

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE
CURRITUCK NATIONAL WILDLIFE REFUGE
PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1986

Review and Approvals

Submitted By

Date

Refuge Supervisor Review

Date

Regional Office Approval

Date

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Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1986

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

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INTRODUCTION

Location

The 118,000 acre Alligator River National Wildlife Refuge lies at the eastern end of a broad, flat, and swampy peninsula in northeastern North Carolina. The majority of the refuge is located in the mainland portion of Dare County, with some land in Tyrrell County. The mainland of Dare County is part of a five county region bounded on the north by Albemarle Sound, on the east by Croatan and Pamlico Sounds, and on the south by Pamlico Sound and Pamlico River. Dare County is separated from Tyrrell County by the Alligator River, which forms part of the Intercoastal Waterway. On its southern border, Dare County joins Hyde County at a 7-mile-wide neck of land between Alligator River and Long Shoal River of Pamlico Sound. Thus, the mainland Dare County portion of the refuge is on a small peninsula at the tip of a large one. Since construction of the Intercoastal Waterway canal between Alligator River and Pamlico Sound, the area has been, at least technically, an island.

Background

Alligator River Refuge and the surrounding areas were first inhabited by native Indians. Although the first attempt at English settlement was made on nearby Roanoke Island in 1587, no large settlement by whites was established in the refuge area until a community called Beechlands was established in the late 1700's or early 1800's, near Milltail Creek.

In 1885 three lumbermen from Buffalo, New York purchased 168,000 acres of Dare County's mainland to set up a lumber industry and camp at Buffalo City, on Milltail Creek. The land changed owners several times over the years and eventually was obtained by the West Virginia Pulp and Paper Company. In 1974, the land was sold to McLean Industries in a large farming experiment called First Colony Farms. Prudential Life Insurance Company obtained all of the Prulean Corporation land as well as some of First Colony Farms land. Years before the Prudential Life Insurance Company donated what is now Alligator River NWR, discussions began between Prudential and The Nature Conservancy (TNC) concerning the possibility of a small donation of land on the Dare County mainland for the purpose of conservation. Although the discussions continued for some time, no actual land transfer occurred.

In March of 1980, the U.S. Army Corps of Engineers (COE) became aware of recent ditching and clearing in Prulean Farm's Dare County landholdings and ordered the operation to cease until after the issuance of a Section 404 permit.

In November of 1980, Prulean Farms applied for a Section 404 permit to clear and drain approximately 23,000 acres for agricultural purposes in the vicinity of Milltail Creek. A Clean Water Act Section 404 permit was granted in March 1981 for the Prulean Farms proposal to convert 2,800

acres to farmland in Dare and Tyrrell Counties while an EIS was being prepared on the 23,000 acre area. In June of 1982, the COE determined that Prulean's activities on approximately 3,457 acres in the Laurel Bay and Sawyer Lake Creek basins of Dare County, satisfied the requirements for a nationwide permit under Title 33, U.S. CFR. While the land clearing continued, the National Wildlife Federation filed a law suit to stop the clearing and conversion of wetlands on Prulean's Dare County landholdings.

In response to the permit proposal to convert 23,000 acres of wetlands to agricultural land by Prulean Farms, the Fish and Wildlife Service Ecological Services Office in Raleigh, N.C. initiated a habitat evaluation procedures study to analyze the fish and wildlife impacts of the proposal. The N.C. Museum of Natural History was contracted to compile a wildlife inventory of the area, and the FWS Asheville Endangered Species office was called in to analyze the possible impacts on endangered species.

In the spring of 1984, Prulean Farms withdrew their permit application and dissolved their organization. All property was transferred to Prudential Life Insurance Co. After more negotiation, Prudential decided to donate a total of 118,000 acres in Dare and Tyrrell Counties.

Before the donation was made, Prudential requested an "advanced ruling" from the Internal Revenue Service. Originally, the donation was to be made to TNC who planned to transfer the land to the FWS. In order to give an "advanced ruling", IRS required the donation be made to a federal agency so as to become a part of the public domain. Hence, the decision was made to make the donation directly to the FWS. Appraisors for Prudential valued it at 43 million dollars. A compromise of 47 million dollars was agreed upon. The FWS accepted title to the land on March 15, 1984.

Since the decision to donate directly to the FWS was made rather abruptly, direct Service involvement did not occur until 2 weeks prior to the actual deed transfer.

Although other management options existed, such as managing the area as a "coordination area" with the State, the decision was ultimately made to designate the area as a NWR and to move forward with appropriate funding and staffing.

The vast expanse of undisturbed swamp forest and wetlands on the refuge contain many important wildlife and ecological resources. Since much of the Pamlico peninsula has been developed by clear-cutting, peat mining, and agricultural conversion, this area remains as one of the most remote and diverse swamps in eastern North Carolina. Principal natural communities in the refuge include broad expanses of non-riverine swamp forests, pocosins, freshwater and salt marshes. Its isolation and undisturbed quality add to the value of its rich wildlife habitats. The Alligator River area is part of the northern border of the American alligator's range and remains as one of the last strongholds of the black bear in North Carolina and the mid-Atlantic coast. The refuge also provides habitat for the endangered red-cockaded woodpecker and migrating bald eagle and peregrine falcon.

A. HIGHLIGHTS

Preparation for and the arrival of the red wolves dominated the year at Alligator River. (Section G.2, I.1)

Hurricane Charlie visits the Outer Banks. (Section E)

Staff members receive special achievement awards. (Section E.1)

June and July provide OJT for fire crews. (Section F.9)

Alligator River Master Plan is history! (Section D.1)

B. CLIMATIC CONDITIONS

Climatic conditions were typical throughout most of the year with a hot humid summer and mild winter. Hurricane Charlie was the weather highlight of the year passing over us on August 19. Approximately nine inches of rainfall were associated with this storm, but only minor erosion to refuge roads resulted. Rainfall on the whole was below average with only around 37 inches recorded.

C. LAND ACQUISITION

1. Fee Title

No fee title acquisition was accomplished during the year. In the FY 86 Department of Interior Appropriation Bill, \$650,000 was ear-marked for a 6,000 acre addition to the refuge. Under an agreement with the North Carolina Nature Conservancy (TNC) the TNC would purchase this tract of land along with a 77 acre refuge inholding and donate the land to the refuge if the Service would purchase the Atlantic white cedar on the tract. The appropriated funds are to purchase this timber, and conveyance is expected early in 1987.

In Regional Office, realty personnel did an appraisal of a potential 18 acre headquarters site on Roanoke Island. A second appraisal by a third party is pending before the Service makes an offer to the owner.

The refuge learned in October that our largest inholding of approximately 11,000 acres was on the market. The owner, Prudential Insurance, had donated the entire refuge in 1985. They, however, retained this tract as an agricultural venture, evidently an unsuccessful endeavor. The land clearing/drainage was begun in the late 1980's and is nearly completed with a major canal and road-dike system completely encircling approximately 5,000 acres of fields.

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Two pumping stations with a total pumping capacity of 12 million gallons per hour are located on each end of the unit.

Notwithstanding obvious access and other wildlife values, the tract would make an excellent "turn key" waterfowl unit as it currently exists. Moist soil and cropland management could easily be employed to attract ducks and geese flying between the Currituck Sound and Mattamuskeet NWR. Presently there is little stopover enroute by these birds because good habitat is scarce between these two major wintering areas. The Regional Office and The Nature Conservancy have been contacted in hopes of donation to or acquisition by the Service, but at least two private hunting clubs are also negotiating with Prudential. We are keeping our fingers crossed.



1 - Aerial view of Prudential farm land. 10/86 JTT

3. Other

Two private hunting camps with cabins were located on the refuge at the time of its establishment. The Tull-Lennon hunt camp, located on Milltail Creek, was built some 50-60 years ago. The club has never had a written lease from any former property owner and no taxes have ever been paid on the camp. The second camp is located on Whipping Creek and has been in existence since the early 1950's. This camp was also operating under verbal permission from the former landowners but had been paying county property taxes. Due partly to congressional pressure, the Service allowed the continued use of both camps during the 1984-85 and 1985-86 hunting seasons. Even

though these camps are on government property without any legal authority, the hunt clubs qualified under the Uniform Relocation Assistance and Land Acquisition Policies Act of 1970 for financial reimbursement. In August, 1985, offers of \$5,000 and \$2,500 respectively were made to the club owners for the appraisal value of their property. Both camps vacated the camps in March, 1986 and the Service compensated the owners.

D. PLANNING

1. Master Planning

A majority of staff time during January, February, and March was spent finalizing the Alligator River NWR Master Plan. Public meetings were held in mid-February to receive public comment on the draft plan. Comments were generally favorable; the plan was "put to rest" in late March, pending printing of the final draft; and Regional Office sign off.

The "dragon of descent" reared his head several final times beginning in mid-June. An aide to Representative Walter B. Jones called the refuge office on June 19 to inquire as to the progress on the master plan. In early July, Refuge Manager Taylor addressed the Dare County Board of Commissioners about the concerns of some local residents on the Draft Master Plan. The board appointed a committee of 5 local residents to work with refuge staff about their concerns. On July 17, Manager Taylor, Assistant Manager Dunaway, and ORP Strawser met with the committee who proposed amendments to the Draft Master Plan. The proposed amendment would expand the area in which the hunting of deer with dogs would be allowed by approximately 6,000 acres and open three additional roads to motor vehicles. They also proposed removing approximately 6,000 acres from the management category which allows deer hunting with dogs. The committee was told that we appreciated their comments and would take them into consideration during the development of the final plan. We also advised them that no decisions could be made until the comment period for the draft plan was over. Evidently, this was not what the committee wanted to hear, and calls were made to the office of Representative Walter B. Jones. One of Jones's aides called another meeting. A similar discussion was held at this meeting and participants were again advised, "Thanks for the input, but no decisions will be made until after the comment period".

In August, Refuge Manager Taylor presented to the District Supervisor, Assistant Regional Director, and Regional Director a decision paper explaining the problem and offering justification for various solutions.

RD Pulliam made the final decision to compromise by opening Possum Road to vehicular traffic during hunting season only. No changes were made concerning the use of dogs for hunting in any of the areas involved.

At this writing, the final Master Plan for Alligator River NWR is in the process of being printed. The final step (RD signature) marks the end of a long road for Alligator River staff!

2. Management Plan

The Fire Management Plan was approved at the Regional Office in January 1986.

The Public Use Development Plan was signed off in Atlanta in January 1986.

3. Public Participation

Public meetings were held on the Draft Master Plan and the Red Wolf Re-establishment. Combining the two agendas worked well logically. A February 10, 1986 meeting was held in Columbia, N.C. with 54 participants. February 11, in East Lake, N.C., the potbellied stove warmed all 45 attenders. Manteo, N.C., on February 12 drew 63 concerned citizens and Stumpy Point, N.C. on February 13, had a crowd of 25.

Neutral and/or positive comments were in the majority concerning the red wolf re-establishment. Deer hunting with dogs continued to arouse vigorous response. Not too many neutral comments were received on this issue. Supporters and opponents alike kept the phones ringing and mailbox full long after the public meetings. Support for deer hunting with chase dogs was primarily local with a scattering of interested support from participants in southern states. Opposition was more national in scope. Many political contacts were generated by this issue.

4. Compliance With Environmental and Cultural Resource Mandates

Refuge Manager Taylor assisted Fish and Wildlife Enhancement in inspecting potential areas for easement under the Farm Bill.

6. Other

Considerable staff time was involved in providing assistance to Endangered Species concerning the red wolf project. Implementing the Recovery Plan required an environmental assessment with a Section 7 Consultation. These documents led to a Finding of No Significant Impact. Then work began on the rulemaking proposal which was published in the Federal Register on July 24, 1986. The rulemaking will classify the individual wolves selected for re-establishment, as well as all subsequent offspring, as an experimental population. This will permit their management and integration with other State and Federal programs. Concurrently, a technical proposal was developed to address the implementation of the project.

Refuge staff members have met with the Red Wolf Recovery Team as "observers".

E. ADMINISTRATION1. Personnel

2 - L to R: 8, 4, 16, 6, 5, 15, 3, 9, 7, 1

PERSONNEL

1. John Taylor, Refuge Manager, GS-12, EOD 01/07/86, PFT
2. M. Alton Dunaway, Assistant Refuge Manager, GS-11, TERM 09/27/86, PFT
3. Alan Schriver, Assistant Refuge Manager, GS-11, EOD 05/11/85, PFT
4. Scott Lanier, Assistant Refuge Manager, GS-05, EOD 09/02/86, PFT
5. Bonnie Strawser, Outdoor Recreation Planner, GS-09, EOD 12/31/80, PFT
6. Beverly Midgett, Secretary (Typing), GS-05, EOD 10/06/71, PFT
7. Angela Elmore, Biological Technician, GS-05, EOD 04/19/82, PFT
8. James Beasley, Biological Technician, GS-05, EOD 05/26/85, PFT
9. Mike Phillips, Biological Technician, GS-07, NTE 08/02/87, TFT
10. Beth Kennedy, Biological Aid, GS-03, NTE 11/02/87, INT
11. Chris Lucash, Biological Aid, GS-03, NTE 11/02/87, INT
12. Jay Tischendorf, Biological Aid, GS-03, NTE 11/02/87, INT
13. Paul Wagner, Biological Aid, GS-03, NTE 11/02/87, INT
14. Hilda Bayliss, Labor Foreman (YCC), WS-01, TERM 08/06/86, TFT
15. J. Bruce Creef, Maintenance Worker, WG-08, EOD 04/21/75, PFT
16. Jonathan Powers, Tractor Operator, WG-05, NTE 07/21/87, TFT

In July, Jonathan Powers reported for duty as a temporary Tractor Operator. Jonathan comes to us from the DOD in the Norfolk, VA area.

Assistant Refuge Manager Alton Dunaway transferred to the Department of Agriculture in September to run the Animal Damage Control facility at Jackson, TN.

Assistant Manager Schriver was temporarily promoted to fill Alton's slot in September and was permanently reassigned to that position in December.

Manager Trainee Scott Lanier reported for duty in September. Scott is no stranger to the area, having served here as a co-operative education student from N.C. State in 1985.

In August, Mike Phillips began his official tour of duty as Biological Technician for the red wolf project. Mike rolled into town earlier from Alaska and had been doing volunteer work at the refuge.

August saw Hilda Bayliss depart as our YCC program closed for the year. Hilda had been our Labor Foreman since June.

In November, Beth Kennedy, Chris Lucash, Jay Tischendorf, and Paul Wagner reported for duty as red wolf caretakers.

On November 4, a Personnel Assistance Review was conducted by Sheila Portoukalian (RO-PM).

In December, Division Chief McDaniel presented a Special Achievement Award to Refuge Manager Taylor for work on master planning and the Currituck NWR access problem; to Assistant Refuge Manager Schriver and ORP Strawser for master planning; to Maintenance Worker Creef, Bio-Techs Beasley and Elmore for hurricane damage repairs, and Manager Taylor submitted an award for Mattamuskeet's Jessie Williams for his help on the project. Secretary Midgett was rewarded with a quality step increase for sustained effort.

ORP Strawser was regraded to GS-09 after many rewrites of her position description and the personnel assistance review.

2. Youth Programs

Alligator River hosted a 10 enrollee YCC program in 1986. On April 16, enrollees were selected by a random drawing conducted by the Coastland Times staff. Hilda Bayliss, former Education Coordinator for the N.C. Marine Resources Center, was selected as Labor Foreman. Again this year, ORP Strawser acted as staff YCC coordinator.

YCC ENROLLEES

3 - L. to R. - Bill Seward, Chip Phillips, Hilda Bayliss
(Labor Foreman), Mike Ortega, Gracie Mann (Youth
Leader), and Andrean "Sweet Pea" Tillett (Youth
Leader).

8/86 BWS

The program began on June 16 with an enrollee orientation session. Bio-Tech Elmore ("Clamity Ange") presented an effective safety session which will long be remembered by all!

Again this year, refuge YCCer's assisted John Weske (Smithsonian Institute) with several banding operations. On June 24 and 26, tern banding was the "event of the day". Results were: Oregon Inlet - 3,030 royal, 451 sandwich with a total of 3,481 banded. Clam Shoal - 573 royal and 18 sandwich with a total of 591 banded. Ferry Channel - 7 common, 11 Forester, 35 sandwich, 114 royal, 9 herring gulls, 4 skimmers with a total of 180 banded.

On July 23 and August 8, 153 and 194 brown pelicans were banded respectively.

The YCCer's toured Pungo NWR on July 30. Assistant Manager David Kitts and Biological Technician Kelly Davis explained management of the refuge. A highlight of the visit was banding 67 wood ducks captured with a cannon net.

The summer of 1986 was a hot, humid one on coastal North Carolina. YCCer's literally "dropped like flies" as the temperatures soared. An outbreak of a flu-like virus added to the absenteeism. By the end of July enrollees numbered 5. Those hardy YCCer's completed the program with flying colors.

Many YCC projects were accomplished on Pea Island and Currituck NWR's and are discussed in the Annual Narrative Reports for those refuges. At Alligator River, clean-up, posting, and wolf pen preparation were major areas of YCC emphasis.

4. Volunteer Programs

Each year has its special role in the Alligator River NWR Volunteer Program: 1984 (and previous years) was "as luck would have it", 1985 was the year for organization and expansion, and 1986 has proved to be the year for diversification.



4 - Refuge Volunteers "Take Pride in America" at the Dare County Volunteer Fair.

04/86 BWS

During 1986, thirty-seven volunteers contributed 3,059 hours of service to Alligator River, Pea Island, and Currituck NWR's. Approximately half of that time involved the Pea Island Host/Hostess program. Unlike previous years, volunteers filtered deep into other aspects of refuge operations during 1986. A categorization of volunteer hours are: construction 120 hours; general maintenance 225 hours; information/visitor center receptionist 1,565 hours;

conducting tours 150 hours; clerical work 35 hours; photography 20 hours; exhibit design/preparation 10 hours; volunteer program coordination 20 hours; wildlife censusing 354 hours; YCC supervision 460 hours; NHF Day 100 hours.

Projects at Alligator River included construction of dog (wolf) houses and electric fence control boxes for the red wolf project, design and construction of 16 hunter information boards, supervision of YCC projects, conducting public programs on the red wolf project, and participation in Career Days at local high schools and colleges.

Included as a part of the volunteer program, Alligator River provided intern programs for two college seniors during the summer months. Patricia Midgett (Appalachian State University) and Steve Smith (East Carolina University) provided valuable assistance by conducting public programs, supervising YCC projects, and assisting with other biological and maintenance programs.



5 - Interns Stephen Smith and Patricia Midgett provided much assistance for the busy summer! 8/86 BWS

Many of our refuge volunteers are retired professionals; all are proud to be able to give part of themselves to the refuge and to the community. On August 15, the annual volunteer pot luck was held to honor those volunteers who had reached specific "milestones". Volunteers Allen Valpey, Bill Perkinson, Bob Pitcher, and Ritchie Buckingham received awards for 100+ hours of service. Volunteers Margaret Burns, Warren Davis, Arch Bush, and Jessie Bush received awards for 250+ of service.

Volunteerism, in general, has been on the rise in the Dare County area. One stimulant to this trend was the organization of the Dare Voluntary Action Center (DVAC). The refuge has gained several very good volunteers through DVAC placement.

On September 16, 1986, DVAC hosted its first awards ceremony for community volunteers. Refuge volunteer Warren Davis was co-recipient of the Nelson M. Bortz Individual Human Service Volunteer Award for his outstanding contributions. Hats off for Warren!!

With volunteers contributing $1\frac{1}{2}$ man years to the refuge during 1986, many staff hours were saved, allowing paid staff to work on other projects. We owe a debt of gratitude to our dedicated and capable refuge volunteers.

5. Funding

In FY 86, Alligator River received base funding of \$257,500 to cover all three refuges. Pea Island received ARMM monies of \$10K for North Pond pump repairs and \$70K for repairs to the New Field dike (hurricane damage), and RPRP monies of \$3K. Another \$5K job order monies was received to install a water control structure on Alligator River. The red wolf project (endangered species) included a total of \$23K.

In FY 87, \$5K of RPRP monies was ear-marked for Alligator River, \$2K for Currituck, and the rest for Pea Island. The red wolf project was budgeted \$135K.

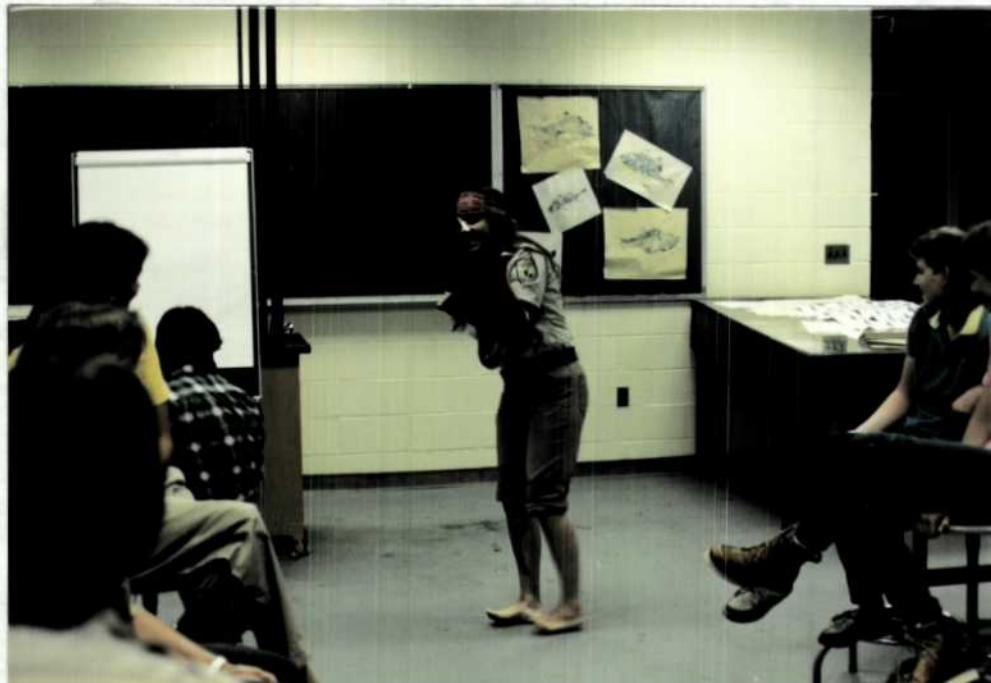
TWO YEAR FUNDING COMPARISON

<u>Work Code</u>	<u>FY 1987</u>	<u>FY 1986</u>
1260	313,800	257,500
ARMM		80,000
RPRP	22,000	3,000
Fire Equipment		20,000
ENHAN R4		5,000
ENDG SP	<u>135,000</u>	
TOTALS	470,800	388,500

6. Safety

Safety equals another year with zero time loss accidents! Congratulations to a safety conscious staff who advanced our total to 229,529 hours. We did have two accidents with one YCC enrollee who wrapped rope around his hand as the group tried to hoist an engine out of a muddy ditch. He also chopped a gash in his upper leg with an axe. (He was kneeling on his shin guards to get a closer swing at the bush). He was more embarrassed than hurt.

As a safety workshop "Calamity Ange" arrived with bandaged skull, patched eye, broken arm, blistered hand, splintered finger, chopped and stitched leg, and a purple toe. She explained to the new YCC crew and staff members how all her injuries could have been prevented if the proper safety gear had been worn. At the end of her skit, all injuries had been covered with the proper safety gear. She had become a safe-equipped worker. Then she discussed and demonstrated the proper and safe uses of hand tools.



6 - "Calamity Ange" explains why we use safety equipment!
06/86 BWS

Safety meetings of the year covered numerous topics with several "hands on" demonstrations. Topics discussed included attitudes about personal protective equipment, eye safety, safety belts, various wildlife diseases, poisons at work and home, collecting dead animals, and front-end loader safety. The "hands on" topics included: motor vehicle safety and maintenance inspection, personal fire equipment, fire shelters, the proper way to lift, handling class "B" explosives, the Heimlich Manouver, and the safe use of new 4 wheel ATC's.

Safety highlights and accomplishments were:

- safety precautions were taken and the beach was secured on Pea Island's north beach while demolition of a grounded fishing boat was attempted by a local company. What a blast!

