Bond)

4. Credits

Manager Bond wrote and edited the report and Rufus Gaymon typed it. Photo credit is given under each photo.

#### K. Feedback

The scenario is not new, but it goes something like this: taking on more responsibility; no more staff power; no more money, but just get the job done. That's easy to say but when "the chickens come home to roost" it's a different story. At the end of the year this refuge lost another FTE to a new refuge coming on line. I don't question higher authority's "big picture" and priorities but when the staff works overtime to accomplish the job and you have to pay overtime, then something has to give. All this brings to mind a quote by an old refuge manager namely Preston White Lane, "People in hell want ice water, but they don't get it".







**MUSKRAT** (*Ondatra zibethicus*). It is common around water.

**BLACK RAT** (*Rattus rattus*). This is a non-native animal that may occur around buildings.

**NORWAY RAT** (*Rattus norvegicus*). Also introduced, the animal may occur around buildings, grain bins and cultivated fields.

**HOUSE MOUSE** (*Mus musculus*). An introduced species, it is common around buildings and fields.

### CARNIVORES

These mammals are predators that live mainly on freshly killed prey, although some are omnivorous, and eat a lot of vegetative material.

**RED FOX** (*Vulpes vulpes*). A small, red, doglike mammal with a long, white-tipped, bushy tail, it is common throughout the refuge, especially in cropland areas.

**GRAY FOX** (*Urocyon cinereoargenteus*). Small and doglike and colored grayish above and reddish below with a long, black-tipped, bushy tail, this mammal is common in woody and brushy areas.

**RACCOON** (*Procyon lotor*). Easily identified by its black and brownish-gray ringed tail and black mask, this mammal is common throughout the refuge.

**LONG-TAILED WEASEL** (*Mustela frenata*). Brown above and white below with a black-tipped, brown tail, this nocturnal mammal prefers to hunt in areas near water.

**MINK** (*Mustela vison*). Dark brown or black with white spots on the chin and throat, this nocturnal mammal hunts along the lake edge and around the refuge canals, impoundments and marshes.

**STRIPED SKUNK** (*Mephitis mephitis*). Black with two white stripes on its back, this mammal is rarely seen in the area.

**RIVER OTTER** (*Lutra canadensis*). Dark brown with a paler belly and throat, prominent whiskers, a long tapering tail and webbed feet, this mammal is common in refuge waters but submerges quickly and quietly when disturbed by humans.

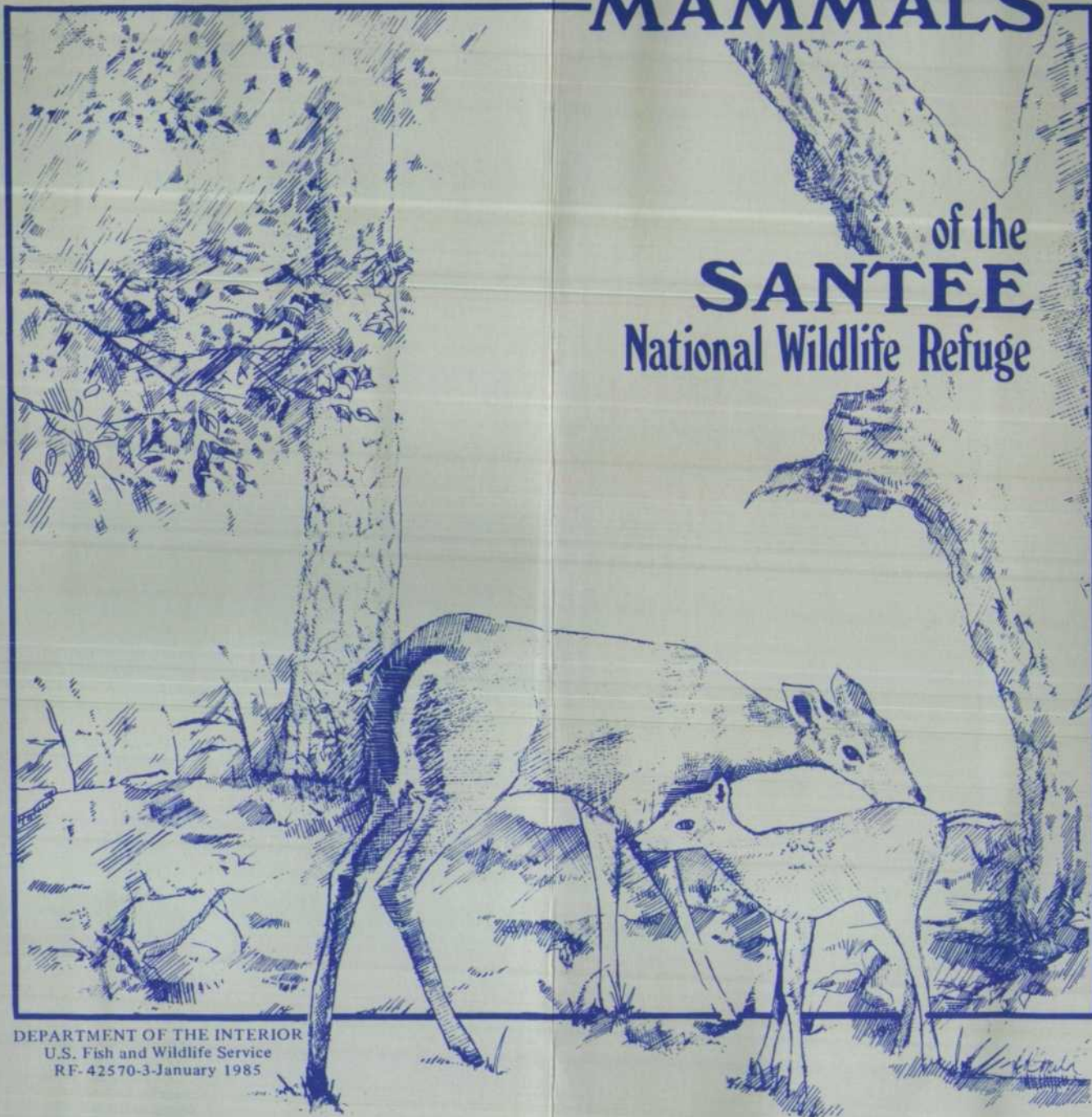
**BOBCAT** (*Felis rufus*). Grayish with black spots and a short tail, this mammal is common but only seen occasionally.

### HOOFED MAMMALS

**WHITE-TAILED DEER** (*Odocoileus virginianus*). Santee's only hoofed mammal is easily identified by its long slender legs and "white-flag" tail. Common but difficult to observe, this mammal is tan or reddish-brown above in summer and grayish-brown in winter with white below. Bucks have antlers which they shed yearly and fawns are reddish colored with white spots.

# MAMMALS

## of the SANTEE National Wildlife Refuge



DEPARTMENT OF THE INTERIOR  
U.S. Fish and Wildlife Service  
RF-42570-3-January 1985



The Santee National Wildlife Refuge, established in 1941 as a refuge for migratory waterfowl, lies in the upper coastal plains of central South Carolina in Clarendon county, approximately seven miles south of Summerton on Highway 301.

The refuge is comprised of 15,095 acres of mixed hardwoods, mixed pine-hardwoods, pine plantations, marsh, croplands, old fields, ponds, impoundments and open waters located in four separate management units along Lake Marion, a hydro-electric reservoir. This diversity of habitat on the refuge supports a wide variety of mammals.

This list of 45 species is based on records and observations by refuge personnel, state biologists and local citizens and on a literature search of appropriate publications. Persons having information regarding species not listed are urged to contact the Refuge Manager, Santee National Wildlife Refuge, Route 2, Box 66, Summerton, South Carolina 29148, or telephone (803) 478-2217.

### MARSUPIALS

These are mammals that bear very undeveloped young and carry them in a pouch on the belly.

**VIRGINIA OPOSSUM** (*Didelphis virginiana*). This nocturnal mammal is common on the refuge.

### INSECTIVORES

Shrews and moles are small mammals with short thick fur, tiny eyes and ears and five clawed toes on their feet.

**SOUTHEASTERN SHREW** (*Sorex longirostris*). This long-tailed mammal is brownish above and buff below and can be found burrowing in mossy areas, fields, brushy areas and woods.

**SOUTHERN SHORT-TAILED SHREW** (*Blarina carolinensis*). This shrew is gray all over with a short tail and is common under hedges and in woodlands.

**LEAST SHREW** (*Cryptotis parva*). The least shrew is short-tailed and grayish-brown or brown with a paler belly and prefers fields, marshes and wet woods.

**EASTERN MOLE** (*Scalopus aquaticus*). A long, naked snout, outturned palms, webbed toes and a short, naked tail identify this resident of fields and waste areas.

**STAR-NOSED MOLE** (*Condylura cristata*). A long, hairy tail and 22 fleshy projections on the nose make this mole unmistakable in its usually wet habitat.

### BATS

Bats are the only mammals that truly fly. These mammals are best seen flying about at dusk searching for insects.

**LITTLE BROWN MYOTIS** (*Myotis lucifugus*). This bat is glossy brown above and buff below and is seen occasionally during warm weather.

**SILVER-HAIRED BAT** (*Lasiorycteris noctivagans*). The silver-haired bat is nearly black with silver frosted hairs on the back and is found in protected areas of trees.

**EASTERN PIPISTRELLE** (*Pipistrellus subflavus*). This species of bat can be found during the daytime hanging in vegetation. The eastern pipistrelle is our smallest bat and has reddish to light brown, tricolored hair.

**BIG BROWN BAT** (*Eptesicus fuscus*). This large brown bat is found in buildings and hollow trees.

**RED BAT** (*Lasiurus borealis*). Varying shades of red with white frosting on back and breast and a whitish patch on each shoulder distinguish this bat which is found in summer in trees and hedgerows.

