

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

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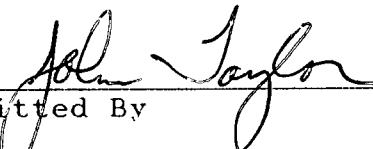
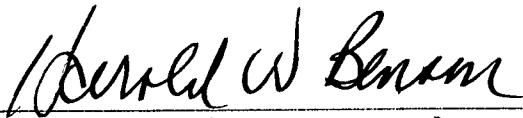
PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1987

Review and Approvals

 Submitted By	<u>03/25/88</u> Date
 Refuge Supervisor Review	<u>4-11-88</u> Date
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U.S. Department of the Interior  
Fish and Wildlife Service  
NATIONAL WILDLIFE REFUGE SYSTEM

## INTRODUCTION

### Location

The 127,000 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 and Hyde Counties. 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 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 to the FWS a total of 118,000 acres in Dare and Tyrrell Counties.

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 on March 15, 1984.

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 contains 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.



# 1 - "An identity at last..."

8/87 BWS

INTRODUCTION

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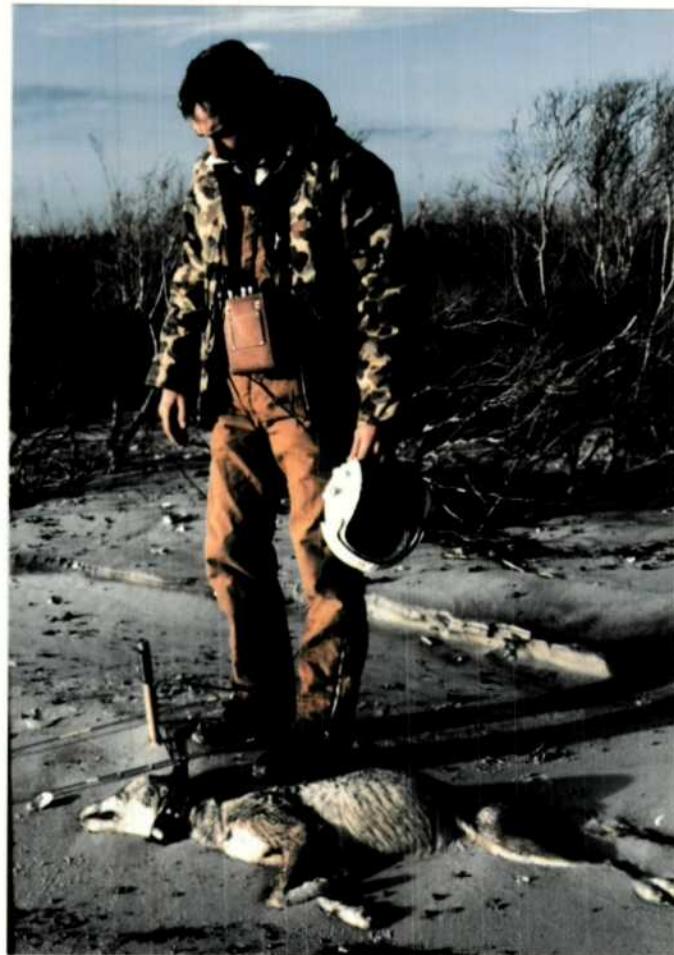
K. FEEDBACK..... 62L. INFORMATION PACKET --- (inside back cover)

A. HIGHLIGHTS

Ground work done for acquisition for Prudential Farmlands. (See Section C)

Two and a half man years donated by volunteers creating new Refuge record. (See Section E.4)

Red wolf project underway; two wolves die. (See Section G.2)



# 2 - # 231...the first loss for the  
red wolf project - death was  
caused by a build-up of fluid  
in the thoracic cavity and  
internal bleeding. 12/87 MKP

More political pressure from dog hunters. (See Section H.8)

#### B. CLIMATIC CONDITIONS

Climatic conditions were typical throughout most of the year with a hot, humid summer with little rainfall and a mild winter. Rainfall on the whole was below average with only around 17 inches recorded; 38 inches below the annual mean and 20 inches below last years low of 37 inches.

#### C. LAND ACQUISITIONS

##### 1. Fee Title

One fee title acquisition was accomplished during the year. The 9,000 acre Lakeway Fuels Tract was purchased under an agreement with The North Carolina Conservancy. The Conservancy purchased the land and then donated it to the Refuge, while the Service purchased the Atlantic white cedar on the land for a total of \$650,000.

Regional Office realty personnel visited the Refuge to conduct appraisals on a 20-30 acre headquarter site on Roanoke Island and two Refuge inholdings (the Harris and Skinner tracts). Action on all were still pending at the end of the year.



# 3 - The Prudential Farm fields - scheduled for acquisition early in 1988. 8/86 JTT

However, the Refuge's largest inholding of approximately 10,000 acres nears acquisition. The owner, Prudential Life Insurance Co., had donated the entire Refuge in 1984, and had retained this developed tract as an agricultural venture. The land clearing and drainage was begun in the late 1980's, and at the present totals 5,000 acres of ditched farm fields drained by a network of canals and dikes. Two pumping stations with a total pumping capacity of 12 million gallons per hour are located on each end of the fields.

Notwithstanding obvious access and other wildlife values, the tract has excellent waterfowl management potential through moist soil and cropland management. Understanding its value, the Refuge worked very hard during the year to identify this to Regional Office and Congressional staff who visited the area. The North Carolina Nature Conservancy became involved and began to negotiate with Prudential. By year's end Congress had appropriated 4 million for purchase of the property from the Conservancy, which would close on the land in January 1988.

3. Other

The southwest boundary of the Refuge was realigned approximately one mile to the south. The boundaries have been based upon county tax maps and have not yet been surveyed. The deed calls to place the line 2,850 feet south of Whipping Creek Road.

In response to a telephone request from the Regional Office Realty Branch, owners of Refuge inholdings were contacted to identify willing sellers. Information gathered was forwarded to Atlanta.

D. PLANNING

1. Master Plan

The master plan was finally printed and final copies mailed out this year. No signature page indicating Regional approval has been received to date.

2. Management Plan

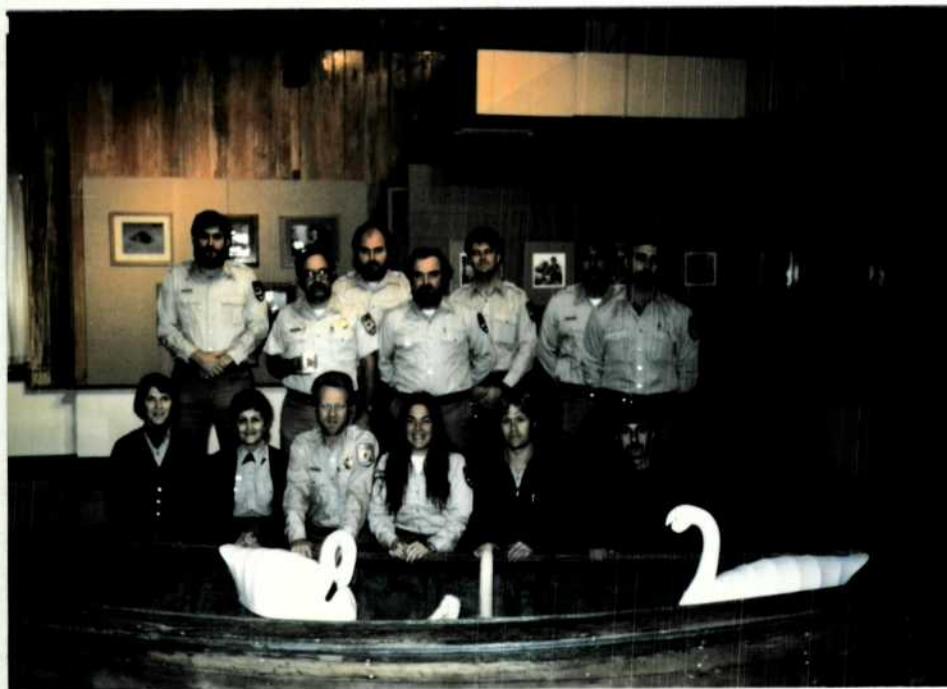
A station law enforcement plan was drafted and submitted during 1987.

#### 4. Compliance with Environmental and Cultural Resource Mandates

A contaminant study proposal for the future Dare County landfill was submitted to the Regional Office. The present landfill has exceeded state water quality standards for oxygen deficiency and mercury since sampling was initiated in 1984.

#### 5. Research and Investigations

Alligator River NR87 - "Vegetation analysis and determination of rate of vegetation change in regional landscape: the Albemarle Embayment" (41630-1). This research project will collect data from field analysis of vegetation and soil samples. Computer methods will be used to quantitatively relate natural vegetation to the soil series occurring in the region. The resulting model will hopefully predict what natural vegetation will be found in association with a particular soil series and known fire regime.

E. ADMINISTRATION1. Personnel

# 4 - Front Row: 5, 9, 1, 7, 6, 13  
Back Row: 3, 2, 11, 10, 4, 8, 12

PERSONNEL

1. John Taylor, Refuge Manager, GS-12, EOD 01/07/85, PFT
2. Alan Schriver, Asst. Refuge Manager, GS-11, EOD 05/11/85, PFT
3. Robert Noffsinger, Asst. Refuge Manager, GS-09, EOD 04/13/87, PFT
4. Scott Lanier, Asst. Refuge Manager, GS-07, EOD 09/02/86, PFT
5. Bonnie Strawser, Outdoor Rec. Planner, GS-09, EOD 12/31/80, PFT
6. Michael Phillips, Biological Technician, GS-07, EOD 06/21/87, PFT
7. Angela Elmore, Biological Technician, GS-06, EOD 04/19/82, PFT
8. James Beasley, Biological Technician, GS-05, EOD 05/26/85, PFT
9. Beverly Midgett, Secretary (Typing), GS-05, EOD 10/06/71, PFT
10. J. Bruce Creef, Crane Operator, WG-09, EOD 04/21/75, PFT
11. Jonathan Powers, Tractor Operator, WG-05, NTE 06/20/88, TFT
12. Chris Lucash, Biological Aid, GS-03, NTE 11/02/88, INT
13. George Paleudis, Biological Aid, GS-03, NTE 06/20/88, INT

In July, Jonathan Powers was extended for another year as a temporary Tractor Operator.

Bob Noffsinger filled our GS-09 vacancy in April. Bob comes to us from Ecological Services in Raleigh, N.C.

J. Bruce Creef was promoted from a Maintenance Worker, WG-08 to a Crane Operator, WG-09 on October 11.

Angela Elmore was promoted to a GS-06 on December 6.

Scott Lanier was promoted to a GS-07 on December 20.

Chris Lucash EOD on November 3, 1986 on a one year appointment and was extended for another year.

The following Biological Aids were Intermittent NTE one year and helped with the Red Wolf Project:

- Jay Tischendorf, EOD 11/03/86 and Resigned 05/04/87
- Paul Wagner, EOD 11/03/86 and Resigned 06/08/87
- Beth Kennedy, EOD 11/09/86 and Resigned 04/18/87
- Mary Steinitz, EOD 06/18/87 and Resigned 09/26/87

Biological Aids hired on a 30 day appointment to help with the Red Wolf Project were:

- Monica Hayes EOD 08/17/87, was extended an additional 30 days and was terminated 10/01/87
- Jan DeBlieu EOD 05/11/87, was extended an additional 30 days and was terminated 06/30/87

In August, each of the following employees received a Special Achievement Award for his/her superior performance during the Red Wolf Reintroduction period: Alan Schriver, Scott Lanier, Bonnie Strawser, Beverly Midgett, Michael Phillips, Angela Elmore, James Beasley, Bruce Creef, Jonathan Powers, Chris Lucash, Paul Wagner, Beth Kennedy, and Jay Tischendorf.

## 2. Youth Programs

Due to the nationwide YCC budget cut in 1987, Alligator River's YCC Program was reduced to 4 enrollees. No labor foreman was funded; recruitment for the enrollees began in March. In early June, Terri Kirby, Education Coordinator for the N.C. Aquarium on Roanoke Island, selected the enrollees in a random drawing. Intern Randy Newman provided field supervision for 60-75% of the YCC projects. ORP Strawser acted as YCC Coordinator and supervised many of the projects.

The 1987 YCC Program began on June 15, with a safety/orientation session. As a result of a no-show and unavailability of alternates, the program ended up involving 4 male enrollees. Roy (Chip) Phillips provided excellent leadership as the Youth Leader; Kenneth Bland, Eddie Holder, and Alfred Jackson filled the other slots.

By all measures that come to mind, the 1987 YCC Program was the most successful in years. Enrollee morale was high throughout the summer. Work accomplishments were many in number and high in quality. The only YCC "accident" was a foreign particle in the eye of one enrollee. He was wearing all safety gear, including glasses; by our evaluation, the incident was classified as unavoidable.



# 5 - 1987 YCCer's (l. to r.) Chip Phillips,  
Eddie Holder, Alfred Jackson, Kenny Bland  
8/87 BWS

Projects included installation of Alligator River NWR entrance signs, regulatory and boundary signing, clearing for red-cockaded woodpecker colonies, general maintenance and litter pick-up, assembly and erection of Refuge information signs for Alligator River, and vehicle washing and waxing.

YCCer's also completed projects on Pea Island and Currituck NWR's. Details of these projects may be found in Section E.2 of the respective Annual Narrative Reports.

#### 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. 1987 meshed the two previous years' methods and proved notable for both expansion and diversification.

During 1987, 5,415 volunteer hours were contributed to Alligator River, Currituck, and Pea Island NWR's by 106 volunteers. This represents a 186% increase in volunteer numbers and a 77% increase in hours contributed. These high increases are due to several causes. First, there are a number of on-going special projects on the Refuge which lend themselves toward volunteerism. For example, the red wolf project has drawn a number of college students to volunteer blocks of time to the project. In 1987, 1,690 hours of volunteer time were spent in caretaking positions for the red wolves. Many more hours were spent building wolf houses, box traps, and other structures for the wolf project.

Much of the increase in Refuge volunteerism can be attributed to an overall staff realization of the potential and capabilities of volunteers. "Can you get a volunteer to ...?" has become a familiar phrase at staff meetings and discussions about particular projects.

Again this year, the Pea Island Host/Hostess program tallied up many hours (960, this year). These hours are down from 1986 only because the "open" hours for the VCS were cut this year due to low public visitation.

During the summer of 1987, volunteers were utilized to run the daily "turtle patrol" to survey for loggerhead sea turtle nests. From June 1 through mid-August, 2-4 hours were contributed each day. This use of volunteers saved the staff much time and energy for other projects.

Another volunteer project was the preparation and presentation of wildlife programs for school classes. Volunteers were trained to conduct programs on the red wolf, birds, mammals, amphibians, reptiles, fish, and animals without backbones. Each program included an audio-visual presentation, an interaction session (usually hands on) and questions/answers.



# 6 - Although a few were absent for the photos,  
these are the folks that contributed 5,415  
hours in 1987!! Hats off to our dedicated  
volunteers!!

8/87 BWS



# 7

8/87 BWS



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8/87 BWS



# 7

8/87 BWS

An unfortunate incident which ended up involving many volunteers was an oil spill in late January. On Monday, February 2, a common loon covered with oil was delivered to the Alligator River NWR office. The Coast Guard was notified; the oil was determined to be bunker oil. Over the next two weeks, a total of 39 birds (34 loons, 5 gannets) were cleaned and cared for in a temporary facility set up at the Refuge at the N.C. Aquarium. (Approximately 114 additional birds were cleaned/cared for at the Norfolk Zoo by a group of Tidewater rehabilitators). The oil spill was never located. Eleven birds (8 loons, 3 gannets) were released on February 12 and 13 from the local facility. Equipment and supplies were brought in by the N.C. Wildlife Resources Commission. Manpower for the project was provided by Refuge staff and volunteers. A total of 537 volunteer hours were donated to the project. Five radio spots by Refuge staff were recorded covering the project.



# 8 - Countless hours were spent  
washing, rinsing, drying,  
swimming, and feeding...2/87 KCD

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As a result of dealing with the oiled birds in February, on November 9, many Refuge volunteers and ORP Strawser attended the "Saving Oiled Seabirds" workshop instructed by the International Bird Rescue Center from Berkeley, California and sponsored by the Outer Banks Audubon.

April 27-May 3 was National Volunteer Week. This year, the Dare Voluntary Action Center sponsored a "Red V" campaign. To help the public in identifying volunteers, each was encouraged to wear a red ribbon "V" throughout the week. On the Refuge, the weekly column, "What's Happening with Wildlife", featured Refuge volunteers and their accomplishments.