- staff members wrestle with new refuge specific hunting regulations for the 86-87 seasons.
- refuge staff captured three of the six awards for the 1986 Safety Slogan Contest!!! "Good Luck Follows Safe Workers" (John Taylor), "Safety: Use It Or Lose It" (Jim Beasley), and "Safety Works For You" (Angela Elmore) were among the regional winners.
- on April 14, all staff members passed the STEP TEST for fire season.
- volunteers and interns were trained on the safe operation of the 3 wheeler ATV.
- Maintenance Worker Creef received training in Safe Motorgrader Operation at Mattamuskeet NWR.
- Assistant Managers Dunaway and Schriver, Bio-Techs Elmore and Beasley, Maintenance Worker Creef, and Tractor Operator Powers attended 18 wheel tractor trailer driver maintenance training and utility tractor training taught by Joe Markwitz at Mattamuskeet.
- on July 31, Joe Markwitz of Atlanta visited Pea Island and Alligator River for a structural safety inspection.
- Safety Officer Elmore trained staff on safe use of new 4 wheel ATC's.
- staff members presented safety programs to hunters for all Pea Island rabbit/pheasant hunts.

7. Technical Assistance

Assistance and advice was provided to North Carolina Power Company concerning osprey nesting on power poles, relocation of nests, and alternative nesting structures.

Advice was given to the National Park Service on prescribed fire on the barrier islands as they attempted to use fire to create vistas.

Advice on waterfowl impoundment management was provided to the Swan Island Hunt Club.

Judges were provided for the local science fairs.

8. Other Items

In May, Division Chief McDaniel conducted a station inspection.

In August, AWR Benson, Division Chief McDaniel, Public Use Manager Podriznik, and Conley Moffett from the Office of Public Use Management (CO); conducted a Take Pride In America Review and a Public Use Review.

December hosted Division Chief McDaniels' annual station inspection and administrative review with assistance from Elaine Bishop (RO) and Joyce Daniels (Mattamuskeet NWR).

F. HABITAT MANAGEMENT

1. General

Five basic habitat types are found on Alligator River Refuge. These are classified as wetlands based on the vegetation present, the degree of soil saturation, and the hydroperiod. Alligator River Refuge represents one of the last remaining large tracts of pocosin type habitat along the east coast. Although much of the refuge is relatively unaltered by man, large portions have undergone changes in vegetative composition and hydrology caused by ditching and canal dredging for access and timber logging purposes.



7 - The refuge is traversed by over 200 miles of roads.
Many wildlife species travel these roads rather than
fight the thick brush that cover most of the refuge.

01/87 ERK

2. Wetlands

Except for a 90 acre fallow field managed as a moist soil impoundment, very little active management has yet been applied to refuge wetlands. Future management will include water level management, prescribed

fire, and forest management. Initial steps have been taken to identify hydrology related needs and concerns for the development of a Refuge Water Management Plan.

Wetland types present on the Refuge are described as follows:

Marsh- Marshes on the refuge consist of irregularly-flooded salt marshes and several freshwater marshes. The largest portion of marsh on the refuge consists of salt marshes present along the eastern boundary adjacent to Croatan and Pamlico Sounds. These salt marshes are also associated with the mouth of almost every creek emptying into East and South Lakes.

Dominant vegetation within these marshes includes big cordgrass, black needlerush, salt meadow cordgrass, sawgrass, and saltmarsh cordgrass. Cattail, wax myrtle, baccharis, and many species of sedges, rushes, and other wetland plants are also present.



8 - Most roads are paralleled by associated deep water canals. These provide additional habitat for wood ducks and other water related species. 12/86 ERK

The freshwater marshes occur along the fringes of streams, lakes, and in isolated pockets in disturbed areas. Panic grasses, sawgrasses, arrow arum, cattail, and water lily are predominate in these areas.

Alligator River NWR Habitat Types
Table 1

Vegetated Wetlands Habitat Type	%	Approximate Acreage			Total
		Dare	Tyrrell		
White Cedar Swamp	6.7	6,900	1,000	7,900	
Hardwood Swamp	10.5	10,600	1,800	12,400	
Hardwood-Mixed Pine Swamp	31.3	33,800	3,200	37,000	
Low Pocosin	6.9	8,100	--	8,100	
Cane Pocosin	1.9	2,300	--	2,300	
Tree Pocosin	20.4	24,100	--	24,100	
Lakes/Open Water	1.0	1,000	--	1,000	
	100.0	112,000	6,000	118,000	

Pocosin - Alligator River NWR exhibits typical pocosin vegetation, characterized by dense shrub growth associated with scattered trees. The dominant tree species are usually pond pine, with some loblolly bay, red bay, and sweet bay. Common shrubs are titi, fetterbush, bitter gallberry, and sweet gallberry. Shrub and Smilax growth is often so dense that walking through it is impossible. Shrub-dominated areas are known as short or low pocosin. These areas are usually found over deeper peat deposits and experience long hydroperiods. Tree or tall pocosins contain more trees than shrub pocosins but lack the grasses, sedges, and herbaceous plants in the understory. Cane pocosins are dominated by a switch cane understory.

3. Forest

Alligator River swamp forests can be categorized into three general types.

Hardwood-Mixed Pine - The hardwood mixed pine forest type is found primarily in the western half of the refuge, but also occurs in scattered areas throughout. Red maple, red bay, and black gum are the dominant hardwood species and are usually mixed with loblolly and pond pine. The understory contains fetterbush and bitter gallberry with little or no herbaceous vegetation present.

Hardwood Swamp - Hardwood swamps are restricted to the western half of the refuge. They are characterized by red maple, black gum, and red bay as the dominant species with red bay and fetterbush comprising the understory. Very little herbaceous vegetation is present. Scattered old growth bald cypress is present in stands bordering the Alligator River.

White Cedar Swamp - Atlantic white cedar swamps are found on the western half of the refuge, primarily along Milltail Creek and in the southwest corner in the Whipping Creek area. This forest type contains dense stands of dominant white cedar with black gum as an

important subdominant. Sweet gallberry and fetterbush make up the understory. Virginia chain fern is the only herbaceous plant present in substantial amounts. Ms. Amilee Ladderman, who inspected refuge Atlantic white cedar stands in March, has been contracted by the FWS to do a community profile of Atlantic white cedar.

9. Fire Management

The Refuge Fire Management Plan was written and approved during 1986. Slight modification to the plan for prescribed burning will be made due to the Red Wolf Project.

Because of the introduction of the red wolf on the refuge, no large scale big block burning is planned for the next 3-5 years. If any burning is conducted it will be done in small blocks in order to avoid any possibility of injuring or killing the animals. Under our co-op agreement with the N.C. Division of Forest Resources, the State agrees to provide presuppression, detection, and suppression services, and will assume overall command of all fires on Alligator River NWR.

The N.C. Division of Forest Resources reported two wildfires on the refuge in 1986. The first fire occurring in June totalled approximately 300 acres of non-commercial forest. The cause was determined to be from a lightening strike. Refuge personnel and the N.C. Forest Service suppressed the fire in two days.



9 - N.C. Division of Forest Resource fire suppression activities.
06/86 JTT

The second fire which occurred in July was estimated at approximately 30 acres. The cause was believed to be from a stray bomb dropped on or near the U.S. Air Force Bombing Range. This fire was solely suppressed by the N.C. Forest Service in one day.

G. WILDLIFE

1. Wildlife Diversity

Alligator River NWR and its surrounding waters support a variety of resident and migratory wildlife. Of these, 48 species are fish, 145 are birds, 48 are reptiles and amphibians, and 40 are mammals.



10 - Clearcutting operations increase habitat diversity
for small mammals and other wildlife. 01/86 ERK

The refuge's interior lakes and streams support fish species characteristic of blackwater or oligohaline systems. The refuge's large size and habitat diversity provide for forest dwelling as well as marsh and shrub dwelling avian and mammalian species.

2. Endangered and/or Threatened Species

a. Federally Listed Endangered and Threatened Species

Four endangered species have been documented on the refuge, and the red wolf is being re-established. Refuge staff are only currently studying the red wolf. Inventory plans for the other species may be developed in the near future.



11 - Eight red wolves arrived at 12:30 p.m. on November
12. 11/86 MKP

American Alligator (Endangered) - American alligators reach the northern extent of their range in the refuge, and probably were never very numerous in the area. A few are seen each year in the marshes, ponds, streams, and canals.

Red-cockaded Woodpecker (Endangered) - Red-cockaded woodpeckers have been sighted and heard in Toblolly and pond pine stands on and adjacent to refuge land. An active colony is known to exist just south of the refuge on the Dare County Bombing Range.

Bald Eagle (Endangered) - Refuge staff sighted a mature bald eagle on December 24, in the South Lake area.

Peregrine Falcon (Endangered) - Although only two sightings were reported for 1986, peregrine falcons are known to move through the refuge during migration.

Red Wolf (Endangered) - Red wolves once roamed throughout the southeastern United States. Due to man's persecution of wild canids and disruption of habitat, the species was extirpated from the northern and eastern portion of its range by the late 1930's. The population continued to decline due to hybridization with coyotes. By the 1960's red wolves were restricted to a small area in southwestern Louisiana and southeastern Texas. Although first listed as endangered in 1967, red wolves didn't

receive priority treatment until passage of the Endangered Species Act in 1973. In 1980 the species was considered extinct in the wild.

After the species was selected for priority treatment, the Service undertook the capture of as many red wolves as possible in order to establish a breeding program at the Point Defiance Zoo at Tacoma, Washington. Over a 5-year period approximately 250 individuals were caught. Nineteen were determined to be red wolves; fourteen of these became the breeding stock for the captive program.

Shortly after the breeding program was established, the Service conducted translocation experiments on Bulls Island, a 5,000 acre component of the Cape Romain National Wildlife Refuge in South Carolina. On November 4, 1976, a mated pair of wolves was brought to the island and placed in an acclimation pen; they were released on December 13. During the evening of December 19 the female swam to the mainland. This forced the Service to return her and her mate to captivity. The project was reassessed and in early July, 1977 another mated pair was placed in the acclimation pen; they were not released until January 5, 1978. During the next 10 months the animals never strayed to the mainland. They established a home range of approximately 11 square miles, obtained food, gained weight and may have produced pups. Since it was not the intent of the project to re-establish a population, the pair was captured and placed back in the breeding program. These experiments demonstrated the feasibility of translocating wild-born red wolves.

From 1982 to 1984 the Service considered re-establishing red wolves on the Tennessee Valley Authority's Land Between the Lakes in western Kentucky and Tennessee. A proposal was developed and coordinated with the wildlife agencies for the two states. Public hearings were held during November and December, 1983. Opposition from several groups prompted the State agencies to withdraw support for the proposal resulting in the Service terminating the project.

Shortly after becoming federal property, the Alligator River National Wildlife Refuge was considered as a site to attempt a red wolf re-establishment. The refuge is ideal for this purpose for a number of reasons. Firstly, the human population in the area is small; approximately 1,400 people live in Manns Harbor, Stumpy Point, or East Lake. Secondly, the refuge is virtually an island, being bound on three sides by water and on the fourth side by an agricultural area that the wolves should be reluctant to cross. Thirdly, coyotes and feral dogs do not occur in the refuge. Fourthly, the area is large enough and there are enough prey animals and cover present to support a wolf population. And lastly, the area is within the historic range of the red wolf.

Early in 1985, the refuge conducted over 100 miles of canid surveys and over 1,500 trap nights of small mammal surveys on the refuge. Results indicated no feral dogs or coyotes and a moderate to high small mammal population on the refuge. During January and February 1986, the Refuge Manager, Regional Director, and Red Wolf Project Leader met with conservation groups, N.C. Department of Agriculture, N.C. Wildlife Resources Commission, the Dare County Commissioners, and others to brief them on the proposed red wolf project. Local meetings were held in Columbia, East Lake, Manteo, and Stumpy Point to elicit public response about the proposal. Opposition was minimal, and in late February the Service decided to attempt the re-establishment.

During spring and early summer, a great deal of time was spent slogging through the pocosins, sawgrass marshes, and hardwood swamps in an attempt to find four remote and reasonable dry sites for the acclimation pens. This was a difficult task in a wetlands area where 6 inches of relief is called a ridge.

By August the sites had been selected and work began on the four 2,500 square foot acclimation pens. The pens consist of 8 or 10 foot high panels made of cyclone fencing. A 3 foot wide skirt of fencing was secured to the ground around the inside perimeter of the pen to prevent the wolves from digging out. The pens were completed in early November after approximately 625 man hours of work. At this time, four biological aides were hired as caretakers. Their duties would include feeding and watering the wolves, assisting with handling the animals, and maintaining 24 hour security at the acclimation sites.



12 - Before being released into the acclimation pens, the wolves were fitted with motion-sensitive radio collars.

86 MKP

During early November, the final touches were put on the pens and the caretakers' living quarters: two trailers and a houseboat that we situated near the pens. On November 11, seven adult red wolves from Tacoma and one adult from the breeding facility at St. Louis began their journey to North Carolina. At the Raleigh-Durham Airport the wolves were loaded into a Coast Guard helicopter and flown to Manteo. The wolves arrived shortly after noon on the 12th.

While the animals were enroute, Regional Office staff along with the Red Wolf Project Leader and the Refuge Manager briefed approximately 100 members of the press. Among other things, they were told that they would be able to visit the Pole Road pen and watch the processing of male 140 and female 231.

Although the weather was cool, cloudy and wet, the crowd to meet the wolves had grown to over 150 as interested County residents lined the tarmac. The wolves were quickly loaded into trucks and taken to the acclimation pens. One pair had to be loaded into a boat for the final leg of their journey. A caravan of 25 vehicles carrying the press corps followed the Pole Road pair until the end of the all weather road closest to the pen. There they piled into Service 4-wheel drive vehicles for the last 5 miles.

Once in the pens the wolves were checked by a veterinarian and then fitted with motion-sensitive radio collars that allow us to monitor their activity and track them should they escape. Finally, they were released in the pens, which would be their homes for the next 6 months.

During their first three weeks in North Carolina, the animals were fed and watered daily. This routine was similar to the ones followed at Tacoma and St. Louis. We hoped this constancy would lessen the stress associated with growing accustomed to a new environment. However, we felt that to increase the wolves' chances of surviving in the wild the routine must eventually be changed. Daily contact with people would probably reinforce the wolves' tolerance of humans, a potentially deadly behavioral characteristic. Also, daily feedings meant the animals would never experience feast or famine, a situation familiar to wild wolves. We considered it important that the wolves be weaned from the dog food they had been fed all their lives and subsist on meat. Finally, we felt that the wolves should have the opportunity to hone their predatory skills by being given as much live prey as possible.

With these ideas in mind, we changed the captive routine on December 8 and started feeding the wolves every other day. On December 22 we introduced red meat into their diets. Approximately 160 hours have been spent collecting about half of the 2,500 pounds of meat (mostly road-killed animals) needed during the

acclimation period. Early in 1987, the wolves will be fed only meat and live prey every fourth day. The food will be thrown to the wolves from behind a screen to limit food association with people.

Although the technical proposal for the project calls for a 6 month acclimation period, the actual date of release will be a function of the reproductive biology of the animals. We are allowing two females to breed, while preventing the other two from doing so with subcutaneously implanted reproductive inhibitors. The South Lake pair will be released first. The gate to their acclimation pen will be opened approximately 2 weeks after the female has whelped, probably during late April or early May. After they have been on their own for about a week, we will stagger the release of the other pairs to simplify tracking and capturing (if necessary).

Prior to release, the wolves will be fitted with radio-triggered anesthetic-dart collars which contain motion-sensitive transmitters. These collars will allow us to locate and determine the activity status of a wolf, and, through radio command, capture the animal if necessary. To supplement radio tracking, we will place in each wolf one or two polymer discs impregnated with various gamma-emitting radioactive isotopes. This will result in the wolves' feces being uniquely marked for 1 to 2 years. Subsequent study of the feces should yield data on individual food habits, territorial and scent-marking behavior, movement patterns, population density, and individual susceptibility to internal parasites.

To better understand habitat use and food habits of red wolves, we also plan to study the relative abundance and distribution of small mammals.

We understand this is the first time anywhere in the world that an attempt has been made to re-establish a predator extinct in the wild. We are hopeful the project will be a success, and that the red wolf will once again roam free in the wild -- where it belongs. (See photo next page).

3. Waterfowl

Large numbers of waterfowl do not utilize Alligator River NWR, however, the refuge does support a substantial population of wood ducks which reside year-round. The wood ducks utilize the numerous ditches, canals, natural openings, and swamps on the refuge. Diving species such as scaup, canvasback, redhead, bufflehead and mergansers can be found in the Alligator River and the associated sounds.

Little Field, an old agricultural field of ±90 acres, is the only area on the refuge managed as a moist soil impoundment. A flashboard riser was installed and water level management began this year using a Crissafuli pump. The impoundment is extensively used by black ducks, pintails, and wood ducks.



13 - We're hopeful the project will be a success, and
that the red wolf will once again roam free in the
wild -- where it belongs. 86 MKP

8. Game Mammals

Alligator River NWR continued to support a healthy herd of white-tailed deer along with substantial small game populations. Annual hunts continue to keep the populations in check. (See photo next page).

10. Other Resident Wildlife

The refuge is one of the few remaining coastal areas in the southeastern United States which presently harbors a substantial black bear population. Black bear use all major cover types on the refuge, particularly the diverse, dense habitats in the isolated, roadless areas. The forested wetlands on the west side of the refuge are the preferred habitat type in late summer and early fall for foraging on black gum fruit, and is believed to be our best denning area. Approximately 6,000 acres of this habitat, The Gum Swamp Natural Area, has been closed to hunting with chase dogs and vehicular traffic in order to enhance this areas appeal to the black bear. In addition to these forested wetlands on the western portion of the refuge, black bear make extensive use of the switchcane thickets in the late spring and summer.



14 - Rocky Raccoon establishing that oysters, scallops, and crabs, in fact, do not grow on trees. 12/86 ERK

H. PUBLIC USE

1. General

Hunting is the major public use activity on Alligator River NWR. Since Alligator River is not noted for waterfowl or as a "birder's paradise", little non-consumptive public use occurs. In actuality, non-consumptive public use is not expected to increase significantly in the foreseeable future. Total visits to the refuge in 1986 were estimated to be 8,828.

Current administrative offices for the refuge are in the laboratory section of the N.C. Aquariums on Roanoke Island. Though adequate for administrative purposes, the office leaves much to be desired for the visiting public. A few folks actually find the office and stop by, but most information is disseminated by telephone, correspondence, and through the news media. During 1986, the refuge staff responded to 2,450 public inquiries and issued 15 news releases directly related to Alligator River NWR. In addition, staff members participated in numerous radio "spots" about the master plan, the red wolf project, hunting, and other wildlife refuge topics.

The biggest media event for 1986, by far, was the arrival of the red wolf in Dare County. On November 12, four pairs of wolves arrived in Raleigh before flying to Manteo for another news briefing here.

accompanied by Refuge Manager Taylor and Warren Parker (SE). Over 100 news media reps and other on-lookers viewed the arrival. News coverage for the wolf project included: London Sunday Times, CBS, Duke University Chronicle, Mutual Radio, CBS Radio, USA Information Agency (American Almanac), Christian Science Monitor, S.C. and N.C. State News Service, Texas News, N.Y. Times, NBC, ABC, Raleigh News & Observer, National Geographic, Newsweek, Washington Chronicle, PBS, Coastland Times, Outer Banks Current, Richmond Times Dispatch, Virginian Pilot/Ledger Star, WTAR, President's Commission on American Outdoor's Newsletter, and WRAL-TV.



15 - The wolves' arrival was a major media event.

86 MKP

During 1986, most of the leg work was done to establish a weekly column in the local newspaper. The column "What's Happening With Wildlife - A Refuge Point of View" began running in mid-November. Public response to the weekly addition has been very favorable. The column provides a consistent audience for refuge staff to educate, preach, or philosophize, as different needs arise.

6. Interpretive Exhibits/Demonstration

Several exhibits/demonstrations were set up and manned by the refuge staff and volunteers in 1986.

On March 20, ORP Strawser represented the USFWS at the Dare County Job Fair. Approximately 550 students attended. This provided an ideal opportunity for YCC recruitment.

On May 17, Assistant Manager Dunaway manned a refuge exhibit at the Outer Banks Mall for "Dare County Law Enforcement Appreciation Day".

On May 10 and 11, Bio-Tech Elmore set up a display entitled "Ducks, Ducks, Ducks", for the Roanoke Island Garden Club flower show.

On June 7, the annual Dare Days celebration was held in Manteo, N.C. The Alligator River NWR exhibit was manned by interns Smith and Midgett.

On September 27, Alligator River NWR co-sponsored Dare County's 5th National Hunting and Fishing Day Expo and Youth Fishing Rodeo. An estimated 150 youth participated in the morning fishing activity and 1,000+ visitors attended the afternoon Expo.



16 - At the National Hunting & Fishing Day Expo, six year old Scotty 'William Tell' Schriver demonstrates the safe, effective way to shoot a bow! 10/86 BWS

7. Other Interpretive Programs

A number of on and off refuge programs were conducted during 1986. Most of the programs dealt with the red wolf project; a few addressed other issues or topics. A list of programs and brief descriptions of each follow.

Assistant Manager Schriver gave a red wolf presentation to the Manteo Rotary Club on January 20.

Refuge Manager Taylor spoke to the First Flight Lions Club about the red wolf on January 22.

On February 6, Manager Taylor flew to Washington, D.C. to meet Warren Parker to brief representatives from five conservation organizations and one free lance writer on the proposed red wolf reintroduction.

On March 17, Manager Taylor gave a talk on the Red Wolf Reintroduction for the Outer Banks Audubon Society. An update on the master plan was also given.

On April 1, Bio-Tech Elmore conducted a 45 minute program for the Dare County Tourist Bureau. Approximately 10 people participated.

On April 16, ORP Strawser presented 15 ten minute programs for the Environmental Awareness Field Day sponsored by the Soil Conservation Service. Approximately 150 eighth graders participated.

On May 31, Assistant Manager Dunaway spoke to the N.C. Wildlife Federation at their quarterly board meeting (update on red wolf proposal).

August 5, ORP Strawser met with Stumpy Point Civic Club to hear comments on draft MP/EA.

August 12, Manager Taylor gave a talk on the red wolf for the Outer Banks Rotary Club.

September 14, Assistant Manager Schriver presented a program on the red wolf for the Museum of Natural History in Raleigh.

September 30, Manager Taylor and State Wildlife Officer Earl Brinkley presented a "Hunter Information" meeting in Manns Harbor to discuss refuge hunting regulations to take effect this season.

November 10, Bio-Aid Tischendorf presented a slide program on the red wolf project to approximately 50 members of the Edenton Lions club.

November 17, Bio-Tech Phillips presented a red wolf slide program for approximately 20 members of the Outer Banks Audubon.

November 22 and 23, Assistant Manager Lanier guided a tour of Pea Island and Alligator River for the Leopold Wildlife Club of N.C. State. He also briefed the participants on the red wolf program.

On December 8, ORP Strawser presented a program on the red wolf project for approximately 115 members of the Elizabeth City Rotary Club.

With interest in the red wolf growing on the Outer Banks, the number of program requests was increasing proportionately. As could be expected, soon schools began requesting the program also. In order to meet this community need without putting unnecessary stress on the existing staff, recruitment began for volunteers to conduct school programs on the red wolf project and other wildlife topics. At the close of 1986, Warren Davis, long time volunteer at Pea Island and Alligator River, had been trained for the red wolf programs. Other volunteers were preparing slide programs on additional wildlife topics.

8. Hunting

Very soon after Prudential's donated lands became a new refuge, the decision was made to adopt N.C. State hunting seasons and regulations until the master plan was completed and approved. This was the most logical course of action to minimize confusion and to effect as smooth a transition as possible from private to public ownership and control.

White-tailed deer are the most sought after game species on refuge lands. Alligator River contains 118,000 acres of habitat traversed by more than 200 miles of logging roads. Because many of these roads share junctions with State roads, it is difficult to establish effective hunter check stations. The N.C. Wildlife Resources Commission requires hunters to register hunter-killed deer with a local wildlife cooperators agent, however, an estimated 40% go unreported. State records show 160 bucks and 13 does taken on the refuge in 1986. That translates into a more realistic harvest of ± 288 deer.



17 - "Three outa four ain't bad."

11/86 BWS

A limited amount of waterfowl hunting took place on the refuge, but most occurred over open water in the sounds and in East Lake.

Estimated public use on hunting activities is shown below:

<u>Activity</u>	<u>Visits</u>	<u>AH</u>
Duck	125	625
Deer (gun)	1,450	8,700
Deer (bow)	176	966
Small Game	260	1,005
Upland Game Birds	130	650

Small game hunting is primarily for raccoon, squirrel, and rabbit.