**SEMINOLE BAT** (*Lasiurus seminolus*). This silver-frosted, mahogany brown bat is found during daytime hanging in clumps of Spanish moss.

**HOARY BAT** (*Lasiurus cinereus*). Light brown with dense white frosting and a buff throat, our largest but rarely seen bat can be found hanging from evergreen branches.

**NORTHERN YELLOW BAT** (*Lasiurus intermedius*). Large with long, silky, yellowish-brown fur touched with black above, this tree-loving bat can rarely be seen by day, hanging in clumps of Spanish moss.

**EVENING BAT** (*Nycticeius humeralis*). The evening bat is reddish-brown above and tawny below and is found in summer in buildings and hollow trees.

**RAFINESQUE'S BIG-EARED BAT** (*Plecotus rafinesquii*). Large ears distinguish this brown bat with white frosting below.

**BRAZILIAN FREE-TAILED BAT** (*Tadarida brasiliensis*). The naked tail extending beyond the interfemoral membrane separates this bat from the others.

### RODENTS

These gnawing mammals have two pairs of incisor teeth. Although common, some species are seldom seen and difficult to identify unless in hand.

**MARSH RABBIT** (*Sylvilagus palustris*). Dark brown with a small grayish-brown tail, this rabbit is common on the refuge around the lake edges, swamps and bottomlands.

**EASTERN COTTONTAIL** (*Sylvilagus floridanus*). Grayish-brown above with white below the short tail, this common resident inhabits brushy areas, old fields, woods and cultivated areas.

**GRAY SQUIRREL** (*Sciurus carolinensis*). Gray, silver-tipped hair and a flat, bushy tail characterize this common forest resident.

**FOX SQUIRREL** (*Sciurus niger*). This, our largest tree squirrel is usually black and white, but can vary. A large bushy tail with yellow-tipped hairs can be seen on this occasional forest resident.

**SOUTHERN FLYING SQUIRREL** (*Glaucomys volans*). This is our only flying squirrel and our smallest squirrel, and although very common on the refuge, is seldom seen since it is nocturnal.

**BEAVER** (*Castor canadensis*). This large, dark brown rodent has a paddle-shaped, flat, black, scaly tail. Although not yet positively identified on the refuge, this mammal is known to occur within three miles of the refuge on Lake Marion and is possibly using the refuge lands and waters.

**MARSH RICE RAT** (*Oryzomys palustris*). It is a common resident of marshes, canals and impoundments.

**EASTERN HARVEST MOUSE** (*Reithrodontomys humilis*). They are common in refuge old fields and field edges.

**OLDFIELD MOUSE** (*Peromyscus polionotus*). This animal is common in timbered lowlands and old fields.

**COTTON MOUSE** (*Peromyscus gossypinus*). It is common in timbered lowlands, brushy areas and swamps.

**GOLDEN MOUSE** (*Ochrotomys nuttalli*). These mammals are common in thickets, brushy areas and swamps.

**HISPID COTTON RAT** (*Sigmodon hispidus*). It is common in grassy areas, brush piles and forest edges.

**EASTERN WOODRAT** (*Neotoma floridana*). They are common in woodlands and hedges.

**WOODLAND OR PINE VOLE** (*Microtus pinetorum*). These animals are noted for their tunnels in woodlands.



## JAYS, CROWS:

Blue Jay	P
American Crow	P
Fish Crow	P

## TITMICE, NUTHATCHES, CREEPERS:

Carolina Chickadee	P
Tufted Titmouse	P
White-breasted Nuthatch	P
Red-breasted Nuthatch	W
Brown-headed Nuthatch	P
Brown Creeper	W

## WRENS:

House Wren	W
Winter Wren	W
Bewick's Wren	A
Carolina Wren	P
Marsh Wren	W
Sedge Wren	W

## MIMIC THRUSHES, THRUSHES:

Northern Mockingbird	P
Gray Catbird	P
Brown Thrasher	P
American Robin	P
Wood Thrush	S
Hermit Thrush	W
Swainson's Thrush	T
Gray-cheeked Thrush	T
Veery	T
Eastern Bluebird	P

## KINGLETS:

Blue-gray Gnatcatcher	P
Golden-crowned Kinglet	W
Ruby-crowned Kinglet	W

## PIPITS:

Water Pipit	W
Sprague's Pipit	A

## WAXWINGS, SHRIKES, STARLINGS:

Cedar Waxwing	W
Loggerhead Shrike	P
European Starling	P

## VIREOS:

White-eyed Vireo	S
Yellow-throated Vireo	S
Solitary Vireo	W
Red-eyed Vireo	S
Philadelphia Vireo	T
Warbling Vireo	T

## WOOD WARBLERS:

Black-and-white Warbler	P
Prothonotary Warbler	S
Swainson's Warbler	S
Worm-eating Warbler	T
Golden-winged Warbler	T
Blue-winged Warbler	T

Tennessee Warbler	T
Orange-crowned Warbler	W
Nashville Warbler	T
Northern Parula	S
Yellow Warbler	T
Magnolia Warbler	T
Cape May Warbler	T
Black-throated Blue Warbler	T
Yellow-rumped Warbler	W
Black-throated Green Warbler	T
Cerulean Warbler	T
Blackburnian Warbler	T
Yellow-throated Warbler	P
Chestnut-sided Warbler	T
Bay-breasted Warbler	T
Blackpoll Warbler	T
Pine Warbler	P
Kirtland's Warbler	T
Prairie Warbler	S
Palm Warbler	W
Ovenbird	T
Northern Waterthrush	T
Louisiana Waterthrush	S
Kentucky Warbler	S
Connecticut Warbler	T
Mourning Warbler	T
Common Yellowthroat	P
Yellow-breasted Chat	S
Hooded Warbler	S
Wilson's Warbler	T
Canada Warbler	T
Slate-throated Redstart	S

## WEAVER FINCHES, BLACKBIRDS:

House Sparrow	P
Bobolink	T
Eastern Meadowlark	P
Western Meadowlark	A
Yellow-headed Blackbird	A
Red-winged Blackbird	P
Orchard Oriole	S
Northern Oriole	W
Rusty Blackbird	W
Brewer's Blackbird	A
Boat-tailed Grackle	A
Common Grackle	P
Brown-headed Cowbird	P

## TANAGERS:

Western Tanager	T
Scarlet Tanager	T
Summer Tanager	S

## FINCHES:

Northern Cardinal	P
Rose-breasted Grosbeak	T
Blue Grosbeak	S
Indigo Bunting	S
Painted Bunting	S

Dickcissel	T
Evening Grosbeak	W
Purple Finch	W
House Finch	T
Pine Siskin	W
American Goldfinch	W
Rufous-sided Towhee	P
Savannah Sparrow	W
Grasshopper Sparrow	W
Henslow's Sparrow	A
LeConte's Sparrow	W
Vesper Sparrow	W
Lark Sparrow	T
Bachman's Sparrow	P
Dark-eyed Junco	W
Chipping Sparrow	P
Clay-colored Sparrow	A
Field Sparrow	P
White-crowned Sparrow	W
White-throated Sparrow	W
Fox Sparrow	W
Lincoln's Sparrow	A
Swamp Sparrow	W
Song Sparrow	W

## NOTES

Date \_\_\_\_\_ No. Species \_\_\_\_\_  
 Observer(s) \_\_\_\_\_  
 Weather \_\_\_\_\_  
 Time Afield \_\_\_\_\_

# BIRDS



of the  
**SANTEE**  
 National Wildlife Refuge

DEPARTMENT OF THE INTERIOR  
 U.S. Fish and Wildlife Service

RF-42570-2 - January 1985



The Santee National Wildlife Refuge, established in 1941 as a refuge for migratory waterfowl, lies in the upper coastal plains of central South Carolina in Clarendon County, approximately seven miles south of Summerton on Highway 301.

The refuge is comprised of 15,095 acres of mixed hardwoods, mixed pine-hardwoods, pine plantations, marsh, croplands, old fields, ponds, impoundments, and open waters located in four separate management units along Lake Marion, a hydro-electric reservoir. This diversity of habitats on Santee supports a wide variety of birds.

This list of 293 species is based on records and observations by refuge personnel, state biologists, and visiting birders and on a literature search of appropriate publications. Persons having information regarding species not listed are urged to contact the Refuge Manager, Santee National Wildlife Refuge, Route 2, Box 66, Summerton, SC 29148 - phone (803) 478-2217.