Recruiting activities for 1987 were not major, but spontaneous efforts were made whenever the opportunity presented itself. On July 1, ORP Strawser conducted a program on volunteerism on Refuges for the Duck Woods Golf Club Ladies Auxiliary. Approximately 35 people attended.

Staff and volunteers participated in the Dare County Job Fair and the Dare County Volunteer Fair.

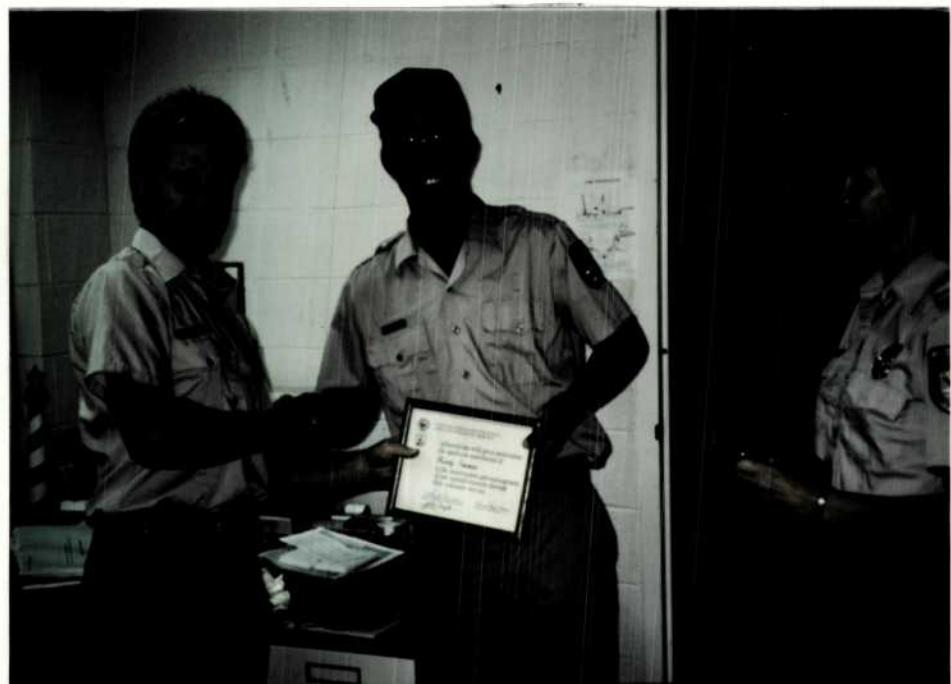
As in the past, several activities were planned as incentives for volunteers. Among them, on Feb. 10, ORP Strawser and 3 volunteers traveled to Mattamuskeet to participate in swan banding with the Johns Hopkins University staff. Seventy-one birds were banded.

In October, the annual volunteer awards ceremony and pot luck dinner was held. In all, 26 volunteers were recognized for their significant contributions to Refuge programs. Of these, 6 people (Margaret Burns, Arch Bush, Jessie Bush, Warren Davis, Monica Hayes, Randy Newman) received lapel pins for contributing more than 500 hours of service.

Intern Randy Newman (East Carolina University) volunteered 12 weeks during the summer. In addition to supervising YCC, he conducted public interpretive programs, ran "turtle patrol", and assisted with many other management and maintenance projects. Randy proved to play an invaluable part in the success of the 1987 YCC Program.

The "Take Pride in America" recognition program has given several local groups more incentive in volunteering their efforts to benefit public lands. Early in 1987, ORP Strawser was designated as the Dare County Coordinator for the Take Pride in America Program. As a part of a district competition, Alligator River nominated the Dare County Alternative High School for a Take Pride in America Award. In early December, we were notified that, not only had our nominee won on the district level, but also on the State

level. The Dare County Alternative High School was notified in December and invited to receive the award from Governor Jim Martin in January, 1988, at a luncheon given in their honor.



# 9 - "Intern Randy Newman receives volunteer certificate for a job well done! 9/87 ADS

A categorization of volunteer hours for 1987 follows: construction 950; general maintenance 350; info/VCS manning 960; conducting tours 235; slide file 50; clerical work 75; photography 250; trail maintenance 25; AV productions 85; fish/wildlife censusing 195; education 100; landscaping 80; YCC supervision 250; signing 120; red wolf caretaking 1,690.

Other projects at Alligator River included design and construction of public information boards, design and construction of entrance sign bases, supervision of YCC projects, conducting interpretive programs, and general maintenance assistance.

With volunteers contributing 2 1/2 man years to the Refuge during 1987, 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 87, Alligator River received base funding of \$313,800 to cover all three Refuges. Pea Island received RPRP monies

of \$2.5K for marsh burning, \$6K for planting New Field for goose browse, \$3.5K for control of phragmites, and \$3K for dike protection. Currituck received RPRP monies of \$2K for prescribed burning of marsh. Alligator River received RPRP monies of \$5K for plugging drainage ditches. Both Currituck and Alligator River shared special monies of \$15K for a WCS at Currituck and a pump for moist soil work at Alligator River. We had a salary savings of minus \$11.1K. An additional \$20K was appropriated for the red wolf project.

#### TWO YEAR FUNDING COMPARISON

	<u>FY 1987</u>	<u>FY 1988</u>
1230	15,000	
1260	313,800	
1261		240,900
1262		197,100
RPRP	22,000	30,000
Fire Equipment	60,000	
ENDG SP (Red Wolf)	155,000	148,000
Red Wolf Exhibit (1260)	10,000	
Contaminant Monitoring		7,500
Salary Savings	-11.100	
Total	574.690	623,500

#### 6. Safety

Safety equals another year with zero time loss accidents! Congratulations to a safety conscious staff who advanced our total to 264,249 hours.

Even though time was not lost, we did have two reportable accidents. Bio-Tech Elmore was driving across a bridge, when a gust of wind blew 2 wire duck traps into the lane of oncoming traffic. Very little damage was done to the oncoming truck. However, both wire traps were flattened beyond repair. The accident was due to her failure to secure the load.

Assistant Manager Lanier was traveling 40 mph as he glanced to the side at an intersection. When he looked back ahead, another vehicle was directly in front of him waiting to make a left turn. He tried to stop but was unable to do so. He hit the vehicle in the rear. Due to the force of the impact, the car was forced off the road and into a ditch. Several claims were filed against the USFWS. Mr. Lanier was charged with failing to reduce speed to avoid an accident.

The monthly safety meetings this year covered a variety of topics with several "hands on" demonstrations. Topics such

as hypothermia, vehicle maintenance, aviation safety, law enforcement for night time wolf trackers, and physical fitness were discussed. Also we had hands on training with the proper operation of bumper mounted winches, the proper methods of jump starting or charging batteries, and the safe use of rocket net systems.

Some staff members and volunteers participated and passed the following courses: CPR and Basic First Aid, Defensive Driving, USFWS ATV Training, Step Test for Fire Fighters, and Advanced Equipment Operator School.

#### 7. Technical Assistance

Refuge Manager Taylor: was asked to serve on the Environmental Awareness Committee of the Dare County Leadership System, a function of the Agricultural Extension Service; advised N.C. Power on the erection of osprey platforms on power poles; attended the Albemarle/Pamlico Estuary Study Workshop; and once again met with the Dare County Board of Commissioners to explain Refuge regulations concerning the training of hunting dogs; met with BBC to locate possible sites to film; assisted National Geographic on an article about The Nature Conservancy; met with the N.C. Auditors Office to assist in evaluating the functional efficiency of state facilities.

Assistant Manager Schriver again judged the local science fair.

Assistant Managers Schriver and Noffsinger attended the Corps of Engineers briefing given to Secretary Hodel about the Oregon Inlet.

Refuge Managers Taylor, Schriver, and Noffsinger attended a fish fry at Mattamuskeet NWR to show them how to pack away the food.

#### 8. Other

March was a busy month at Alligator River: Phil Morgan (DARD), Chuck Danner (RO), Tuck Stone (Tensas River NWR), and Rick Ingram (SE) conducted a Wildlife and Habitat Management Review.

Bill Grabill (RO), Don Shultz (RO), and Kate Benkert (ES) visited the Refuge for a Contaminant Review.

Assistant Refuge Manager Schriver met with the U.S. Navy, U.S. Air Force and representatives of the Bird Air Strike Hazard (BASH) team from Washington, DC. The compatibility of birds and low level-high speed aircraft was discussed.

The Refuge agreed to defer waterfowl work at little field due to its proximity to target approach patterns. The suggestion by the BASH team leader to work with waterfowl farther north outside of the restricted air space has been taken into consideration in Refuge waterfowl planning (see Section C.1).

#### F. HABITAT MANAGEMENT

##### 1. General

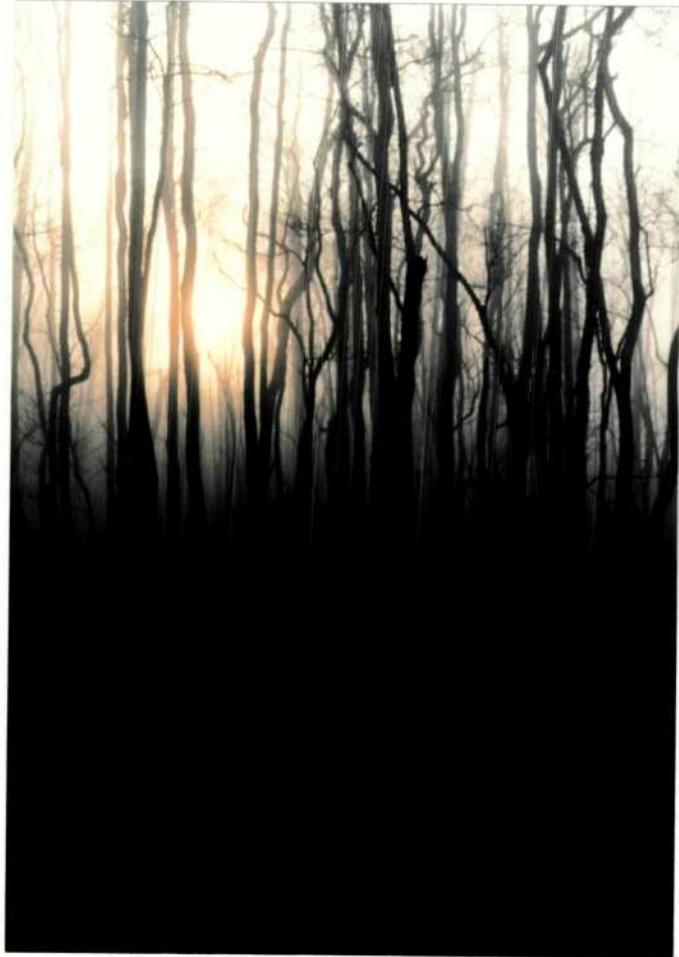
Five basic habitat types are found on Alligator River Refuge. These are classified as wetlands based on the vegetation present, the degree of soil saturation, and the hydroperiod. Alligator River Refuge represents one of the last remaining large tracts of pocosin type habitat along the east coast. Although 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. See photo next page.

##### 2. Wetlands

The Draft Refuge Water Management Plan is approximately 50 percent complete. The primary thrust of the plan will be to restore the natural hydrology of the area. Drainage ditches and canals put in by previous owners will be plugged or controlled with flashboard risers. The Wilmington Corps has informed us in preliminary field meetings that Section 404 permit will be required. They indicate that we should have no problems obtaining permits for the restoration of wetlands. In order to avoid delays in implementing the water management plan we have applied for Section 404 permits for a section to plug ditches and place water control structures in a block of hardwood swamp in the western portion of the Refuge. The permits should be in hand by the time the water management plan has been finalized and approved. The value of the restored area as wood duck brood habitat will greatly increase once the longer flooding regime becomes established.

A ninety acre fallow field on the Refuge which was being managed as a moist soil unit became a controversial issue this year. The unit is adjacent to the U.S. Air Force Bombing range and is within their restricted air space area. The Air Force protested our attraction of waterfowl and wading birds to the area since it lies under the approach lanes to their target areas. They were concerned with the safety of their pilots and aircraft due to bird aircraft strike hazards (BASH). In light of the proximity of the

area to their range we honored their request and stopped pumping into the area. We now have the option of managing many more acres of moist soil on the 4,000 acres of farm lands being acquired from Prudential through The Nature Conservancy. These lands are outside the restricted air space of the Bombing Range.



# 10 - "Of course, most photographers are looking for elusive forms of wildlife. They don't know what they're missing..."

5/87 MKP

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.

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	% Habitat Type	Approximate			Total
		Dare	Tyrrell	Hyde	
White Cedar Swamp	6.2	6,900	1,000	--	7,900
Hardwood Swamp	16.8	10,600	1,800	9,000	12,400
Hardwood-Mixed					
Pine Swamp	29.1	33,800	3,200	--	37,000
Low Pocosin	6.4	8,100	--	--	8,100
Cane Pocosin	1.8	2,300	--	--	2,300
Tree Pocosin	19.0	24,100	--	--	24,100
Lakes/Open Water	1.0	1,000	--	--	1,000
Marsh	19.7	25,200	--	--	25,200
	100.0	112,000	6,000	9,000	127,000

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 Similax 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. Pockets of lizards tail and arrow arum are found in more open areas when the swamp floor receives more sunlight. Scattered old growth bald cypress is present particularly in stands bordering the Alligator River and Milltail Creek.

The hardwood swamps are found on deep organic soils (e.g. Pungo and Belhaven Mucks) as well as shallow organic soils (e.g. Roper Muck) or wet mineral soils (e.g. Cape Fear Loam, Hyde Loam). The wet mineral soils and in some instances the shallow organic soils are capable of supporting water and willow oaks. Areas with these soil types, have been spot checked and scattered oaks, primarily water oaks, have been located. We believe these areas had a large oak component in the past. Possible past logging and/or drainage practices reduced the amount of oak regeneration on these areas. Areas of wet mineral soils not identified on SCS soils maps have also been found. These are usually in the less accessible areas and occur as "ridges" or "fingers" running through the organic soils.

The Dare County Alternative High School provided volunteers for harvesting acorns from one of the larger "stands" of water oaks found along Milltail Creek. Approximately 3,000 acorns were collected by 12 students working from boats in a half-day effort in October. The acorns will be used to plant wet mineral soil areas that presently contain no oaks. We plan to thin around those oaks presently existing in the wet mineral soils area to both improve their vigor and acorn production and increase advanced oak regeneration. Increasing the amount of the wet mineral soils areas that produce oak mast will greatly improve the habitat quality of the Refuge for a range of species from wood ducks to black bears.

**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.



# 11 - Forestry...?

9/87 ADS

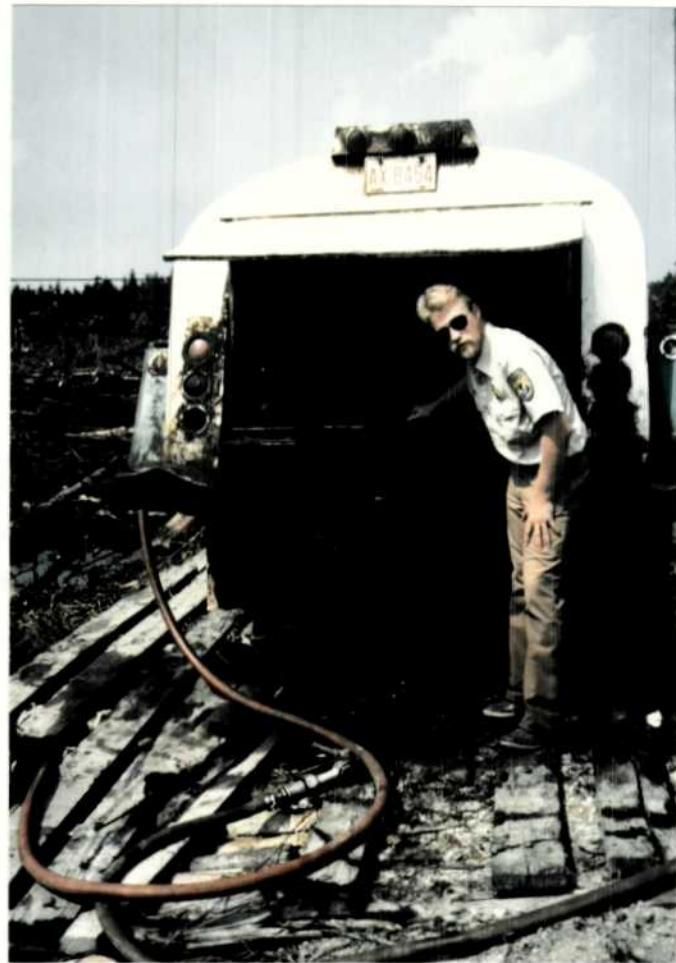
In April of 1987, we discovered that Alligator Timber Company, a logging company under contract to Atlantic Forest Products had illegally cut 21 acres of white cedar swamps on the Refuge. Alligator Timber Company stopped cutting immediately when we informed them of the trespass. A consultant forester determined the volume of timber involved and Manager Taylor, Special Agent Jack Baker (Washington, NC), Assistant Lanier and Assistant Noffsinger met with representatives of two companies, in July. North Carolina Statutes call for compensating the victim of timber trespass with twice the value of the stumps taken. We negotiated an out of court settlement with Atlantic Forest Products. In the settlement they agreed to give us twice the board foot volume of the 21 acres in existing stands on the Refuge which they have timber easements to cut. In addition, they will leave an additional volume equal in value to our consulting costs with the forester we had to hire and they will pay the costs for a forester of our choice, to determine the acreage needed for offsetting our damages. (As an offshoot of the settlement, they have agreed to leave additional white cedar timber standing in lieu of road repair due to damages from their logging trucks). A consultant forester has cruised the areas to be offered to offset our damages but we have not received his report. We should be meeting with Alligator Timber and Atlantic Forest Products to finalize the issue this winter.