9. Fishing

The heaviest recreational fishing effort in the vicinity of the refuge is for striped bass in the surrounding sound system from October through April. Fishing pressure on the refuge is relatively low and is a reflection of the isolation of the area and limited access rather than of low catch per unit effort. The most popular fishing areas on the refuge are East Lake Canal, Milltail Creek Lake, and two areas of South Lake. Angling for bluegill, crappie, chain pickerel, channel catfish, flier, largemouth bass, and yellow and white perch is considered good.

During 1986, there were an estimated 1,370 fishing visits to the refuge with 4,740 activity hours spent participating in this activity.

10. Trapping

Furbearer trapping was allowed during State seasons under North Carolina regulations. Since no refuge permit was required in 1986, there is no quantitative data available on the number of trappers or trapper success. Species taken include raccoons, muskrat, otter, and mink.

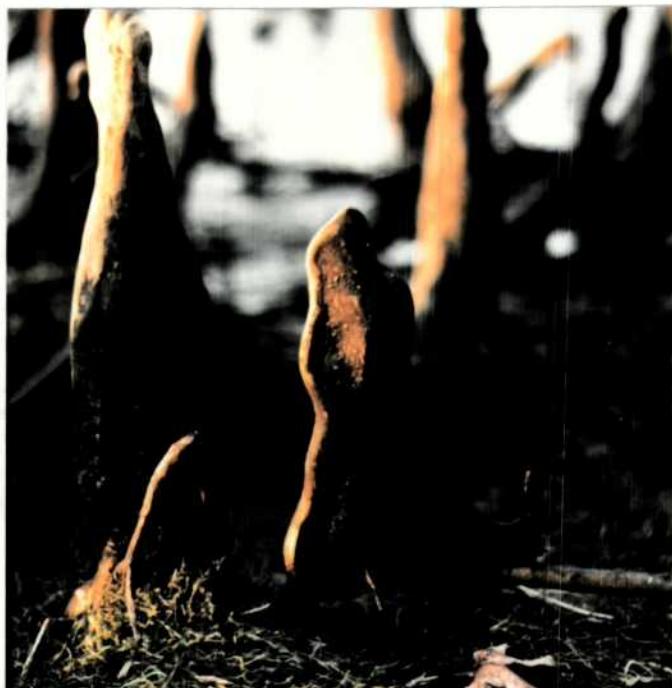
11. Wildlife Observation

Alligator River NWR attracts few visitors for any form of non-consumptive public use. Canoeists enjoy paddling on Milltail and Whipping Creeks and observing an occasional alligator, wood duck brood, or other wildlife in the area. The serenity is probably the most appealing aspect of the trip.

Wildlife photographers utilize the refuge to some extent for a chance at bear, deer, or any number of birds and other animals that may be wandering by. General habitat scenes are popular for the adventuresome few who go there.

The following figures represent wildlife/wildlands observation on Alligator River NWR during 1986:

<u>Activity</u>	<u>Visits</u>	<u>AH</u>
Foot	1,650	3,300
Vehicle	4,800	9,600
Boat	665	2,610
Photography	170	585



18 - Photographic opportunities at Alligator River include much more than a chance to shoot an alligator or a black bear.

01/87 ERK

17. Law Enforcement

This was the first year for enforcing refuge specific regulations on Alligator River. Staff officers conducted regular weekend patrols beginning with the opening of the deer season. The N.C. Wildlife Resources Commission officers also conducted patrols and enforced hunting regulations and laws. Hunter information boards complete with maps, regulations, and other pertinent information for hunting on the refuge were installed at key access points. Two of the signs fell victim to vandalism, a continuous problem.

The one regulation which appeared to create the most problem was prohibiting the transporting of loaded firearms on the refuge while engaged in hunting activity. Numerous verbal warning and some violation notices were issued for violating the regulation. During the deer season, two incidents of discharging hunting rifles inside a vehicle occurred. Luckily, no injuries occurred.

Bear poachers also created L.E. problems on the refuge. Attempts were made to identify the hunters and curtail their activities. A joint effort with N.C. Wildlife officers resulted in violation notices being issued to the main participant of the group for trespass and loaded firearm in a vehicle.

Dare County Sheriff's Deputies and Refuge officers searched select areas for the possibility of marijuana being grown on the refuge. The searches were conducted based on information received through informants of the Sheriff's Department. The suspected areas are remote with very limited access and under restricted military air space making aerial detection almost impossible. The alleged fields, which were reported to be booby trapped, were not located this season.

The following violations were issued during the 1986 hunting season:

Possession of uncased fire arm after hours - Pending
Entering National Wildlife Refuge after hours - Pending
Possession loaded firearm on National Wildlife Refuge - \$50.00 fine

The State wildlife officer made the following cases on the refuge this year:

Take deer after hours - \$400+costs+surrender license, not hunt for 1 year.
Birds/bait - \$10+costs
Bait ducks - \$150+costs+no hunting for 1 year.
Hunt with aid of vehicle - \$10+costs
No hunting license - \$10+costs
No hunting license - \$10+costs
No hunting license - \$10+costs
Fail to register deer - \$10+costs
No hunting license - \$10+costs
Hunting with improper gun - \$10+costs
No hunting license - \$10+costs
No hunting license - \$25+costs
Take deer after hours - \$400+\$279 for deer+surrender license, not hunt for 1 year.
Hunt with aid of vehicle - \$10+costs
Hunt with aid of light - Not guilty
Hunt with aid of light - Not guilty
Hunt with aid of light - \$500+\$80 costs+confiscated gun
Hunt with aid of light - \$500+\$80 costs+confiscated gun

Note: Court costs were \$40.00.

I. EQUIPMENT AND FACILITIES

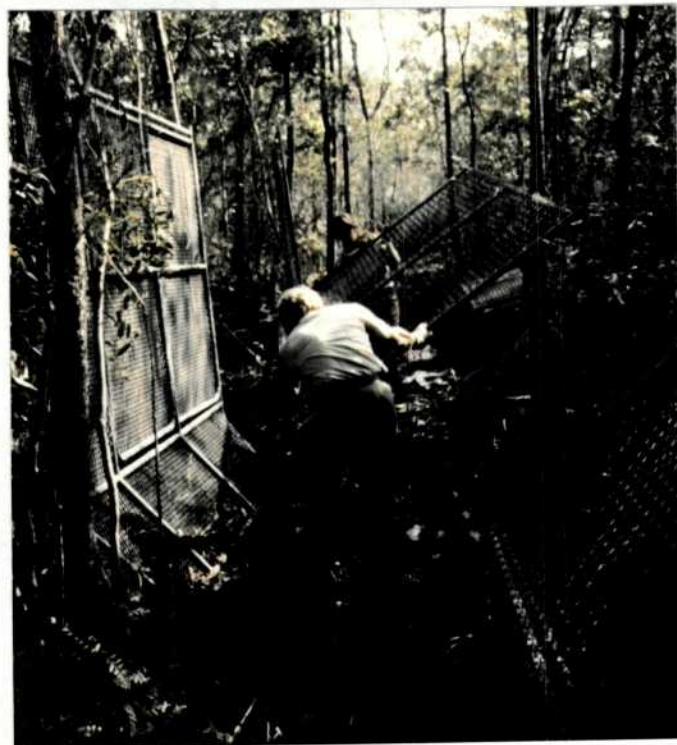
1. New Construction

Red wolf acclimation pen sites were located and marked with flagging by late July. Only one site was located where equipment could be used to prepare it. The other three sites were cleared and leveled by hand so the chain link enclosures could be erected. Four enclosures were ready for the wolves by the end of October.

Finding multiple locations for pen construction was no easy job. Very few high and dry spots were to be found on the Alligator River NWR. Not only were we concerned with relatively dry locations, but requirements of access and spatial positioning relative to the other sites had to be considered.

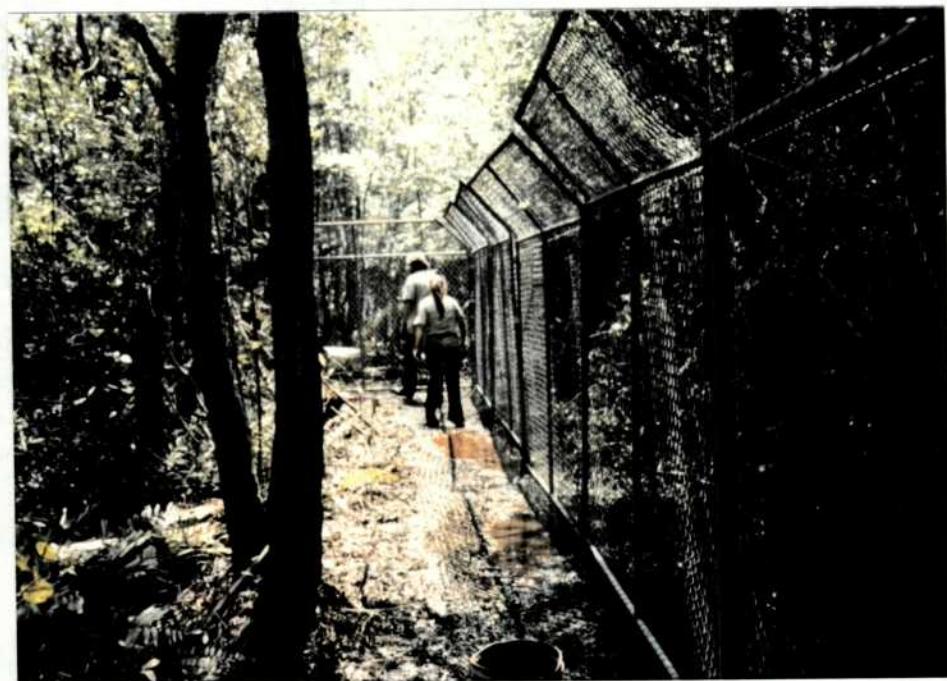


19 - Building the acclimation pens was hard, frustrating work.
86 MKP



20 - But, we finished them...

86 MKP



21 - ...ahead of schedule.

86 MKP

Site preparation was largely completed by hand. Only one pen site was directly accessible by vehicle. Two sites were within fifty yards of a road, but fifty yards of pocosin can be a long way. One site was accessible only by boat and provided a nice balance to our developing logistical nightmare. All the pens were constructed of prefabricated sections of chain link fence six to eight feet in height with a two foot inward overhand. A three foot wide foundation skirt of chain link mesh was first laid upon the ground. Clearing and leveling to accomodate the skirt was a thankless job. The combination of heat, humidity, location, access, relentless attacks by biting flies and mosquitoes, and the pressure of a rapidly approaching wolf delivery date did not phase the wolf pen construction crew; much. After the skirt was laid the fence sections clamped together with little trouble, the skirt and fence were wired together and guy wires were secured. We were finally ready to receive the red wolves.

This being the only place that this unglamorous phase of the red wolf re-establishment will receive any attention, I want to give a pat-on-the-back and a well deserved "atta-boy" to all who labored on this phase of the project.

A stoplog water control structure with a 24" pipe was installed at Little Field to enhance moist soil management capabilities.

4. Equipment Utilization and Replacement

Equipment problems at Alligator River are directly related to our large geographic area of coverage, expanding programs, and limited manpower and money. Obviously we cannot afford to purchase the equipment we need so we borrow a lot, which is very difficult to plan around, and we take advantage of government "yard rules". Most of the equipment we pick up is in need of repairs, however, the cost of repairs is significantly less than new acquisition costs. With a maintenance staff of one, down time is considerable, but we do the best we can with what we have to work with.

Items of interest acquired this year include: 1967 GMC truck tractor, 1966 IHC stake truck, 1976 GMC 4x4 dump, 1976 AC loader, and a 1977 Huber grader. New items included a Transport trailer (35T lowboy), 1986 AMC Wagoneer, 9.9 and 30 h.p. Johnson outboards, two 12' Monark boats, and two Yamaha 4-wheeled ATV's.

Three camper trailers were brought in for field housing for the red wolf caretakers. One is on loan from Hatchie NWR and two were transferred from Cross Creeks NWR and HEW in Atlanta.

5. Communications System

Several refuge vehicles have been equipped with scanners this year. National Park Service, North Carolina Forest Service, U.S. Coast Guard, N.C. Wildlife Resources Commission, National Weather Service, plus all the area law enforcement, fire, and EMS frequencies are now available for monitoring.

6. Computer Systems

The microcomputer we borrowed last summer from J. C. Bryant at F.L.E.T.C. to assist us through the master planning process was returned in April. We were very pleased with the computer and were just beginning to get "literate" enough to utilize more of its potential. Microcomputers integrated servicewide could be the answer to most of the administrative and data management problems we all have dealt with and fussed about for so long!

7. Energy Conservation

Car pooling and consolidation of trips from the headquarters area continues to be our major energy conservation effort.

J. OTHER ITEMS

1. Cooperative Programs

A special use permit was issued to Tideland Electric Membership Corp. to clear vegetation in and around their power line right-of-way.

Dr. Mary Ann Tompa was issued a SUP to collect pond pine seeds to continue her propagation studies and evaluate the effects of flooding.

U.S.D.A. placed gypsy moth traps on the refuge in an attempt to determine moth presence and densities.

2. Other Economic Uses

Two permittees placed 400 bee hives on the refuge during the year.

3. Items of Interest

In June, revenue sharing checks were delivered to the various county offices with Dare County receiving \$258,012.00; Currituck County receiving \$18,393.00; and Tyrrell County receiving \$9,921.00.

4. Credits

This narrative is a joint effort by all the refuge staff with the exception of the typing and assembly which rests solely upon Secretary Beverly Midgett.

The staff photo was taken by Carolyn Waltz.

K. FEEDBACK

It has been a very busy year for us, as I'm sure for most of the rest of you. However, we are very fortunate to be surrounded by good neighbors. I'm not talking about our local residents, some of which certainly fall into that category. I'm talking about our neighbor refuges. It's hard to start up any new refuge, but with neighboring refuges like we have you know help is only a phone away. Over the last two years, Mattamuskeet, Pungo, and Cedar Island to the south have taken us under their wing more than I would like to admit. Pee Dee is always there to the west and MacKay Island to the north. Regional boundaries present no problems for us, Dismal Swamp and Back Bay have never hesitated giving a helping hand when they can.

I dare to say we have borrowed or, been transferred equipment or materials from everyone of those stations, but two examples of assistance come especially to mind. A major dike on Pea Island Refuge was breached in 1985 by Hurricane Gloria. A major force account repair was undertaken by the refuge in the spring of 1986. A year later, after setback from Hurricane Charlie and equipment breakdowns, we are nearing completion of the project. Mattamuskeet has loaned us their dragline during the entire period. Their D-7 and several other pieces of equipment was called on when needed. Hundreds of staff hours were spent by their employees helping us get the job done. Needless to say, we couldn't have done it without them. Thanks again, Larry.

Another example of the good neighbors we have is the Red Wolf Project. The Endangered Species Office and Alligator River cannot claim sole credit for the success of the project thus far. Again, equipment was generously loaned by Mattamuskeet; and Pee Dee, MacKay Island, Pungo, and Mattamuskeet all spent many hours (on and off duty) collecting road kill animals and trapping live prey for wolf food. If the wolves make it, these refuges can take pride in knowing they contributed to the re-establishment.

Again, we are fortunate here at Alligator River Refuge to be surrounded by refuges with managers willing to help one another when they can. I've found this to be the case most places throughout the nation I've worked and it's one of the things that makes me proud to be part of the refuge family.

On a sour note - when is the Department going to update the Administrative Manual? Most sections of the AM are so out-of-date and cluttered up that one has to do a major "literature search" to find out if this page dated March 1968 is still current. Has it been superceded by a section of the Refuge Manual or been updated by memoranda from the Regional or Washington Offices. One finally gives up and just calls the Regional Office to find out the answer to his or her question. They in turn have to conduct a quest for the truth for their Administrative Manual is no better than yours. Obviously, this is a waste of everyone's time.

The Regional and Washington Offices need to put pressure on the Department to update this manual. A monumental task yes, but one that needs to be undertaken and soon.

CURRITUCK NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1986

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

INTRODUCTION

The Currituck NWR is located in northern Currituck County, North Carolina along the Outer Banks barrier island chain. The Currituck Banks are part of an extensive coastal lowland which stretches from Newfoundland southward to Florida, and westward into the Gulf of Mexico. Along the Currituck Banks, inlets have periodically formed and reformed depending on the occurrence of storms, amount of sedimentation, the tidal heights, and degree of vegetation on the barrier beach.

The Fish and Wildlife Service has long recognized the dynamic and fragile character of coastal barrier islands and has endeavored to represent the national interest in protection of barrier islands in general. The estuaries and sounds that these barrier islands protect are among the richest and most productive ecosystems known to man. They provide nesting and feeding grounds for numerous bird and mammal species in addition to being important nursery and spawning areas for fin and shellfish.

The Outer Banks remained isolated from the mainstream of activity in early America, and those few people who lived there relied heavily on activities associated with the area's natural values for their subsistence. Activity in the Outer Banks/Currituck Sound area reached a peak in the late 1800's when commercial fishing and market hunting were at an all time high. A number of hunting clubs were established for sport hunting of waterfowl and drew much of their membership from affluent northern businessmen and professionals.

The hazards to shipping of shoals near the Outer Banks resulted in numerous wrecks along the coast. Lifesaving stations were established at intervals along the beach and several of these still exist as does the Currituck Lighthouse at Corolla.

Acquisition of Currituck NWR was designed to preserve and protect a portion of the North Carolina Outer Banks, one of the largest undeveloped coastal barrier ecosystems remaining on the East Coast. This area has further been identified as an important black duck wintering area. Fish and Wildlife Service ownership would ensure perpetuation of basic wetland functions including nutrient cycling, floodplain and erosion control; and would help preserve the role of Currituck Sound estuary's as important nursery areas. Ownership of the protective buffer east of the productive marshes bordering the sound would protect the marsh from direct pollution sources associated with development.

During 1975 and 1976 The Nature Conservancy (TNC) acquired several parcels of land on the Currituck Outer Banks. The two major tracts of land that came under at least partial control of TNC were being utilized by the Swan Island Hunt Club and the Monkey Island Club. Funds to purchase these areas were provided by the Melon Foundation, a sponsor of the National Wetlands Project. TNC had committed to a 2 to 1 matching of funds.

TNC transferred approximately 500 acres of the Monkey Island tract to the State of North Carolina for inclusion in the National Estuarine Sanctuary System. A narrow strip from sound to sea of approximately 50 acres was retained by TNC.

The Migratory Bird Conservation Commission (MBCC) met to consider the Currituck Refuge on August 2, 1983. The MBCC approved the boundary of the refuge in two parcels: the Monkey Island tract, which is just north of the village Corolla, and the Swan Island property some three miles to the north.

Two phases of acquisition resulted in approximately 1,185 acres fee, 166 acres in conservation easement and some hunting blind rights at a cost of \$3.9 million.

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7. Energy Conservation.....	"Nothing to report"
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K. FEEDBACK....."Nothing to report"L. INFORMATION PACKET ---- (inside back cover)

A. HIGHLIGHTS

ARD Benson and Chief McDaniel review the proposed Monkey Island exchange during their August visit. (Section C.3)

MacKay Island NWR is welcomed to Region 4. (Section J.1)

Piping plovers observed on refuge. (Section G.2)

A covert strategy to remove trespass cattle from the refuge works. (Section A.17)

B. CLIMATIC CONDITIONS

See Alligator River NWR narrative.

C. LAND ACQUISITION

3. Other

In August, Currituck County contacted the refuge to discuss the possibility of exchanging 55 acres of county owned marsh for the refuge owned acre Monkey Island. Located on the island are the lodge, caretaker's house, and boathouse from the former Monkey Island Hunt Club. The structures have some historical significance, more so to the county than nationally, but the Service does not have the money or manpower to properly maintain and protect them. The county would like to turn the island into a historical/outdoor classroom for the school system.

Since the county marsh lands have a greater wildlife value, we are in favor of the exchange. Realty personnel from the Regional Office visited the sites to appraise the land values. An initial review indicates the island is worth considerably more than the marsh. A solution to this inequality must be found before the exchange can be carried out.

D. PLANNING

6. Other

Assistant Managers Schriver and Lanier represented the refuge on the N.C. Marine Estuarine Sanctuary Advisory Board at its annual meeting. No significant actions affecting the refuge were discussed.

E. ADMINISTRATION

1. Personnel

See Alligator River NWR narrative.

2. Youth Programs

For several weeks, Alligator River NWR YCCer's worked on Currituck NWR. The major project, posting the recently surveyed boundaries, was a long, hot, energy consuming task. YCCer's walked sign posts with signs along the boundary line, crossing marsh, hummocks, and dune areas. On some days, the lack of accessibility caused the day's accomplishments to be carrying in and erecting only one sign post per person. The job was much more difficult than had been expected; however, a major part of the needed posting was completed. At this writing, the posting of the sound shore has not been accomplished.

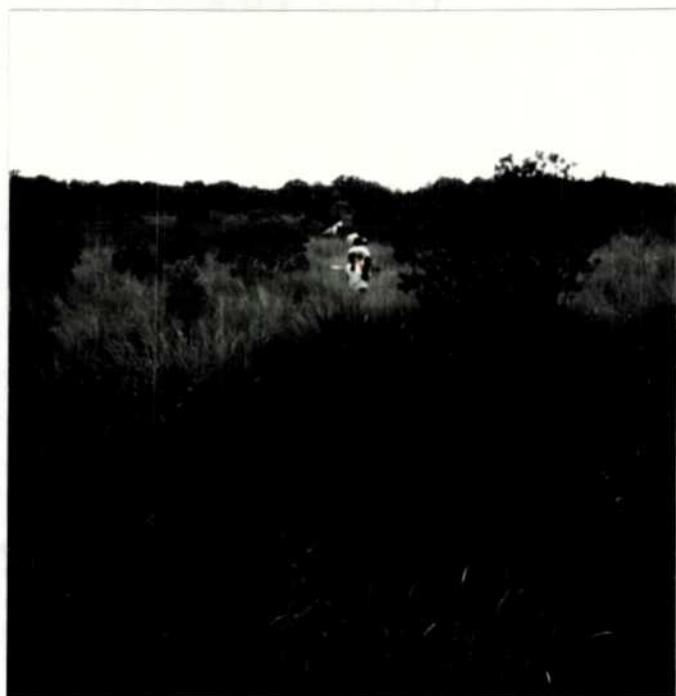
In addition to boundary posting, YCCer's constructed a "cattle enclosure" to aid managers in assessing the effects of indiscriminant mammal grazing on the potential "duck food". Three transect lines were also installed to assist in further vegetative studies.

For more details of the 1986 YCC program, see Section E.2 of the Alligator River NWR narrative.



1 - Boundary posting

08/86 BWS



2 -for miles, and miles, and miles.

08/86 BWS

5. Funding

See Alligator River NWR narrative.

6. Technical Assistance

See Alligator River NWR narrative.

F. HABITAT MANAGEMENT

1. General

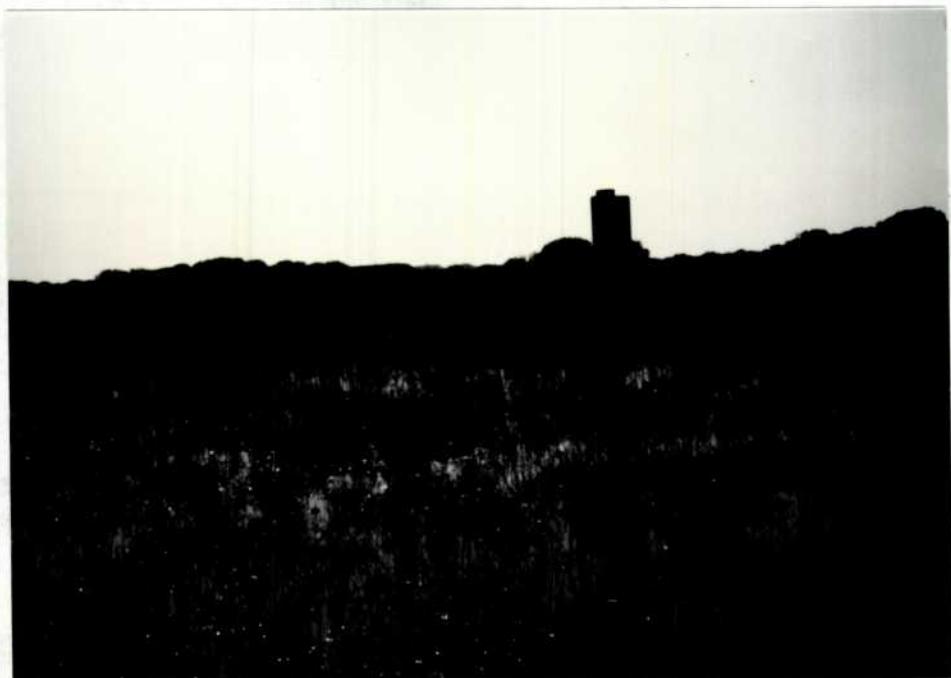
The majority of Currituck NWR is on the Currituck Outer Banks barrier island. This island chain was formed when melting glaciers caused a world-wide rise in the sea level. Later when sea level rise slowed, a combination of factors were set in motion to create barrier islands on the shallow shelf. The bays and estuaries that have formed behind these barriers have become shallow, due to sediments received from rivers draining the coastal plain and overwash from storm surges. Currituck Spit and surrounding Outer Banks islands are primarily perpetuated by the following processes: long shore currents, tides and tidal currents, wave action, storm surges, and wind action. These dynamic ongoing processes coupled with sea level rise cause shorelines and associated dunes to undergo constant change. The adaptability of these islands to constant physical change is a major part of their natural ecology.