Since most birds are migratory, species use of the refuge is indicated by the following codes:

P = Permanent Resident      T = Transient  
W = Winter Visitor          A = Accidental  
S = Summer Resident

#### LOONS:

Common Loon	T
Red-throated Loon	T

#### GREBES:

Red-necked Grebe	T
Horned Grebe	W
Eared Grebe	A
Pied-billed Grebe	P

#### PELICANS, CORMORANTS, DARTERS:

American White Pelican	A
Double-crested Cormorant	P
Anhinga	P

#### HERONS, BITTERNs, STORKS:

Great Blue Heron	P
Green-backed Heron	S
Little Blue Heron	P
Cattle Egret	S
Great Egret	P
Snowy Egret	P
Tricolored Heron	P
Black-crowned Night Heron	P
Yellow-crowned Night Heron	S
Least Bittern	S
American Bittern	W
Wood Stork	A

#### IBISES:

Glossy Ibis	S
White Ibis	P

#### WATERFOWL:

Tundra Swan	W
Canada Goose	W
Barnacle Goose	A
White-fronted Goose	W
Snow Goose	W
Fulvous Whistling Duck	A
Mallard	P
American Black Duck	W
Gadwall	W
Northern Pintail	W
Green-winged Teal	P
Blue-winged Teal	P
Cinnamon Teal	A
Eurasian Wigeon	A
American Wigeon	W
Northern Shoveler	W
Wood Duck	P
Redhead	W
Ring-necked Duck	W
Canvasback	W
Greater Scaup	W
Lesser Scaup	W
Common Goldeneye	W
Bufflehead	W
White-winged Scoter	A
Ruddy Duck	W
Hooded Merganser	W
Common Merganser	W
Red-breasted Merganser	W

#### VULTURES:

Turkey Vulture	P
Black Vulture	P

#### HAWKS:

American Swallow-tailed Kite	A
Mississippi Kite	S
Sharp-shinned Hawk	W
Cooper's Hawk	P
Red-tailed Hawk	P
Red-shouldered Hawk	P
Broad-winged Hawk	S
Rough-legged Hawk	A
Golden Eagle	W
Bald Eagle	P
Northern Harrier	W

#### OSPREYS, FALCONS:

Osprey	P
Peregrine Falcon	T
Merlin	T
American Kestrel	W

#### QUAIL, TURKEYS, CRANES:

Northern Bobwhite	P
Wild Turkey	P
Sandhill Crane	A

#### RAILS, AVOCETS:

King Rail	P
Virginia Rail	W
Sora	W
Yellow Rail	T
Black Rail	T
Purple Gallinule	S
Common Moorhen	P
American Coot	W
American Avocet	A

#### PLOVERS:

Semipalmated Plover	T
Wilson's Plover	T
Killdeer	P
Piping Plover	T
Lesser Golden Plover	T
Black-bellied Plover	T

#### SANDPIPERS:

Marbled Godwit	T
Whimbrel	T
Upland Sandpiper	T
Greater Yellowlegs	W
Lesser Yellowlegs	T
Solitary Sandpiper	T
Willet	T
Spotted Sandpiper	W
Ruddy Turnstone	T
Wilson's Phalarope	T
American Woodcock	P
Common Snipe	W
Short-billed Dowitcher	T
Long-billed Dowitcher	T
Red Knot	T
Sanderling	T
Semipalmated Sandpiper	T
Western Sandpiper	T
Least Sandpiper	T
White-rumped Sandpiper	T
Baird's Sandpiper	T
Pectoral Sandpiper	T
Dunlin	T
Stilt Sandpiper	T
Buff-breasted Sandpiper	T
Ruff	A

#### GULLS, TERNS, SKIMMERS:

Herring Gull	P
Ring-billed Gull	P
Laughing Gull	T
Franklin's Gull	A
Bonaparte's Gull	W
Forster's Tern	W
Common Tern	W
Little Tern	S
Royal Tern	T
Caspian Tern	T

Black Tern	T
Black Skimmer	A

#### PIGEONS, DOVES, CUCKOOS:

Rock Dove	P
Mourning Dove	P
Common Ground Dove	A
Yellow-billed Cuckoo	S
Black-billed Cuckoo	T

#### OWLS:

Common Barn-Owl	P
Eastern Screech Owl	P
Great Horned Owl	P
Barred Owl	P
Long-eared Owl	W
Short-eared Owl	W
Northern Saw-whet Owl	T

#### GOATSUCKERS:

Chuck-will's widow	S
Whip-poor-will	T
Common Nighthawk	S

#### SWIFTS, HUMMINGBIRDS, KINGFISHERS:

Chimney Swift	S
Ruby-throated Hummingbird	S
Belted Kingfisher	P

#### WOODPECKERS:

Northern Flicker	P
Pileated Woodpecker	P
Red-bellied Woodpecker	P
Red-headed Woodpecker	P
Yellow-bellied Sapsucker	W
Hairy Woodpecker	P
Downy Woodpecker	P
Red-cockaded Woodpecker	P

#### FLYCATCHERS:

Eastern Kingbird	S
Gray Kingbird	A
Western Kingbird	T
Scissor-tailed Flycatcher	A
Great Crested Flycatcher	S
Eastern Phoebe	W
Yellow-bellied Flycatcher	T
Acadian Flycatcher	S
Willow Flycatcher	T
Alder Flycatcher	T
Least Flycatcher	T
Eastern Wood-Pewee	S
Olive-sided Flycatcher	T

#### LARKS, SWALLOWS:

Horned Lark	W
Tree Swallow	T
Bank Swallow	T
Northern Rough-winged Swallow	S
Barn Swallow	S
Cliff Swallow	T
Purple Martin	S



Dollar sunfish  
Longear sunfish  
Redear sunfish  
Spotted sunfish  
Largemouth bass  
White crappie  
Black crappie

*Lepomis marginatus*  
*Lepomis megalotis*  
*Lepomis microlophus*  
*Lepomis punctatus*  
*Micropterus salmoides*  
*Pomoxis annularis*  
*Pomoxis nigromaculatus*

#### PERCHES

Carolina darter  
Fantail darter  
Swamp darter  
Johnny darter  
Tessellated darter  
Saluda darter  
Sawcheek darter  
Seagreen darter  
Yellow perch  
Piedmont darter  
Shield darter

**PERCIDAE**  
*Etheostoma collis*  
*Etheostoma flabellare*  
*Etheostoma fusiforme*  
*Etheostoma nigrum*  
*Etheostoma olmstedi*  
*Etheostoma saludae*  
*Etheostoma serriferum*  
*Etheostoma thalassinum*  
*Perca flavescens*  
*Percina crassa*  
*Percina peltata*

#### MULLET

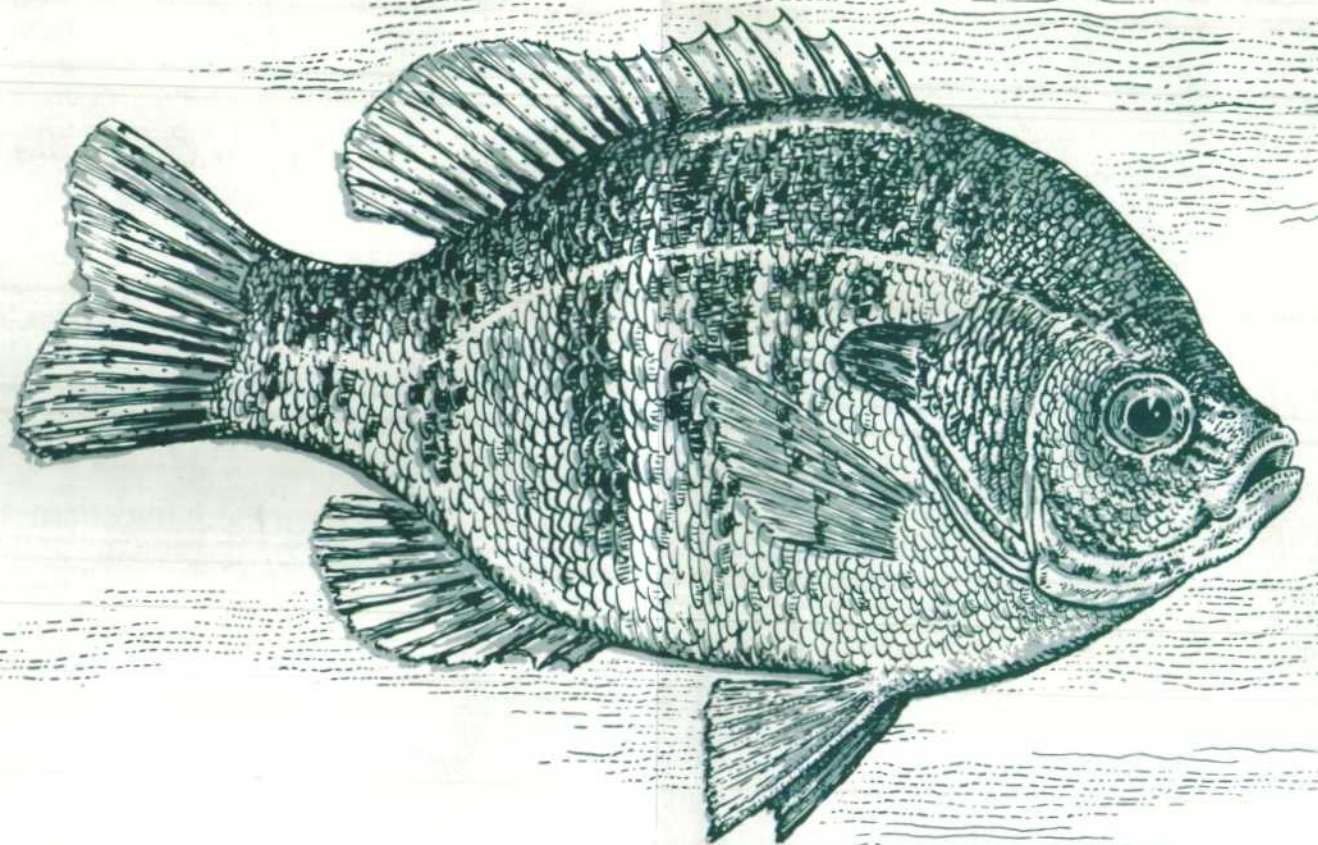
Striped mullet

**MUGILIDAE**  
*Mugil cephalus*

#### SOLES

Hogchoker

**SOLEIDAE**  
*Trinectes maculatus*



# FISHES

of the  
**SANTEE**  
National Wildlife Refuge

DEPARTMENT OF THE INTERIOR  
U. S. Fish and Wildlife Service



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Although minimal fish management is conducted at Santee, the waters of the lake and refuge provide optimum habitat for a variety of game and non-game fish species. Lake Marion is one of the foremost recreational fishing spots in the nation. Following is a species list derived from records and collections by refuge personnel and visiting ichthyologists. More exhaustive collecting would doubtlessly reveal additional species. Persons having information regarding species not listed herein are urged to contact the Refuge Manager, Santee National Wildlife Refuge, Route 2, Box 66, Summerton, South Carolina 29148.