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# 12 - "With leaky fuel trucks"  
9/87 ADS

#### 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 3-4 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 Refuge and State personnel responded to two wildfires on the Refuge in 1987. The first fire occurred on March 5, and totalled approximately 400 acres of non-commercial forest. The cause was determined to be lightning strike. The second



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occurred in July, was approximately 7 acres, and was also lightning caused.

#### 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. 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

Five endangered species have been documented on the Refuge. Management programs are in place for the red wolf and the red-cockaded woodpecker. Inventory plans for the other species may be developed in the future.

American Alligator (Endangered) - American alligators reach the northern extend 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. On September 17, a 3-foot alligator was brought to the Refuge by the Norfolk Zoo. Assistant Managers Schriver and Noffsinger released the gator in Milltail Creek. The alligator had been brought from Florida several years ago and anonymously given to the zoo. Arrangements for the release were made by the Non-game and Endangered Species Section of the N.C. Wildlife Resources Commission.

Bald Eagle (Endangered) - Refuge staff sighted an immature bald eagle on February 9, in the South Lake area. On September 18, an immature bald eagle with a metal band and orange tag attached to its right leg was observed at South Lake. This bird was one that had been hacked at Mattamuskeet NWR.



# 13 - This might be an "easy shot" at Okee, but  
at Alligator River, it's a whole new ball  
game! 9/87 ADS

Peregrine Falcon (Endangered) - Although no sightings were reported for 1987, peregrine falcons are known to move through the Refuge during migration.

Red-cockaded Woodpecker (Endangered) - There have been four reported sightings of active red-cockaded woodpecker colony sites. Two have been reported along Whipping Creek Road, one near the intersection of Cedar and Koerhing and one along Chip Road. These were all reported from 1981 to 1983 before the area came into the Refuge system. The reported sightings have been plotted on maps and aerial photographs as closely as the descriptions will allow. Preliminary surveys were made in May to try to locate each of these. Only the colony on Chip Road was found. The habitat in the areas of all the reported sightings are not typical open understory red-cockaded woodpecker areas. Each area contains an overstory of pond pine and/or loblolly pine 10 to 20 inches dbh and 40 to 70 feet tall. However, the understories contain thick pocosin vegetation up to 20 feet high. Searching for cavity trees in such areas is time consuming and arduous. A searcher must cut a path from one overstory tree to another and usually cut understory vegetation back away from each tree to be able to circle the truck to look for any cavities. More

effort will be needed this winter or early spring to attempt to locate the other three reported sites.

The colony site found on Chip Road had an understory of bitter gallberry, fetterbush, sweet gallberry, and red bay about 8 to 12 feet high with a mid-story of red bay that reached to within one foot of the only active cavity tree on the site. An intraservice Section 7 Consultation was submitted to the Raleigh Field Office for removing the hardwood understory on the site. This was approved and in late June our YCC's removed the hardwood understory that was within 50 feet of four of the five cavity trees on the site. The clearing around the fifth cavity tree will be done in 1988.



# 14 - Before clearing... It's a wonder the RCW's can even find the cavity tree!

8/87 REN



# 15 - After - note the cavity tree flagged on  
the left. 10/87 REN



# 16 - Break time...! 10/87 REN

Red Wolf (Endangered) - Eight adult captive-born-and-reared red wolves (four pairs) arrived at the Alligator River National Wildlife Refuge on November 12, 1986. During the 10-10 1/2 month acclimation period certain measures were taken to increase the wolves' chances of surviving after being released to the wild: human contact was minimized in an attempt to reduce the wolves' tolerance of people, the feeding regime was varied to expose the animals to "feast or famine", the wolves were weaned from dog food and fed an all-meat diet, and they were given the opportunity to hone predatory skills by being exposed to live prey.



# 17 - Red wolves #194 and 227.

12/87 MKP



# 18 - "Morff!"

1/87 MKP



# 19 - Caretaker's quarters at South Lake.

1/87 BWS



# 20 - Radioactive implants were placed to mark  
urine and feces. 1/87 MKP



# 21 - 45 lb curls...

1/87 MKP



# 22 - Radio tracking...

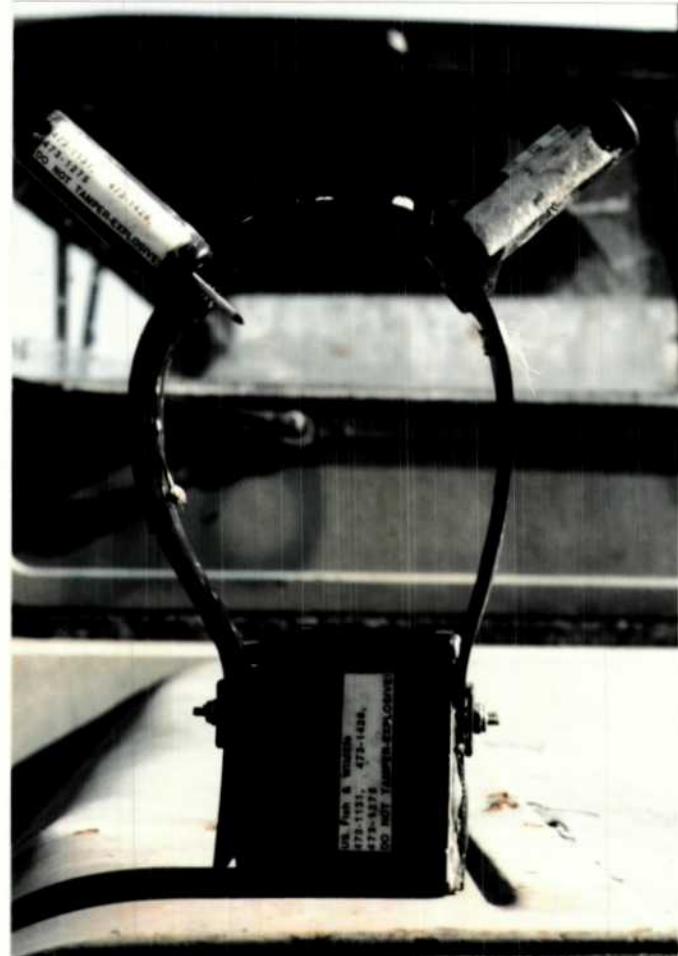
10/87 JTT



# 23 - Visual check from caretakers  
quarters at Point Peter.  
2/87 JTT



# 24 - 3-M dart collar: The impossible dream.  
10/87 MKP



# 25 - "Anybody wanna buy a used  
dart collar?" 11/87 MKP

Because there was uncertainty about whether adult red wolves should be released with or without pups, we only allowed two pairs to breed. The other two pairs were prevented from breeding by placing a reproductive inhibitor subcutaneously at the base of the neck of the two females.

On March 3, the breeding females were handled and we noticed that their vulvas were swollen and a bloody discharge was present. We took this to mean that they were in proestrus and therefore, expected them to reach their height of sexual receptivity around March 10-13, and whelp around May 5-8.

On April 28, after about two weeks of very heavy rains, we entered the pen of the first breeding pair and much to our surprise found one male pup laying in a puddle of water. It's likely that he had been in the dog house

with the adult female and was accidentally knocked outside as she ran from the box as we entered the pen. The pup was dried off and put back in the box. We removed the male and took him to the project vet's office so that he could be instrumented for release (radio collar and radioactive tag were placed). When we returned the male to the pen later that evening, we found the pup lying outside in one corner of the pen. Apparently the female had carried him out of the doghouse, dropped him, and then abandoned him. He was cold and stiff and appeared to be dead.

As we carried him out of the pen (so that a necropsy could be performed) he began to breath. We rushed him to a local vet's office and began emergency treatment to try to stabilize his condition. He died about 4 hours later. The necropsy report indicated that the pup was in excellent health and concluded that over-exposure was the cause of death.

Although no other pups were found in the pen we feel it's likely that she gave birth to an average-sized litter (4-6 pups). It seems likely that the other pups died of over-exposure before we entered the pen on April 28, and were eaten by one of both of the adults.

On April 28, we also entered the pen of the other breeding pair so that the male could be taken to the vet's office and instrumented for release (radiocollar and radioactive tag were placed). Examination of the female revealed that she would whelp in about 2 weeks. Because this pair was in a badly flooded pen, we moved them to another site in an attempt to minimize the chances of this litter succumbing to over-exposure. On May 8, we observed the female in the dog box curled up with her back to the door as though she was trying to keep something warm (pups?). On May 15 and 24, the male barked and acted aggressively as the keepers put food in the pen. This is the only time we observed this kind of behavior and we feel it was brought about because of the litter of pups. Unfortunately, on May 25, we entered the pen and could not find any sign of the pups: once they were dead it's likely that one or both of the adults ate them.

Although the wolves were scheduled to be released during late spring or early summer, 3M experienced many problems with the production of the radio-triggered anesthetic-dart collars. The problems caused a 3 1/2-4 month delay in releasing the wolves. During the delay we followed the acclimation routine outlined in the first paragraph.

Before releasing the wolves, we vaccinated them against rabies, distemper, and canine parvo-virus; injected them with vitamins; drew a blood sample (35 cc); and fitted them with radio transmitters and radioactive tags. The tags allow us to assign scats and urine samples to individuals. Subsequent study of the feces will yield data on individual food habits, territorial behavior, movement patterns, population density, and individual susceptibility to internal parasites. Because the 3M recapture collars had not undergone rigorous testing before we put them on wolves, we felt that in four cases back-up collars were necessary. Two of the animals (i.e. 140 and 231) were modified Johnson collars in addition to 3M collars. Johnson collars, each containing a variable-pulse (60 and 100 bpm) activity switch, had been worn by the animals throughout the acclimation period. Although the 3M/Johnson combination only weighed 800 g, it appeared bulky.

In an attempt to streamline a dual-collar package, we ordered "wolf pup" collars from Advanced Telemetry Systems (ATS). Each of these collars weighed approximately 180 g and contained a mortality switch (120 bpm) that is activated by 5.5 hours of inactivity. Two of the animals (i.e. 227 and 211) were released wearing the 3M/ATS combination that weighed approximately 700 g.

Because each of the collars mentioned above had a short expected field life, and because we had problems with the software and the hardware associated with the 3M recapture device, we replaced each wolf's telemetry package with a conventional Telonics collar. Each of these collars was equipped with a variable-pulse (60 and 120 bpm) activity switch and a mortality switch (180 bpm) that overrides the activity switch after 6 hours of inactivity.

Before releasing each pair, we placed a deer carcass near the acclimation site, threw food into the pen (to mimic a normal feeding event), and then locked the gate open. At that point the wolves were free to come and go as they pleased.

The releases were staggered to simplify logistics of tracking. Male 140 and female 231 were released at 0923 h on September 14. The other pairs (M, f: 227, 194; 211, 196; 184, 205) were released between 1345 h and 1700 h on October 1.

We maintained 24-hour contact with 140 and 231 from the time they were released September 20. During this period, we monitored their radio signals every 15 min. From September 21-30, we monitored the pair from the ground during early morning (0550-0830 h) and mid-evening (1930-2300 h), and from the air during the daylight hours (flights usually conducted at 1100, 1400, and 1600 h). Throughout October, we tried to locate each wolf at least once a day. During November and December, we located the wolves as frequently as possible.

During the 3.5-month period, we located the wolves 767 times (Table 1). The areas used by the animals ranged in size from about 10 to 60 km<sup>2</sup> (Fig. 1). Cursory examination of the telemetry data yields some generalities:

- 1) all the wolves spent 12-24 h near their acclimation sites before exhibiting exploratory movements,
- 2) four of the animals (231, 184, 205, and 227) spent considerable time near their acclimation sites,
- 3) those animals that wandered widely (140, 194, 211, and 196) periodically returned to their acclimation sites and showed affinity for other specific locations within their "home ranges",
- 4) the wolves frequently traveled on and rested near roads,
- 5) the waterways (even relatively narrow canals) and perhaps thick vegetation restricted the wolves' movements,
- 6) by late November we began to detect patterns to the animals' movements,
- 7) mainland Dare County probably contains the minimum amount of acreage necessary for a red wolf reestablishment.

Certain movements by the wolves warrant special consideration. On October 18 and November 6, wolves 211 and 194, respectively, wandered into Est Lake, and on October 30, male 184 wandered into Stumpy Point. None of these incidents required much intervention on our part as the wolves did not cause trouble and left the communities on their own accord.

TABLE 1

Results of radio-tracking red wolves from  
September 14 - December 31, 1987

Wolf	No. Days in wild	No. Locations ground	No. Locations aerial
140	87	193	20
231	84	158	22
184	85	53	10
205	83	66	12
227	39	44	9
194	65	37	10
211	92	65	13
196	92	43	12
Totals	627	659	108

Contrary to these incidents, on October 19, male 140 wandered into Manns Harbor and had to be captured. For 4 days we had monitored his movement toward the community along a canal adjacent to Highway 64. During this period we repeatedly hazed him hoping he would change his direction of travel. Nonetheless, he entered the community at 1900 h, and the capture crew had to be brought in. After numerous failures to fire the dart-collar, we decided to use dart rifles to capture the wolf. This was accomplished at 0005 h on October 20.

Although 140 had lost 4.5 kg since being released, we do not believe he entered the community in search of food. Rather, we feel he didn't want to swim the canal and instead chose to follow its' course; unfortunately that decision led him to Manns Harbor. However, reassuring this explanation is, it is still distressing that the sights and sounds of the town, and the presence of our capture crew were not strong enough stimuli to force him out of the community.