Approximate refuge habitat types are: 18% sand and dune, 43% brush, and 39% marsh.

2. Wetlands

Limited water control has been conducted on the Swan Island tract by the Swan Island Hunt Club. Two weir type plugs have been installed to restrict outflow of runoff from a fresh water pond to Currituck Sound. Although these structures have not been maintained in recent years, they still could provide the refuge with some water management capabilities with minimal construction or maintenance.

In July, three vegetative transects and a cattle enclosure were constructed to help assess grazing damage to aquatic vegetation in a large seasonally flooded pond on the Swan Island tract. Even after one month a significant difference could be noted between the vegetation outside the enclosure and the vegetation inside it. It is evident that much damage is occurring to the natural waterfowl food plants from cattle grazing.



3 - Fall of '86 marked the first time this area was void of cows, horses, and 4x4's. Wonder how long it can last.

12/86 BWS



4 - This is what it's like "from the inside looking out".
08/86 BWS

G. WILDLIFE

1. Wildlife Diversity

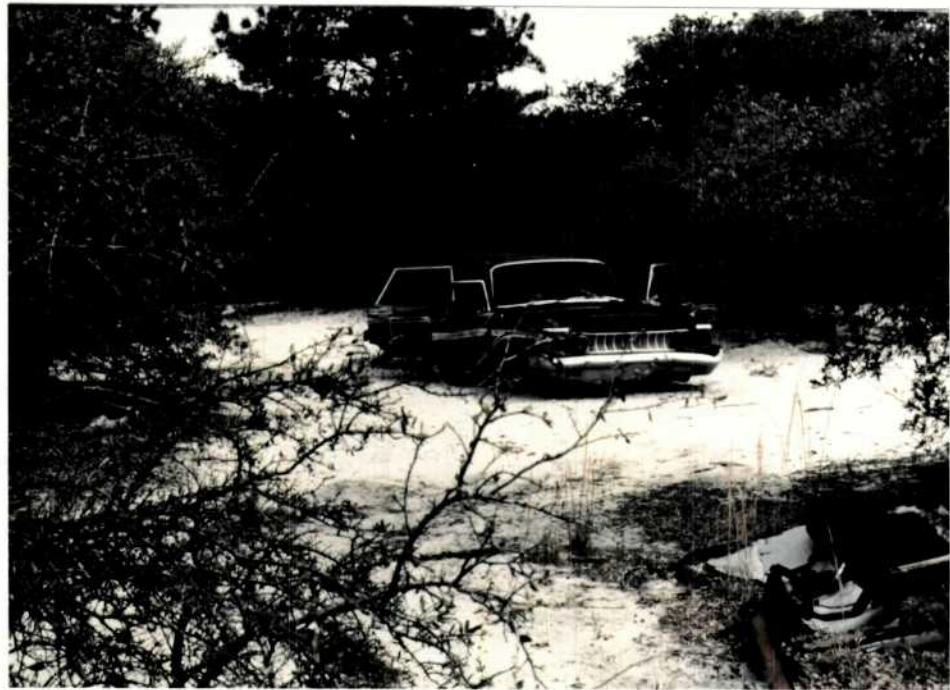
No inventories, except for occasional aerial waterfowl counts, and/or management activities have been initiated on Currituck NWR. It is assumed that its species diversity is similar to that of the nearby barrier islands. See photo next page.

2. Endangered and Threatened Species

a. Federally Listed Endangered and Threatened Species

Atlantic Loggerhead Sea Turtle (Threatened) - Loggerhead turtles are known to utilize the beaches to a limited extent. Development in the area and increased vehicular traffic on the beaches may limit loggerhead use of the refuge. Commercial fishing may also adversely impact sea turtles in the area. On November 8, three dead loggerheads were reported to the refuge. Trawl boats were operating near the shore and may have been the cause.

Piping Plovers (Threatened) - During 1986, refuge staff recorded several observations of piping plovers: April 24, four adults; May 8, seven adults; June 5, three adults; June 19, two adults and two chicks, and one lone adult; August 6, three adults. Factors limiting piping plovers include modification and destruction of habitat, and disturbance of nesting adults and chicks.



5 - One of the unfortunate facets of Currituck's habitat diversity.
04/86 BWS

3. Waterfowl

Several aerial counts were again made this year. The numbers were very low once again this year. Manager Taylor and Assistant Manager Schriver attended a meeting at the Swan Island Hunt Club to discuss declining waterfowl and fish populations in Currituck Sound. Also, in attendance were personnel from N.C. Wildlife Resources Commission, N.C. State University, Swan Island Hunt Club, Currituck Hunt Club, and USFWS (MacKay Island NWR and East Coast Biologist). Aside from lower continental waterfowl numbers, changes within and around Currituck Sound are believed to be contributing factors. A decision was made to pursue having a study of the sound conducted by some university. It is hoped that a Restoration Foundation can be created to help return Currituck Sound to a more productive, healthy state.

6. Raptors

Ospreys continue to use the refuge extensively. Ospreys are utilizing structures suitable for nesting throughout the area. ORP Strawser and several volunteers aided the osprey's nesting effort with the construction of several nesting platforms which were erected on the refuge.

8. Game Mammals

White-tailed deer, marsh rabbits, raccoons, and gray squirrels have been observed on the refuge. Deer hunting is not permitted on the Currituck Outer Banks by the N.C. Wildlife Resources Commission.

13. Surplus Animal Disposal

"Wild" horses are present on the refuge. The Currituck Outer Banks ponies are another potential timebomb. Damage to vegetation in the natural waterfowl ponds caused by trespass cattle and the horses is more than we can tolerate. Political, historical, and aesthetical problems are relatively certain to surface when we find the time and manpower to tackle the surplus horse issue.

H. PUBLIC USE

1. General

Estimates on specific public activities were made and reported throughout the calendar year. By talking with local residents and making observations while on the infrequent trips to the refuge, the following yearly totals were reported:

<u>Activity</u>	<u># Visits</u>	<u># AH</u>
Wildlife Observation		
Foot	1,919	1,910
Vehicular	22,100	11,050
Photography	90	285

Total visits to the refuge were 23,900.

8. Hunting

Currituck Sound and refuge marshes and ponds have traditionally received heavy gunning pressure from waterfowlers. State hunting seasons and regulations applied in 1986. Waterfowl numbers and hunter success were extremely low. Currituck NWR is currently closed to all hunting. Two blinds associated with the Swan Island Hunt Club are located on fee title land. The Swan Island Hunt Club has deeded hunting rights for those two blinds. No problems have arisen due to those deeded rights.

Hunting blind rights in Currituck Sound were acquired with the Monkey Island Tract purchase. Eighteen point blind locations were licensed by the USFWS in 1984 and 1985 to provide some sanctuary in Currituck Sound adjacent to our lands. Hunting from these blinds was not permitted which, in effect, created a 200 yard wide no hunting strip in the sound bordering refuge property. Refuge staff met with the

Currituck County Game Commission in 1985 to redistribute the blind locations to effect the same coverage with fewer blind permits. Thirteen locations were utilized and FWS paid \$325.00 for one season's protection of the 200 yard no hunting buffer. Again in 1986, the 13 blinds were leased by the refuge to provide a buffer area along the refuge marsh in Currituck Sound.

Several intensive law enforcement patrols were planned and executed on Currituck NWR and the Currituck Sound. Few birds were seen; many hunters "gave up the cause" after learning the "feds" were out!

17. Law Enforcement

The waterfowler's paradise of northeastern North Carolina has apparently become the "waterfowler's nightmare". In years and generations past, waterfowlers have had their way in regards to hunting and hunting methods. Since being acquired by USFWS and placed under Alligator River NWR, things are different for the hunters.

Apparently the random "blitzes" of the Alligator River LE staff patrolling the area and aided by the reduced numbers of waterfowl, has reduced number of waterfowl hunters and violations on the refuge. According to N.C. Wildlife officers and some local residents the uncertainty in knowing when the "feds" will be around has been a very effective LE tool on the refuge.

A covert strategy by the refuge to remove trespassing cattle from the refuge apparently worked during the year. Mr. Ernie Bowden, a Currituck County Commissioner, lives north of the refuge and historically has allowed his cattle to graze upon the refuge as open range. His cattle are not branded and earlier contacts with him to remove his livestock were met with only verbal abuse. The cost and time of confiscating the cattle were extraordinary and without brands it would be difficult to prove ownership and charge for trespass.

On July 7, Refuge Manager Taylor addressed the public Currituck Board of Commissioners to ask assistance in identifying the owner of the cattle, removing them and protecting the waterfowl habitat of the refuge. After a good grilling on beach access and federal tyranny, Mr. Bowden stated that Refuge Manager Taylor knew that "he owned every cow on the Currituck Outer Banks" and the presentation was nothing more than an attempt to embarrass him.

With this "on the record" we attempted to send registered letters to Mr. Bowden giving him 30 days to remove all livestock from the refuge or he would be cited for trespass. He refused all letters until Officers Beasley and Strawser hand delivered one to his home. Being on parole for Back Bay NWR charges, he promptly removed all cattle within the month. Later refuge staff found two cows he had missed, and he removed them within 24 hours.



6 - The enforcement of the animal trespass regulation ended an era of "open range" on the Currituck Outer Banks.

08/86 BWS

J. OTHER ITEMS

1. Cooperative Programs

MacKay Island NWR was transferred to Region 4 from Region 5 this year. A cooperative effort was established to visually inspect the refuge and assist with law enforcement in the area.

3. Items of Interest

A revenue sharing check for \$18,393.00 was presented to Currituck County in June.

4. Credits

This narrative is a joint effort by all the refuge staff with the exception of the typing and assembly which rests solely upon Secretary Beverly Midgett.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1986

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

INTRODUCTION

Location

Pea Island National Wildlife Refuge was established in 1938 by Executive Order 7864 as a wintering area for the greater snow goose and other migratory waterfowl. The refuge contains 5,915 acres of beach, dunes, high marsh dikes, salt marsh, impoundments, ponds, and salt flats. Presidential Proclamation #2284 closed 25,700 acres of adjacent waters in the Pamlico Sound to migratory waterfowl hunting.

The refuge is located on the north end of Hatteras Island, a coastal barrier island which is part of a chain of islands known as the "Outer Banks". These islands are separated from the mainland by a series of marshes and/or sounds which are up to 25 miles wide.

Located within the boundaries of Cape Hatteras National Seashore, Pea Island is approximately 175 miles east of Raleigh, N.C. and 225 miles southeast of Washington, D.C.

Pea Island's climate is generally moderated by the ocean, thus being cooler in the summer and warmer in the winter than the North Carolina mainland. The average daily maximum temperature is 69 degrees and the minimum is 56 degrees. Due to heavy and prolonged storms, the average rainfall is 55.6 inches, most of which occurs during the winter and summer. It is frequently windy during both day and night with 11 mph as the annual mean wind speed. The prevailing summer wind is from the southwest and from the northeast in the winter.



1 - "Pea Island was established on May 17, 1937 as a wintering sanctuary for the greater snow goose and other migratory waterfowl." 11/84 SJK

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K. FEEDBACK"Nothing to report"L. INFORMATION PACKET ---- (inside back cover)

A. HIGHLIGHTS

Hurricane Charlie visits Outer Banks. (Section B)

Twenty-two yearling loggerhead turtles released. (Section G.2)

Only 43 applications were received for the refuge hunt. (Section H.8)

Refuge officers man roadblock in search for "Rambo". (Section H.17)

Departmental Managers Development Training Program comes to Pea Island.
(Section J.1)

B. CLIMATIC CONDITIONS

Snowfall fell on Pea Island in late January with ponds beginning to freeze up for a few days during the same period.

July was very dry and with the pump out of service at North Pond it was at its lowest level in at least three years.

August brought Hurricane Charlie's wind and rain.

D. PLANNING

2. Management Plan

Refuge Managers Taylor, Schriver and ORP Strawser met with the National Park Service in March for an annual review of the cooperative Public Use Management Plan. Better coordination and the Service's authority to approve or disapprove all NPS work on the refuge were discussed. The plan was rewritten and submitted to the RO to clarify both agencies responsibilities.

4. Compliance with Environmental and Cultural Resource Mandates

Assistant Manager Dunaway continued liaison with the U.S. Army Corps of Engineers in securing COE Permit SAWCO85-N-028-0074 amendments to facilitate continued work on the New Field dike. Hurricane Gloria really messed this project up last year and Hurricane Charlie again set our progress back.

6. Other

The refuge participated again this year in the Atlantic Flyway Canada Goose Study (Section G.16).

E. ADMINISTRATION

1. Personnel

See Alligator River narrative.

2. Youth Programs

Much of the work accomplished by the Alligator River NWR YCC program occurred at Pea Island.

Enrollees provided weeks of valuable assistance to refuge staff on the New Field Dike project. The annual clearing and trimming of the North Pond Trail, litter pickup on NC 12, construction of a fire cache and sign storage area, office complex cleanup, cleanup and inventory of the seed/storage building, office cleaning, and other general maintenance assistance were some, but not all, of their Pea Island accomplishments.

For details of the 1986 YCC program, see Section E.2 of the Alligator River NWR narrative.

4. Volunteer Programs



2 - Pea Island Hosts and Hostesses - a portion of our dedicated group of volunteers! 04/86 BWS

Most of the volunteer effort at Pea Island NWR involved the Host/Hostesses program. From April 1 through November 30, hosts and hostesses manned the visitor contact area, greeted visitors, provided refuge and wildlife information, answered the telephone, and relayed radio messages. In addition, they assisted with office work, minor construction and rehab projects, conducted public interpretive programs, and assisted with the supervision of YCC projects.

For more information on the overall volunteer program, see Section E.4 of the Alligator River NWR narrative.

5. Funding

See Alligator River NWR narrative.

In March, Manager Taylor met with Don Manley, Ducks Unlimited Field Operations Supervisor to discuss the possibility of the New Field dike as a DU MARSH project. Later reprogrammed funds were made available by the regional office and the DU project was withdrawn.

7. Technical Assistance

Several on site visits to the infamous S-curves at the south end of Pea Island NWR were made with the N.C. Department of Transportation engineers, surveyors, and geologists. The state plans to relocate and straighten out this section of NC Hwy 12. Ocean overwash is probable on any high tide with easterly wind. Numerous accidents occur as motorists not expecting curves in the road find them difficult to negotiate at high speed.

8. Other

Division Chief McDaniel conducted station inspections in May and December.

F. HABITAT MANAGEMENT

1. General

Pea Island, a coastal barrier island, consists of seven basic habitat types which cover approximately 5,915 acres. The most recent survey revealed 456 acres of ocean beach, 518 acres of barrier dunes, 630 acres of sand ridge brush and grassland, 3,024 acres of irregularly flooded salt marshes, 328 acres of salt flats, three brackish water impoundments totalling 950 acres, and one nine acre fresh water pond. Beach and dune acreages have changed since the survey. Hurricanes combined with intense northeast storms have caused severe erosion along the beach and dunes.

2. Wetlands

Refuge wetlands consist of irregularly flooded salt flats, impoundments, and one fresh water pond. The sizes of the impoundments are as follows: North Pond 461 acres, New Field 266 acres, and South Pond 223 acres.

Total precipitation decreased significantly this year. Pea Island received only 37 inches; 18 inches below the annual mean. The refuge experienced an especially dry spring and early summer. However, waterfowl food production was not hindered due to extensive pumping in the impoundments.

South Pond was dewatered in the spring of 1983 and 1984 to encourage production of desirable emergent waterfowl foods. However, in 1985 South Pond was held to full capacity. This year a dry spring and early summer necessitated pumping for 127 hours from April through mid-July. This pumping resulted in excellent submergent waterfowl food production. This year approximately 45% of the submergent growth was sago pond weed (Potamogeton pectinatus) and/or widgeongrass (Ruppia maritima). This is in contrast to earlier years when these desirable submergents comprised only a small portion of the total submergent production. This dramatic increase in quality submergents can be directly related to the installation of the pump at South Pond. (See Table 1).

North Pond has also been managed as a permanent pool to favor the growth of submergent vegetation. However, the North Pond pump has been inoperative since June, 1985 and a smaller Crissafulli has been used in its place. 167 hours of pumping by the smaller Crissafulli occurred this year, but the unusually dry spring and early summer caused a near 50% pond bottom exposure. This bottom exposure was not broken in North Pond until late July when considerable rain fell due to Hurricane Charlie. However, this year was one of the highest widgeongrass years on record for North Pond. This good production of widgeongrass was due to the spring pumping and timely arrival of the rains in late July, in addition to the high salinities which occurred in July at the peak of the drought. (See Table 2).

In 1985, the management scheme of New Field was interrupted to install a 30 inch low lift pump. However, in September, 1985 Hurricane Gloria broke the dike at the site of the pump installation completely into. Throughout the remainder of 1985 and until the last week in July, 1986 the New Field water level ebbed and flowed with each tide. In late July, a coffer dam was built across the break and tidal fluctuation was halted. Once again, due to the dry growing season this year, the majority of New Field was dry throughout most of the growing season. Due to the break in the dike, salinities reached a high of 34% sea strength in May. The break in the dike and the reintroduction of highly saline tidal waters favored the growth of

non and poor waterfowl foods such as saltmarsh cordgrass (*Spartina alterniflora*) and saltmeadow cordgrass (*Spartina patens*). This break in the dike also resulted in the complete disappearance of widgeongrass from New Field this year. The loss of permanent water and the increased salinities of the sound waters were intolerable for widgeongrass. (See Table 3).

Vegetation transects were not run for the tidal area north of North Pond known as the "saltflats". However, data from previous years indicate that this area has not changed significantly in the past 18 years. Glassworts (*Salicornia* spp.) usually dominate the vegetation, and an abundance of bare ground is prevalent. Also, previous data shows that for an unknown reason, saltmarsh cordgrass is diminishing from the area while saltmeadow cordgrass is increasing.

4. Croplands

Approximately 35 acres of tall fescue were planted for goose browse in New Field in September. The field was fertilized with 10-10-10 at a ratio of 1,000 pounds per acre and broadcast seeded at a rate of 100 pounds per acre. Efforts to establish the fescue were hampered by the lack of sufficient rainfall, thus only a poor stand of fescue was produced.

6. Other Habitats

The areas of ocean beach and barrier dunes are not actively managed, but undergo constant gradual movement and are subject to abrupt changes during storms. Strong winds from hurricanes and northeast storms produce ocean overwash and sound side flooding. On August 17, Hurricane Charlie passed over the refuge dropping 14 inches of rain and causing 50-60 mph winds. Damage, however, to the refuge was minimal. Overwash and flooding occurred over much of Highway 12.

A dune erosion study was initiated in 1982 to document losses to the dune line from wave and wind action. The study indicates that severe winter storms cause the greatest amount of change in the dune line. The last field measurements from the study were performed from May 31, 1985 to April 13, 1986. These measurements show that along the 13 miles of Pea Island beach, dune erosion averages only 2.5 feet. The greatest dune loss occurred approximately one mile south of Oregon Inlet where the dune line raced 13 feet and at the south end of the S-curves where 16 feet were lost. No measurements were taken after Hurricane Charlie.

The 9 acre fresh water pond just south of Oregon Inlet seems to be holding its own despite the constantly shifting inlet channel. The pond lies between the inlet and the U.S. Coast Guard Oregon Inlet Station. Four years ago the Coast Guard expressed concern over danger to the Station if the inlet breached the pond and accelerated erosion resulted. Since that time, however, scouring action and overwash during storms and high tides has moved enough sand to create a berm which separates the pond from the inlet by some 300 feet.

Table 1
 South Pond Vegetation Transect Line Comparisons¹
 Pea Island NWR 1968 - 1986

Plants	Percent composition				
	1986	1985	1984	1977-83 Avg.	1968-76 Avg.
Muskgrasses	51.4	37.2	5.5	20.4	66.0
Sago Pondweed and/or Widgeongrass	45.1	40.9	23.1	13.5	10.4
Panic Grasses	1.3	0.9	2.2	4.5	0.1
Water Hyssop	0.7	7.8	32.9	8.5	3.8
American Three-square	0.2	2.4	2.6	1.7	0.2
Spikerushes		0.9	11.6	11.1	4.6
Dwarf Spikerush			5.3	8.7	1.7
Bare Ground	1.3	4.5	10.5	24.4	12.5
Totals	100.0	94.6	93.7	92.8	99.3
Plants per Point Sample	1.70	1.65	1.32	---	---

Run by: Alton Dunaway and Alan Schriver, Assistant Managers (8/29)
 and Dunaway and Scott Lanier, Assistant Managers (9/10)

Dates: August 29, 1986, east two-thirds and September 10, 1986 west third
 Food Values:

Good - 45.9% (46.0) Percent of points under water = 100.0 (93.5)

Fair - 54.1% (52.1) Depth variance - 3 to 24 inches (3 to 16)

Non - 0.0% (1.9) Mode depth - 20 inches (10)

Mean depth - 18.87 inches (10.13)

Annual salinity range - 3.0 to 22.2% sea strength

Annual average - 8.8% sea strength

Note: 1985 figures in parentheses

General Management Information: Impoundment flooded all year and
 supplemented with 127 hours of pumping from April through July, 1986.
 This compares to 66 hours pumped April - August, 1985.

¹1986 Wetland Vegetation Results, Otto Florschutz, East Coast Biologist

Table 2
 North Pond Vegetation Transect Line Comparisons¹
 Pea Island NWR 1968 - 1986

Plants	Percent Composition					
	1986	1985	1983	1982	1977-83 Avg.	1968-76 Avg.
Muskgrasses	45.2	60.4	58.4	52.0	49.2	66.8
Widgeongrass	32.8	6.1	1.5	16.3	8.0	5.6
Water Hyssop	2.4	1.5	0.3	0.2	2.4	0.9
Saltgrass	2.2	1.5				
Saltmeadow Cordgrass	1.1		0.6	0.4	Trace	
American Three-square	0.7	0.7				
Orach (<u>Atriplex patula</u>)	0.4					
Knotgrass (<u>Paspalum distichum</u>)	0.2					
Round rushes (<u>Juncus spp.</u>)	0.2	0.5				
Dwarf Spikerush		3.9	14.1	3.7	4.3	1.0
Sago Pondweed (<u>Potamogeton pectinatus</u>)		0.7		21.8	6.5	10.0
Spikerushes		0.5	5.8	4.9	4.4	1.5
Bare Grand	14.8	18.7	19.3	0.4	24.1	14.1
Totals	100.0	94.5	100.0	99.7	98.9	99.9
Plants per Point Sample	1.14	0.89	0.88	1.63	---	---

Run by: Alton Dunaway, Assistant Manager and Chip Phillips, YCC
 Date: August 21, 1986

Food Values:

Good - 39.3% (16.5)

Fair - 56.1% (79.6)

Non - 4.6% (4.0)

Water Conditions:

Percent of points under water = 100.0 (84.7)

Depth variance = 2 to 20 inches (1 to 9)

Mode depth = 17 inches (9)

Mean depth = 13.88 inches (6.87)

Salinity: range = 5.0 to 14.1% sea strength

Annual average = 8.4% sea strength

Note: 1985 figures in parentheses

General Management Information: Early-summer drought caused near 50% pond bottom exposure by July 23, 1986. North Pond pump not operating all summer. Rains after July 23 caused recovering of submergent vegetation and near 100% pond bottom coverage thereafter to present.