#### STURGEONS

Atlantic sturgeon  
Shortnose sturgeon

#### ACIPENSERIDAE

*Acipenser oxyrhynchus*  
*Acipenser brevirostrum*

#### GARS

Longnose gar

#### LEPISOSTEIDAE

*Lepisosteus osseus*

#### BOWFINS

Bowfin

#### AMIIDAE

*Amia calva*

#### FRESHWATER EELS

American eel

#### ANGUILLIDAE

*Anguilla rostrata*

#### HERRINGS

Blueback herring  
Hickory shad  
American shad  
Gizzard shad  
Threadfin shad

#### CLUPEIDAE

*Alosa aestivalis*  
*Alosa mediocris*  
*Alosa sapidissima*  
*Dorosoma cepedianum*  
*Dorosoma petenense*

#### MUDMINNOWS

Eastern mudminnow

#### UMBRIDAE

*Umbra pygmaea*

#### PIKES

Redfin pickerel  
Chain pickerel

#### MINNOWS and CARPS

Goldfish  
Common carp  
Mississippi silvery minnow  
Highback chub  
Thicklip chub  
Bluehead chub  
Golden shiner  
Highfin shiner  
Ironcolor shiner  
Greenfin shiner  
Greenhead shiner  
Warpaint shiner  
Dusky shiner  
Whitetail shiner  
Spottail shiner  
Sailfin shiner  
Yellowfin shiner  
Taillight shiner  
Whitefin shiner  
Coastal shiner  
Swallowtail shiner  
Fieryblack shiner  
Sandbar shiner  
Mirror shiner  
Creek chub

*ESOCIDAE*  
*Esox a. americanus*  
*Esox niger*

#### CYPRINIDAE

*Carassius auratus*  
*Cyprinus carpio*  
*Hybognathus nuchalis*  
*Hybopsis hypsinotus*  
*Hybopsis labrosa*  
*Nocomis leptocephalus*  
*Notemigonus crysoleucas*  
*Notropis altipinnis*  
*Notropis chalybaeus*  
*Notropis chloristius*  
*Notropis chlorocephalus*  
*Notropis coccogenis*  
*Notropis cummingsae*  
*Notropis galacturus*  
*Notropis hudsonius*  
*Notropis hypselopterus*  
*Notropis lutipinnis*  
*Notropis maculatus*  
*Notropis niveus*  
*Notropis petersoni*  
*Notropis procne*  
*Notropis pyrrhomelas*  
*Notropis scepticus*  
*Notropis spectrunculus*  
*Semotilus atromaculatus*

#### SUCKERS

Quillback  
White sucker  
Creek chubsucker  
Lake chubsucker  
Smallmouth buffalo  
Bigmouth buffalo  
Spotted sucker  
Silver redhorse  
Shorthead redhorse  
Suckermouth redhorse  
Smallfin redhorse

#### CATOSTOMIDAE

*Carpoides cyprinus*  
*Catostomus commersoni*  
*Erimyzon oblongus*  
*Erimyzon sucetta*  
*Ictiobus bubalus*  
*Ictiobus cyprinellus*  
*Minytremma melanops*  
*Moxostoma anisurum*  
*Moxostoma macrolepidotum*  
*Moxostoma pappilosum*  
*Moxostoma robustum*

#### FRESHWATER CATFISHES

Snail bullhead  
White catfish  
Blue catfish

#### ICTALURIDAE

*Ictalurus brunneus*  
*Ictalurus catus*  
*Ictalurus furcatus*

#### Yellow bullhead

Brown bullhead  
Flat bullhead  
Channel catfish  
Tadpole madtom  
Margined madtom  
Flathead catfish

*Ictalurus natalis*  
*Ictalurus nebulosus*  
*Ictalurus platycephalus*  
*Ictalurus punctatus*  
*Noturus gyrinus*  
*Noturus insignis*  
*Pylodictis olivaris*

#### CAVEFISHES

Swampfish

#### AMBLIOPSIDAE

*Chologaster cornuta*

#### PIRATE PERCHES

Pirate Perch

#### APHREDODERIDAE

*Aphredoderus sayanus*

#### NEEDLEFISHES

Atlantic needlefish

#### BELONIDAE

*Strongylura marina*

#### KILLIFISHES

Golden topminnow  
Lined topminnow

#### CYPRINODONTIDAE

*Fundulus chrysotus*  
*Fundulus lineolatus*

#### LIVEBEARERS

Mosquitofish  
Least killifish

#### POECILIIDAE

*Gambusia affinis*  
*Heterandria formosa*

#### SILVERSIDES

Brook silverside  
Tidewater silverside

#### ATHERINIDAE

*Labidesthes sicculus*  
*Menidia beryllina*

#### TEMPERATE BASSES

White perch  
White bass  
Striped bass  
Hybrid striped bass x white bass

#### PERCICHTHYIDAE

*Morone americana*  
*Morone chrysops*  
*Morone saxatilis*  
*Morone sp.*

#### SUNFISHES

Mud sunfish  
Flier  
Banded pygmy sunfish  
Blackbanded sunfish  
Bluespotted sunfish  
Banded sunfish  
Redbreast sunfish  
Green sunfish  
Pumpkinseed  
Warmouth  
Orangespotted sunfish  
Bluegill

#### CENTRARCHIDAE

*Acantharchus pomotis*  
*Centrarchus macropterus*  
*Elassoma zonatum*  
*Enneacanthus chaetodon*  
*Enneacanthus gloriosus*  
*Enneacanthus obesus*  
*Lepomis auritus*  
*Lepomis cyanellus*  
*Lepomis gibbosus*  
*Lepomis gulosus*  
*Lepomis humilis*  
*Lepomis macrochirus*



# *Santee National Wildlife Refuge*

Route 2, Box 66

Summerton, S. C. 29148

Santee Refuge is one of over 400 National Wildlife Refuges. The primary objective of a National Wildlife Refuge is to provide habitat for the conservation and protection of all species of wildlife. Sport fishing is permitted at a level compatible with the environment, provides wholesome recreational activities, and permits the use of a valuable renewable resource.

The regulations listed below supplement the general regulations which govern fishing on wildlife refuge areas as set forth in Title 50 Code of Federal Regulations. Sport fishing will be in accordance with applicable State regulations.

## GENERAL FISHING REGULATIONS

Public fishing on the Santee National Wildlife Refuge is permitted on approximately 16,000 acres as shown on the reverse map, except for those areas designated by signs and/or map as being closed.

Sport fishing is permitted 24 hours per day except for waters within land units which are limited to daylight use/bank fishing only.

Sport fishing is permitted year-round except that Cantey Bay, Black Bottom, Savannah Branch and waters within all land units are closed from November 1 through February 28.

A valid State fishing license is required in accordance with State regulations.

Camping, overnight mooring of boats, open fires and firearms are prohibited.

Disturbing, damaging, destroying or other molesting of wildlife, habitat, or refuge facilities is prohibited.



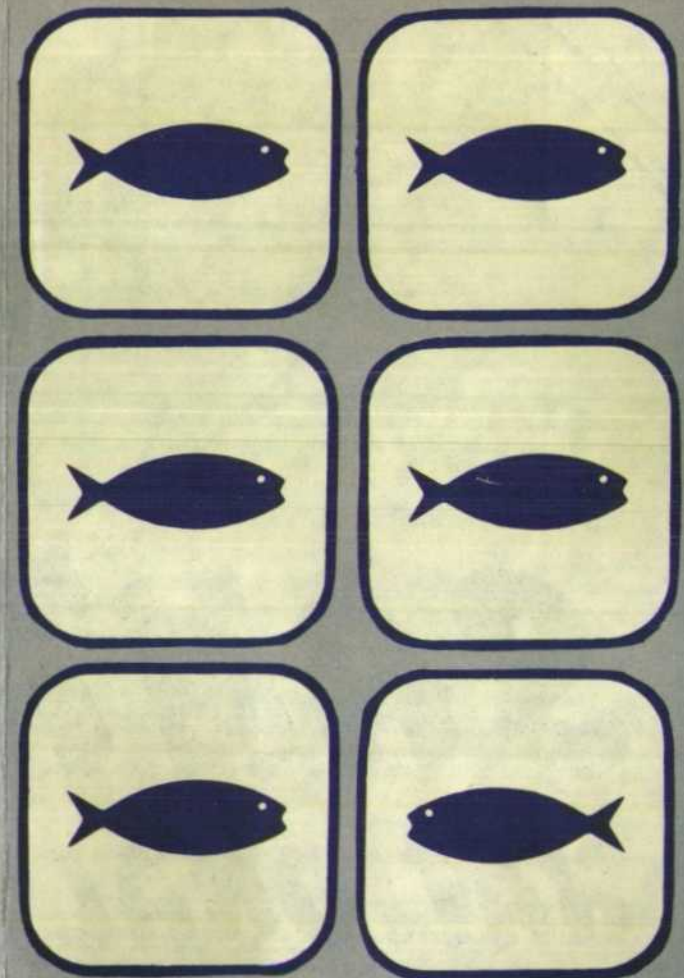
U. S. DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service

RF - 42570-7

March 1985

# *FISHING REGULATIONS*

## *Santee National Wildlife Refuge*









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NOTES

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## Calendar of Wildlife Events

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Santee  
National Wildlife Refuge

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## CALENDAR OF WILDLIFE EVENTS

This calendar is meant to provide visitors with a general guide to seasonal wildlife events. Weather may cause variations of one to two weeks.

**JANUARY.** . Waterfowl concentrations peak with Canada geese abundant on the wheat fields and large numbers of mallards in the impoundments and bays. "Winter" sparrows, juncos and finches are here in good numbers for the winter. Striped bass are schooling.

**FEBRUARY.** Waterfowl numbers begin to drop with shovelers becoming prevalent. Crappie begin to move into the creeks. Wood ducks, purple martins and bluebirds are beginning to look over the nesting boxes.