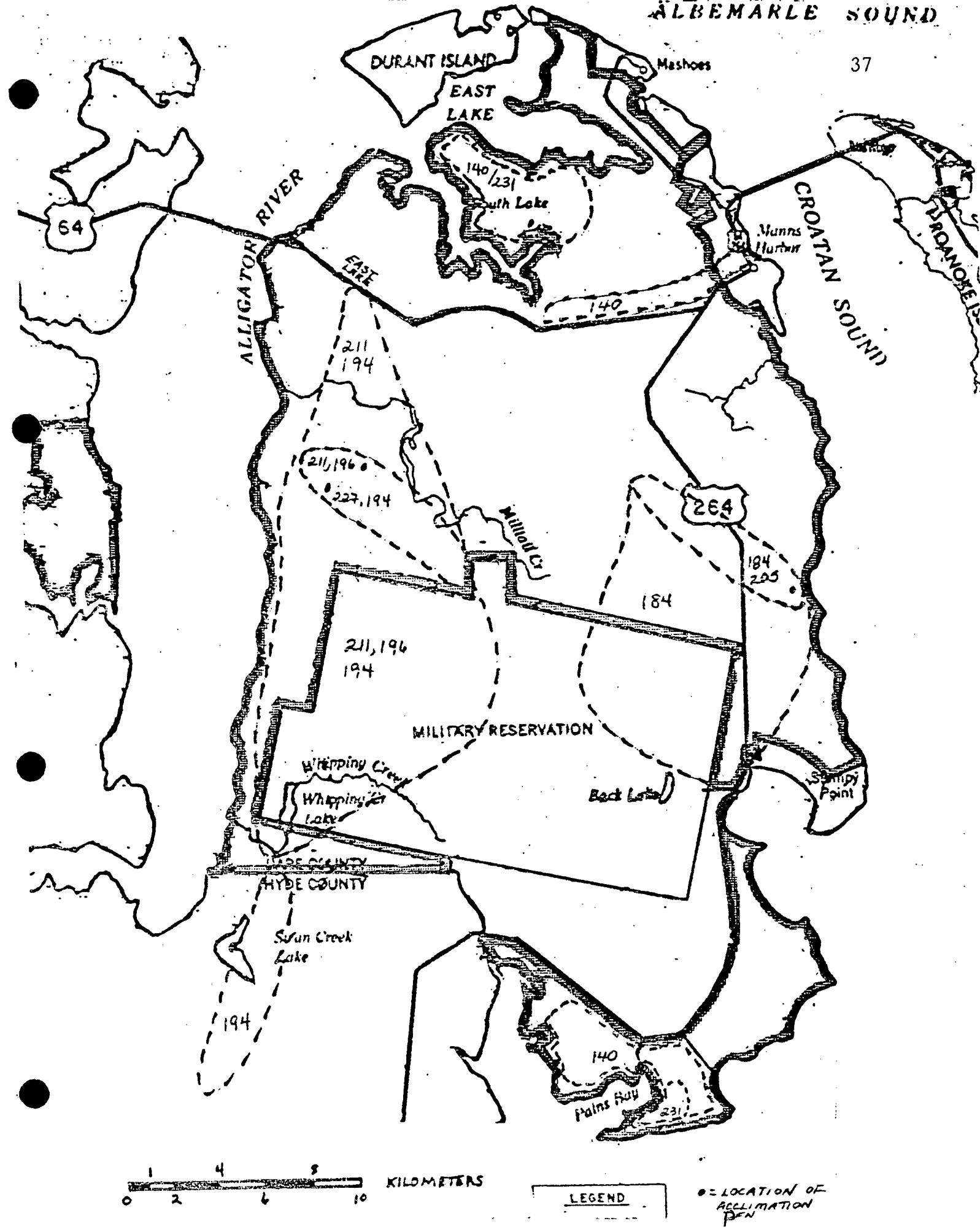
After being captured he was held in the South Lake pen for 10 days during which time we kept him on a good diet. He was re-released on October 30, and 13 days

later he was located 2.4 km south of Manns Harbor; it appeared that he was again travelling along the canal. At 2300 h, on November 16, he was located only 1.0 km from the community. Cracker shells fired in his direction caused him to move 2.0 km to the south where he stayed for the next 48 h. Concerned that 140 would again wander into Manns Harbor, we decided to use steel

Figure 1. Areas used by red wolves in Alligator River National Wildlife Refuge from 14 September - 31 December 1987.

ALBEMARLE SOUND

37



foothold traps to capture him and his mate (231) and relocate them to the Pains Bay area in the southern portion of the Refuge. This area was chosen because it is bound on all sides by water. So far, the canals and the sound (and probably the food we put out) have kept 140 in this general area. We do not believe that the relocation contributed to 231's death.

Like 140, movements by 194 also forced us to intervene. On October 19, we located her approximately 1.6 km south of the Refuge. A capture attempt that day proved unsuccessful. Fortunately, on October 21, we were able to force her into a small hole where she was easily captured by hand. She was put in the Phantom Road pen and because she had lost about 4.5 kg we kept her on a good diet for 8 days. She was re-released on October 29. Food was thrown in the pen and half a deer carcass was placed outside the gate before it was opened.

For the next month her movements were wide-ranging; during this period, her mate (227) was captured, his flight-related injuries were attended, and he was placed in the Phantom Road pen (see section on Territorial BEhavior). On December 5, she was again located about 1.6 km south of the Refuge. By December 8, she had moved an additional 3.2 km to the south. On December 9, after an attempt to capture her with dart rifles failed, we set five steel foothold traps. She was found in one of the traps on the morning of December 11. After processing, she was placed in the Phantom Road pen with 227. It is possible that her wanderings to the south were in response to the movements and territorial behavior exhibited by 211 and 196.

Although scats were collected from each pair of wolves, obvious scent marks were only seen in the western portion of the Refuge. We acclimated four wolves in this area (the Phantom Road pair, wolves 227 and 194; and the Pole Road pair, wolves 211 and 196) and they were all released within 2.0 km of one another at about 1700 h on October 1. At 0100 h on October 2, the pairs were located near their acclimation sites. However, by 0400 h the Phantom Road pair had moved to the Pole Road acclimation site and apparently displaced 211 and 196; they were observed at 0500 h travelling on a road about 1.6 km southeast of the Pole Road pen. Within 30 h female 194 had moved back to her acclimation site at Phantom Road; we never again located her near the Pole Road site.

For the next 6 days 227, 211, and 196 seemed to restrict their movements to an area within 1.6-3.2 km of the Pole Road pen. More than once they were located within 500 m of one another. On October 3, we observed 227 sleeping in one of the dog houses in the Pole Road pen. On that same day we encountered a scent mark (either a scratch, scat, or both) every 51.5 m along Pole Road.

Additionally, we found an area where tracks indicated that a confrontation might have taken place.

From October 13-19, none of the wolves frequented Pole Road. Then, from October 22, until November 8, 227 restricted his movements to the immediate area around the Pole Road pen. During this period, wolves 211 and 196 were frequently located in the same general area. On November 8, 227 was captured at the Pole Road pen. His poor condition necessitated a trip on November 9, to the vet's office for a thorough examination. Dr. Cooper (project vet) found many wounds that probably resulted from a fight or fights with one or more canids during the last 7-10 days of October. While 227 was convalescing at the vet's office, both 211 and 196 were frequently located in the Pole Road area.

For three reasons it seems likely that 211 and 196 were involved in the confrontation(s): 1) 227's apparent displacement of them in early October; 2) the size and the shape of the wounds indicated that they were made by canines; and 3) they were in the area when the fight(s) probably occurred. It is also possible that hunting dogs were involved in the fight(s). However, this seems unlikely because the area is closed to hunting dogs (we rarely see them as far west as Pole Road, nor did we encounter any dogs or dog sign in this part of the Refuge during the period of concern), and most of them are timid and much smaller than the wolves.

The conflict appeared to continue even while 194 and 227 were in the Phantom Road pen as both 211 and 196 were located on several occasions within 400 m of that location. The Pole Road pair actually wore a path around the pen near the gate, and we found areas where they tried to dig in from the outside. Thus, it seems likely that 194's wanderings to the south were in response to the movements and behavior exhibited by 211 and 196.

Because the potential for additional conflicts seems high if 227 and his new mate (the female from the breeding facility that will replace 194) were released at Phantom Road, we are planning to relocate them to the South Lake area. Using similar logic, the pairs of

wolves that will be acclimated at Sandy Ridge during 1988 might need to be separated by a few kilometers before being released.

Since being released all of the animals except male 227 maintained reasonable weights. An unknown (but likely significant) percentage of the 227's weight loss (25 pounds in 5 weeks) is probably attributed to the wounds (especially his broken foot) inflicted during the fight which hindered his hunting. Two animals gained weight (231 and 184). We did not provide enough food to account for the gain or maintenance of weights. Therefore, the wolves had to have found food on their own.

Unlike 231 and 184, wolves 140, 205, and 194 lost about 4.5 kg by the time they were captured, but appeared to be in good shape. Their weight losses suggest that captive-born-and-reared red wolves can exist in the wild at lighter weights than they achieved in captivity.

Although 194 lost about 4.5 kg from October 1-21, she maintained her weight from October 29-December 11. This pattern of weight change suggests that it took her about 2 months to learn how to consistently feed herself. This information supports the idea that food supplements should be provided to captive-born-and-reared red wolves for 1 to 2 months after they're released into the wild.

Fortunately, we anticipated this need and supplemented the wolves' diets every 2-3 weeks from September 14 until November 22. Only four supplements were provided to free-ranging wolves after November 22. On December 2 and 22 food relocated to Pains Bay, an area unfamiliar to the. On December 28, food was placed near 211 and 196. This was done in an attempt to restrict their movements for 24-48 h as we considered a capture attempt. Also, on December 28, food that was put in the Point Peter pen for 231 was eaten by 184.

Over the 3 1/2 months approximately 250 scats were collected. About half were sent to Batelle Pacific Northwest Laboratories to have their radioactive contents assessed. We have not received the results. The first 50 or so scats collected appeared to be empty or contained remains of food items we provided. However, the last 100-150 scats contained remains of food items we did not provide. Gross examination of these scats revealed that marsh rabbit, deer, and raccoon were eaten. Field observations also suggest that rabbit and deer were food items; on November 20, female 196 was located very close to a recently killed

marsh rabbit; fresh canid tracks were present around the carcass. On December 7, tracks were found that indicated that male 184 chased a small deer.

The animals' maintenance of reasonable weights and remains of food items in scats suggest that the wolves may have made the transition from dependence on humans for food to self-sufficiency.

Even though the captive wolves seemed to adjust relatively quickly to life in the wild, consideration should be given to altering the captive program and the acclimation period in an attempt to reduce the length of time that supplemental food needs to be provided.

Females 231 and 194 died during the first 3 1/2 months of the program. On December 18, we found 231 about 3 km from the relocation site in the Pains Bay area of the Refuge. Telemetry data and the condition of the carcass indicated that she probably died around December 16 or 17. The proximal cause of death appears to be kidney failure; the ultimate cause of death is unknown. At this time we do not believe that the capture and subsequent relocation to the Pains Bay area were factors involved in her death.

Female 194 had to be euthanized because of extensive damage to her left front leg that occurred while she was in the Phantom Road pen (waiting to be re-released after being captured on December 11). Although the cause of the damage is unknown the Red Wolf Recovery Team believes the most probable scenario is she was in a fight through the pens fencing with 211 or 196 (both of these animals were frequently located near the Phantom Road pen).

When we returned to the pen on the 28th, most of the leg was gone. She was immediately transported to the project vet, but because the damage was irreparable, she was euthanized.

We made 19 attempts to capture the wolves (Table 2). These attempts were necessary in order to replace faulty 3M dart-collars, remove an animal from within and near Manns Harbor (140), and to retrieve an animal that twice wandered south of the Refuge (194).

TABLE 2

Attempts to capture red wolves from  
September 14-December 31, 1988

Date(s) of Capture Attempt	Reason	Capture Tech.	Comments
<b>MALE 140</b>			
10/20	in Manns Harbor	dart-collar dart rifle	collar didn't work dart rifle did
11/17- 11/19	near Manns Harbor	Braun foothold	damage to foot apparent within a few days
<b>FEMALE 231</b>			
10/24- 10/30	replace collar	box trap	wolf showed interest in bait and box but didn't go in box
10/27	replace collar	dart rifle	animal avoided shooters
10/29	replace collar	dart-collar	collar didn't work
11/19- 11/20	replace collar	Braun foothold	damage to foot apparent within a few days
<b>MALE 184</b>			
10/30	replace collar	dart rifle	animal froze about 5 m from shooters and was easily darted
<b>FEMALE 205</b>			
11/02- 11/04	replace collar	box trap	wolf showed interest in bait but didn't go in box
12/21	replace collar	box trap	collar didn't work
12/21- 12/22	replace collar	dart collar	damage to foot apparent within a few days

TABLE 2 continued

Date(s) of Capture Attempt	Reason	Capture Tech.	Comments
<b>MALE 227</b>			
10/29	replace collar	dart collar	collar didn't work
<b>MALES 227 AND 211 AND FEMALE 196</b>			
10/23- 10/31	replace collars	box trap	wolves showed interest in bait and box but didn't go in box
11/02- 11/04	replace collars	box trap	wolves showed interest in bait and box but didn't go in box
11/07-	replace collars	box trap	227 captured 11/08 other wolves showed interest in bait and box but wouldn't go in box
<b>FEMALE 194</b>			
10/19	off refuge	dart rifle	animal avoided shooters
10/21	off refuge	dart rifle	animal tried to hide in hole and was easily captured by hand
12/09	off refuge	dart rifle	animal avoided shooters
12/09- 12/11	off refuge	Braun foothold	damage to foot developed within a few days
<b>MALE 211</b>			
11/10	replace collar	dart collar	collar didn't work

On five occasions we tried to immobilize wolves with the 3M dart-collar. All of these attempts were unsuccessful. We also conducted eight tests of the collar using a dog as a surrogate wolf; only one of these tests was successful. We encountered problems with the software (it sometimes got "lost" and wouldn't perform the requested function), the hardware (the front and back of the dart holder blew off, the silicone cap hindered dart penetration, and the release mechanism malfunctioned), and the triggering transmitter (it would not recharge, and range was poor at times). I told 3M about these problems and they supposedly corrected them. Currently we are waiting for new collars, at which time we will begin rigorous testing. Adequate testing will take a minimum of a few months. If the collars work, they could be worn by the animals to be released in the spring of 1988.

On six occasions we used dart rifles to try to capture wolves. Twice we darter wolves and on a third occasion a wolf tried to avoid us by hiding in a hold and was easily captured by hand.

On five occasions we used box traps to try to capture wolves. The boxes were baited with beef scraps or deer parts and set at three locations; twenty-three trap-nights were logged. On November 8, 227 was captured in the trap baited with deer. Other wolves showed interest in the boxes and the bait but didn't go in the traps.

On four occasions we used Braun steel foothold traps to try to capture wolves. These traps were only used after other capture techniques failed. Tranquilizer (propriopromazine) tabs were attached to most of the traps which were checked about every 12 h. Thirty-two trap-nights were logged during which we captured four wolves, a gray fox, and a opossum. No trap line was out for more than two nights.

Although our success with foothold traps was high, all of the wolves sustained damage to the foot that was caught. In each case it took a few days for the injury to become apparent. As a result of these injuries, we should pursue other capture techniques (smaller steel foothold traps, foot snares, and box traps) and continue to only use large steel foothold traps (#14 OS Newhouse Oneida, and Braun) after less stressful methods prove unsuccessful.

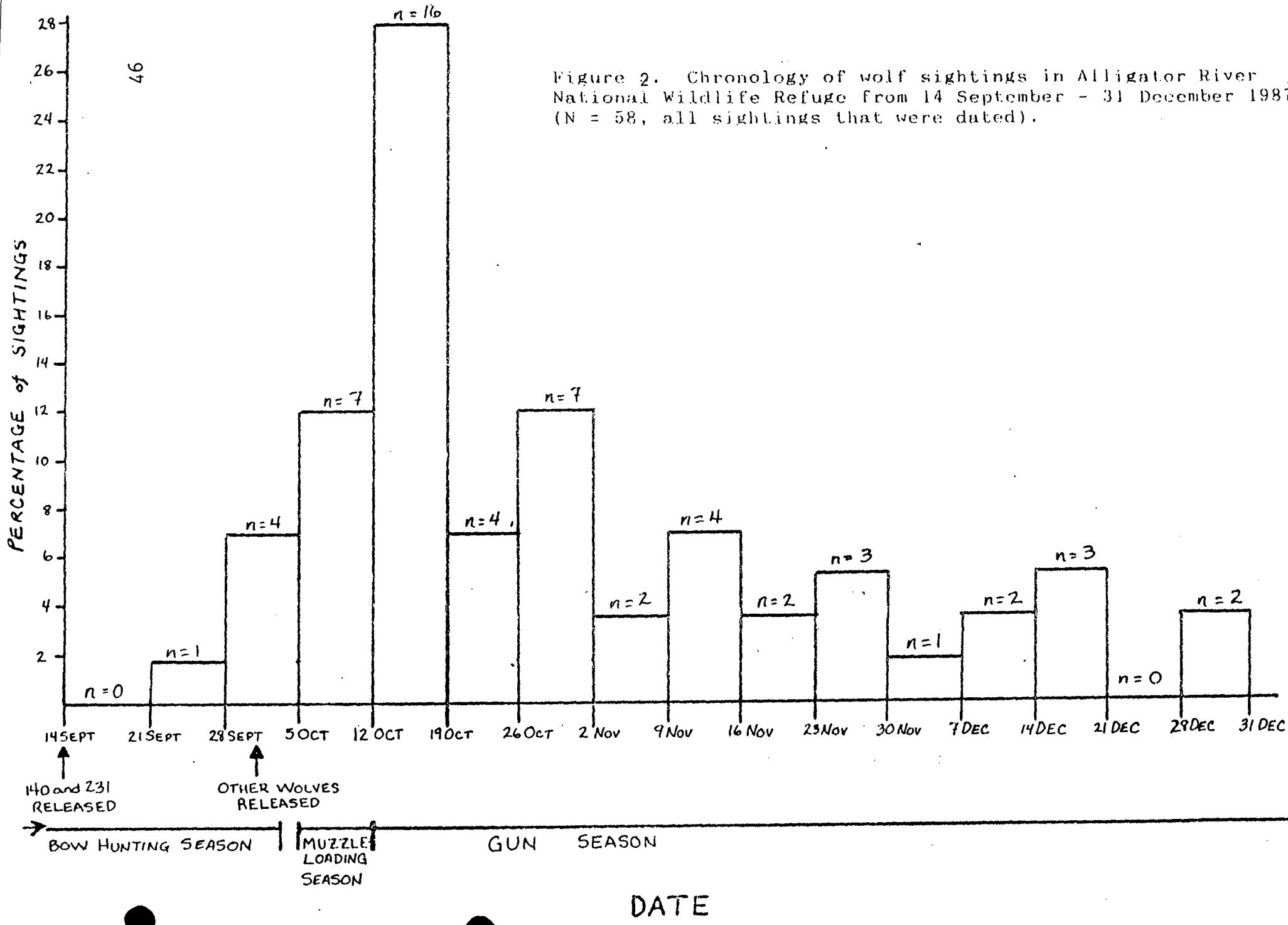
When foothold traps are used in the future, each will not only be outfitted with two tranquilizer tabs but also a transmitter that will be monitored nearly continuously. The transmitter will allow us to quickly detect when a trap has sprung and thus minimize the amount of time an animal spends in the trap which should lessen the severity of trap-related injuries.