¹1985 Wetland Vegetation Results, Otto Florschutz, East Coast Biologist

Table 3
New Field Vegetation Transect Line Comparisons¹
Pea Island NWR 1968 - 1986

Plants	Percent Composition				
	1986	1984	1983	1977-83 Avg.	1968-76 Avg.
Saltmarsh Cordgrass (<u>Spartina alterniflora</u>)	15.0	0.4	0.2	0.2	3.3
Saltmeadow Cordgrass (<u>Spartina patens</u>)	13.5	1.9	5.2	7.8	17.3
Glassworts (<u>Salicornia spp.</u>)	10.5				Trace
Saltgrass (<u>Distichlis spicata</u>)	5.3	0.4	1.9	1.6	3.4
Sea Ox-eye (<u>Borrichia frutescens</u>)	4.7				Trace
Saltmarsh Bulrush (<u>Scirpus robustus</u>)	2.4	1.1	0.6	0.4	0.9
Dwarf Spikerush (<u>Eleocharis parvula</u>)	2.1	5.2	15.0	10.8	1.1
American Three-square (<u>Scirpus Americanus</u>)	1.1	2.8	1.3	2.9	3.9
Groundselbush (<u>Baccharis halimiflora</u>)	1.1	0.2	0.5	0.2	1.9
Marsh Goldenrod (<u>Solidago sp.</u>)	1.1	0.4		Trace	Trace
Spikerushes (<u>Eleocharis spp.</u>)	0.2	2.2	2.1	7.8	5.6
Widgeongrass (<u>Ruppia maritima</u>)		40.9	37.5	24.5	17.4
Muskgrasses (<u>Chara spp.</u>)		13.1	7.1	5.0	1.0
Water Hyssop (<u>Bacopa monnieri</u>)		9.7	3.2	2.8	Trace
Wild Millet (<u>Echinochloa crusgalli</u>)		1.1	6.3	5.2	2.0
Panic Grasses (<u>Panicum spp.</u>)		1.3	1.9	1.1	Trace
Bare Ground	42.9	12.1	7.9	16.9	23.0
Totals	99.9	92.8	88.7	87.2	80.8
Points per Point Sample	0.69	1.16	1.20	---	---

Run by: Alton Dunaway, Assistant Manager, Jim Beasley, Bio-Tech and Otto Florschutz, East Coast Biologist

Date: August 5, 1986

Food Values:

Good - 9.8% (58.3)

Fair - 45.1% (32.3)

Non - 45.1% (9.4)

Water Conditions:

Percent of points underwater = 37.7 (74.1)

Depth variance = 1 to 8 inches (1 to 16)

Mode depth = 1 inch (10)

Mean depth = 2.79 inches (8.78)

Salinity - range 14.1 to 34.0% sea strength

Annual average = 23.0% sea strength

Note: 1984 figures in parentheses.

General Management Information: West dike broke in early September, 1985 and lower third of area ebbed and flowed from Pamlico Sound tides through July, 1986. Area remained dry most of year. U-shaped coffer dam being back filled over tidal cut area.

¹1986 Wetland Vegetation Results, Otto Florschutz, East Coast Biologist

9. Fire Management

Refuge staff conducting controlled burns on Pea Island burned approximately 300 acres of marsh in 1986.

The areas were overgrown with myrtle bushes and black needlerush, and are burned to encourage snow goose use.

No wildfires occurred on the refuge in 1986. However, staff members were called to assist local fire departments in Rodanthe, a nearby village, with extinguishing a grass fire in the community.

10. Pest Control

Attempts to keep the nutria and muskrat populations in check are implemented through a public trapping program to reduce burrowing damage to impoundment dikes.

G. WILDLIFE

1. Wildlife Diversity

Pea Island exhibits a natural diversity of habitat types. Habitat management practices such as prescribed burning, moist soil management, disking, brush removal, and green browse planting, serve to enhance habitat and wildlife diversity. Pea Island provides habitat for a wide variety of mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans. This diversity is especially evident in birds with over 315 species of birds having been identified in the area. The 1986 Christmas Bird Count identified 150 species on December 30.

2. Endangered and/or Threatened Species

a. Federally Listed Endangered and Threatened Species

Peregrine Falcon (Endangered) - Refuge staff sighted the first peregrine falcon of the season at Pea Island on October 3. On October 11, an injured peregrine was brought to Pea Island. The bird was transferred to Dr. Brown of the Carolina Raptor Center Foundation. Dr. Brown reported that the bird had been shot in the metacarpel area of the wing, cutting off circulation. This left the bird permanently disabled.

Piping Plover (Threatened) - In early March it was decided that the refuge would conduct weekly surveys for piping plovers. The surveys were begun in April; on April 25 refuge staff observed two adult plovers on the Pea Island beach.

Atlantic Loggerhead Sea Turtle (Threatened) - Loggerheads used Pea Island beach even though the area was vulnerable to ocean overwash and erosion. Frequent surveys were carried out from May until August. Trained refuge volunteers conducted most of the surveys. Experienced staff members handled the marking and/or relocating of nests. Only those nests in danger of ocean overwash were relocated. Before the nesting season, it was decided that as many nests as possible would be marked and nesting success monitored.

This year 11 nests were located on Pea Island. The first nest was discovered on June 6, and the last on August 16. Six were left in place and four of these marked. All of the five relocated nests were marked.

During November, the marked nests were excavated. Hatching success averaged 72.9%, resulting in an estimated production of 828 loggerheads. While excavating one nest 20 days past the normal 60 day incubation period, Bio-Tech Elmore found live turtles. Since the nest had been buried under 2.5 feet of sand by Hurricane Charlie and the water temperature was low, she dug out the nest and took the turtles to the North Carolina Aquarium. Of the original 56, 17 were still alive at last count. They are scheduled to be released during the summer of 1987.

On August 12, 22 yearling loggerhead sea turtles were released on Pea Island.

b. State Listed Endangered and/or Threatened Species

Of the other species that occur on the refuge, the State of North Carolina lists seven as threatened and 26 as species of special concern. Although the refuge is not being managed for all these species, they do benefit from present practices. The species specifically managed for are:

Osprey (Special Concern) - During 1986, an active nest was located on the platform built near North Pond in 1981. Behavior exhibited by the adults indicated that young were in the nest.

Least Tern (Special Concern) - For many years least terns have nested at a specific area of the Pea Island beach. There, the refuge tries to restrict human activity. This is accomplished by posting the area on three sides (the ocean marks the fourth side), and prohibiting vehicular traffic on the entire beach.

Hurricane Gloria, which moved through the refuge during September 1985, apparently created loafing and/or nesting habitat for terns; during summer 1986, refuge staff consistently observed a small group of terns near the "blown out" section of the New Field dike.

3. Waterfowl

Overall waterfowl use in 1986 fell to the lowest level in the past 22 years. Waterfowl numbers on Pea Island declined another 10% from last year's previous low. Peak numbers fell 5,000 birds from last year, however, there were still 5,000 waterfowl above the 22 year record low peak.

Swan use was down 29% from last year's unusually high use and peak numbers. Canada goose use was half of the previous year, and the peak number was down over 40% from last year's rebound from 1983-84's 22 year record low use and second lowest peak. Greater snow goose use and peak numbers dropped only slightly from last year, but were low enough to set new 22 year record lows which were previously set in 1982-83. The peak of 2,840 broke the old low peak of 3,400. Duck use on Pea Island increased slightly from last year, while the peak decreased slightly. Both duck use and peak numbers are well within the average range of duck use on the refuge for the past 22 years. Black duck use and peak numbers increased slightly. (See Table 4).

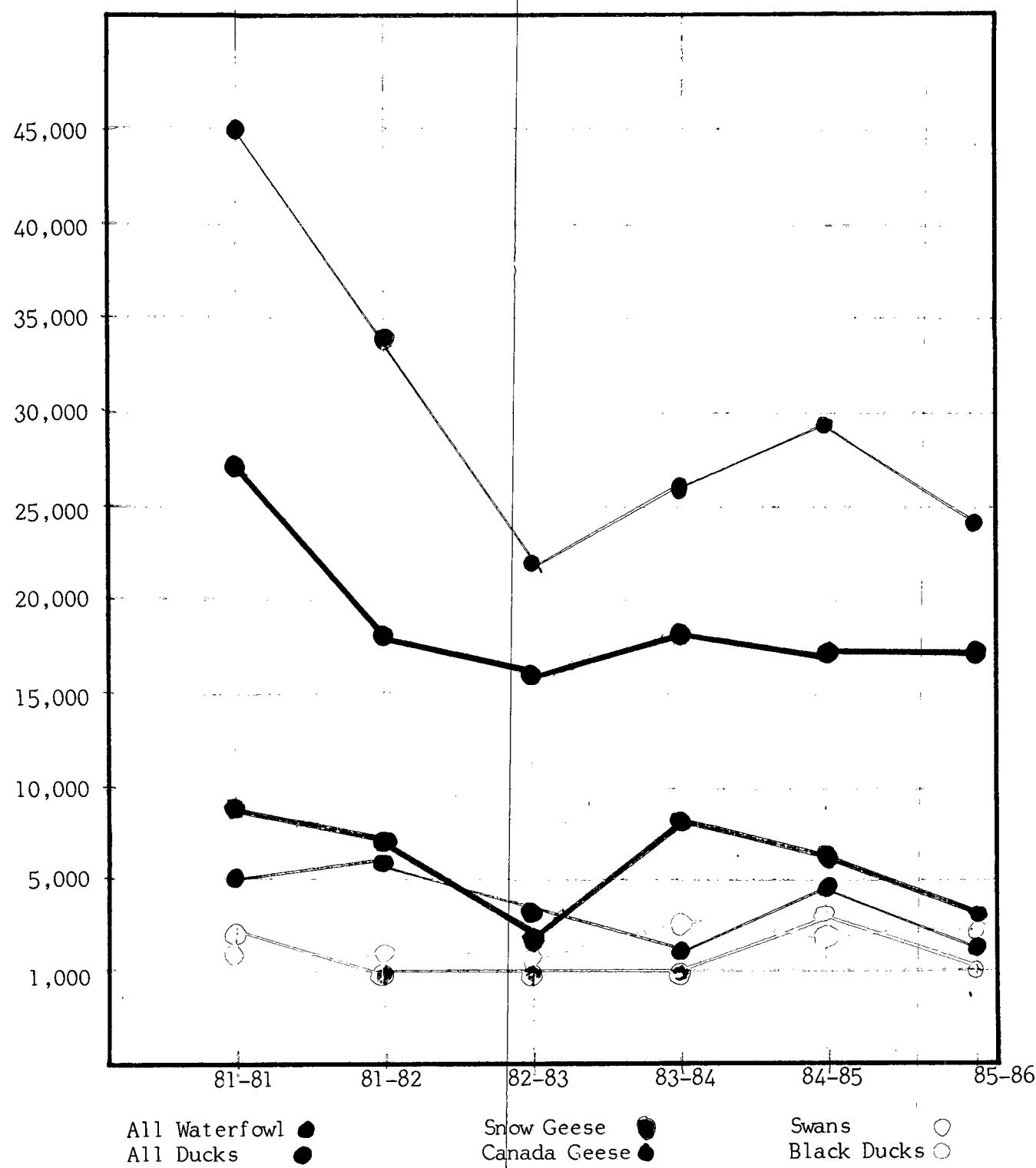
4. Marsh and Water Birds

Refuge beaches, marshes, and impoundments were heavily utilized by many species of marsh and water birds for both feeding and nesting. Although no active management occurs exclusively for these species, an upward trend in use days has been observed in recent years. Habitat management practices for waterfowl and other species have had a positive influence on marsh and water bird use of the refuge. For example, these species have taken advantage of the lower water levels in New Field while the impoundment level was down for construction purposes. Bird numbers increased throughout the spring of 1986 and reached their greatest numbers and diversity in the summer and fall.

The increasing use of the refuge may also be due to the dramatic loss of habitat along the Outer Banks. Increased human disturbance is continually forcing these birds to smaller and smaller areas, many times utilizing habitat which is sub-optimal.

Brown pelican numbers have increased steadily over the past few years as the species has expanded northward into coastal North Carolina. These birds were once considered an endangered species in this state and were rare sightings. They have since been removed from the endangered species list in North Carolina and are quite common. On July 23, 153 juvenile brown pelicans were banded and 194 more pelicans were banded in August by Dr. John Weske from the Smithsonian. A July aerial count of a spoil island colony near Oregon Inlet estimated 150 nests. This number is a dramatic increase from 1985's 65 active nests and 1983's 3 active nests. This is the northernmost nesting ever recorded for brown pelican.

Table 4
Peak Waterfowl Populations
Pea Island NWR





3 - The avocets always announce spring's arrival at Pea Island.
04/86 MJH



4 - And, that's what spring is all about!
07/84 USFWS Staff Photo

5. Shorebirds, Gulls, Terns, and Allied Species

Shorebird surveys were conducted from April until November with the peak population occurring in August when 4,878 gulls, terns, and shorebirds were sighted. Two piping plovers were observed on Pea Island in April. The tern colony on the beach south of refuge headquarters was posted in May and the first nest was discovered in June.

On June 24 and 26, YCC'ers and refuge staff assisted John Weske with tern banding. A total of 4,239 terns were banded with royal terns being the predominate species. Sandwich, common, and Forester's terns were also banded.

6. Raptors

The Carolina Raptor Center operated a banding observation station on Pea Island again in 1986. The station was manned from October 9 through October 25. Once again sharp-shinned hawks were the most prevalent species observed, 387 were spotted, while kestrels were the second most prevalent species with 203 being observed. 26 peregrine falcons were observed this year. In all, 687 raptors were observed by the Carolina Raptor Center. This is down from the previous year's total of 871.

Ospreys continued to stage their comeback along the Outer Banks with a successful nesting season.

7. Other Migratory Birds

The diversity of bird life on Pea Island is so great that it is sometimes referred to as a "birders paradise". This is especially true when considering the passerines. One hundred and fifteen different species of song birds migrate through Pea Island.

8. Game Mammals

Rabbits are the only game mammals that occur in any numbers on Pea Island. Cottontail and marsh rabbit numbers are estimated at \pm 1,200.

Raccoons are fairly common on Bodie Island to the north. Occasional raccoon tracks have been observed on Pea Island for several years, but no raccoons have been sighted.

On November 1, 1985 a road-killed doe was found on the shoulder of N.C. Highway 12 at the northend of Pea Island. This is the only record of white-tailed deer on Pea Island.

10. Other Resident Wildlife

Ring-necked pheasant are observed year-round over most of Pea Island. The birds concentrate around the impoundment dikes and New Field browse area. It is estimated that the annual peak population is 750 birds, with approximately 500-550 being present throughout the year. These numbers represent approximately one bird per eight acres of suitable habitat.

15. Animal Control

A trapping program was again held in 1986 to reduce the number of muskrat and nutria present in refuge impoundments and to allow for recreational use of furbearing animals. Only one application was received this year and this trapper was permitted to trap all three impoundments. A total of 168 muskrat and 22 nutria were taken from January 12 through February 28. One incidental catch of a snapping turtle occurred.

16. Marking and Banding

The destruction caused by Hurricane Gloria painted a bleak outlook for duck and goose banding on Pea Island. Before preseasong banding efforts could begin for the Flyway Canada Goose Study, much repairing and clean-up of refuge roads, dikes, and other facilities was required. Our large, new, YCC constructed walk-in trap was completely demolished and the fescue planted in New Field for goose browse was killed by salt water intrusion into the ground water.

The west side of New Field was finally re-seeded, and another walk-in trap was constructed in the Pamlico Sound. The fescue did better than expected and two rocket net sites in the field turned out to be quite productive. All banding quotas were met or exceeded except for canvasback and ring-necked quotas. These quotas were once again assigned to us, however, they are not realistic at Pea Island.

Three live decoy geese were obtained from Dennis Luszcz, N.C. Wildlife Resources Commission Waterfowl Biologist, for use in the walk-in trap. Their use was only moderately successful.

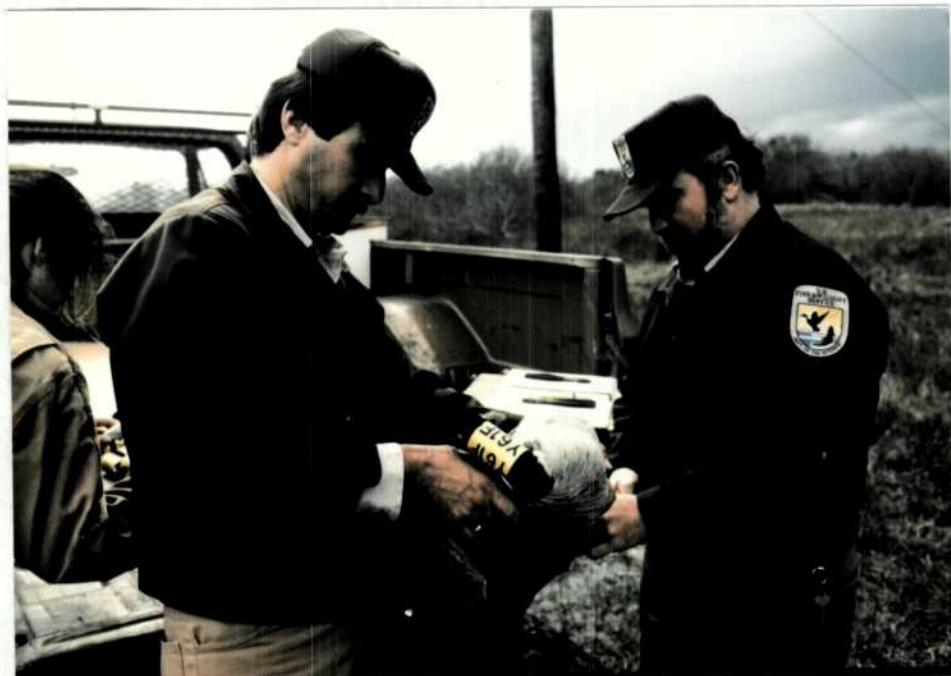
Pea Island participated in neck-collaring Canada geese for the third year of a special 3 year Atlantic Flyway Study. Yellow neck bands with black numbers and letters were placed on all the Canada geese. Banding accomplishments and quotas are as follows:

	# Banded	Quotas
Canada Geese	107	75
Black Duck	350	200
Mallard	102	100
Canvasback	0	50
Ring-necked Duck	0	50
Black/Mallard Hybrid	11	0



5 - Volunteer Terri Schriver prepares for one of her many trips home with a load of corn for banding operations.

03/87 RSS



6 - "Henceforth known as Y61F..."

02/86 MJH

H. PUBLIC USE

1. General

Based on the National Park Service vehicle counter at Bodie Island, estimated visitation to Pea Island NWR during 1986 was 1,507.464. The Host/Hostess program continued to provide visitor information at the Visitor Contact Station from April-November. YCC provided manpower for a re-vamping of the sign program, minor trail maintenance, and general clean-up in visitor areas.



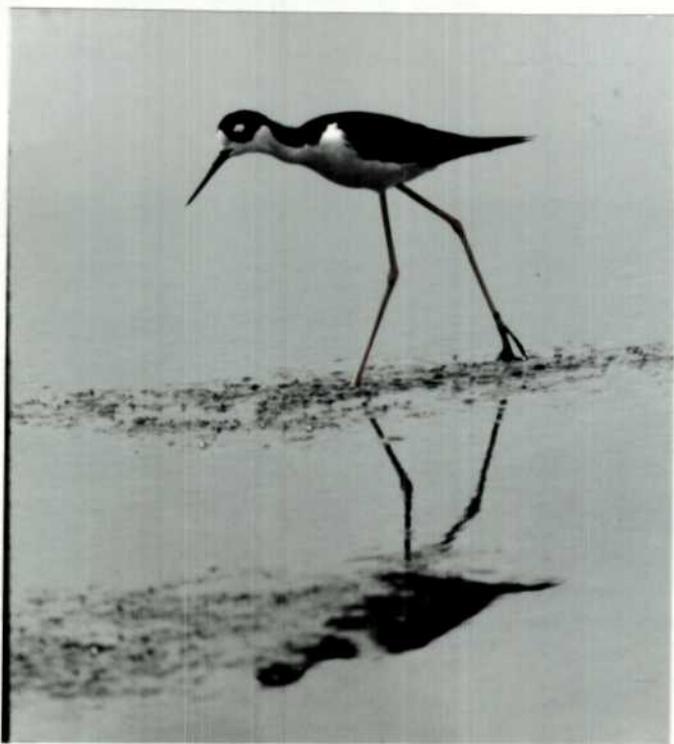
7 - It's a judgement call. Would you classify this as
"Wildlife Oriented" or "Non-wildlife Oriented" public
use?

11/86 BWS

During the year, Pea Island received 9,505 requests for information and thirteen news releases were prepared. In addition, there were numerous radio spots and news articles covering facets of refuge operations.

2. Outdoor Classrooms - Students

The emphasis on non-staff conducted activities continued in 1986. School groups, scouts, etc. were encouraged in the independent use of the refuge for educational activities. Marsh investigation equipment (seines, mud sieves, etc.) was available for loan from the VCS.



8 - If you ever really want to get a kid's attention, ask him why the stilt's knees bend backwards! 10/86 MJH

4. Interpretive Foot Trails

Due to other activities of higher priority, several planned I&R projects were again put on a "back burner" in 1986. Among them were upgrading interpretative signs for Pea Island's two trails. A high priority item for 1987 is to develop and implement interpretive signing for the North Pond and New Inlet Trails.

Approximately 110,547 visitors (221,055 AH) utilized interpretive foot trails at Pea Island in 1986.

6. Interpretive Exhibits/Demonstrations

The two interpretive kiosks constructed in 1984 have been popular spots for Pea Island visitors. These exhibits have done an excellent job of presenting the "message of the Service" while answering many of the common questions asked by refuge visitors.

Exhibits displayed in the VCS have also been popular with refuge visitors. Though these displays are "homemade", and their quality is below Service standards, they represent the refuge's best effort. Hopefully, office renovation for a more appropriate VCS will be possible in the near future. During 1986, 53,325 visits (19,389 AH) and 13,024 visits (3,256 AH) were spent at the kiosk and VCS, respectively.

7. Other Interpretive Programs

Summer interpretive programs were conducted, as usual, at Pea Island; however, the refuge became independent in its programs during 1986. In past years, staff or interns from the N.C. Aquariums or National Park Service conducted public programs on the refuge during the summer months. By 1986, the volunteer program had developed to an appropriate degree to handle the programs inhouse.

Two birdwalks, a Children's Wildlife Discovery Program, and a refuge tour were conducted weekly during the summer months. Interns Smith and Midgett conducted a majority of the programs with occasional relief from other volunteers or ORP Strawser. Program participation follows:

<u>Program Name</u>	<u># Programs Conducted</u>	<u>Total Participation</u>
Birdwalk	16	296
Children's Wildlife Discovery	9	225
Refuge Tour	9	78

In addition, marsh programs were conducted for 5 additional groups totalling 67 participants.

8. Hunting

The third and final youth rabbit/pheasant hunt took place at Pea Island from October to December, 1986. Changes made in 1985 did little to improve the quality of or interest in the hunt.

The 1986 hunt was conducted only because the N.C. Wildlife Resources Commission had included information about the hunt in their 1986 regulations digest. After consultation with the RO, the decision was made to continue the hunt for one more year to avoid confusion of the public. Forty-three valid applications were recorded; thirty-two party permits were issued. Of these, 12 permits were utilized during the hunt; two pheasants were harvested during the hunt.

The N.C. Wildlife Resources Commission was notified that the 1986 hunt would be the final hunt. On November 4, ORP Strawser met with Debbie Paul and Kim Garner (NCWRC) to review the Pea Island Rabbit/Pheasant Hunt history. A memo to the RD followed to brief on the cancellation of the hunt.

In all, 46 visits (276 AH) to Pea Island were associated with hunting.

9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island during 1986. Bluefish,

spot, pompano, croakers, and trout were the major fish caught. As always, a popular fishing spot was Oregon Inlet; many visitors parked their vehicles on the refuge and walked onto the catwalks on the Bonner Bridge to fish. Approximately 870,623 AH (217,658 visits) were spent fishing on Pea Island during 1986.

10. Trapping

The 1986 trapping program at Pea Island was the 4th in refuge history. Trapping is considered a management tool at Pea Island; therefore, the program is discussed in detail in Section G. of this narrative.

11. Wildlife Observation

Pea Island continues to be a "birder's paradise". Though numbers of some species, waterfowl in particular, have declined in recent years, the rich diversity continues to draw crowds of bird watchers year-round.

Due to the location of the road (Highway 12) through Pea Island, it is difficult for a traveler to pass without observing wildlife. On most days of the year, the quality of observation is quite high. During the fall and winter, greater snow geese frequently feed on the road shoulders. Often vehicles must pause to allow the birds to move out of their paths.