**MARCH** . . . Raptors are plentiful. Alligators may be seen sunning on canal and pond edges. Largemouth bass begin to move into the shallows.

**APRIL** . . . . Butterflies and dragonflies are everywhere. Buntings, orioles, tanagers, vireos and blue grosbeaks have returned and warblers are migrating. Productive fishing for most species.

**MAY.** . . . . Spring migration continues. Nesting activities are evident. Excellent fishing for all species.

**JUNE** . . . . Hummingbirds, titmice and chickadees are using the porch feeders while rabbits and squirrels forage below. Fish begin to seek out cooler waters. White bass begin schooling.

**JULY** . . . . Shorebirds begin to return from their nesting grounds and can be seen on pond and lake edges. Young of the year are out practicing their skills and learning to survive. Bass, crappie and catfish have moved to deep water.

**AUGUST.** . . Summer warblers begin to migrate south. Redbugs, biting flies and mosquitos are voracious. Fishing is generally poor.

**SEPTEMBER.** Fall songbird migration peaks. Terns are leaving as kestrels, blue-winged teal and gulls are arriving. Hummingbirds leave feeders.

**OCTOBER.** . Raptors, cormorants, white-throated and song sparrows, and waterfowl are arriving in numbers. Ruby-crowned kinglets and yellow-rumped warblers are prevalent. Catfishing is excellent.

**NOVEMBER.** Bald eagles are frequently sighted around waterfowl concentrations. Finches begin to monopolize the feeders. Striped bass are schooling.

**DECEMBER.** Large concentrations of waterfowl. Whistling swans may be observed on Bluff Unit. Excellent fishing for largemouth bass, striped bass and catfish.

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## VISITOR INFORMATION

The Santee National Wildlife Refuge Office/Visitor Center is located in North Santee on the shores of Lake Marion. The office is located off U.S. Highway 301/15, seven miles south of Summerton, S.C. and five miles north of Santee, S.C. Signs that will lead you to the office are located at the entrance to the refuge on U.S. Highway 301/15 and on Interstate 95, Exit 102. The historical site of Ft. Watson/Santee Indian Mound and the Wright's Bluff Nature Trail are located at the end of the paved entrance road and are open year round.

Public ramps for launching boats are located on the Cuddo Unit (State Highway 260 at Taw Caw Creek, open year round), on the Pine Island Unit (east end of State Highway 400, open year round), and on the Bluff Unit (State Highway 257 and U.S. Highway 301/15 intersection on Cantey Bay, open March 1 - October 31).

There are several campgrounds, restaurants, and motels within two to seven miles of the Refuge Office. Recreational camping is not permitted on the refuge. Restrooms and drinking water are available at the Refuge Office during office hours.

Foot, bicycle and boat traffic is permitted inside the land units from March 1 - October 31. Exterior Lake waters are open year round with the exception of Cantey Bay, Savannah Branch, and Black Bottom, which are closed to boating traffic from November 1 - February 28. The Dingle Pond Public Use Natural Area and the Scott's Lake and Wright's Bluff Nature Trail areas are open year round.

**REMEMBER** - Bring everything you need to make your visit enjoyable .... rain gear, comfortable walking shoes, insect repellent during warm weather, water, binoculars, etc.

**WEAPONS, WATER SKIING AND SWIMMING ARE NOT PERMITTED. PETS MUST BE ON A LEASH.**

For additional information on hunting, fishing, and other public uses, please write the Refuge Manager, Route 2, Box 66, Summerton, S.C. 29148 or call (803) 478-2217.

*DON'T LITTER, HELP KEEP OUR WILD AREAS CLEAN*

DEPARTMENT OF THE INTERIOR  
U. S. Fish and Wildlife Service

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Southern Hognose Snake (*Heterodon simus*)  
 Mole Kingsnake (*Lampropeltis calligaster*)  
 Eastern Kingsnake (*Lampropeltis getulus*)  
 Scarlet Kingsnake (*Lampropeltis triangulum*)  
 Eastern Coachwhip (*Masticophis flagellum*)

Redbelly Water Snake (*Nerodia erythrogaster*)  
 Banded Water Snake (*Nerodia fasciata*)  
 Brown Water Snake (*Nerodia taxispilota*)  
 Rough Green Snake (*Opheodrys aestivus*)  
 Pine Snake (*Pituophis melanoleucus*)  
 Glossy Crayfish Snake (*Regina rigida*)  
 Black Swamp Snake (*Seminatrix pygaea*)  
 Brown Snake (*Storeria dekayi*)  
 Redbelly Snake (*Storeria occipitomaculata*)  
 Southeastern Crowned Snake (*Tantilla coronata*)

Eastern Ribbon Snake (*Thamnophis sauritus*)  
 Eastern Garter Snake (*Thamnophis sirtalis*)  
 Rough Earth Snake (*Virginia striatula*)  
 Smooth Earth Snake (*Virginia valeriae*)

- \* Eastern Coral Snake (*Micrurus fulvius*)
- \* Copperhead (*Agkistrodon contortrix*)
- \* Cottonmouth (*Agkistrodon piscivorus*)
- \* Eastern Diamondback Rattlesnake (*Crotalus adamanteus*)
- \* Timber Rattlesnake (*Crotalus horridus*)
- \* Pigmy Rattlesnake (*Sistrurus miliarius*)

#### HYPOTHETICAL LIST OF AMPHIBIANS AND REPTILES WHOSE RANGES ARE IN THE VICINITY

Dwarf Mudpuppy (*Necturus punctatus*)  
 Tiger Salamander (*Ambystoma tigrinum*)  
 Two-lined Salamander (*Eurycea bislineata*)  
 Three-lined Salamander (*Eurycea guttolineata*)  
 Mud Salamander (*Pseudotriton montanus*)  
 River Frog (*Rana heckscheri*)  
 Pickerel Frog (*Rana palustris*)  
 Painted Turtle (*Chrysemys picta*)

DEPARTMENT OF THE INTERIOR  
 U. S. Fish and Wildlife Service

## AMPHIBIANS AND REPTILES OF THE SANTEE NATIONAL WILDLIFE REFUGE

The Santee National Wildlife Refuge, established in 1941 as a refuge for migratory waterfowl, lies in the upper coastal plains of central South Carolina in Clarendon County, approximately seven miles south of Summerton on Highway 301.

The refuge is comprised of 15,095 acres of mixed hardwoods, mixed pine-hardwoods, pine plantations, marsh, croplands, old fields, ponds, impoundments, and open waters located in four separate management units along Lake Marion, a hydro-electric reservoir. This diversity of habitats on Santee supports a wide variety of amphibians and reptiles.

This list of 35 amphibian species and 54 reptilian species is based on a special study by Dr. Julian R. Harrison, III of the College of Charleston, on observations by refuge personnel, state biologists, and local citizens, and on information obtained from the following books: *Amphibians and Reptiles of the Carolinas and Virginia*, 1980 edition, by Martof, Palmer, Bailey, Harrison, and Dermid, published by the University of North Carolina Press; *The Audubon Society Field Guide to North American Reptiles and Amphibians*, 1979 edition, by John L. Behler and Wayne King, published by Alfred A. Knopf, Incorporated, New York, New York. Persons having information regarding species not listed are urged to contact the Refuge Manager, Santee National Wildlife Refuge, Route 2, Box 66, Summerton, South Carolina 29148. The telephone number is (803) 478-2217.

### AMPHIBIANS

Amphibians, the first land-dwelling vertebrates, are very important links in the chain of life at Santee, in both roles of predator (eating insects, worms, mollusks, etc.) and prey (being eaten by many other organisms). Amphibians have moist, thin skin and most have four legs and soft clawless toes. Most young are totally aquatic while most adults are quasi-terrestrial air breathers.

**SALAMANDERS** - Long, slender bodies and small limbs make these animals resemble the more well known lizards. These amphibians are often overlooked by the casual observer since most are voiceless and nocturnal and can only be found by looking under rocks, logs, leaf litter, etc;

Lesser Siren (*Siren intermedia*)  
 Greater Siren (*Siren lacertina*)  
 Eastern Newt (*Notophthalmus viridescens*)



Two-toed Amphiuma (*Amphiuma means*)  
 Mabee's Salamander (*Ambystoma mabeei*)  
 Spotted Salamander (*Ambystoma maculatum*)  
 Marbled Salamander (*Ambystoma opacum*)  
 Mole Salamander (*Ambystoma talpoideum*)  
 Southern Dusky Salamander (*Desmognathus auriculatus*)  
 Dwarf Salamander (*Eurycea quadridigitata*)  
 Slimy Salamander (*Plethodon glutinosus*)  
 Many-lined Salamander (*Stereochilus marginatus*)

**FROGS AND TOADS** - Adult frogs and toads are easily recognized with their tailless stocky bodies, broad heads, large eyes, well-developed forelimbs, large hind legs, and unique vocalizations. The eggs of most of these amphibians hatch into aquatic forms called tadpoles which, in turn, change into the adult forms.

Eastern Spadefoot Toad (*Scaphiopus holbrooki*)  
 Oak Toad (*Bufo quercicus*)  
 Southern Toad (*Bufo terrestris*)  
 Fowler's Toad (*Bufo woodhousei*)  
 Northern Cricket Frog (*Acris crepitans*)  
 Southern Cricket Frog (*Acris gryllus*)  
 Gray Treefrog (*Hyla chrysoscelis*)  
 Green Treefrog (*Hyla cinerea*)  
 Spring Peeper (*Hyla crucifer*)  
 Pine Woods Treefrog (*Hyla femoralis*)  
 Barking Treefrog (*Hyla gratiosa*)  
 Squirrel Treefrog (*Hyla squirella*)  
 Little Grass Frog (*Limnaea ocularis*)  
 Brimley's Chorus Frog (*Pseudacris brimleyi*)  
 Southern Chorus Frog (*Pseudacris nigrita*)  
 Ornate Chorus Frog (*Pseudacris ornata*)  
 Crawfish Frog (*Rana areolata*)  
 Bullfrog (*Rana catesbeiana*)  
 Green Frog (*Rana clamitans*)  
 Pig Frog (*Rana grylio*)  
 Southern Leopard Frog (*Rana sphenoccephala*)  
 Carpenter Frog (*Rana virgatipes*)  
 Eastern Narrowmouth Toad (*Gastrophryne carolinensis*)

## REPTILES

About 300 million years ago, primitive amphibians evolved into reptiles with dry scaly skin, well-developed lungs, and either no limbs or four limbs with claws. These were the first vertebrates that could live on land without needing an aquatic environment during some stage of their life cycle.