The wolves were sighted 62 times since September 14. All but two observations were turned in by motorists, trackers, and hunters ( $n = 27, 26$ , and 7). Sightings were distributed throughout much of mainland Dare County. Most observations (67.2%) occurred during the first 45 days after the wolves were released (Fig. 2). Sightings by trackers and motorists were reported throughout the 3 1/2 month period, whereas most observations by hunters (42.9%) occurred during the muzzle loading season (October 5-10). The last sighting by a hunter was on November 28, despite the fact that the gun season lasted until January 1, 1988. The lack of sightings was probably due to a decrease in hunter effort toward the end of the season and an improvement in the wolves' ability to avoid hunters.

All the wolves were seen at least twice. However, since October 23, 77.4% of the sightings involved 184 or 205. Male 184 was probably the wolf seen in most, if not all, of these cases because his movements were more wide-ranging than 205's. It is likely that 184 was often observed because he was acclimated near Highway 264 and may have frequently traveled on the road, and he was tolerant of vehicles.

The other wolves also initially seemed tolerant of vehicles. They commonly responded to vehicles by running down the middle of the road until the car or truck was close, then they moved off the road into the brush or stood at the side of the road and waited for the vehicle to pass. These responses were probably due to the wolves' inexperience with vehicles, and the presence of canals and thick vegetation that seemed to hinder movements. The wolves' initial tolerance of humans was most obvious during four occasions when two wolves voluntarily moved toward trackers. This tolerance was probably due to the human/food association that the wolves developed during captivity.

Hazing involved people, cracker shells, high-powered pistols, trucks, lights, horns, a bottle, and a stick. The attempts were largely unsuccessful; we never effected significant changes in wolf movements. Usually they moved around the hazers and stayed out of sight but



never left the general area. The most successful hazing occurred on November 16, when we were able to move 140 about 2.0 km; however, he stayed in the general area for the next 48 hours.

The public made four attempts to haze wolves. These attempts probably did not cause major changes in movements.

More evidence of the wolves' initial tolerance of people and vehicles comes from the six occasions the animals froze and let people or vehicles approach within a few feet. These incidents involved three or four wolves. In two of these cases, we easily captured the animals.

Further evidence of the wolves' initial tolerance of people comes from six capture attempts during which we tracked the wolves closely for long periods of time. As during the hazing attempts, the wolves simply moved around us in the woods and stayed out of sight; they did not leave the general area. In one case, female 194 tried to hide from us by laying in a hole; we captured her easily.

Fortunately, within 3-5 weeks the wolves seemed to grow "wilder". For example, as previously stated, all the wolves except the Point Peter pair were rarely seen after October 23. The lack of sightings was probably partly due to an increase in the wolves' intolerance of humans and vehicles, and experience at moving unseen through the Refuge. Another example involves 194. On October 28, (the day before she was re-released) we attempted to catch her in the pen, usually giving up and laying in a corner. This time she refused to be captures; she seemed "wilder". On December 9, we tried to recapture her in the woods, but she refused to freeze and instead ran through us. Even 184 seemed to grow more intolerant of people. On December 17, we located him near a road in the farm. As we approached, he immediately flushed and quickly ran out of sight.

Even though the captive wolves seemed to adjust relatively quickly to life in the wild, consideration should be given to altering the captive program and the acclimation period in an attempt to increase the wolves' intolerance of humans and vehicles before they're released into the wild.

### 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.

### 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 next page for photos.

### 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 Unit, 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.

The Air Force has provided eight radio collars for a bear study. In cooperation with the Air Force and the N.C. Wildlife Resources Commission, we will trap and collar eight bears in 1988. They will be tracked in conjunction with the red wolf tracking.



# 26 - Wolf food.

8/87 KCD



# 27 - "Wolves, what wolves?"

KCD

H. PUBLIC USE1. 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 1987 were estimated to be 9,284.

Current administrative offices for the Refuge are in the laboratory section of the N.C. Aquarium 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 1987, the Refuge staff responded to 3,170 public inquiries and issued 51 news releases directly related to Alligator River NWR. In addition, staff members participated in numerous radio "spots" about the red wolf project, hunting, and other Refuge topics.

The weekly column "What's Happening with Wildlife - A Refuge Point of View", which was begun late in 1986 became the "status quo" in 1987. The column was well received by the public and has proven to be a valuable tool for disseminating information as well as fostering "good will" in the community.

In June, Alligator River NWR finally gained an identity! YCCer's, volunteers, Intern Newman, and ORP Strawser erected and landscaped the three entrance signs.

## 2. Outdoor Classrooms - Students

Dare County and other local schools have a keen interest in environmental education. Unfortunately, their teachers lack much of the needed expertise (and, more importantly, the confidence) to conduct field activities with their students. The school system, also lacks transportation for their students for on-refuge activities.

In more recent years, teachers have begun to utilize the marshes of Pea Island for independent use with their classes. To encourage contact between the classes and the Refuge and to ensure a reasonable level of "wildlife literacy" in the local public schools, a core group of volunteers have prepared and stand ready to present in-classroom programs on assorted wildlife topics. During 1987, programs titled the Red Wolf, Birds, Mammals, Amphibians, Reptiles, Fish, and Animals without Backbones were available. Figures for these programs were included in Section H.7 of this report.

## 6. Interpretive Exhibits/Demonstrations

Several exhibits and demonstrations were presented by Refuge staff during 1987. Among them were:

- On January 9, ORP Strawser and volunteer Margaret Burns represented the USFWS at the annual College of the Albemarle Career Day. Approximately 700 students attended.
- On March 16, ORP Strawser coordinated a panel discussion on "Dealing With Wildlife in Distress" at the Outer Banks Audubon meeting. Approximately 35 people attended
- On April 7, was the 1987 Environmental Awareness Day at the N.C. Aquarium. ORP Strawser presented a short program entitled "Fair or Fowl" for 12 groups of 20 seventh graders.
- On June 6, Intern Newman and Volunteer Arch Bush manned an Alligator River exhibit at the Annual Dare Day Celebration in Manteo. Approximately 3,000 people attended.

- The 1987 National Hunting and Fishing Youth Fishing Rodeo was held on September 19, on seven Dare County piers. Record numbers of participants were involved. Twenty volunteers and five staff were involved as "O-FISH-ALS" and 293 kids fished.
- On November 15, Alligator River participated in the Dare County Farm Home Days program sponsored by the Agricultural Extension Agent by providing a display on the Refuges and the red wolf project.

#### 7. Other Interpretive Programs

A number of on and off Refuge programs were conducted during 1987. Many dealt with the red wolf program; others addressed Refuge related topics. A list of programs, a brief description of each, and information on participants follow:

- On January 8, Refuge Manager Taylor presented a program on the red wolf project for the Dunes of Dare Garden Club. Approximately 30 members were present.



# 28 - Professional staff and volunteers have shared the load on the many program requests this year! 8/87 BWS

- On January 13, Volunteer Warren Davis presented a red wolf program for the Columbia Rotary Club. Approximately 25 members attended.

- On January 14, Volunteer Davis presented a red wolf program to 3 third grad classes at Kitty Hawk Elementary School totalling 75 students.
- On January 15, Volunteer Davis presented a red wolf program to 3 third, 3 second, and 3 fourth grade classes at Manteo Elementary School totalling 225 students.
- On January 21, Refuge Manager Taylor presented a red wolf program to a group from the University of New England. Approximately 10 people attended.
- On January 22, Assistant Refuge Manager Schriver presented a red wolf program to Manteo Elementary School first grade class of 25 students.
- On February 1, Assistant Refuge Manager Lanier and Bio-Tech Phillips met with a Wildlife Management class from N.C. State University to discuss Pea Island management and the red wolf project.
- On February 20, Bio-Aid Beth Kennedy conducted a public program for the N.C. Aquarium on Hawk Mountain and the raptor program there. Approximately 40 people attended.
- During February, volunteers gave four red wolf programs to audiences totalling 255 .
- Two school programs were conducted by volunteers in March for 150 children.
- Several staff members assisted in conducting a tour of Milltail Creek and Red Wolf program for 30 members of The Nature Conservancy on March 14.
- May 2, Bio-Tech Phillips conducted a red wolf program for 20 members of the Pamlico/Tar River Foundation.
- On May 8, Volunteer Davis conducted a program on the red wolf for 30 4th and 5th graders from Henly Middle School in Charlottesville, VA.
- On May 18, Volunteer E.J. Buckingham conducted a program on birds for 69 second graders at Manteo Elementary School.
- On June 24, Intern Newman conducted a marsh/estuarine field trip via canoe for the volunteer group from Calvary Methodist Church.
- On July 28, Volunteer Davis conducted a red wolf program for approximately 30 members of the Kitty Hawk Kiwanis.

- August 28, Refuge Manager Taylor and Assistant Refuge Manager Schriver conducted a Refuge tour for Lori Williams, Counsel for House Committee on Merchant Marine and Fisheries. The agenda included aerial, boat, and vehicle tour of Refuge and a briefing on Refuge programs.
- August 29, Refuge Manager Taylor spoke for the Defenders of Wildlife Red Wolf Workshop held in Kill Devil Hills. Warren Parker (FWS, Asheville) also spoke at the workshop.
- On October 17, Bio-Tech Phillips conducted a program for the N.C. Museum of Natural History. The program included a brief slide presentation and some "hands-on" telemetry work and approximately 15 members of the Junior Naturalist and Junior Curators programs participated.
- On December 1, Volunteer Davis presented a program on the Red Wolf Re-establishment Project to approximately 95 third graders at Manteo Elementary School. On December 17, he presented a similar program for approximately 35 students at Manteo Middle School.

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.

The Alligator River Master Plan was officially completed during 1987. This document divided the Refuge into three basic public use areas, with 3 additional tiny safety zones closed to all hunting. (See Fig. 3).

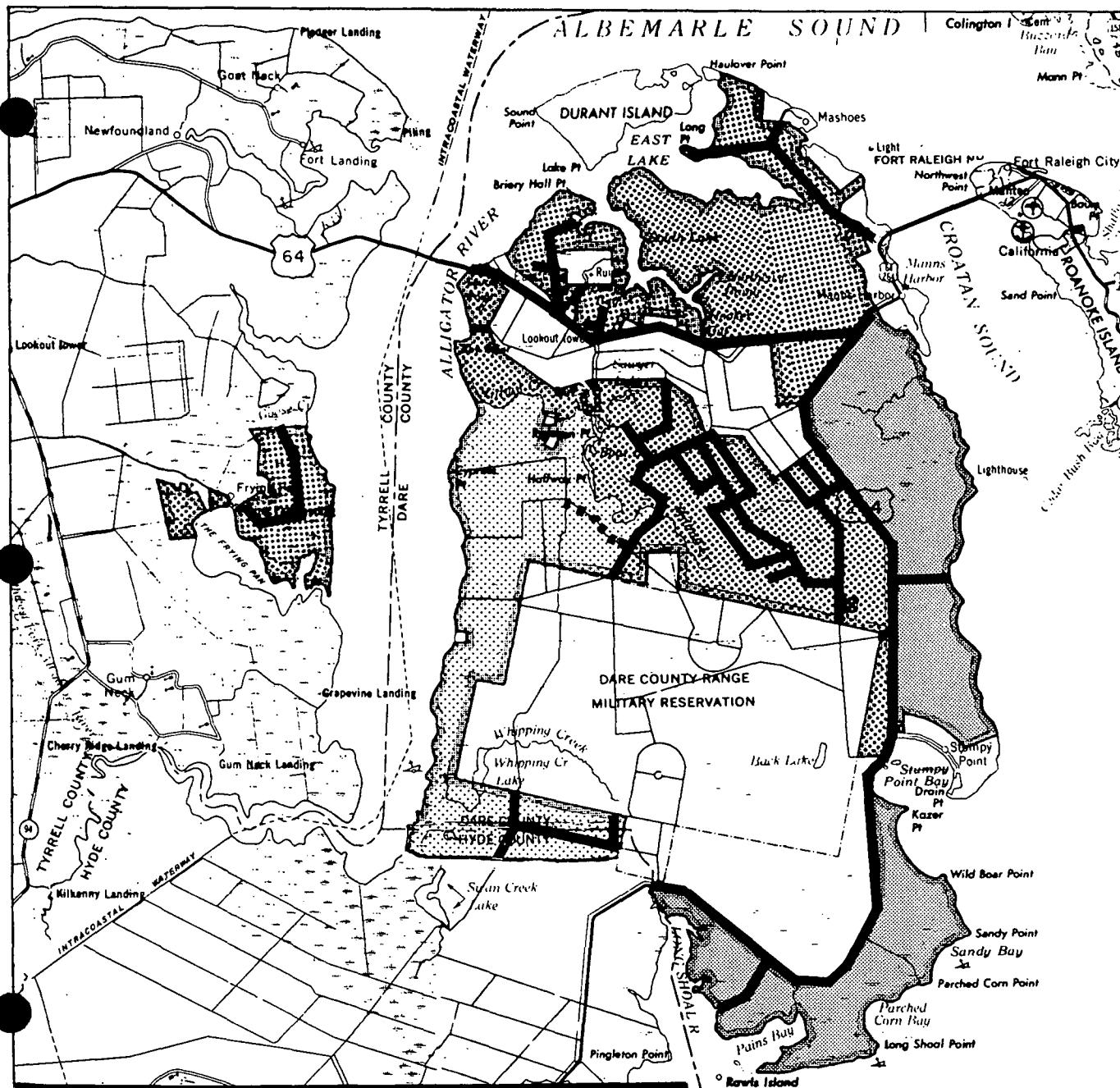
White-tailed deer are the most sought after game species on Refuge lands. Alligator River contains 127,000 acres of habitat traversed by more than 200 miles of logging roads. Because many of these roads share junctions with State roads, it is difficult to establish effective hunter check stations. The N.C. Wildlife Resources Commission requires hunters to register hunter-killed deer with a local wildlife cooperator agent, however, an estimated 40% go unreported. State records show bucks and does taken on the Refuge in 1987. That translates into a more realistic harvest of 252 deer.

# ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

DARE AND TYRRELL COUNTIES, NORTH CAROLINA

UNITED STATES  
DEPARTMENT OF THE INTERIOR

UNITED STATES  
FISH AND WILDLIFE SERVICE

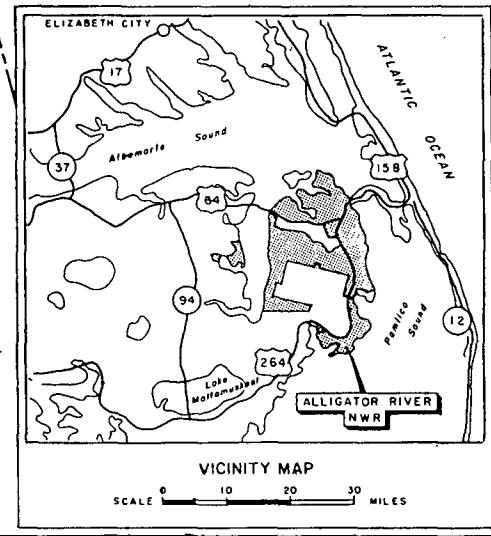


## PUBLIC USE MAP

Figure 3

- 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.
- Roads open to motorized vehicles.
- Roads seasonally open to motorized vehicles.

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



On April 13, Manager Taylor was called before Dare County Board of Commissioners to answer questions and concerns of local residents and board members, on a Refuge regulation which prohibits the training of hunting dogs on the Refuge outside of the hunting season. Approximately 50 deer hunters, which use hunting hounds, were in attendance to protest the regulation and claim that "their heritage" had been taken away by the Refuge. The board took no action, but stated they would pursue any action their constituents desired, eg. write a strongly worded letter to the congressman, call for a meeting in Atlanta, or Washington, DC, etc. Since this time, no further major comments or questions concerning this issue have been raised.