During the spring and summer, cattle egrets replace snow geese as the most easily observed wildlife. Various species of raptors utilize the dunes, power line poles, and boundary sign posts for resting and hunting, thus making them clearly observable from a vehicle. During 1986, an estimated 1,004,974 visitors spent time in association with vehicular wildlife observation.

Refuge trails and other access points are located to make wildlife observation (on foot) easy and enjoyable. Refuge visitors spent approximately 337,880 AH (220,880 visits) participating in this activity during 1986.

12. Other Wildlife Oriented Recreation

Wildlife photography continues to be a popular activity at Pea Island. Several photo blinds are available on a "first come, first served" basis, but most photographers wander around the impoundments or use the observation platforms along North Pond Trail. Good photographs tend to be the result of being at the right place at the right time.

During 1986, the use of refuge photo blinds was limited by dike work; however, "wandering photography" was popular. Approximately 12,359 AH (3,092 visits) were spent with photography at Pea Island last year.



9 - Waterfowl numbers have been low; however, for birdwatchers, the quality remains exceptionally high.

02 85 MJH

15. Off-Road Vehicling

The use of ORV's on Pea Island is restricted to North Carolina Highway 12. Though illegal ORV traffic has plagued the refuge somewhat in the past, significant erosion of the beach and dunes has caused a rise in violations of this nature. In several places, the beach is easily visible from N.C. Highway 12 and the temptation is more than some motorists can handle. Increased signing has become a necessity. ORV violations have become more frequent and, as always, the violators are difficult to apprehend. More often than not, officers arrive at the scene to find only the tell-tale ruts in the sand.

As public use of Outer Banks beaches continues to increase dramatically, the importance of the few remaining tracts of natural, relatively undisturbed beach habitat is becoming increasingly important to gulls, terns, shorebirds, and allied bird species. It is evident from weekly surveys conducted at Pea Island and from observations of bird use at Currituck NWR and along other beaches in Currituck and Dare counties, including Cape Hatteras National Seashore, that increasing human activity on beaches is adversely impacting bird use of this important habitat type. The birds are simply avoiding areas of heavy to moderate human use and are concentrating on beaches where public access is limited and the numbers of swimmers, sunbathers, surfers, and fishermen are low.

16. Other Non-Wildlife Oriented Recreation

Because Pea Island is associated with the "beach scene", non-wildlife related recreational activities will always occur on the refuge. Swimming, surfing, and sunbathing are major summer activities.

No facilities have been constructed specifically for these uses. Approximately 785,756 AH (242,480 visits) were spent in non-wildlife oriented recreation on Pea Island in 1986.

17. Law Enforcement

Staff participation in law enforcement was very limited in 1986 with one exception. A 5 day manhunt was conducted in Cape Hatteras National Seashore (Dare County) beginning on April 9.

According to Park Service reports, a ranger was investigating a report of a stolen airplane at the Billy Mitchell Airstrip in Buxton, N.C. The airstrip is located approximately 20 miles south of Pea Island Refuge. The ranger confronted a suspect at the plane and ordered him to place his hands on the wing. He pulled a small caliber automatic handgun from his belt and began firing at the ranger. 17 shots were exchanged before the assailant turned and ran. Neither persons involved were injured. The suspect was a former Special Forces Executive Officer in Viet Nam and suffered from mental disorders. The 5 day search involved approximately 160 police officers and agents from 17 agencies, including U.S. Fish and Wildlife Refuge officers. The refuge officers participated in one of several roadblocks. People similar in appearances to the suspect were interviewed and vehicles were searched. After 3 days of day and night roadblocks it was assumed the suspect may have escaped and all but one roadblock in the Buxton area were suspended. On the 5th day, the suspect was located on the beach by fishermen, completely exhausted and ready to turn himself in.

The following violations handled by the refuge staff are listed below:

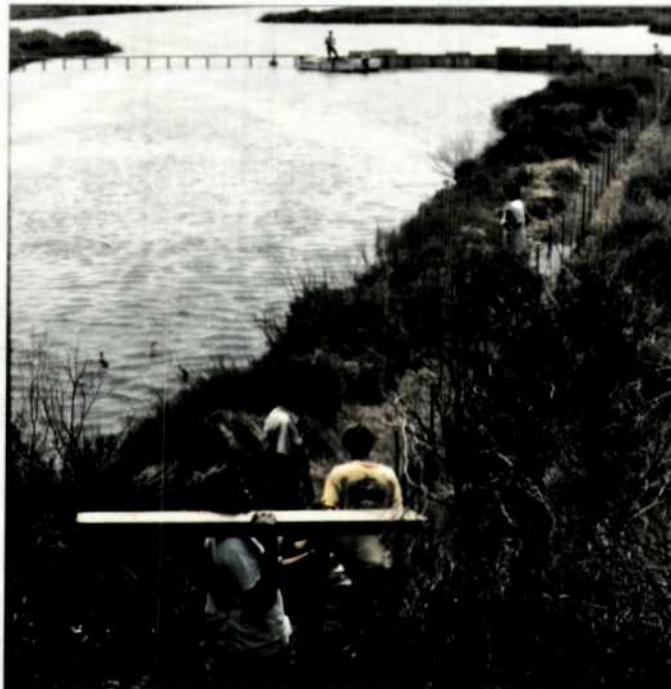
Vehicle Trespass (4 cases) - \$50.00 each
Vehicle Tresspass - Dismissed

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

"Murphy" was in evidence at the New Field dike job again this year. Last year Hurricane Gloria completely rearranged the project. Assistant Manager Dunaway, consistently in touch with the Corps of Engineers, managed to redesign the project and still have it fall under our existing COE permit. By June, temporary silt retention bulkhead and barrier had been built across Pea Island Creek. By late

July, the temporary bulkhead and silt barriers had been inspected by the COE and work began. Jesse Williams from Mattamuskeet NWR arrived with dragline and rehabilitation was underway. The pump head was finally retrieved with assistance from the dragline and D-6. Just as things got rolling, Hurricane Charlie arrived August 17. Damage was not as severe as Gloria but none the less another setback.



10 - YCC'ers assist refuge staff with wingwalls on the
New Field Dike work. 07/86 MAD

In August, new windows and doors were installed on sections of the shop and storage buildings. Corrosion had affected the window frames and doors and frames to such an extent that security and safety were about to become real problems.

The carpet in the office was replaced this year.

3. Major Maintenance

Our D-6 was vandalized in February and had to be hauled to Edenton for replacement of all the gauges and repairs to the bent control levers.

This dozer was also taken to Chesapeake where 30" tracks were installed to increase its capabilities in marsh and pocosin areas.

5. Communications Systems

An omnidirectional antenna was installed to improve communications north to Currituck and west to Alligator River. This antenna replaces a directional antenna utilized for Pea Island only.

Carolina Telephone and Telegraph Co. was issued a special use permit to relocate telephone lines from the east side of N.C. Highway 12 to the west side. This year the lines on the east side were laying on top of the ground subject to sand, sea, tourists, vehicles, etc. Hopefully by relocating and installing the line underground the reliability of Hatteras Island phone service will improve.

7. Energy Conservation

Staff traveling from Alligator River to Pea Island share the ride and use the most fuel efficient vehicles available.

J. OTHER ITEMS

1. Cooperative Programs

The Wilmington office of the Corps of Engineers special use permit to conduct beach profile studies on the northern Atlantic beaches of the refuge was renewed again this year. This has been an ongoing study since 1983.

The N.C. Department of Transportation's request to stabilize the southern end of the Herbert C. Bonner bridge spanning the Oregon Inlet was referred to the refuge by Realty-RO to be handled by a special use permit. The permit has been issued and on site inspections with DOT personnel have been made but no work had begun by years end.

The week of March 31 through April 4 was a "training" period for Gary Cummings who was a NPS employee participating in the Departmental Managers Developmental Training Program. The GS-13 trainee was assigned to assist the field staff, and upon leaving said it was a very educational experience on what work on refuge's is all about and it was the hardest week he had worked in many, many years.

4. Credits

This narrative is a joint effort by all the refuge staff with the exception of the typing and assembly which rests solely upon Secretary Beverly Midgett.

Most photos were taken by staff. Additional photo credits are indicated as follows: Michael Halminiski (MJH), Roy Swindel (RSS), and Stephen Krasemann (SJK). Graphics were prepared by Volunteer Debbie Perry.

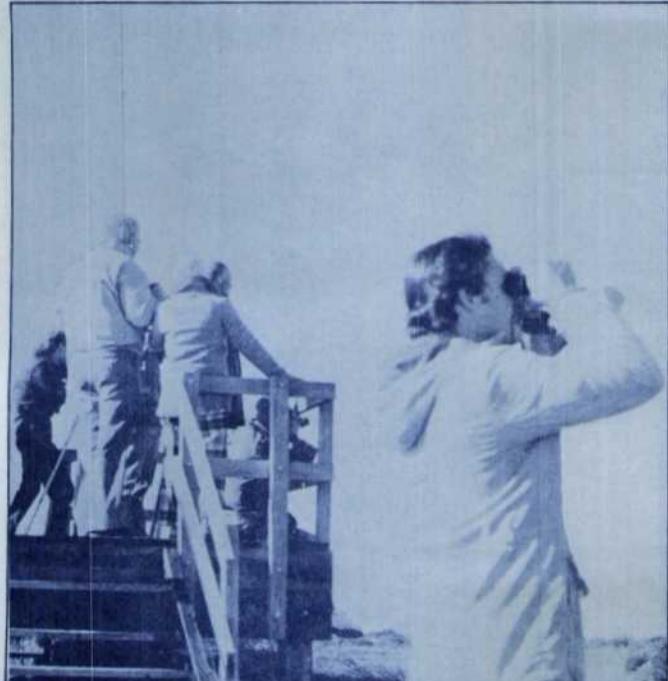
Pea Island National Wildlife Refuge is administered by the Fish and Wildlife Service on Cape Hatteras National Seashore. Pea Island is composed of 5,915 acres of coastal barrier island extending over 12 miles along North Carolina's "Outer Banks" from Oregon Inlet southward to the village of Rodanthe.

Pea Island and an adjacent 25,700 acres of Pamlico Sound waters on its western boundary was established in 1938 by Congressional Act and Presidential Proclamation. The island was named for dune peas which grow in the dunes. This area was set aside to provide safe wintering habitat for greater snow geese and other migratory waterfowl. Civilian Conservation Corps workers improved the low sandy island by the construction of barrier dunes to protect inland portions from storms. The CCC also built dikes and ponds for waterfowl and fields to grow wildlife foods. Pea Island's basic mission is the same today, providing a quality environment for wildlife.

WILDLIFE

Thousands of snow and Canada geese, whistling swans and 25 different species of ducks winter on the refuge each year.

Although the waterfowl numbers are greatest in January, a greater variety of birdlife may be observed in October and November during the fall migrations. The refuge's abundant bird life lists 265 species that occur with regularity and 50 species which are accidental visitors.



During the spring and summer months, several species of shore and wading birds nest on the refuge. Least terns, willets, black skimmers and oystercatchers raise their young in the dune and beach zone. Ibises, egrets, and herons find safety and suitable nesting cover in the impoundment and marsh areas on the Pamlico Sound side of the refuge.

Suitable habitat for several endangered species is found on the islands. Peregrine falcons are frequently observed as they move along the coast on their north and south migrations. Eastern brown pelicans feed in the impoundments and the waters offshore during the summer and fall. Bald eagles occasionally visit the refuge during warmer months. Loggerhead sea turtles lumber ashore on dark summer nights to lay their eggs in the warm beach sand.

Resident species such as the otter, create paths or slides between the fresh water impoundments and salt marsh. Muskrats and nutria build lodges or mounds of grass in the marshes. Colorful ring-necked pheasants feed along the dikes and highway.

Many species of aquatic life live in the marshes and tide flats along the sound. Speckled trout (weakfish), croaker, spot, menhaden, and flounder all spawn and spend their early stages of life in the protected creeks and bays of the refuge. Blue crabs, oysters, and clams also find this area ideal.

Along with the loggerhead sea turtle, reptiles such as the diamondback terrapin, common snapping turtle, hognosed snake, black racer and banded water snake make their homes on the refuge. There has never been a verified report of a poisonous snake on Pea Island.

MANAGEMENT

The harmonious blending of man's technical know-how and nature's processes is sought to provide natural cover and foods. The barrier dune system is no longer rebuilt to prevent overwash, but the potential overwash areas are identified and plans made to provide proper drainage. Grain crops are no longer planted but fields are sown with perennial grasses which will replenish themselves with minimal need for management.

The freshwater ponds are manipulated using the natural dry and wet seasons coupled with timely opening and closing of water control structures. Controlled burning removes the less desirable brush and allows the more productive grasses to dominate. However, many areas are left untouched to provide habitat diversity for all species of wildlife.

Endangered species utilization and critical habitat protection add a new dimension to present management. The refuge monitors the loggerhead sea turtle nesting population and provides a nursery for the safe hatching of young turtles.

Censusing and banding of waterfowl aids the entire Atlantic flyway in its management. Pea Island's data is compiled with that obtained from other refuges to determine the most effective approach for enhancing and protecting our waterfowl populations.

Law enforcement patrols are conducted to ensure the protection and safety of the refuge's natural resources.

RECREATIONAL OPPORTUNITIES

Bird watching, nature study, and photography are the most popular activities associated with wildlife on the refuge. Low observation platforms located on the dikes of North Pond provide excellent sites for observing waterfowl and other wildlife. The refuge is open to foot traffic and an interesting four mile walk may be taken around the North Pond Impoundment. However, portions of the refuge may be closed in the spring due to nesting birds. All pets are prohibited in the impoundment areas, but may be taken elsewhere on the refuge, if kept on a leash.

In the fall and winter, driving along Highway 12 can provide a chance to see many wildlife species. Care should be exercised in pulling off Highway 12 due to deep sand. Walking in the spring and fall is a good way to observe wildlife, but in the summer months populations of biting flies and mosquitoes make foot travel difficult.

The 12.2 miles of pristine beach provides the surf fishing enthusiast an excellent opportunity to take home a good catch. Speckled and gray trout, spot, flounder, blue fish, red drum and striped bass are some of the most sought after species. Swimmers, sunbathers, beachcombers, and surfers all find plenty of sea and sand.

The best opportunity for crabbing is the shore along Oregon Inlet.

Recreation vehicles are not allowed off the designated roadways on Pea Island. Beach driving is not allowed.

REGULATIONS

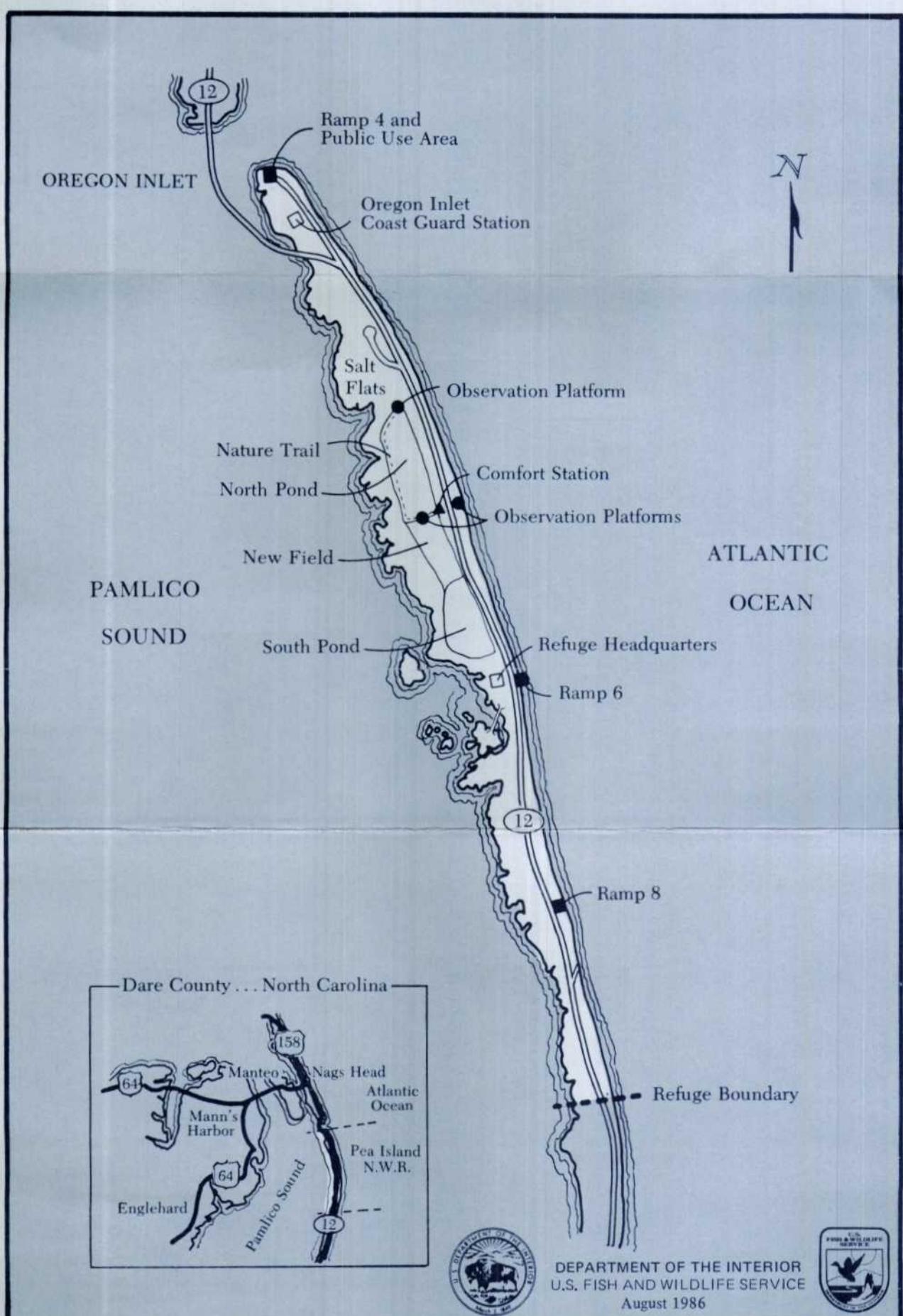
Visitors are requested to obey refuge signs to ensure that wildlife has a place to grow and survive for future generations to enjoy. It will be beneficial to inquire at the Refuge Office as to whether a specific activity is permitted or prohibited. Inquiries concerning the refuge should be directed to the:

Refuge Manager
Pea Island National Wildlife Refuge
P.O. Box 150
Rodanthe, North Carolina 27968
Telephone: 919-987-2394

The following list indicates some of the restricted activities on the refuge:

Fishing is allowed on the beach, not in the ponds.
Camping is prohibited. Check NPS camping areas on Bodie Island.
Fires are prohibited.
Pets on a leash are allowed on the beach. Pets are not allowed around the ponds.

Hunting is prohibited.
Weapons are prohibited.
Vehicles are allowed only in parking areas and on Highway 12.



Pea Island National Wildlife Refuge



VISITOR INFORMATION

Headquarters for Pea Island National Wildlife Refuge is located 6½ miles south of Oregon Inlet on N.C. Highway 12. Refuge staff is usually available from 8 - 4:30 weekdays to answer visitor questions or give refuge information. The refuge offers a wide variety of quality outdoor experiences.

We invite you to enjoy Pea Island. In order to ensure that the refuge is protected for future generations to enjoy, we ask that you obey the following regulations:

- Drive only on designated roads. Refuge beaches are closed to vehicles.
- Camping is prohibited.
- Firearms are prohibited.
- Please do not litter.

Ask about the following opportunities:

- Wildlife photography/observation.
- Outdoor classrooms.
- Conducted programs.

WARNING: Insects are abundant during the months of May through September, and appear throughout the year following a warm rain. Insect repellent and appropriate protective clothing are recommended.

For more information contact the Refuge Manager, Pea Island National Wildlife Refuge, P.O. Box 150, Rodanthe, N.C. 27968 or call (919) 987-2394.

NOTES

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

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

Calendar of Wildlife Events



Pea Island
National Wildlife Refuge

CALENDAR OF WILDLIFE EVENTS

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

JANUARY . . . High concentrations of ducks and geese. Ducks are best observed in North Pond. Geese can easily be seen from Highway 12 in New Field. Marsh hawks and kestrels are fairly common. Herons, egrets, ibis and several species of shorebirds can be seen easily in the pond and salt flat areas. Barn owls can be seen searching the marsh for food at dusk.

FEBRUARY. Waterfowl populations continue to be high. Likewise, the January trends with raptors, waders, and shorebirds continue.

MARCH . . . Spring shorebird migration causes numbers to increase. Brown pelicans congregate in the sound. Osprey are usually evident and begin nesting activity.

APRIL . . . Shorebird migration continues in full force. Wading birds begin to establish rookery sites. The bounties of surf fishing include big blues, big croakers, trout, and an occasional red drum. Warm weather activities begin, including yellow-bellied sliders sunning themselves on pond banks, and mullet jumping in the ponds. Diamondback terrapins can be seen in the ponds as they surface to breathe.

MAY . . . A variety of terns return to the refuge and begin courtship and nesting activities. Of the many gulls, the laughing gull's courtship display is the most easily observed. Willets nest in dunes and high beach areas. Osprey hatching occurs. The first broods of black ducks and gadwalls appear, usually in the ponds. Occasionally, swallow-tailed kites can be seen. Surf fishing produces big blues, croakers, trout, flounder, sea mullet, and drum.

JUNE . . . Duck broods are abundant in North Pond area. Black-necked stilts feign injury to lure intruders from their nests. Least terns, oystercatchers, black skimmers, and other shorebirds nest in colonies on the beach and on islands in North Pond. Surf fishing continues to yield blues, flounder, and croaker, and spots begin to show up. Crabbing begins to pick up. Loggerhead sea turtle nesting begins.

JULY . . . Osprey fledglings leave the nest. Duck broods continue to be seen in North Pond. Surf fishing drops off with only smaller fish being caught. Fishing from the Bonner Bridge over Oregon Inlet at night produces large gray trout. Crabbing is excellent. Sea turtle nesting continues.

AUGUST . . . Brown pelican young (produced south of the refuge) begin to learn to fish and are evident off the beach and around Oregon Inlet. Bridge fishing continues to yield gray trout and small blues. Spanish mackerel and pompano begin to appear. Crabbing continues to be excellent. Sea turtle nesting drops off this month.

SEPTEMBER . Wader and sparrow fall migrations begin with dikes providing the best observation areas. Raptor migration is evident with peregrine falcons being observed frequently. Teal migration begins through the refuge. Crabbing continues.

OCTOBER . Songbird, teal, and raptor migrations continue. Trout begin to get larger. Blue fish, puppy drum, and larger drum can be expected. Canada and snow goose migration becomes evident. Clamming becomes quite good, especially at low tide after a strong northeaster. Large number of cormorants can be observed this month and next.

NOVEMBER . Winter populations of gulls are highest now. Black-bellied plovers and willets may be seen on the beach. Peregrine falcons and other migratory raptors including kestrels, merlins, and sharp-shinned hawks frequent the refuge. The peak of swan migration occurs now. Numbers of ducks, geese, and coots are increasing. Lucky fishermen catch big blues, drum, or an occasional flounder.

DECEMBER . Pelagic birds can be seen off the beach, especially after strong northeast winds. Barn owls are seen frequently over the marsh at dusk. Waterfowl numbers grow by leaps and bounds. Whistling swans, Canada and snow geese, and approximately 25 species of ducks congregate and settle in for the winter.

YEAR-ROUND ON THE REFUGE

Muskrats, nutria, and otter can be seen scurrying over the dikes or swimming in the ponds. Colorful pheasants are abundant and can be seen almost anywhere on the refuge.

Beach combing is particularly productive after large storms and/or strong northeast winds.



National Wildlife Refuge on the South Carolina Coast. After a week on the coastal islands, the female swam to the mainland, and the pair was recaptured immediately. Using modified procedures, a second pair was released on Bulls Island in January 1978 where the wolves thrived during the one-year planned for the experiment. The pair was then easily recaptured and returned to the captive breeding program.

These experiments indicate not only that the red wolves can be translocated to other suitable habitats, but also that they can be successfully handled, transported, acclimated, and, when necessary, quickly recaptured.

The Proposal

The U.S. Fish and Wildlife Service is considering a proposal to reestablish red wolves onto the Alligator River National Wildlife Refuge in Dare County, North Carolina. This fact sheet has been prepared to provide basic information on red wolves and the proposed release.