**ALLIGATORS** - Large, armored "lizard-like" bodies make these aquatic carnivores easy to identify as they lie about basking in the sun or gliding through the water with nose and eyes protruding.

American Alligator (*alligator mississippiensis*)

**TURTLES** - A hard, protective shell, four limbs, a tail and a horny beak make these popular reptiles easy to identify as they lie basking on logs or as they stick their noses out of the water for a breath of air.

Snapping Turtle (*Chelydra serpentina*)  
 Eastern Mud Turtle (*Kinosternon subrubrum*)  
 Eastern Musk Turtle (*Sternotherus odoratus*)  
 River Cooter (*Chrysemys concinna*)  
 Florida Cooter (*Chrysemys floridana*)  
 Yellowbelly Slider (*Chrysemys scripta*)  
 Spotted Turtle (*Clemmys guttata*)  
 Chicken Turtle (*Deirochelys reticularia*)  
 Eastern Box Turtle (*Terrapene carolina*)  
 Spiny Softshell (*Trionyx spiniferus*)

**LIZARDS** - Dry scaly skin, clawed feet and external ear openings separate the reptiles from their amphibian ancestors, the salamanders. A few lizards are legless and are easily confused with snakes until you notice their ear openings and movable eyelids. The long slender tails of most lizards are easily broken, but they quickly grow another (regeneration).

Carolina Anole (*Anolis carolinensis*)  
 Eastern Fence Lizard (*Sceloporus undulatus*)  
 Five-lined Skink (*Eumeces fasciatus*)  
 Southeastern Five-lined Skink (*Eumeces inexpectatus*)  
 Broadhead Skink (*Eumeces laticeps*)  
 Ground Skink (*Scincella lateralis*)  
 Six-lined Racerunner (*Cnemidophorus sexlineatus*)  
 Slender Glass Lizard (*Ophisaurus attenuatus*)  
 Eastern Glass Lizard (*Ophisaurus ventralis*)

**SNAKES** - Long scaly bodies without limbs, external ear openings or eyelids distinguish these unpopular, but extremely necessary, reptiles. All snakes are carnivorous and swallow their prey whole, without chewing. Some snakes swallow live organisms, some wrap their bodies around their prey and suffocate it, and others inject poison into their prey to immobilize it. In the following list of refuge snakes, poisonous species are asterisked (\*).

Worm Snake (*Carphophis amoenus*)  
 Scarlet Snake (*Cemophora coccinea*)  
 Black Racer (*Coluber constrictor*)  
 Ringneck Snake (*Diadophis punctatus*)  
 Corn Snake (*Elaphe guttata*)  
 Rat Snake (*Elaphe obsoleta*)  
 Mud Snake (*Farancia abacura*)  
 Rainbow Snake (*Farancia erythrogramma*)  
 Eastern Hognose Snake (*Heterodon platyrhinos*)



## HUNTING REGULATIONS

### GENERAL PROVISIONS

Santee Refuge is one of over 400 national wildlife refuges. The primary objective of a national wildlife refuge is to provide habitat for the conservation and protection of all species of wildlife. The harvest of surplus animals is one tool used to manage wildlife populations. Carefully managed hunts maintain wildlife populations at a level compatible with the environment, provide wholesome recreational opportunities and permit the use of a valuable renewable resource.

The regulations listed below supplement the general regulations which govern hunting on wildlife refuge areas as set forth in Title 50, Code of Federal Regulations. Hunting will be in accordance with applicable State regulations.

### GENERAL HUNTING REGULATIONS

Public hunting of white-tailed deer, mourning dove, waterfowl, gray squirrel, raccoon and opossum is permitted on portions of the Santee National Wildlife Refuge other than those areas marked or otherwise designated as being closed to entry or to hunting (see reverse map).

Hunters must personally check in and out of designated check stations.

Permits are required for all hunts and must be in possession when hunting on the refuge.

Upland game and migratory bird hunters are requested to use hunter check stations identified on reverse map.

Dogs may be used only for dove, waterfowl, opossum and raccoon hunting.

All vehicles must remain on established refuge roads identified by signs and/or gates.

All firearms must be unloaded and dismantled or encased while being transported in a vehicle.

No Sunday hunting is permitted.

Hunters must launch boats at designated boat launching sites within the Cuddo Unit to hunt open water or island areas.

Camping, overnight parking, open fires and littering are prohibited.

All hunters under the age of 16 must have successfully completed a state-approved hunter education course in order to participate in any refuge hunt.

### SPECIFIC HUNTING REGULATIONS

#### BIG GAME

#### WHITE-TAILED DEER HUNTS

**Pine Island Unit** - Primitive Weapons Season - The first Monday in October through the following Saturday.

**Cuddo Unit** - Archery Season - The second Monday in October through the following Saturday.

Primitive Weapons Season - The third Monday in October through the following Saturday.

Primitive weapons include long or compound bows and muzzleloading (blackpowder) shotguns or rifles only.

No bag limit - either sex (does must be tagged at the designated check station prior to leaving the refuge).

An outer garment of daylight fluorescent orange material is required during gun deer hunts.

### UPLAND GAME CUDDO UNIT ONLY

**Gray Squirrel Only** - Fox squirrels are protected. Opens with State season and closed September 30.

**Raccoon and Opossum** - Last ten days of State gun season.

### MIGRATORY BIRDS CUDDO UNIT ONLY

**Mourning Dove** - Opens with State season and ends September 30.

**Waterfowl** - Opens for October season, hunting is allowed until noon.

Decoys and non-native blind materials must be removed at end of each days hunt. Permanent blinds are not permitted.

### SCOUTING

No special scouting season for white-tailed deer or waterfowl has been designated for the Cuddo Unit. Scouting is permitted during the dove and squirrel hunts.

The scouting period of the Pine Island Unit will be the last Friday and Saturday before the hunt - vehicles permitted. Hunters may scout anytime prior to this date on foot or bicycle.

### SANTEE NATIONAL WILDLIFE REFUGE

#### HUNT PERMIT VALID FOR:

#### BIG GAME, UPLAND GAME & MIGRATORY BIRDS

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_  
\_\_\_\_\_

I have read and understand the regulations governing hunting on Santee NWR.

\_\_\_\_\_  
SIGNATURE

This permit is valid only when signed by the hunter listed above.