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



# 29 - The perfect duck hunt...except for the  
corn... 1/87 BWS

Estimated public use on hunting activities is shown below:

<u>Activity</u>	<u>Visits</u>	<u>AH</u>
Duck	140	700
Deer (gun)	1,475	8,825
Deer (bow)	200	1,000
Small Game	275	1,000
Upland Game Birds	135	405

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 1987, there were an estimated 1,355 fishing visits to the Refuge with 5,420 activity hours spent participating in this activity.

10. Trapping

Furbearer trapping was allowed during the State season under North Carolina regulations. Special Refuge permits were required; nine were issued. Special regulations on the permits limited trap size and required that trappers report their take. Three completed "trapping results" forms were received by this effect. Of those, one was a negative report; the permit had not been used. Total take from the other two trappers was 68 raccoons, 13 otters, and 4 bobcats.

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 1987:

<u>Activity</u>	<u>Visits</u>	<u>AH</u>
Foot	3,825	7,650
Vehicle	4,700	9,400
Boat	675	2,700
Photography	160	640

#### 17. Law Enforcement

1987 was the second year for enforcing Refuge specific regulations on Alligator River. Staff officers conducted random 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. Information boards complete with maps, regulations, and other pertinent information for hunting on the Refuge were installed at key access points. Extra efforts were made to ensure appropriate regulatory signs were in place prior to the respective seasons.

The one regulation which appeared to create the most problem in 1986 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 during that season. Luckily, no injuries occurred. For the 1987 season, the wording of the regulation describing the transport of firearms was clarified. This, along with a year's experience for local hunters in dealing with federal regulations, made the season a less complicated one for law enforcement officers.

Alligator River has many remote areas. Traversed by over 200 miles of old logging roads, there are areas of the Refuge that may go for months without a staff member's presence. Most of the Refuge visitors are hunters; some fishermen utilize the Refuge for access to the sound or fish in some of the Refuge creeks, lakes, or canals.

Poaching is a problem at Alligator River, but it is difficult to catch poachers due to the vastness of the area. Because of its remoteness, Alligator River is always susceptible to use by drug traffickers or for other such illegal activities. Vehicle trespass, littering and dumping, illegal harvest of wood, boats overnight, after hours trespass, transport of loaded firearms, and dog

trespass are common violations. There has been some evidence of production of marijuana on the Refuge, but no areas have been found.

The following violations were issued by Refuge officers during 1987:

4 transporting loaded firearms - 50 CFR 32.2 - \$ 50 each  
1 transporting loaded firearms - 50 CFR 27.41 - \$100

N.C. Wildlife Resources Commission Officer Earl Brinkley issued the following citations on the Refuge:

1 closed season dove - \$10 + cost  
1 hunting ducks after hours - pending  
3 hunting ducks over bait - \$150 + cost + loss of hunting privilege for 1 year  
3 hunting ducks during closed season - \$150 + cost + loss of hunting privilege for 1 year  
1 no big game license - \$10 + cost  
2 no hunting license - \$10 + cost  
2 hunting from vehicle - \$10 + cost  
1 taking doe deer closed season - \$10 + cost  
Note: Court cost is \$40

As in past years, on October 9, Refuge Officers and Officer Early Brinkley met to discuss state and federal regulations for the coming hunting season.

On October 28, Refuge Manager Taylor, Assistant Manger Schriver, ORP Strawser, Bio-Tech Beasley, and refuge officers from other local refuges met in Manteo for the semi-annual firearms qualifications. All participants qualified both with revolvers and shotguns.

All current Refuge law enforcement officers attended the annual law enforcement refresher training in Tallahassee, FL.

During the year, two Naval jets crashed on the Refuge and an Air Force plane crashed just off the Refuge. On May 20, the A-6 crash killed 2 Naval aviators. Shortly after, a F-14 Tomcat crashed very near the first crash site and killed two. The A-6 crash created an opening approximately a quarter acre in size. An Air Force F-4 crashed just off the Refuge in July.

The 9,000 acres of Refuge acquired during 1987 in Hyde County presented law enforcement opportunities unavailable in the past. Since Hyde County has an annual bear season, and the Refuge has not been opened to bear hunting, appropriate signing and "bear enforcement" were in order.

On November 3, "No Bear Hunting" and Refuge boundary signs were posted on the newly acquired Refuge lands in Hyde County in anticipation of the upcoming bear season. There is no bear season in Dare County due to County opposition; however, the acquisition of land in Hyde County increased the significance of the Refuge regulation against bear hunting. During the five day season, Special Agents Ted Curtis and Jack Baker, and State Wildlife Officers made several bear cases on that area of the Refuge.

## I. EQUIPMENT AND FACILITIES

### 1. New Construction

Site preparation for this years red wolf acclimation area near Sandy Ridge was complete by mid-November. This year the erection of the pens was contracted out since this years acclimation area was accessible by motor vehicle. The contractor (Whitehurst & Sons) began work on December 8. The pens were not complete at years end. The Sandy Ridge site was high, dry, and large enough to incorporate more of the acclimation activities at one location.

### 4. Equipment Utilization and Replacement

The best find this year was a pair of Huber road graders, vintage 1977. Although we aren't staffed to permit serious road maintenance, we now have the capability to make a bad spot passable.

Portable generators, and lorans were purchased for use in the red wolf project.

A acquisition request was submitted to purchase a much needed truck tractor.

Motor vehicles are in constant use. Station growth in both acreage and programs has extended our fleet to the limits. This usage coupled with a one man maintenance force and lack of maintenance facilities places us in the "break-down" maintenance mode of operations with a lot of repair work done on the open market. The quality of available repair facilities has caused us considerable problems.

### 5. Communication Systems

A proposal was submitted this year to convert our present radio system to a high band system. This would give us more flexibility in communicating. With the low band system when the office is closed the probability of raising any assistance is nil. The proposed system would provide

communications possibilities with other agencies plus telephone capabilities. This will provide around-the-clock contact with someone.

6. Computer Systems

Our IBM PC/AT arrived in October. A training schedule was established and by years end all of the administrative/management staff were "literate" in the use of the word processing software. Various experiments to utilize the system for property, finance, waterfowl data, and of course red wolf data are underway. The possibilities are limited only by the imagination, and we are looking forward to continued progress in utilizing this technology.

7. Energy Conservation

Car pooling continued this year as did consolidation of travel from headquarters to the Refuges and/or around town.

J. OTHER ITEMS

1. Cooperative Programs

A special use permit was issued to the Elizabethan Gardens to collect three specimens of native plants for use in an educational diorama.

A special use permit was issued to the North Carolina Aquarium/Roanoke Island to collect plants for their public education programs.

2. Other Economic Uses

Two permits were issued to place bee hives on the Refuge, but neither was utilized. The Master Plan called for hives to be at least 50 feet from a road and clearing of vegetation to place hives is discouraged. Interest in this activity may decrease due to those restrictions.

3. Items of Interest

Most of the month of September, Biological Technician Beasely and Tractor Operator Powers were volunteers for overhead support duty on the wildfires in California.

Assistant Refuge Manager Schriver delivered Dare County its revenue sharing check for \$240,758.00.

In May Assistant Manger Schriver and Bio-Technician Phillips spent a day in the field and an evening on the town with Don

Knowles (Interior Appropriations Committee), John Blackburn (Aid to N.C. Senator Sanford), and Katherine Skinner (Director TNC/NC). ORP Strawser assisted with the ground tour, Schriver also provided air tour.

Assistant Manager Schriver and Maintenance Worker Creef were both called for jury duty this year.

Managers Taylor and Schriver attended the Ducks Unlimited MARSH project dedication at Mackay Island NWR.

Managers Taylor and Schriver provided Lori Williams (Counsel for the House Committee on Merchant Marine and Fisheries) with a tour of Alligator River.

Managers Taylor, Schriver, and Noffsinger met with First Colony Farm Manager Jeff Collier to gain some insight of farming operations on our largest private inholding.

#### 4. Credits

This narrative was a joint effort by all the Refuge staff with special kudos to ORP Strawser for "production" and Secretary Midgett for deciphering our penmanship.

#### K. FEEDBACK

The concept of a credit card to use while traveling does have some merit. We don't have to fill out or keep copies of GTR's. We can charge room costs at most major hotel chains. We can charge meal cost at some larger restaurants. However,... a lot of places we travel to do not have major hotel chains. A lot of places we travel to are not blessed with an abundant supply of restaurants. Even if they were, some folks prefer lunch at a fast food establishment. Then there are cab fares, parking fees, road and bridge tolls, registration fees, banquet fees, etc. Two points to consider: (1) Why all the justifications and approvals for the \$25/day "emergency only" advance of funds? Lets go direct to DFC like before. It is unreasonable to expect employees to finance their official travel with personal funds. Even if the traveler is likely enough to find a hotel that takes Diner's Club there are a lot of other expenses involved in travel that the credit card is no good for, (2) Since we are committed to the credit card, get Master Card or Visa, that even Joe's Motel down on highway 3 may accept.

GSA contracts this year have been some problem. Information is incorrect, items no longer available and most common delivery times way past those specified in the contract.

On purchases over \$1,000. we are supposed to show evidence of competition even on GSA contracts. Why have them then? It's

much easier just to work the open market if evidence of competition is necessary. Most stations don't have access to complete GSA contract information anyway. That used to be the benefit of GSA contracts - just pull one out and order - all the rest had already been done by GSA. If competition is necessary let GSA do it when contracts are awarded.

A special note of thanks: Since the establishment of this Refuge (and even before that - with Pea Island) Special Agent Ted Curtis (LE, Washington, NC) has provided support and "tactical" assistance, both professionally and personally, to the staff of this Refuge. Often, the on-going efforts that help so much are overlooked in the day-to-day grind. We would like to take this opportunity to say thanks to Ted for his support as a special agent, pilot, "legal counselor", "duck counter"...and friend.



# 30 - Special Agent Ted Curtis and his tail dragger - ever present in our times of need! (Waterfowl surveys, LE patrols, telemetry work, etc.)

CURRITUCK NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1987

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 designated 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 ensures perpetuation of basic wetland functions including nutrient cycling, floodplain and erosion control, and would help preserve the role of Currituck Sound estuaries as important nursery areas. Ownership of the protective buffer east of the productive marshes bordering the sound protects 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 and Monkey Island Clubs. 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 of 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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#### A. HIGHLIGHTS

Storm damage destroys only water control structure on Currituck NWR. (See Section F.2)

Low waterfowl numbers and federal ownership lessen law enforcement problems. (See Section H.17)



# 1 - What's that old saying? "You can't turn back the sands of time!" 8/87 RSL

#### B. CLIMATIC CONDITIONS

See Alligator River narrative.

#### C. LAND ACQUISITION

##### 3. Other

On April 15, Refuge Managers Taylor and Noffsinger along with regional office personnel P. Podriznik and Jerry Vitts, met with the Currituck County Board of Commissioners to discuss the land exchange proposed last August. In July, Steve Paulson and Pat Lehr (RO, Realty) were in to work on the Currituck land exchange and look at inholdings.

#### D. PLANNING

4. Compliance with Environmental and Cultural Resource Mandates  
On October 21, Assistant Manager Noffsinger met with N.C. Power and inholding owner Mr. Lockhart to discuss electrical right-of-way procedures. By December 7, a completed Section 7 and ROW application had been submitted.

5. Research and Investigations

On May 26, Kate Benkert (Raleigh ES Office - RCA Specialist) went to Monkey Island to collect green herons and eggs for contaminant analysis.

6. Other

On September 17, Refuge Managers Taylor, Schriver, and Noffsinger attended the annual advisory committee meeting of the Currituck Banks National Estuarine Research Reserve formerly the Currituck Banks Estuarine Sanctuary. The Currituck County Board of Commissioners also attended this meeting. Access problems were again the main topic of discussion. This year access through private development superceded a more improved access through the Refuge as the issue of concern. Earlier that evening a dinner meeting with the Currituck County Commissioners provided an opportunity to discuss several areas of concern.

#### E. ADMINISTRATION

2. Youth Programs

The four YCCer's from Alligator River NWR worked on Currituck for two days during the summer of 1987. With assistance from the Refuge L.E. Officer Mike Panz (Mackay Island NWR) the dune line was reposted with boundary and appropriate regulatory signs. Appropriate signs were also placed along the east/west boundaries where vehicle trespass had been noted.

For more details of the 1987 YCC program, see Section E.2 of the Alligator River NWR narrative.

4. Volunteer Programs

On January 21, ORP Strawser and Alligator River volunteers Davis and Kristoffersen constructed and erected an osprey platform to replace a vandalized nesting structure on the Swan Island tract of Currituck NWR.

For more information about the general Refuge volunteer program, see Section E.4 of the 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 costal 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.



# 2 - Diverse wildlife habitat ....! 8/87 RSL

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

## 2. Wetlands

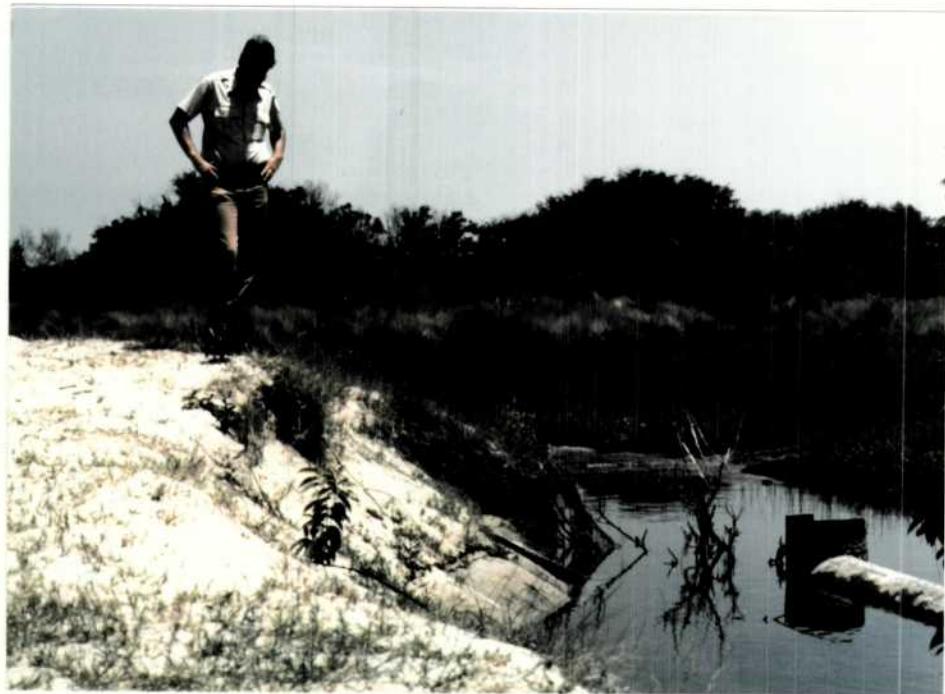
In February, the plug and drain pipe on the Swan Island tract adjacent to Currituck Sound was washed out. Our limited water control became almost entirely dependent upon rainfall and wind, ebb, and flow. See photo next page.

With the removal of cattle from the marsh, vegetation growth averaged 12-14 inches in height this year compared to 4-6 inches last year. East Coast Biologist Florschutz sampled two of the three transect lines in September. The results of this sample and the initial sample from 1986 are shown below:

### Swan Island Back Dune Marsh Vegetation Currituck NWR 1987

Plants	Percent Incidence	1986	1987
Buttonweed ( <u>Diodia</u> sp.)	15.2	10.7	
Knotgrass ( <u>Paspalum distichum</u> )	12.7	4.4	
Three-square ( <u>Scirpus Americanus</u> )	12.2	5.8	
Beakrushes ( <u>Rynchospora</u> spp.)	10.9	32.9*	
Water Hyssop ( <u>Bacopa Monnieria</u> )	9.4	0.7	
Baldrush ( <u>Psilocarya nitens</u> )	9.1	*	
Bermudagrass ( <u>Cynodon nitens</u> )	8.4	8.6	
Panic Grasses ( <u>Panicum</u> spp.)	6.6	5.8	
Foxtail ( <u>Setaria</u> sp.)	5.1	4.2	
Pennyworts ( <u>Hydrocotyle</u> spp.)	4.0	0.5	
Spikerushes ( <u>Eleocharis</u> spp.)	2.5	1.1	
Crabgrasses ( <u>Digitaria</u> spp.)	1.5	7.4	
Saltmeadow Cordgrass ( <u>Spartina patens</u> )	1.3	0.4	
Unidentified	0.2	3.7	
Bare Ground	1.0	2.6	
 Totals	 100.1	 88.8	
 Plants per Point Sample	 1.82	 1.70	

\* Erroneously called Tuft Rush (Fimbristylis sp.) in 1986.