Proposed Procedures

Four mated pairs of adult red wolves would be brought to the refuge during the fall of 1986. These eight animals would be fitted with radio collars and "acclimated" as mated pairs in four 50' by 50' pens. About six months later three of these four pairs would be released at staggered intervals and at various locations within the refuge. All activities would be closely monitored by radio transmitter. In the event recapture of any of these animals is deemed necessary, capture collars would be activated and the individual picked up. The following fall (1987), if the first releases are determined to be successful, two more pairs would be brought in for release the next spring (1988).

It is expected that young will be born throughout the duration of the project; and a population, which would eventually reach the carrying capacity of the area, would develop. If any of the originally introduced wolves move onto private lands, they will be recaptured.



Red Wolf

THE RED WOLF

The red wolf (*Canis rufus*) is a little-known North American canine that once ranged over the southeastern United States, from the Atlantic Coast to central Texas and from the Gulf Coast to central Missouri and southern Illinois.

There are three wild canids (exclusive of foxes) native to the United States. Two of these are termed wolves: the gray wolf (timber) and the red wolf. The coyote is the third member of this group.

The red wolf is larger and more robust than the coyote with a broader head and almond-shaped eyes. Compared to the gray wolf, the red wolf is smaller and more lanky in appearance. The color of the red wolf is highly variable, but most individuals are cinnamon to gray in color. The weight ranges from 40 to 80 pounds with males being slightly heavier than females.

Very little is known about the social structure of the red wolf which, like its appearance, falls between the gray wolf and the coyote. The family structure is not as complex as the pack system of the gray wolf but probably more structured than the coyote. Strong compatibility bonds are believed to develop between male and female pairs. It is believed that naturally mated pairs of wolves stay together.

Like all canids, the red wolf is a predator feeding on a wide range of prey species from small rodents, such as mice and rats, to the larger rabbits, muskrats, raccoons, groundhogs, squirrels, opossum, and available birds. It is probably most accurately described as an opportunistic feeder whose diet may include carrion, berries, and other vegetation, or just about any species which occurs at Alligator River, including an occasional deer or turkey. The wolf feeding habits, as with most predators, will not seriously impact any group of animals and pose no threat to man.

Why Is It Endangered

Expanding human populations and extensive land clearing in the South affected the red wolf in two ways. First, these animals,

along with other large predators, were killed in great numbers. Second, the extensive clearing of forests and hardwood bottomlands and large impoundments eliminated prime red wolf habitat. Continued clearing created conditions which allowed the adaptable coyotes to expand eastward from their traditional prairie range. This increase in coyote population, coupled with a decline in red wolf numbers, increased the opportunity for interbreeding until the red wolf was in danger of being hybridized out of existence.

The last wild population existed in extreme southwest Louisiana and southeast Texas, a five-county area made up of coastal marsh and prairie. On this marginal habitat, the few remaining animals had fallen prey to severe infestations of heartworms, hookworms, and sarcoptic mange. Concern for the species' survival was brought to light in the early 1960s, and by 1975 biologists concluded that it was no longer feasible to preserve the red wolf as a pure genetic population in this limited range. It was then decided to locate and capture as many red wolves as possible and to preserve the species in captivity free from other wild or feral canids until suitable areas were identified within its former range that could support wild populations.

Present Status

Today the red wolf is one of the most endangered mammals in North America. It exists only as a captive breeding population of less than 75 animals located in five holding areas. The main group is at the Point Defiance Zoo Captive Breeding Facility at Tacoma, Washington. Red wolves are also on display at the Wild Canid Survival and Research Center, St. Louis, Missouri; the Audubon Zoo in New Orleans, Louisiana; and the Texas Zoo in Victoria, Texas.

Previous Release

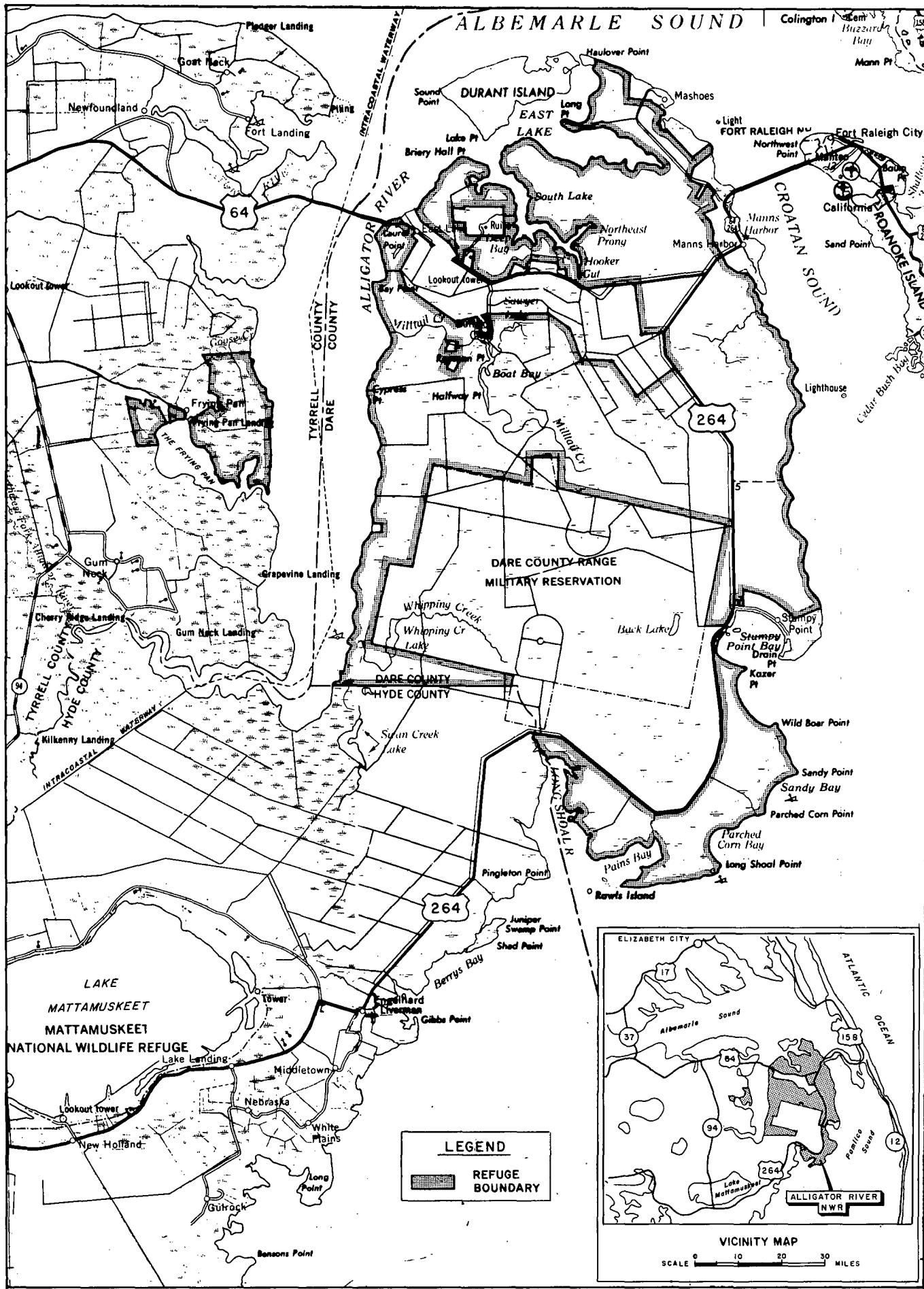
With the program to develop a breeding population underway, an effort was made to determine the feasibility of establishing red wolf populations in areas of its historic range. The first experimental translocation effort was carried out in 1976 when a pair of wolves was released on Bulls Island, a part of Cape Romain

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

DARE AND TYRRELL COUNTIES, NORTH CAROLINA

UNITED STATES
FISH AND WILDLIFE SERVICE

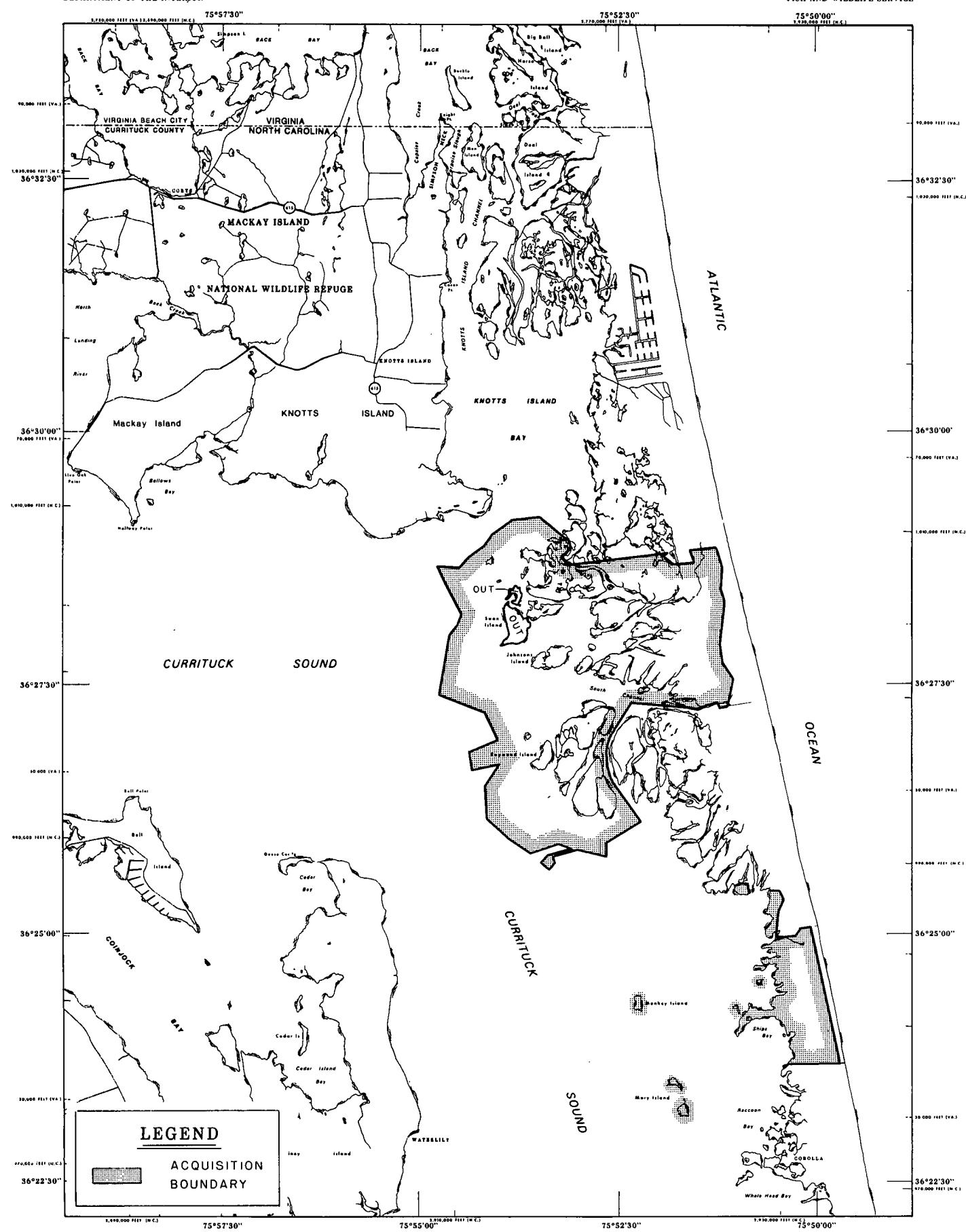


CURRITUCK NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

VIRGINIA BEACH CITY, VIRGINIA & CURRITUCK COUNTY, NORTH CAROLINA

UNITED STATES
FISH AND WILDLIFE SERVICE



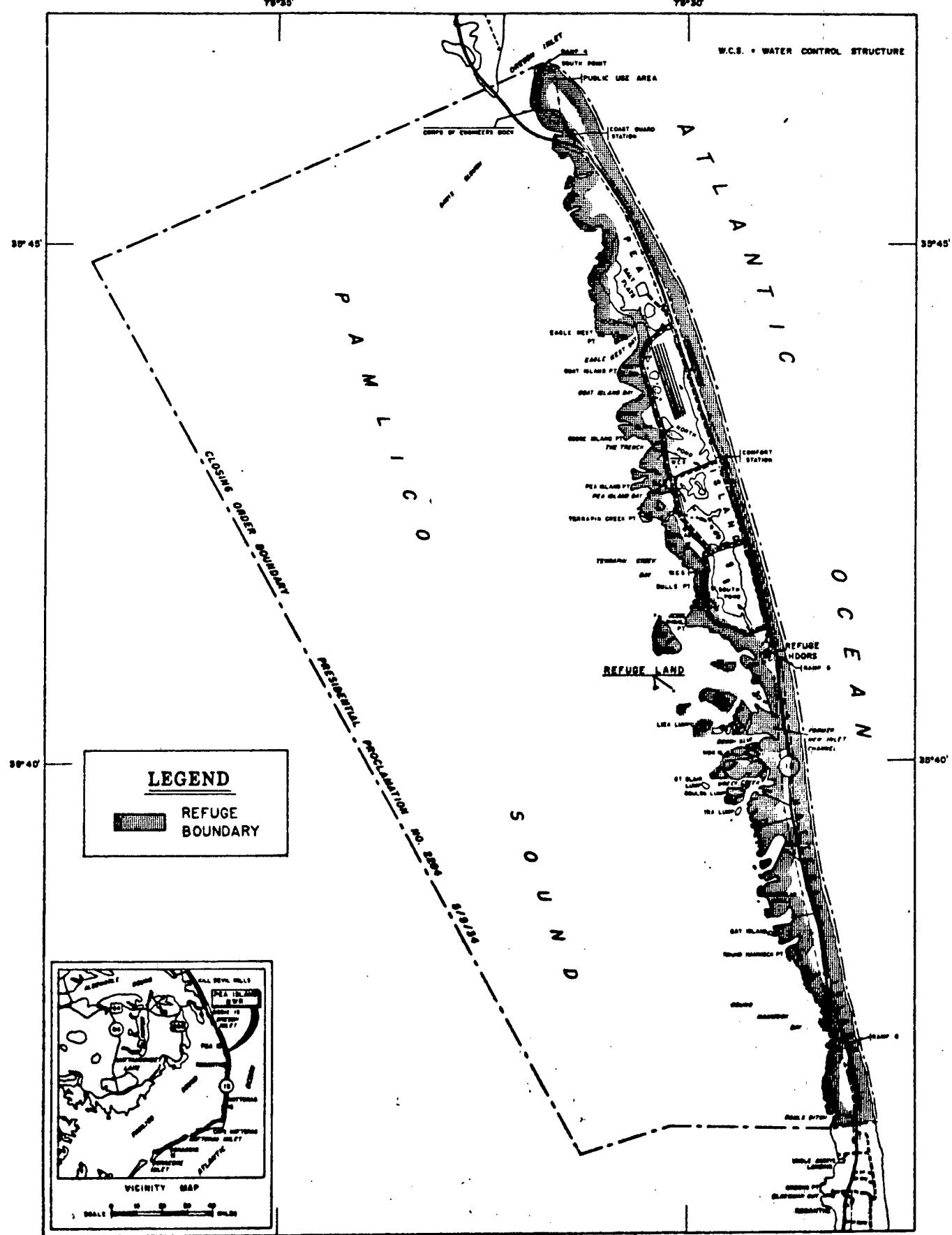
8° QUADRANGLE
Magellan N.

PEA ISLAND NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

DARE COUNTY, NORTH CAROLINA

UNITED STATES
FISH AND WILDLIFE SERVICE



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

ATLANTA, GEORGIA

JUNE, 1976

Scale: 0 1 2 3 4 5 6 7 8 MILES
0 1000 2000 3000 4000 5000 6000 FEET

MEAN
DECLINATION
1974

4R-N.C.-231-40



ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE
HUNTING INFORMATION



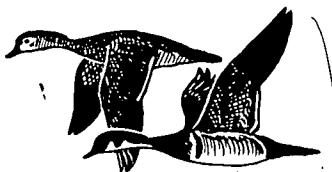
Regulations:

- The refuge is open daylight hours only. Hunter access is allowed from one hour before until one hour after legal shooting hours.
- Firearms are prohibited on the refuge unless they are unloaded and dismantled or encased, except when participating in a hunting activity when all firearms must be unloaded while inside a vehicle.
- The use of artificial lights (including car headlights) to locate, observe, or take wildlife is prohibited.
- The use of dogs is restricted to designated areas.
- Vehicular access is restricted to designated roads.
- Camping is prohibited.
- Wood gathering is by permit only.
- Only temporary blinds or tree stands are permitted.
- No commercial guiding permitted.



In addition to these, all State and County regulations and Title 50 of the Code of Federal Regulations apply.

IF YOU HAVE ANY QUESTION AS TO THE ADVISABILITY OR LEGALITY OF ANY ACTIVITY, CONSULT THE REFUGE MANAGER BEFORE PARTICIPATING IN THAT ACTIVITY.



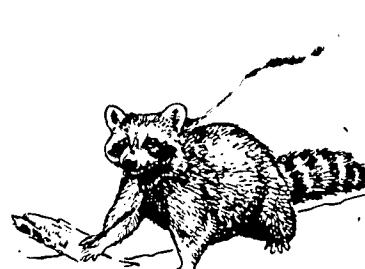
Alligator River National Wildlife Refuge
P. O. Box 1969
Manteo, North Carolina 27954
(919) 473-1131

State seasons and bag limits apply. A State license is required.

Take PRIDE in America's Wildlife Resources.

Report Wildlife Violations.

1-(800)-662-7137



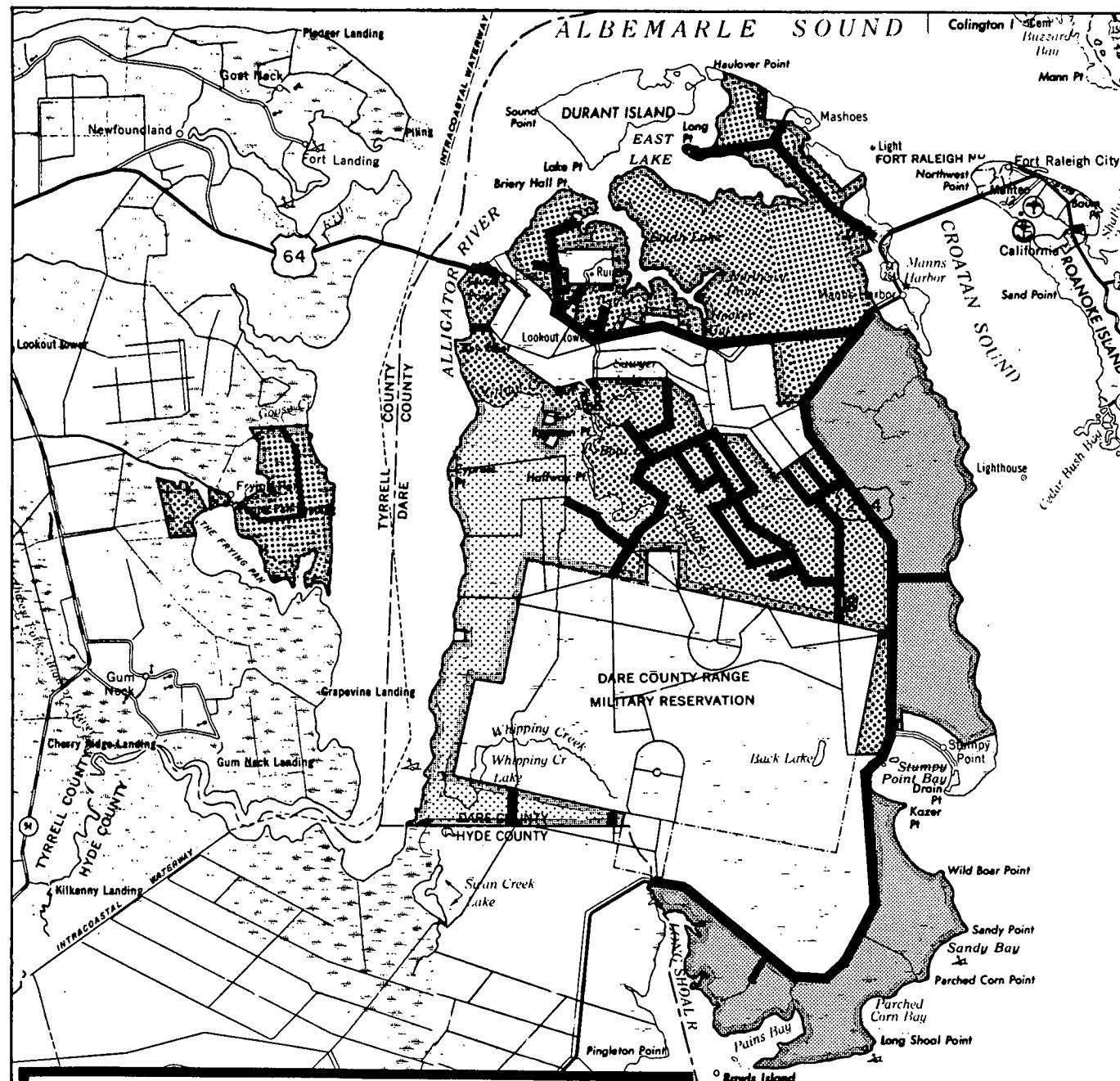
See map on reverse side for dog and vehicle restrictions.

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

DARE AND TYRRELL COUNTIES, NORTH CAROLINA

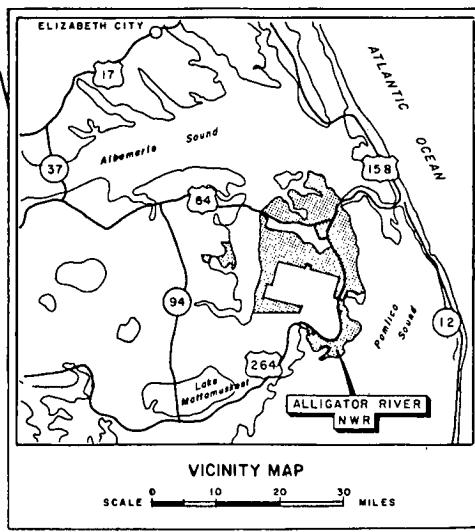
UNITED STATES
FISH AND WILDLIFE SERVICE

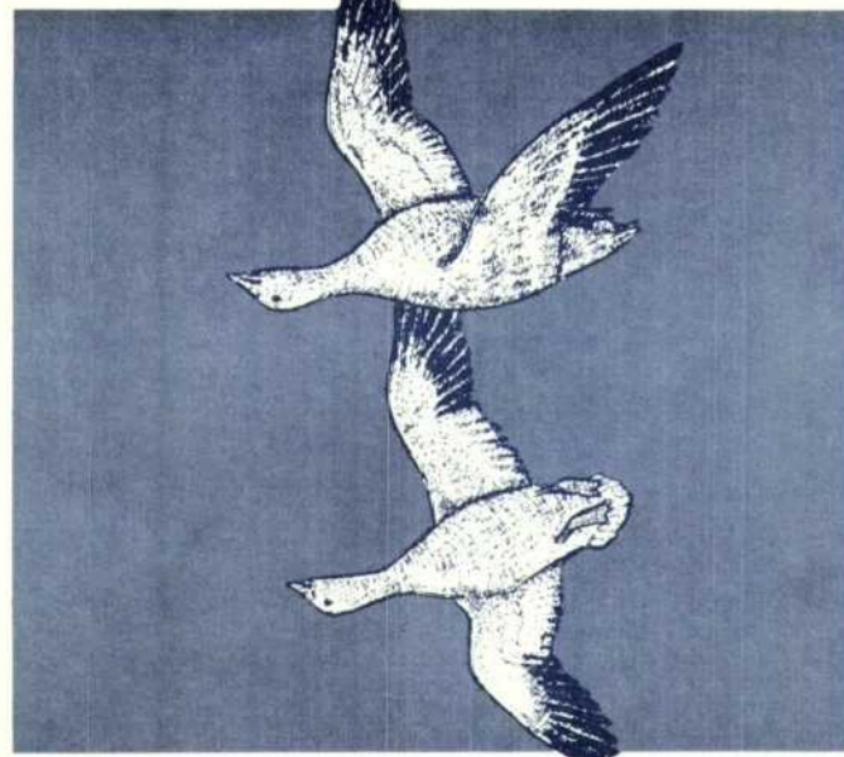


HUNTING MAP

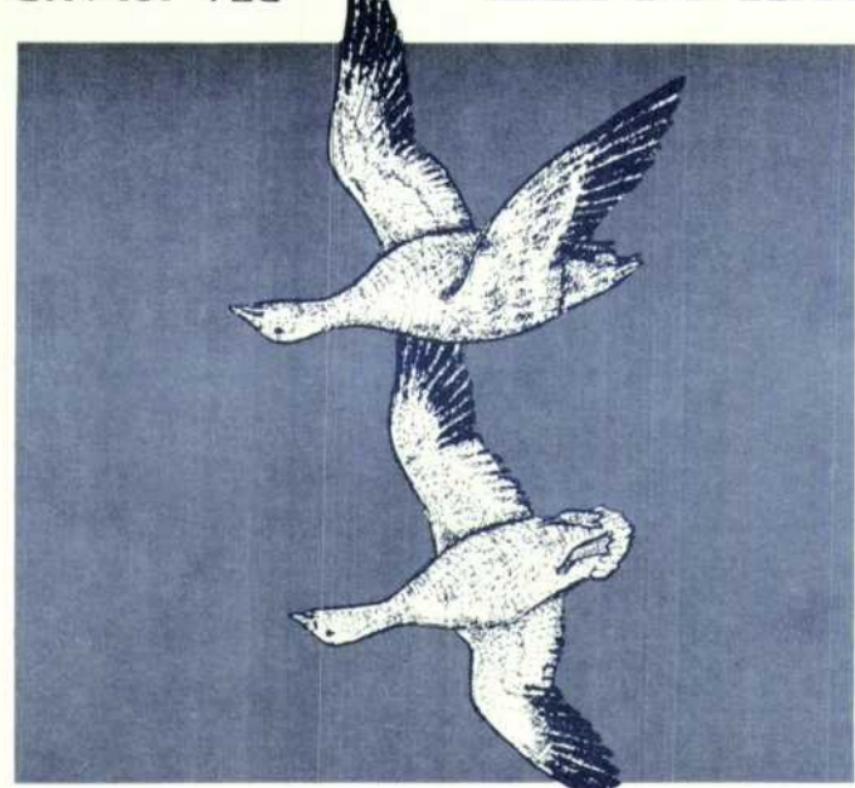
- Gum Swamp Unit-Hunting allowed;
Dogs prohibited.
- Hunting allowed;the use of dogs
is restricted to bird hunting
with retrieving dogs.
- Hunting with dogs allowed.
- No hunting-safety/resource
management zone.
- Road**

ALL REFUGE ROADS ARE CLOSED TO MOTORIZED
VEHICLES UNLESS DESIGNATED AS OPEN.