# SANTEE NATIONAL WILDLIFE REFUGE

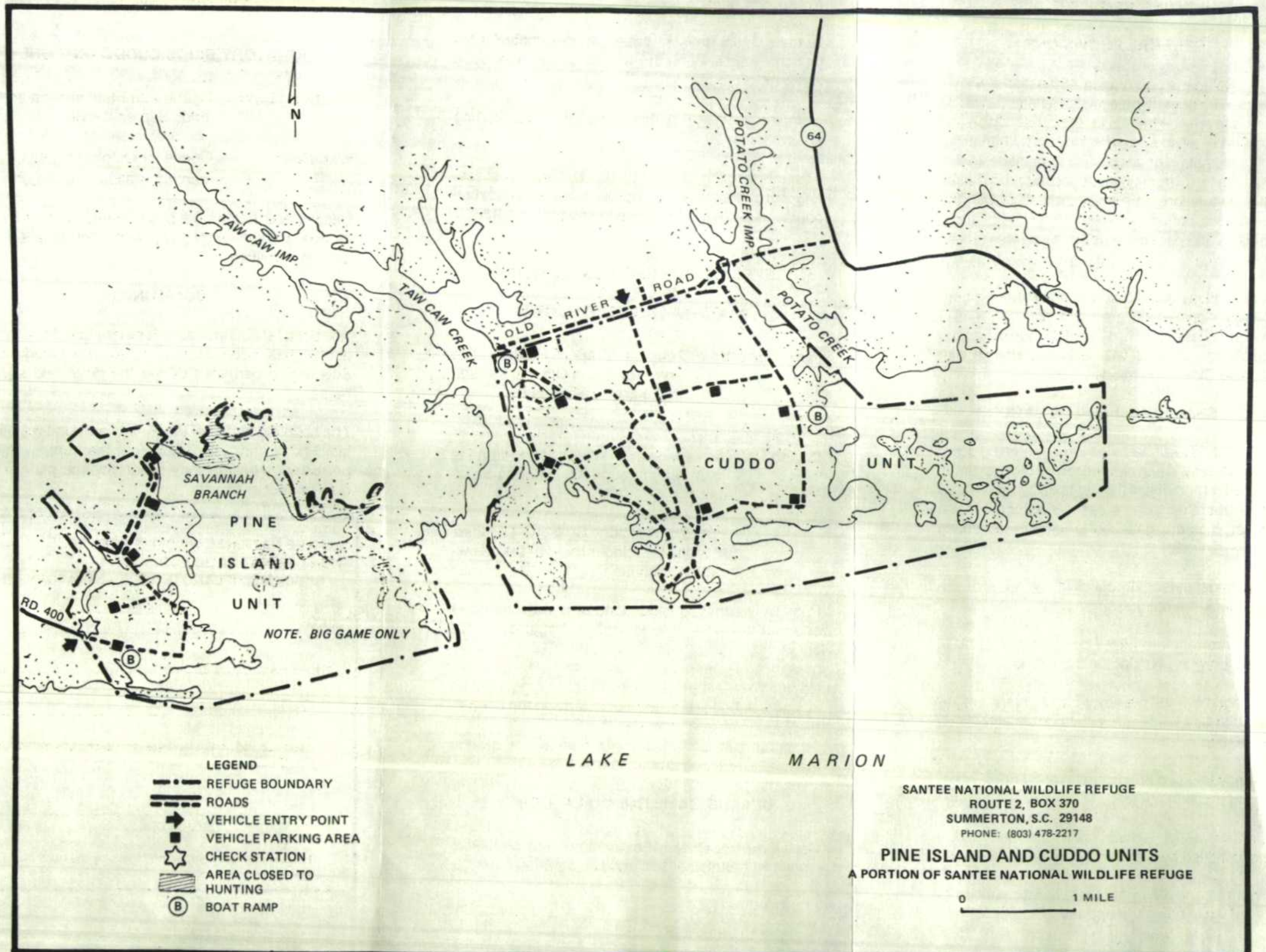


## HUNTING REGULATIONS



# SANTEE NATIONAL WILDLIFE REFUGE

SOUTH CAROLINA



SANTEE NATIONAL WILDLIFE REFUGE  
ROUTE 2, BOX 370  
SUMMERTON, S.C. 29148  
PHONE: (803) 478-2217

**PINE ISLAND AND CUDDO UNITS**  
A PORTION OF SANTEE NATIONAL WILDLIFE REFUGE



For more information contact:

Refuge Manager  
Santee National Wildlife Refuge  
Route 2, Box 66  
Summerton, SC 29148

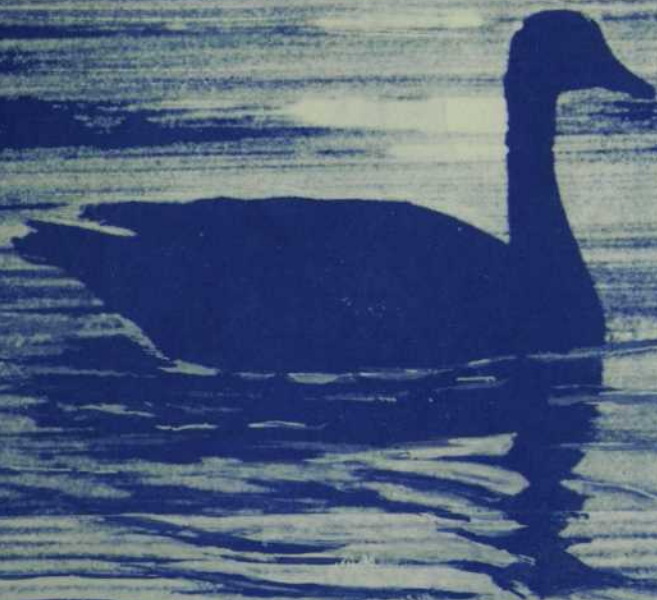
Phone (803) 478-2217



DEPARTMENT OF THE INTERIOR  
U.S. Fish and Wildlife Service  
RF-42570-1 - March 1985

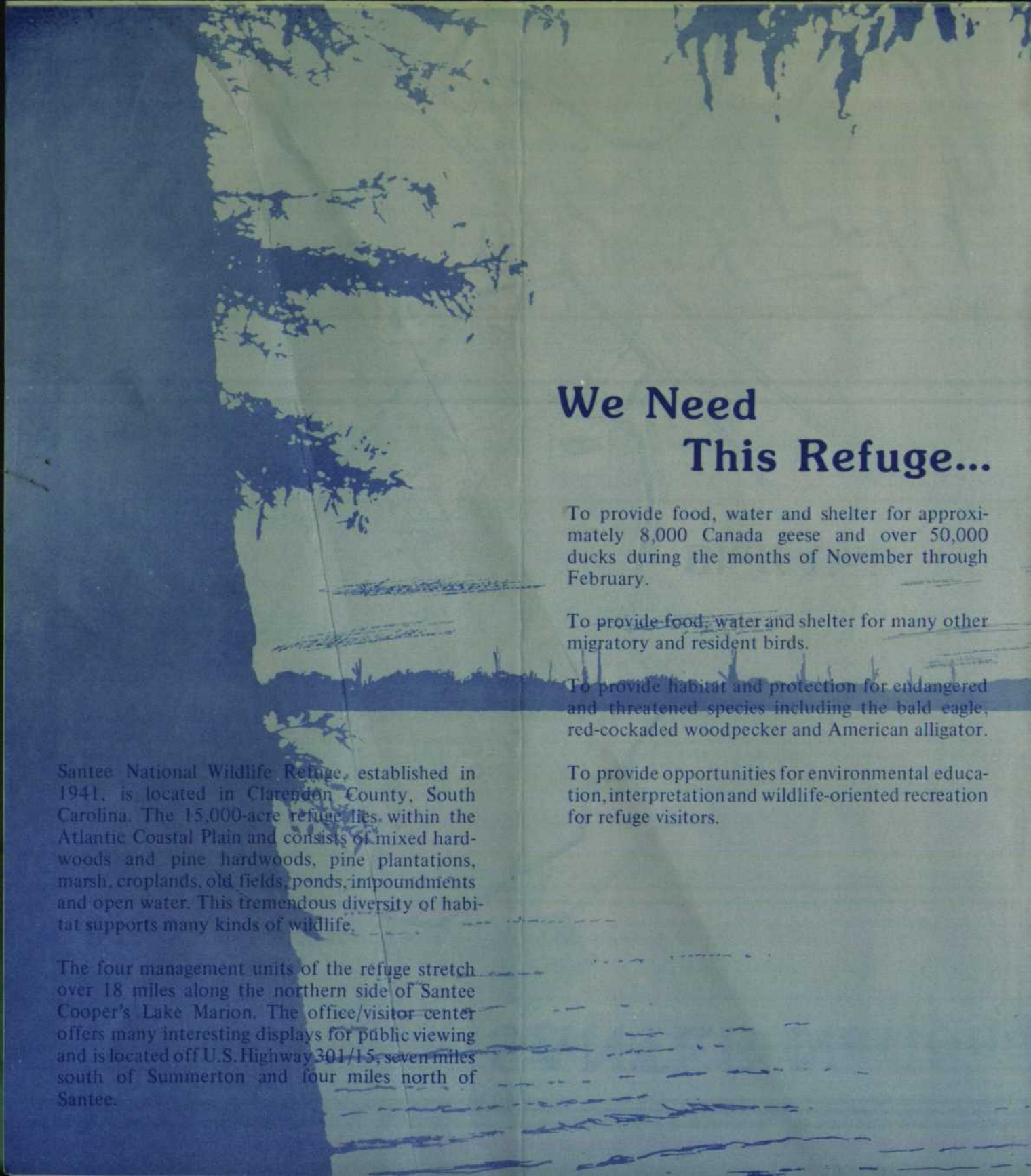
# SANTEE

## National Wildlife Refuge



## South Carolina





## We Need This Refuge...

To provide food, water and shelter for approximately 8,000 Canada geese and over 50,000 ducks during the months of November through February.

To provide food, water and shelter for many other migratory and resident birds.

To provide habitat and protection for endangered and threatened species including the bald eagle, red-cockaded woodpecker and American alligator.

To provide opportunities for environmental education, interpretation and wildlife-oriented recreation for refuge visitors.

Santee National Wildlife Refuge, established in 1941, is located in Clarendon County, South Carolina. The 15,000-acre refuge lies within the Atlantic Coastal Plain and consists of mixed hardwoods and pine hardwoods, pine plantations, marsh, croplands, old fields, ponds, impoundments and open water. This tremendous diversity of habitat supports many kinds of wildlife.

The four management units of the refuge stretch over 18 miles along the northern side of Santee Cooper's Lake Marion. The office/visitor center offers many interesting displays for public viewing and is located off U.S. Highway 301/15, seven miles south of Summerton and four miles north of Santee.





## Wildlife

A myriad of wildlife species inhabit the varied landscape of Santee. During the winter months the endangered bald eagle and occasionally the peregrine falcon can be seen. From November through February migrating waterfowl such as mallards, pintails, teal and wood ducks along with Canada geese are a major attraction. Throughout the year red-tailed and red-shouldered hawks can be viewed soaring overhead, as can a variety of songbirds in the trees, and wild turkey.

Birds are not the only residents of Santee. The forest provides a home for white-tailed deer and other woodland creatures such as raccoons, squirrels and bobcats. The ponds and marshes provide a home for an alligator here and there plus a number of snakes including cottonmouths.

## Habitat Management

To support a large variety of wildlife species, intensive habitat management is a must. The habitat management programs at Santee range from the very basic to the complex. One of the basic programs is the wood duck nest box program, where nesting boxes are provided in areas that are lacking in available tree cavities, thus "adding to" the natural habitat. The water and marsh management program is more complex. Water levels are adjusted to provide maximum benefits for wildlife. In the impoundments and marshes different levels are used to help some types of vegetation to grow while controlling unwanted "pest plants". Periodically flooded woodlands containing nut-producing hardwoods are food-rich and very beneficial to waterfowl.

The management of forest and croplands are also critical. Private farmers are contracted who plant corn, wheat, millet and soybeans. These crops attract many species of wildlife. The farmers receive three-quarters of the crops planted while leaving one-quarter for the refuge at no cost to the government.

Habitat management is a complicated process but well worth the effort since it provides an abundant amount of food, cover and shelter for a wide range of animals.



# Enjoy Your Visit...

Santee offers a variety of outdoor recreation activities for the refuge visitor. The refuge Visitor Center presents a general overview of what there is to do and see at Santee. Trails for hiking, wildlife observation and photography are available. Boating, fishing and hunting are also permitted. Portions of the refuge are closed during parts of the year. For current information on closures check with the refuge office.