# 3 - Storm damage on Currituck's only WCS.

8/87 RSL



# 4 - Upland barrier island habitat.

8/87 RSL

## 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.

### 2. Endangered and Threatened Species

#### a. Federally Listed and Threatened Species

Atlantic Loggerhead Sea Turtle (Threatened) - Although there were no reports of loggerhead turtles on the beaches of the Refuge, turtles are known to utilize the area 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.

Piping Plovers (Threatened) - On January 12, ORP Strawser and Volunteer Kristoffersen observed 4 piping plovers on the beach of the Monkey Island tract of the Refuge. During the week of July 5-11, John Fussell, who conducts shorebird surveys for the Cape Hatteras National Seashore, sighted eight piping plover adults and three chicks on the Refuge.

### 3. Waterfowl

Two aerial waterfowl surveys were conducted this year at Currituck NWR.

	<u>January '87</u>	<u>November '87</u>
Tundra Swan	360	390
Canada Goose	315	105
Snow Goose	3	0
Mallard	25	10
Black Duck	65	94
Pintail	50	0
Wigeon	0	105
Blue-winged Teal	0	40
Ring-necked Duck	50	0
Coot	0	20

Human disturbance in the area (hunting, general development etc.) and deteriorating quality of the Currituck Sound are probably important factors in the decline of waterfowl use of this area. Hopefully studies in the Chesapeake Bay areas will have some application for the Currituck Sound. Refuge

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contacts with the state and county to establish sanctuaries in the sound areas adjacent to the Refuge have drawn little interest and less response.

#### 15. Animal Control

Two trespass cattle were observed and the owner was notified to expedite removal.

Feral horses or historical Currituck Banks wild horses (depending upon your beliefs and/or source of information) continue to range over the Refuge. Stocking rates are probably no greater than one animal per forty acres.

### 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	2,850	2,850
Vehicular	25,400	12,700
Photography	128	512

Total visits to the Refuge were 25,400. There were 695 public inquiries.

Alligator River YCCer's, with assistance from Refuge L.E. Officer Mike Panz (Mackay Island NWR) reposted the dune line on both the Swan Island and Monkey Island tracts. Boundary corners were marked with 6" heavy gauge galvanized pipe sunk 5-6 ft. and filled with sand. To date the four corner posts are still in place, though obvious efforts have been made to remove them and their attached signs.

The new Carsonite curv-flex posts with decals were utilized in several locations and are being watched and evaluated for effectiveness.

Officer Panz also completed boundary posting on the marsh side of the Swan Island tract.

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# 5 - District Biologist Florschutz risks life for close up of Refuge neighbor's pets. 1/87 REN

#### 8. Hunting

Currituck Sound and what are now Refuge marshes and ponds have traditionally received heavy gunning pressure from waterfowlers. 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 and 1987, the 13 blinds were leased by the Refuge to provide a buffer area along the Refuge marsh in Currituck Sound.

## 17. Law Enforcement

The waterfowler's paradise of northeastern North Carolina has apparently become a "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 in the past, the presence of Mackay Island staff this year, and the low numbers of waterfowl have reduced the 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.

Currituck Refuge is more than an hour's drive from the Alligator River office, making enforcement there a logistical nightmare. Mackay Island NWR has assisted a great deal by patrolling Currituck on occasion. Because four-wheel-drive vehicles are allowed on the beaches there, vehicle trespass is a major problem on the Refuge. Other common violations include waterfowl poaching, firelighting for deer, littering and dumping, and drug violations. Some local attitudes are not favorable toward government ownership of land there; we see the results of these attitudes primarily in vandalism of Refuge signs.



# 6 - "Proposed headquarters site for Currituck  
NWR." 8/87 RSL

Refuge Law Enforcement Officer Panz made the four cases on Currituck NWR in 1987. Each was a motor vehicle trespass; each paid \$50 forfeiture of collateral.

J. OTHER ITEMS

1. Cooperative Programs

A cooperative effort with Mackay Island NWR staff to visually inspect and assist with law enforcement was continued this year. Refuge Manager Hegge and Refuge Law Enforcement Officer Panz have been a big help in reducing the travel of Alligator River staff.

3. Items of Interest

On April 27, Refuge Manager Taylor delivered the revenue sharing check of \$17,163.00 to Currituck County.

4. Credits

This narrative was a joint effort by all the Refuge staff with special kudos to ORP Strawser for "production" and Secretary Midgett for deciphering our penmanship.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1987

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.

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, Canada geese, snow geese, and over 25 species of ducks. Many other interesting species can be found at Pea Island during the winter months and the spring and fall migrations. During the summer months, several species of herons, egrets, ibises, terns, gulls, along with American avocets, willets, black-necked stilts, other wading and shore birds and a few species of ducks nest on the Refuge.

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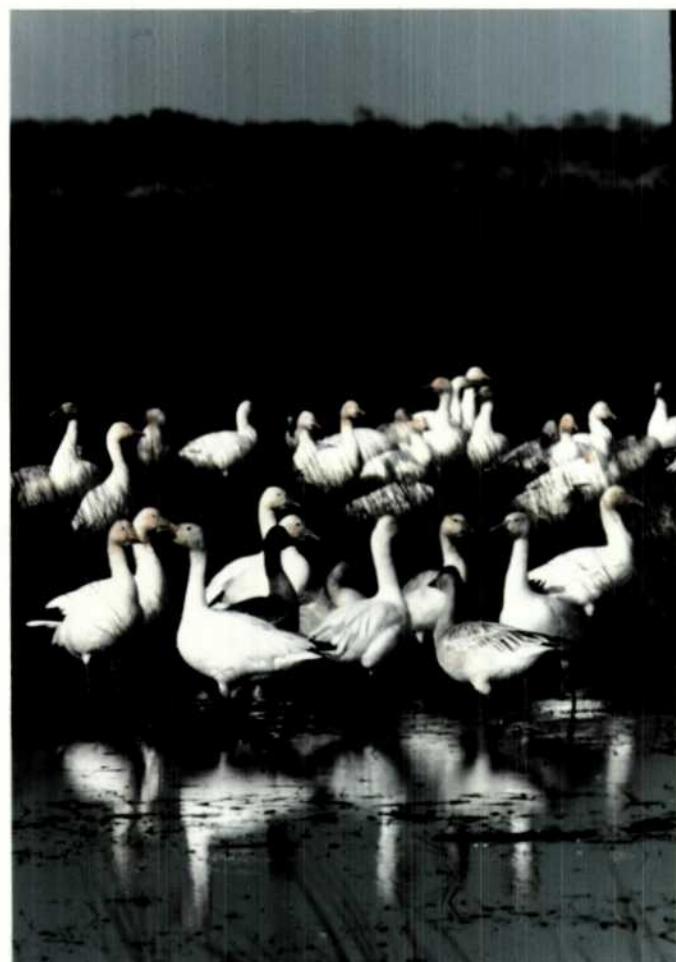
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A. HIGHLIGHTS

Waterfowl populations at 23 year low. (See Section G.3)

50TH Anniversary Celebration 1987-88. (See Section H.1)



# 1 - Pea Island NWR - established  
to provide wintering habitat  
for greater snow geese and  
other migratory waterfowl - is  
50 years old!! 11/84 SJK

New Field dike/pump in place, at last! (See Section I.2)

B. CLIMATIC CONDITIONS

See Alligator River narrative.

#### D. PLANNING

##### 2. Management Plan

A station law enforcement plan was drafted and submitted. See Alligator River narrative Section H.17.

The Public Use Management Plan was reviewed and revised by RO staff. At year's end, the revision had not been received by this office.

##### 4. Compliance with Environmental and Cultural Resource Mandates

Numerous meetings and site visits were conducted to combining road work mitigation required of N.C. Department of Transportation. Acreage required for relocating a section of N.C. 12 on Pea Island and acreage covering road work on NPS land on Ocracoke Island will all be mitigated by creating two ponds on Pea Island. Final plans and details were pending at years end.

##### 6. Other

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

#### E. ADMINISTRATION

##### 1. Personnel

See Alligator River narrative.

##### 2. Youth Programs

Approximately 30% of the enrollee hours for the Alligator River YCC Program were spent performing work projects on Pea Island NWR. Enrollees executed the annual clearing and maintenance on North Pond Trail. With assistance (supervision) from Volunteer Warren Davis, YCC installed the new interpretive placques on the trail. Much fill material was brought to the trail to build up the sides of the trail which had suffered from severe wind/water erosion. Several days were spent picking up litter along N.C. 12 - a never ending project! Signing, as always, occupied the enrollees for almost a week. The standard clean-up projects: seed/storage area, garage, poleshed, and office area filled in the remainder of the YCC days at Pea Island

During the summer, YCC and volunteers again banded royal and sandwich terns and brown pelicans with Dr. John Weske of the Smithsonian Institute. On June 19, 2,509 royal and 325

sandwich terns were banded. On July 7, 999 royals, 62 sandwich, and 50 herring gulls were banded. 1987 seemed to be a strange year for tern nesting; up and down the east coast, nesting schedules were skewed, making it difficult to pinpoint good banding dates.

On July 22, YCCer's, volunteers, and Weske ventured out to band brown pelicans at the 4-year old colony in Oregon Inlet. As we left, Weske joked "I guess 400 bands will be enough." By early afternoon, we had run out of bands! We returned on August 10 and banded 284 more pelicans.



# 2 - John Weske, staff, YCCer's, and volunteers return each year for another episode of "As the world terns..." 7/87 KCD

For more details of the 1987 YCC Program, see Section E.2 of the Alligator River NWR narrative.

#### 4. Volunteer Program

Again in 1987, the majority of volunteer time at Pea Island involved the Host/Hostess Program. From April 1 through October 31, hosts and hostesses manned the visitor contact station, greeted visitors, gave out Refuge and Service information, answered the phone, and relayed radio messages. As in 1986, volunteers also assisted with office work, minor construction, and rehab projects, conducted summer public interpretive programs and supervised YCC projects.

During 1987, interpretive programs expanded to include 10 Saturday morning bird walks through the winter months. An added volunteer project at Pea Island this year was the turtle nesting program or the "turtle patrol". Volunteers were trained on the safe operating of 4-wheeled ATV's and on the location and excavation of turtle nests. From June 1-August 31, each volunteer committed to one day each week; he/she arrived at the Refuge at 7:30 a.m., conducted the "turtle patrol", cleaned the ATV, recorded all necessary information, and was usually ready to leave by 11:00. This program saved countless staff hours this year and proved to be an acceptable way to conduct the turtle nesting program.

On June 23 and 24, Reverend John Walker and a youth group from Calvary United Methodist Church in Uniontown, PA assisted YCC with a community service cleanup project. In two mornings participants walked 26 miles along N.C. 12 through Pea Island picking up litter and contributing 120 volunteer hours to the Refuge. They filled 12 dumpsters with trash!



# 3 - Such a good example of community service.  
These folks certainly did Take Pride In  
America!

7/87 BWS

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

5. Funding

See Alligator River narrative.

6. Safety

See Alligator River narrative.

7. Technical Assistance

The N.C. Department of Transportation (DOT) placed rip-rap along the shoreline at the south end of the Oregon Inlet (H.C. Bonner) Bridge. Assistant Manager Lanier selected storage areas, coordinated the job with public use and vehicular traffic patterns, and advised on reseeding materials and schedules.

Assistant Managers Schriver and Noffsinger were "on-call" September 4, while Secretary Hodel was being briefed by the U.S. Army Corps of Engineers on the Oregon Inlet jetties project. No requests of the staff were made during this visit.

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

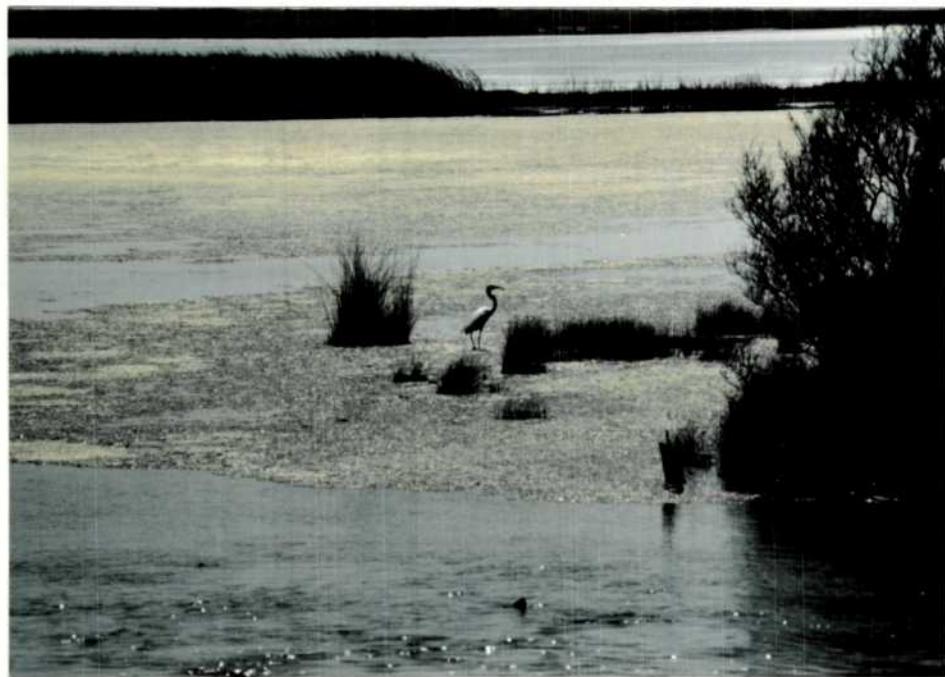
Refuge wetlands consist of irregularly flooded salt flats, impoundments, and one fresh water pond. The sizes of the impoundments are as follows: North Pond 461 acres, New Field 266 acres, and South Pond 223 acres.

Total precipitation once again decreased tremendously this year. Pea Island received only 17 inches; 38 inches below the annual mean and 20 inches below last year's low of 37 inches. As was the case last year, the Refuge experienced an especially dry spring and summer. This dry weather hindered waterfowl food production in two of the three

impoundments. Because hurricanes during the past two years placed two of the pumps out of commission, the staff was unable to pump at all in New Field impoundment and pumping wasn't resumed in North Pond until mid-July.



# 4 - Habitat management works! Just ask these little black ducks! 7/87 BWS



# 5 - Ideal water level for summer food production. 7/87 BWS

South Pond was dewatered in the spring of 1983 and 1984 to encourage production of desirable emergent waterfowl food. However, from 1965 up to this year, South Pond was held to full capacity. This year's dry spring and summer necessitated pumping for 156 hours from June through September. This pumping once again resulted in excellent submergent waterfowl food production. This year approximately half of the submergent growth was sago pond weed (Potamogeton pectinatus) and/or widgeon grass (Ruppia maritima). Although adequate water levels were maintained in the impoundment, the pumping rate was reduced when it was discovered that the ground behind the bulkheading and underneath the pumphouse was eroding into the sound. This problem has also occurred at the North Pond pump. Assistance from engineering has been requested as to what steps should be taken to alleviate this problem. North Pond has also been managed as a permanent pool to favor the growth of submergent vegetation. However, the North Pond pump was inoperative from June 1985 until mid-July of this year when the platform was reconstructed and the engine was placed back into position. Pumping was resumed in late July. Adequate water levels were finally reached in September through 89 hours of pumping. Even though adequate water levels were reached in September, much of North Pond was dry and exposed throughout the spring and early summer, thereby, hindering the growth of favored submergents such as sago pond weed and widgeon grass. Chara sp. was the predominant species found in North Pond, however, sago and widgeon grass were found, but in smaller percentages than was found in 1986.

In 1985, the management of New Field was interrupted to install a 30 inch lowlift pump. However, in September 1985, Hurricane Gloria broke the dike at the site of the pump installation. Throughout the remainder of 1985 and until late 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. The break in the dike and the reintroduction of highly saline tidal waters has favored the growth of non and poor waterfowl foods such as saltmarsh cordgrass (Spartina alterniflora) and salt meadow cordgrass (Spartina patens). This break in the dike also resulted in the complete disappearance of widgeon grass last year. Although the break was repaired in late July of last year, a pump has not been placed at New Field yet. It is unlikely that the widgeon grass will return until adequate water levels are maintained through pumping.

Vegetation transects were run this year for the tidal area north of North Pond known as the "salt flats". Once again the results indicated that this area has not changed significantly in the past 18 years. Glassworts (Salicornia spp.) were the dominant species. This area is frequented by snow geese because of the large amounts of glasswort present.