		S	S	F	W
—	Palm Warbler	c	a	c	
—	Bay-breasted Warbler		r		
—	Blackpoll Warbler	c	c		
—	Black-and-white Warbler	u	c		
—	American Redstart	c	a		
—	Prothonotary Warbler	o	o		
—	Ovenbird	r	r		
—	Northern Waterthrush	o	c		
—	Louisiana Waterthrush	u	u		
—	Connecticut Warbler		r		
—	*Common Yellowthroat	c	c	a	u
—	Hooded Warbler		r		
—	Wilson's Warbler		r		
—	Canada Warbler		r		
—	*Yellow-breasted Chat	o	o	u	o
—	Summer Tanager	o	r		
—	Scarlet Tanager		r		
—	*Northern Cardinal (Cardinal)	c	c	c	c
—	Rose-breasted Grosbeak		u		
—	Blue Grosbeak		u		
—	Indigo Bunting	o	u		
—	Dickcissel		u		
—	*Rufous-sided Towhee	a	a	a	a
—	American Tree Sparrow (Tree Sparrow)		r	r	
—	Chipping Sparrow	o	c	o	
—	Clay-colored Sparrow		u		
—	*Field Sparrow	u	u	c	u
—	Vesper Sparrow		c	u	
—	Lark Sparrow		u	c	u
—	Lark Bunting				
—	Savannah Sparrow (Ipswich)	a	a	a	
—	Grasshopper Sparrow		u	o	
—	Sharp-tailed Sparrow	a	a	a	
—	*Seaside Sparrow	a	c	a	a
—	Fox Sparrow	o	u	o	
—	*Song Sparrow	a	a	a	a
—	Lincoln's Sparrow		u		
—	Swamp Sparrow	o	a	a	
—	White-throated Sparrow	u	a	u	
—	White-crowned Sparrow		c	o	
—	Dark-eyed Junco (Slate-colored)	u	u	u	
—	Lapland Longspur				
—	Snow Bunting	o	o	o	
—	Bobolink	c	c		
—	*Red-winged Blackbird	a	a	a	a
—	*Eastern Meadowlark	c	c	c	a
—	Western Meadowlark				
—	Rusty Blackbird		r		
—	*Boat-tailed Grackle	a	a	a	a
—	*Common Grackle	r	r	r	r
—	Brown-headed Cowbird	c	c	c	c
—	*Orchard Oriole	u	u		
—	Northern Oriole (Baltimore)		a		
—	Purple Finch		u	u	
—	Common Redpoll				
—	Pine Siskin		u	u	
—	American Goldfinch	u	c	u	
—	Evening Grosbeak		r		
—	*House Sparrow	u	u	u	u



		S	S	F	W
Palm Warbler		c	a	c	
Bay-breasted Warbler			r		
Blackpoll Warbler		c	c		
Black-and-white Warbler		u	c		
American Redstart		c	a		
Prothonotary Warbler		o	o		
Ovenbird		r	r		
Northern Waterthrush		o	c		
Louisiana Waterthrush		u	u		
Connecticut Warbler			r		
*Common Yellowthroat		c	c	a	u
Hooded Warbler			r		
Wilson's Warbler			r		
Canada Warbler			r		
*Yellow-breasted Chat		o	o	u	o
Summer Tanager		o	r		
Scarlet Tanager			r		
*Northern Cardinal (Cardinal)		c	c	c	c
Rose-breasted Grosbeak			u		
Blue Grosbeak			u		
Indigo Bunting		o	u		
Dickcissel			u		
*Rufous-sided Towhee		a	a	a	a
American Tree Sparrow (Tree Sparrow)			r	r	
Chipping Sparrow		o	c	o	
Clay-colored Sparrow			u		
*Field Sparrow		u	u	c	u
Vesper Sparrow			c	u	
Lark Sparrow			u	c	u
Lark Bunting					
Savannah Sparrow (Ipswich)		a	a	a	
Grasshopper Sparrow			u	o	
Sharp-tailed Sparrow		a	a	a	
*Seaside Sparrow		a	c	a	a
Fox Sparrow		o	u	o	
*Song Sparrow		a	a	a	a
Lincoln's Sparrow			u		
Swamp Sparrow		o	a	a	
White-throated Sparrow		u	a	u	
White-crowned Sparrow			c	o	
Dark-eyed Junco (Slate-colored)		u	u	u	
Lapland Longspur					
Snow Bunting		o	o	o	
Bobolink		c	c		
*Red-winged Blackbird		a	a	a	a
*Eastern Meadowlark		c	c	c	a
Western Meadowlark					
Rusty Blackbird			r		
*Boat-tailed Grackle		a	a	a	a
*Common Grackle		r	r	r	r
Brown-headed Cowbird		c	c	c	c
*Orchard Oriole		u	u		
Northern Oriole (Baltimore)			a		
Purple Finch			u	u	
Common Redpoll					
Pine Siskin			u	u	
American Goldfinch		u	c	u	
Evening Grosbeak			r		
*House Sparrow		u	u	u	u

Birds

The diversity and abundance of birdlife on Pea Island explains its reputation of being a "birder's paradise". The refuge is an important wintering ground for tundra swans, snow geese, Canada geese and over 25 species of ducks. Many other interesting species can be found here during the winter months and the spring and fall migrations. During the summer months several species of herons, egrets and terns along with American avocets, willets, black-necked stilts and a few species of ducks nest on the refuge. Oceanic species can be expected during most any season offshore but are most common from late summer through the fall into late winter. Following storms many unusual species for this area have been observed.

This bird list is in accordance with the sixth A.O.U. Check-List. New names are used with the former name in parenthesis.

The seasonal occurrence and abundance of these avian species are coded as follows:

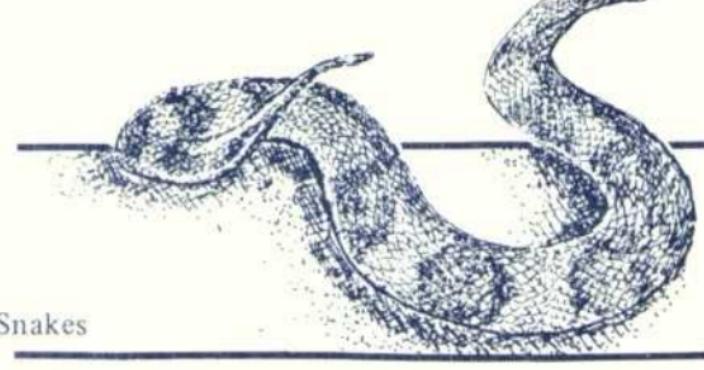
a - abundant	a common species that is numerous.
c - common	probable to be seen in suitable habitat.
u - uncommon	usually present, but not certain to be seen.
o - occasional	seen only a few times during a season.
r - rare	seen at intervals of 2 to 5 years.

Note: Accidental species (seen 1-3 times at Pea Island) are included but are listed as having no relative abundance.

S -	March-May
S -	June-August
F -	September-November
W -	December-February
*	nests locally
+	seasonal abundance refers to frequency offshore. Birds are occasionally observed on refuge, especially after a storm and/or strong winds.

Lizards

—	Five Lined Skink	E
—	Ground Skink	E
—	Six-lined Racerunner	E
—	Eastern Glass Lizard	D



Snakes

—	Racer	D
—	Corn Snake	D
—	Rat Snake	E
—	Eastern Hognose	D
—	Eastern Kingsnake	E
—	Carolina Salt Marsh Snake	D
—	Rough Green Snake	E
—	Brown Snake	D
—	Eastern Ribbon Snake	E
—	Eastern Garter Snake	E
—	Eastern Cottonmouth (poisonous)	E

* Documented - actual observations on the refuge are recorded.

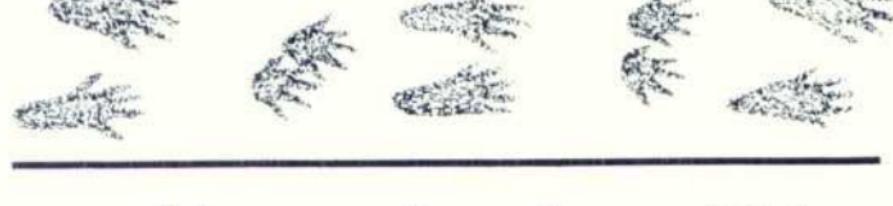
Expected - species exist north and/or south of Pea Island; however, no documented observations on the refuge have been recorded.

• Reptiles

Mammals

Mammals are often secretive and wary of humans, so you're not apt to see many of these individuals on a casual visit to the refuge. Try looking for animal signs: tracks, trails, scats, the remains of dinner, or their homes. Field guides that describe these signs are available in most book stores and are quite helpful in identifying mammals.

This checklist is divided into characteristic categories for your convenience. Notice that many typical mammalian species are absent here. As the barrier islands connect and disconnect and as the environment changes through the years, the species makeup will also change. What predictions can you make about these changes?

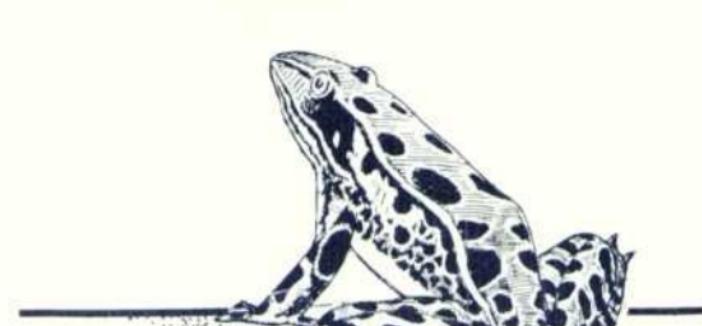


Order	Common Name	Status*
MARSUPIALIA: (Pouched Mammals)		
<input type="checkbox"/> Opossum		D
INSECTIVORA: (Shrews and Moles)		
<input type="checkbox"/> Southeastern Shrew		D
<input type="checkbox"/> Least Shrew		E
<input type="checkbox"/> Eastern Mole		E
CHIROPTERA: (Bats)		
<input type="checkbox"/> Silver-haired Bat		D
<input type="checkbox"/> Eastern Pipistrelle		E
<input type="checkbox"/> Red Bat		E
<input type="checkbox"/> Hoary Bat		E
<input type="checkbox"/> Evening Bat		E
LAGOMORPHA: (Rabbits)		
<input type="checkbox"/> Eastern Cottontail		D
<input type="checkbox"/> Marsh Rabbit		D
RODENTIA: (Rodents)		
<input type="checkbox"/> Rice Rat		D
<input type="checkbox"/> Eastern Harvest Mouse		E
<input type="checkbox"/> Hairy Cotton Rat		E
<input type="checkbox"/> Meadow Vole		D
<input type="checkbox"/> Muskrat		D
<input type="checkbox"/> Norway Rat		D
<input type="checkbox"/> House Mouse		D
<input type="checkbox"/> Nutria		D
CARNIVORA: (Meat Eating Mammals)		
<input type="checkbox"/> Gray Fox		E
<input type="checkbox"/> Raccoon		D
<input type="checkbox"/> Mink		D
<input type="checkbox"/> River Otter		D

* Documented - actual observations on the refuge are recorded.

Expected - species exist north and/or south of Pea Island; however, no documented observations on the refuge have been recorded.

		S	S	F	W
—	Fulvous Whistling Duck (Fulvous Tree Duck)	r	r	u	
—	Tundra Swan (Whistling Swan)	c	r	c	c
—	Greater White-fronted Goose	r		r	
—	Snow Goose	a	r	a	a
—	Ross' Goose			r	
—	Brant			r	r
—	Barnacle Goose			r	r
—	Canada Goose	a	r	a	a
—	Wood Duck	r	r	r	
—	*Green-winged Teal	a	r	a	a
—	*American Black Duck	a	u	a	a
—	*Mallard	u	o	u	u
—	Northern Pintail	c		a	a
—	*Blue-winged Teal	a	o	a	r
—	Northern Shoveler	c	c	c	
—	*Gadwall	c	c	c	u
—	Eurasian Wigeon (European Wigeon)			r	
—	American Wigeon	c		c	a
—	Canvasback	u		u	c
—	Redhead	u		c	c
—	Ring-necked Duck	c		c	c
—	Greater Scaup	c	r	u	c
—	Lesser Scaup	c		u	c
—	Common Eider				r
—	King Eider				
—	Oldsquaw	u		r	u
—	Black Scoter (Common)	c		u	c
—	Surf Scoter	c		u	a
—	White-winged Scoter	u		u	u
—	Common Goldeneye	r		r	o
—	Bufflehead	c	r	c	c
—	Hooded Merganser	u		u	c
—	Common Merganser	u		u	u
—	Red-breasted Merganser	a	r	c	a
—	Ruddy Duck	c	r	c	c
—	Black Vulture	r	r	r	r
—	Turkey Vulture	r	r	r	r
—	*Osprey	u	u	c	
—	American Swallow-tailed Kite				
—	Bald Eagle	r	r	r	r
—	Northern Harrier (Marsh Hawk)	c		c	c
—	Sharp-shinned Hawk	o		a	u
—	Cooper's Hawk	r		r	r
—	Red-shouldered Hawk	r		r	r
—	Swainson's Hawk				
—	Red-tailed Hawk	r		r	r
—	Rough-legged Hawk				
—	Golden Eagle				
—	American Kestrel (Sparrow Hawk)	c		a	a
—	Merlin (Pigeon Hawk)	u		c	u
—	Peregrine Falcon	u		c	u
—	*Ring-necked Pheasant	c	c	c	c



Common Name	Status*
— Fowler's Toad	D
— Green Treefrog	D
— Squirrel Treefrog	D
— Bullfrog	E
— Southern Leopard Frog	D

* Documented - actual observations on the refuge are recorded.

Expected - species exist north and/or south of Pea Island; however, no documented observations on the refuge have been recorded.

• Amphibians

Reptiles

Many reptiles are as at home in water as they are on land. All are covered with scales or plates. Besides protecting these animals from injury and disease, this adaptation is an effective means of preventing water loss. Consequently, many reptiles live and thrive in the salty refuge environment.

Reptiles are also cold-blooded and utilize their surroundings to adjust their body temperatures. Basking in the sun is a class habit during cold weather; burrowing or staying submerged in water helps reptiles avoid extreme heat. On Pea Island you are most likely to observe reptiles on cool, sunny days.

Common Name	Status*
Turtles	
— Common Snapping Turtle	D
— Eastern Mud Turtle	D
— Diamondback Terrapin	D
— Yellowbelly Slider	D
— Loggerhead	D
— Atlantic Green Turtle	D
— Atlantic Hawksbill	D
— Atlantic Ridley	D
— Leatherback	D

Common Name	Status*	S	S	F	W
Turtles					
— Common Snapping Turtle	D				
— Eastern Mud Turtle	D				
— Diamondback Terrapin	D				
— Yellowbelly Slider	D				
— Loggerhead	D				
— Atlantic Green Turtle	D				
— Atlantic Hawksbill	D				
— Atlantic Ridley	D				
— Leatherback	D				
—					
—					
—					
—					
—					
—					
—					
— Red-throated Loon	c c a				
— Common Loon	c r c c				
— Pied-billed Grebe	c o c a				
— Horned Grebe	c u a				
— Red-necked Grebe	r				
— Eared Grebe					
— Western Grebe					
—					
— +Northern Fulmar	a o a c				
— +Cory's Shearwater	u u u				
— +Greater Shearwater	c c				
— +Sooty Shearwater	r u r				
— +Audubon's Shearwater	a a				
— +Wilson's Storm-Petrel	r a a				
— White-faced Storm-Petrel					
— +Leach's Storm-Petrel	r r r				
—					
— White-tailed Tropicbird					
— Northern Gannet	c r c a				
— American White Pelican					
— Brown Pelican	c c c u				
— Great Cormorant					
— Double-crested Cormorant	a r c c				
— Anhinga					
— Magnificent Frigatebird					
—					
— American Bittern	c o c c				
— *Least Bittern	u u o				
— Great Blue Heron	u u u u				
— Great Blue Heron (White Morph)					
— Great Egret (Common)	c c c c				
— *Snowy Egret	c c c u				
— *Little Blue Heron	c c c u				
— *Tri-colored Heron (Louisiana)	c c c u				
— Reddish Egret					
— *Cattle Egret	u c c r				
— *Green-backed Heron (Green Heron)	u u u o				
— *Black-crowned Night Heron	c c c u				
— *Yellow-crowned Night-Heron	r u u r				
— *White Ibis	o o r				
— *Glossy Ibis	c c c r				
— Wood Stork					
—					
— Greater Flamingo					

• Birds

		S	S	F	W
—	Little Gull				
—	Common Black-headed Gull				
—	Bonaparte's Gull	c		u	c
—	Ring-billed Gull	a	c	a	a
*—	Herring Gull	a	c	a	a
—	Iceland Gull				
—	Lesser Black-backed Gull				u
—	Glaucous Gull	r		r	
*—	Great Black-backed Gull	c	c	c	a
+—	Black-legged Kittiwake	r	u	c	
*—	Gull-billed Tern	c	c	u	
*—	Caspian Tern	u	u	c	o
*—	Royal Tern	c	c	c	u
*—	Sandwich Tern	c	c	c	
—	Roseate Tern	r	r	r	
*—	Common Tern	c	c	c	r
—	Forster's Tern	a	c	r	a
*—	Least Tern	c	c	c	
+—	Bridled Tern	c	u		
—	Black Tern	u	c	a	
*—	Black Skimmer	c	c	c	u
—	Dovekie	r	r	r	
—	Thick-billed Murre				
—	Razorbill				r
—	White-winged Dove				
*—	Mourning Dove	u	u	u	u
—	Black-billed Cuckoo	r		r	
—	*Yellow-billed Cuckoo	u	u	c	
*—	Common Barn-Owl	o	o	o	o
—	Snowy Owl				
—	Short-eared Owl	o		u	u
—	Northern Saw-whet Owl				
*—	Common Nighthawk	o	o	o	
—	Chuck-will's Widow	r	r	r	
—	Chimney Swift	o	o	o	
—	Ruby-throated Hummingbird	o	u	u	
—	Belted Kingfisher	u	u	c	c
—	Red-headed Woodpecker				o
—	Yellow-bellied Sapsucker	u		c	u
*—	Downy Woodpecker	u	u	u	u
—	Hairy Woodpecker	r	r	r	
*—	Northern Flicker (Common, yellow-shafted)	u	u	a	c
—	Olive-sided Flycatcher				r
—	Eastern Wood-Pewee	u	u	u	
—	Yellow-bellied Flycatcher				r
—	Acadian Flycatcher				r
—	Eastern Phoebe	u		u	u
*—	Great Crested Flycatcher	u	u	u	
—	Western Kingbird				u
—	Eastern Kingbird	c	c	c	
—	Gray Kingbird				

• • • • •

• • • • •

In observing the wildlife populations here, remember the dynamic nature of a barrier island. Over the years inlets open and close. The ocean overwashed intermittently during frequent winter storms. Sometimes all surface water is salty. Animal populations here generally have more limiting factors than other places. On an island the mere existence of a species may depend solely on its ability to swim or fly. Survival largely relates to its ability to tolerate the harsh salt environment. Is it any wonder that our richest diversity of wildlife is among the avian populations and our least diverse, the amphibians, who would dehydrate in salt water? Ponder these environmental factors as you observe refuge wildlife.

Wildlife observation can be very enjoyable. Field guides and binoculars might make the experience more rewarding. We encourage visitors to report any rare or unusual sightings to the refuge headquarters.

• General Information

Amphibians

Toads, frogs and salamanders belong to the class Amphibia, derived from the Greek "amphibious" meaning "living a double life". Most members are aquatic and breath with gills as larvae; adults usually have lungs. Even adults, however, have thin, wet skin and must live in moist surroundings. Freshwater ponds, bogs and damp forest floors are ideal spots for amphibians. Such environments do not exist on this refuge. Few amphibians survive the salty environment of Pea Island; none thrive there.

—	Yellow Rail	r r r r
—	Black Rail	c c c c
—	*Clapper Rail	c c c c
—	*King Rail	c c c c
—	Virginia Rail	u o u u
—	Sora	c u a u
—	*Purple Gallinule	r r r
—	*Common Moorhen	u u u r
—	American Coot	a r a a
—	Black-bellied Plover	a u a c
—	Lesser Golden Plover	r o r
—	*Wilson's Plover	u o u u
—	Semipalmated Plover	c u c u
—	*Piping Plover	u u u u
—	*Killdeer	u u u u
—	*American Oystercatcher	c u u r
—	*Black-necked Stilt	u c c
—	*American Avocet	u u u r
—	Greater Yellowlegs	a c a c
—	Lesser Yellowlegs	a c a u
—	Solitary Sandpiper	u o u o
—	*Willet	c c c u
—	Spotted Sandpiper	c u c o
—	Upland Sandpiper (Plover)	o o o
—	Whimbrel	c r c o
—	Long-billed Curlew	u
—	Hudsonian Godwit	r r u
—	Bar-tailed Godwit	
—	Marbled Godwit	o u c u
—	Ruddy Turnstone	a u a u
—	Red Knot (Knot)	c u c u
—	Sanderling	a c a a
—	Semipalmated Sandpiper	a c a u
—	Western Sandpiper	c u a c
—	Least Sandpiper	a c a u
—	White-rumped Sandpiper	o r c
—	Baird's Sandpiper	u u
—	Pectoral Sandpiper	u c r
—	Purple Sandpiper	
—	Dunlin	a u a c
—	Curlew Sandpiper	
—	Buff-breasted Sandpiper	r
—	Ruff	
—	Short-billed Dowitcher	c c a u
—	Long-billed Dowitcher	u r c u
—	Common Snipe	a r c a
—	American Woodcock	r r r
—	Wilson's Phalarope	r r u
—	+Red-necked Phalarope (Northern)	c c
—	+Red Phalarope	c c r
—	+Pomerine Jaeger	u u c r
—	+Parasitic Jaeger	r u u
—	+Long-tailed Jaeger	u u
—	*Laughing Gull	a a a u