**VISITOR CENTER** - The Santee Visitor Center is currently open Monday through Friday, 8:00 AM - 4:30 PM. It contains a number of displays describing refuge wildlife and habitats. The Center provides an excellent opportunity for the visitor to become acquainted with the refuge before venturing out, and is highly recommended, especially for the first time visitor.



**WILDLIFE OBSERVATION** - Foot and bicycle trails are open during March through October for wildlife observation, photography and hiking. For history buffs the Ft. Watson/Santee Indian Mound is a must. For birders, the dikes around the Dingle Pond Public Use Natural Area are excellent for viewing wading birds and shorebirds. Wintering migratory waterfowl may be observed from the observation tower along the Wright's Bluff Nature Trail, which is open year-round.



**BOATING** - Lake Marion is open year-round to boating, except Cantey Bay, Savannah Branch, and Black Bottom, which are closed from November 1 through the end of February. Public launches are available at Log Jam Landing and the Pine Island Unit Launch Site.



**FISHING** - All areas open to boating are also open to fishing, as well as the Scott's Lake Public Fishing Beach. Open year-round, these areas produce largemouth bass, catfish and bream. Remember, all Federal and State regulations are in effect.



**HUNTING** - Permitted on the refuge during designated seasons. Deer, small game, quail, dove and waterfowl seasons are scheduled yearly. Consult the hunt brochure for additional details.



# Dingle Pond Unit

0 1/2 1 Mile

Polly-Cantey Bay

Potato

Creek

Caw Creek

Taw

Black Bottom

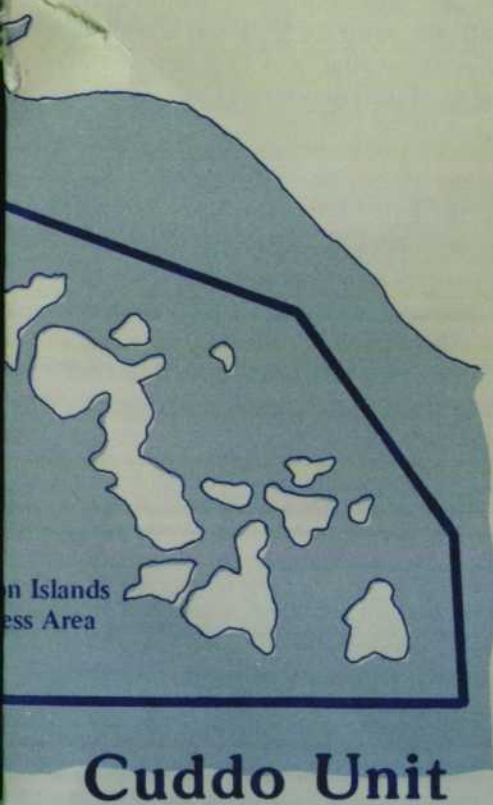
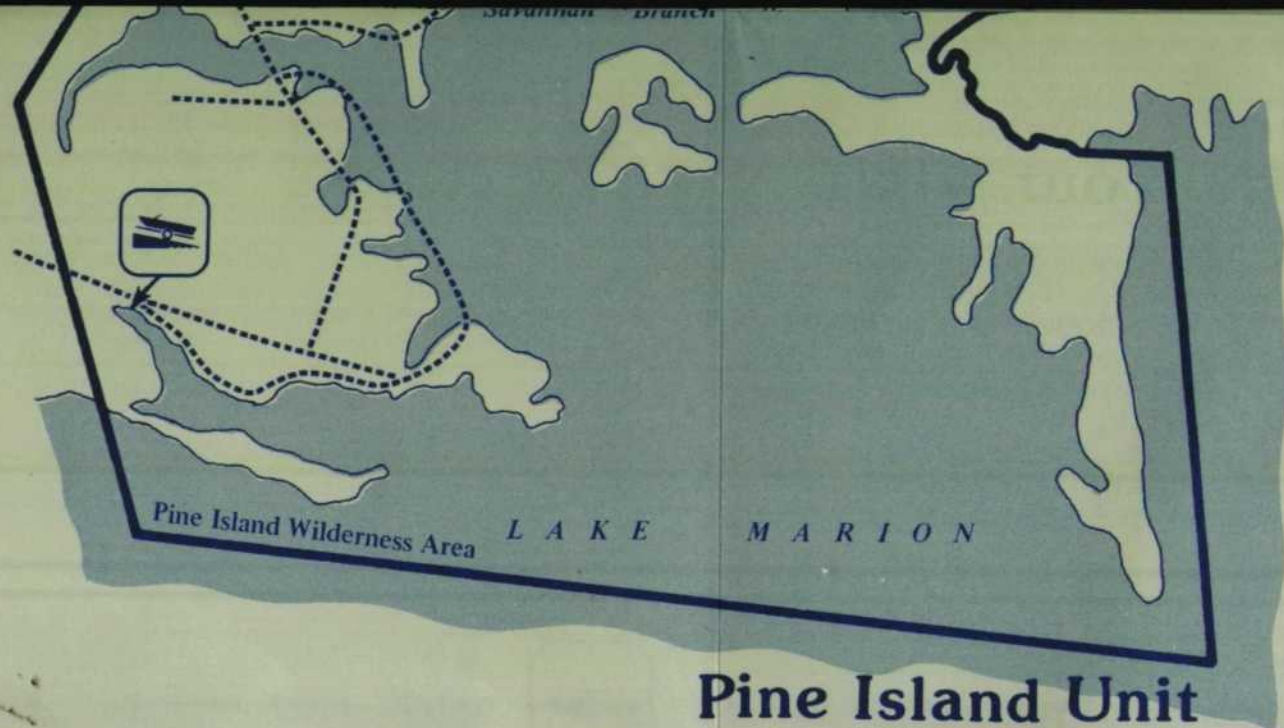
100Acre Island

Round Island

L A K E M A R I O N

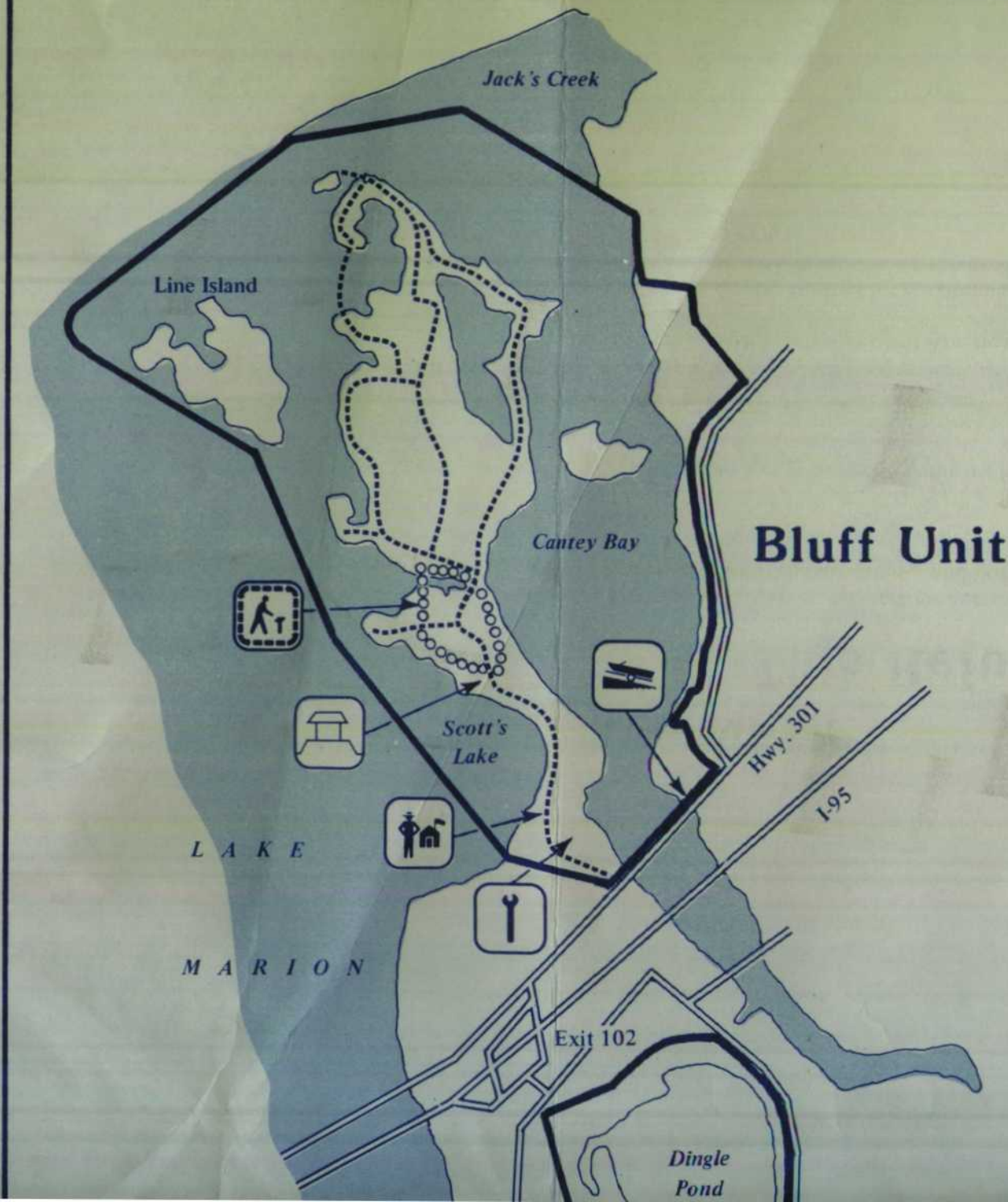
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# SANTEE National



# 1 Wildlife Refuge