#### 4. Croplands

The farming regimen for New Field was altered from that of last year. Approximately 20 acres of tall fescue were planted for goose browse in September, 15 acres less than was planted in 1986. The field was fertilized with 10-10-10 at a ratio of 2,000 pound per acre and broadcast seeded at a rate of 1,000 pounds per acre. The remained of the field, approximately 30 acres, was either disked and not plated or left untouched. This regimen gave the geese a variety of natural and planted browse.

#### 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. In August of 1986 Hurricane Charlie passed over the Refuge with 50-60 mph winds. Damage to the Refuge was minimal. This year Pea Island was quite lucky as no hurricanes passed near the Refuge.

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. Field measurements were made on July 21. These measurements showed that along the 13 miles of Pea Island beach, dune erosion averaged 31 feet. The average for 1986 was only 2.5 feet. The greatest dune loss occurred approximately one mile south of Oregon Inlet where 293 feet of dune were lost. In 1986, only 13 feet of dune were lost at this same point.

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. In 1982, 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 have moved enough sand to crate a berm which separates the pond from the inlet by some 300 feet.



# 6 - The distance between the S-curves and the ocean is down to zero. N.C. 12 relocation is scheduled for 1988. 7/87 AJE

#### 9. Fire Management

No controlled burns were conducted on Pea Island in 1987 due to the fact that the fire management plan for the Refuge was not updated.

No wild fires occurred on the Refuge in 1987.

#### 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. However, no applications were received for Pea Island in 1987.

### G. WILDLIFE

#### 1. Wildlife Diversity

Pea Island exhibits a natural diversity of habitat types. Habitat management practices such as prescribed burning, moist soil management, disk ing, 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.

2. Endangered and Threatened Species

a. Federally Listed and Endangered Species

Peregrine Falcon (Endangered) - On January 30, Assistant Manager Lanier and Bio-Tech Elmore observed a peregrine falcon on the New Field dike. On December 4, a peregrine falcon was observed. On December 13, Assistant Manager Lanier picked up an injured peregrine falcon in the dunes across from North Pond. Arrangements were made for the Carolina Raptor Center to care for the bird. It was transported to the Norfolk Airport by tractor operator Powers and flown to Charlotte. A report from the center informed us that the bird had a fractured left humerus and femur. To facilitate recovery, the falcon was transported to the Raptor Research and Rehabilitation Program at the University of Minnesota.

American Bald Eagle (Endangered) - Throughout late May and June, an immature bald eagle was sighted on and near the Refuge. On June 19, a NPS ranger delivered the bird, emaciated, and full of lice, to Refuge staff in Manteo. Veterinarian Jane Rowley treated the bird, then transported it to the N.C. Raptor Rehabilitation Center in Charlotte. Within a few weeks the bird was released near Jordan Lake.

Piping Plover (Threatened) - On August 19, Volunteer Perkinson sighted one adult piping plover on the north end of the Pea Island beach. During the week of July 5-11, John Fussell, who conducts shorebird surveys for Cape Hatteras National Seashore, sighted a pair of adult on Pea Island.

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 and handled the marking and/or relocating of nests. Only those nests in danger of ocean overwash were located. Before the nesting season, it was decided that as many nests as possible would be marked and nesting success monitored.



# 7 - Turtle patrol training.

6/87 BWS

During 1987, thirteen crawls were located on Pea Island's beaches. Unless the crawl indicated the nest was in an unsafe area, the nests were not probed or dug. If the nest was judged to be in an unsafe area, it was probed and relocated.

Of the thirteen crawls, 2 nests were relocated in the summer and excavated in November. The number of eggs totalled 231; 163 hatchlings were produced.

On December 3, a team from the Virginia Institute of Marine Science brought several large loggerhead sea turtles to Oregon Inlet for release. One turtle, weighing approximately 250 pounds, was outfitted with a satellite transmitter. ORP Strawser arranged for the U.S. Coast Guard at Oregon Inlet to transport the turtles and VIMS staff out to the Gulf Stream for the release and arranged press coverage for the event.



# 8 - Picture book turtle crawl...  
8/87 KCD

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) - Two pairs of osprey used the platforms constructed in North Pond for nesting. 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.

### 3. Waterfowl

Overall waterfowl use in the 1986-87 season fell to the lowest level in the past 23 years. It dropped over 3/4 million use days from the year before to set a new low Refuge record, breaking the old low set in the 1965-66 season. Peak numbers fell to 12,375 birds - only half of last year's peak, and also set a new 23 year refuge low, breaking the former low record of 19,000 set in 1968-69. The decline may partially be due to the loss of New Field Impoundment to Hurricane Gloria in 1985. Repairs to the impoundment will hopefully be completed in 1988.

Swan use was down for the second consecutive year, but was still substantially above the average for the past 22 years. Peak numbers for swans were up 500 from the previous year. The Canada goose population dropped further and set a new 23 year low use day record of 135,716, breaking the previous record set in 1983-84 at 136,100. The peak of 1,575 was also the lowest on record breaking the old low by 325 birds. Greater snow goose use also continued to decline at Pea Island, setting new 23 year low use days and peak records. Snow goose use days and peak numbers fell to 138,523 and 1,950, respectively. Duck use days and peak numbers also fell to 23 year record low numbers. Use days were almost halved from last year and fell below 1,000,000 for the first time on record. The peak number of ducks, 7,000, broke the old record low of 15,100 set in 1971-72. (See Table 1)

Table 1

Composition of Waterfowl Wintering on  
Pea Island NWR  
1986-87

Group	Percent	Number Use Days	% Diff. from 1985-86	Peak Number
Swans	11.2	125,034	-23.8	2,970
Canada Geese	12.2	135,716	-08.1	1,575
Snow Geese	12.4	138,523	-37.3	1,950
Ducks	59.2	660,051	-48.0	7,000
Coots	5.0	55,531	-09.3	2,100
TOTALS	100.0	1,114,855	-40.1	15,595

\* Calculations for table provided by East Coast Biologist Otto Florschutz.

#### 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 is down for construction purposes. Bird numbers increased throughout the spring of 1987 and reached their greatest numbers and diversity in the summer and fall.



# 9 - Make room for more... 8/87 KD

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 those birds to smaller and smaller areas, many times utilizing habitat which is suboptimal.

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. They utilize the spoil islands in and around Oregon Inlet extensively. There were approximately 805 nests in the pelican colony in the summer of 1987.

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

Shorebird surveys were conducted from April until November with the peak population occurring late May when 3,689 gulls, terns, and shorebirds were sighted. This number is down from the previous year when 4,878 were sighted. The tern colony which usually nests on the beach south of the Refuge headquarters was not present this year. It appears the birds nested on the spoil islands in and around Oregon Inlet. It is not known why the terns did not utilize the Refuge beach.

Again this year, staff, YCCer's, and volunteers assisted John Weske in banding terns on the spoil islands at Oregon Inlet. For details of the banding, see Section E.2 of this report.

#### 6. Raptors

Once again, The Carolina Raptor Center operated a banding and observation station on Pea Island in 1987. The station was manned throughout the month of October. Raptors trapped and banded between September 24 and October 24, 1987 totaled 10 sharp-shinned, 5 American kestrel, and 1 merlin.

It should also be noted that it was discovered that Carolina Raptor Center personnel were caught using wild, captured mourning doves and brown-headed cow birds as bait, after the station was visited by Refuge personnel. Several injured raptors were picked up by refuge staff, including an injured osprey and an injured peregrine falcon. The osprey was treated by a local veterinarian, but the peregrine was sent to The Carolina Raptor Center for care. A dead peregrine was also brought to the Refuge after it was discovered in Rodanthe.

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 have declined in recent years.

Raccoons are fairly common on Bodie Island to the north. In recent years, raccoon tracks have been observed on Pea Island with higher and higher frequency.

Evidence has been found to indicate an influx of foxes and opossums in small numbers. The immigration of foxes and the presence of feral house cats may be one of the causes for the decline in rabbit and pheasant populations. (See Section G.1).

#### 9. Marine Mammals

On several occasions during the summer, Refuge staff patrolled the beaches and aided staff from the Smithsonian Institute in the task of collecting dolphin carcasses which had washed ashore. It is believed that the deaths of these animals were related to the deaths of hundreds of dolphins along the mid-Atlantic coast. It appears that these animals died of a common bacterium which is normally present in small amounts; however, in these animals the bacterium was in unusually large amounts.

#### 10. Other Resident Wildlife

Ring-necked pheasant are seen in the salt marsh brushland, the browse area in New Field, and in the dunes. Sightings of pheasants have dropped significantly in recent years. Only one pheasant was seen on the Christmas Bird Count.

#### 15. Animal Control

Muskrat and nutria thrive on Pea Island. Populations are estimated at 5,000 muskrat and 900 nutria. Damage continues to occur on impoundment dikes and berms. The Refuge was open for fur trapping in 1983 for the first time for the month of February. Two trappers worked the refuge with great success, however, since 1983 only one trapper has trapped at Pea Island. His efforts were met

with limited success. In 1987, no applications for permits were received.

#### 16. Marking and Banding

Refuge staff experienced a successful banding season in 1987. Even though Refuge waterfowl numbers were at their lowest in 23 years, all quotas were either met or exceeded for the second year in a row.

	<u># Banded</u>	<u>Quota</u>
Canada Goose	76	--
Black Duck	267	100
Mallard	100	100
Black/Mallard Hybrid	30	--
Redhead	59	--
Canvasback	2	--

Once again, Pea Island participated in neck-collaring Canada geese for the special Atlantic Flyway study. The Refuge has participated in this study since 1983. Although rocket net trapping was hampered by "tourists" scaring the geese off the net sites, the staff was able to exceed last years quota of 75. In the future other sites will be examined as possible rocket net sites to help alleviate this problem with tourists.

#### H. PUBLIC USE

##### 1. General

Based on the National Park Service vehicle counter at Bodie Island, estimated visitation to Pea Island NWR during 1987 was 1,542,370. The Host/Hostess program continued to provide visitor information at the visitor contact station from April-October. YCC provided manpower for a re-vamping of the sign program, minor trail maintenance, and general clean-up in visitor areas.

On February 5, Manager Taylor met with NPS Superintendent Tom Hartman for the annual "discussion" called for in the MOU on Pea Island Public use.

The Coastland Times visited Pea Island on February 24, to photograph the waterfowl banding operations. The photographic series appeared in the following Saturday/Sunday paper as a FOCUS topic.

On May 12-13, Frank Podrizznik and Richard Mattison (RO, Atlanta) conducted a Public Use Review of Pea Island NWR.

May 17, marked the 50th Anniversary of the signing of the enabling legislation that created Pea Island NWR. Since the Refuge was not actually purchased until 1938, our focus on the 50th anniversary celebration is scheduled for next year. During 1987, appropriate media coverage was given for the "official date" of the establishment.

For 1988, we have planned a special commemorative action of the local paper, special winter bird walk, and a Pea Island Beach Sweep in April.

On May 18, ORP Strawser contacted Don Conner (NCDOT) to request that double yellow lines be painted on N.C. 12 through Pea Island at each Refuge parking area and that pedestrian cross walks be added at the base of the Bonner Bridge and at the comfort station at North Pond. Mr. Conner advised that he would have the work done as soon as the new fiscal year began (July 1). At this writing, this has not been accomplished.

May 19, Manager Taylor talked to Mirlo Beach Properties Vice President Roger Meekins on public use problem and parking lots on the south end of Pea Island. When N.C. Highway 12 is relocated, Mirlo Beach would like for the Refuge to leave portions of the old pavement or build a parking lot to accommodate visitors on that end of the Refuge. We are against doing either due to potential impacts to nesting waterfowl, shorebirds, and sea turtles.

On September 19, Operation Beach Sweep was underway on all the beaches of Dare County. Assistant Manager Lanier and volunteer Ken Dyar assisted with collecting the trash on Pea Island beaches. Unfortunately, the quantity of trash on the Refuge beach coupled with limited volunteer turnout caused the sweep to have minimal effect on the Refuge. The Pea Island Beach Sweep planned for April 1988 should catch our beaches up!

During the year, we received 9,700 requests for information about Pea Island and 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.

Since no registration is required for the use of outdoor classrooms, we have no record of the actual number of such uses that occurred. Several groups borrowed equipment from the Refuge for marsh investigations on May 17, 19, and 20. Approximately 100 students, from West Craven Middle School and Greensboro Day School were involved.

In addition to the groups mentioned above and other independent groups, the North Carolina Aquarium utilized Pea Island marshes for a number of conducted salt marsh studies during 1987.

#### 4. Interpretive Foot Trails

North Pond Trail finally received new interpretive placques during 1987. Five placques were ordered from Wilderness Graphics in Tallahassee, FL. These were so well received we have ordered an additional 6 placques to be installed past the overlook on the trail. These should be in place by late summer, 1988.



# 10 - With the avocets come the spring bird  
watchers! 12/87 KD

Much clearing, cleaning, trimming, and filling was done on the North Pond Trail during 1987. YCC and volunteers spent several weeks on the trail during June and July.

On November 5, ORP Strawser seeded and fertilized the areas associated with the North Pond Wildlife Trail that YCCer's had filled during the summer months. Trampling of

vegetation on the sides of the dike near the overlook and subsequent erosion continue to be a problem with no solution in sight. Hopefully, the vegetation will help.

Approximately 113,564 visitors (227,131 AH) utilized interpretive foot trails at Pea Island during 1987.

#### 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 1987, 61,943 visits (15,486 AH) and 3,670 visits (917 AH) were spent at the kiosk and VCS, respectively.

#### 7. Other Interpretive Programs

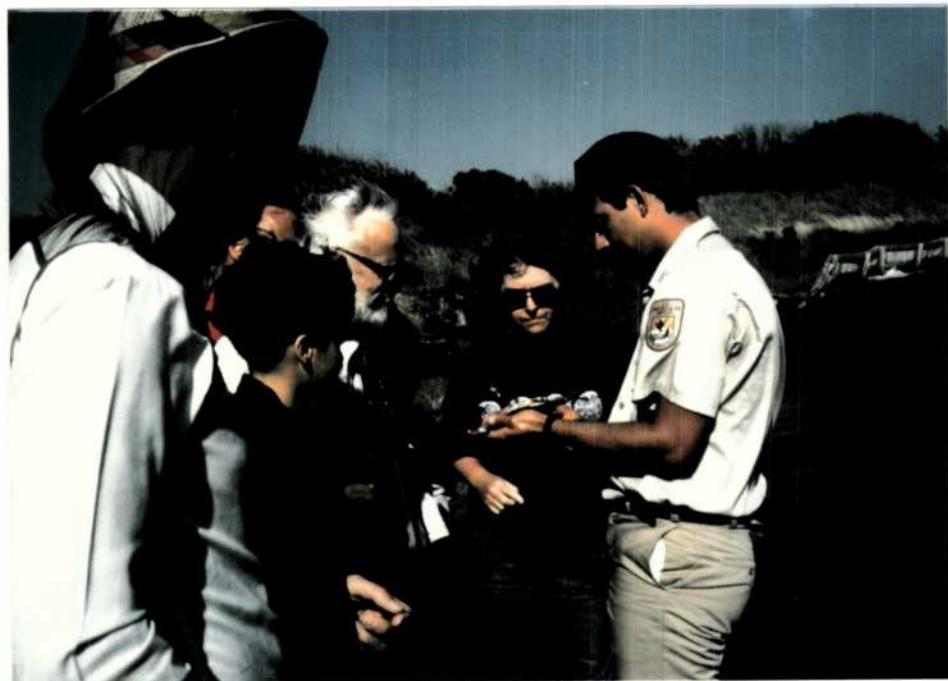
Summer interpretive programs were conducted, as usual, at Pea Island. The Refuge continued to be independent in its programs during 1987. In years prior to 1986, staff or interns from the N.C. Aquarium or National Park Service conducted public programs on the Refuge during the summer months. By 1986, 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. Intern Newman and Volunteer Bush conducted most of the Children's Wildlife Discovery sessions; Newman and Volunteer Kristoffersen shared responsibilities for the Bird Walk and Newman conducted the Refuge Tours. Visitor interest in the Refuge Tour has dropped in recent years. Plans are to drop the program in 1988 and incorporate the basic information into the Bird Walk.

Participation for 1987 follows: Birdwalk - 23 programs conducted and 602 participants; Children's Wildlife Discovery - 13 programs conducted and 307 participants; Refuge Tour - 10 programs conducted and 57 participants.

Participation in the winter "50th Anniversary" Saturday Bird Walks mostly involved local people, since winter-time tourism is low. A total of 72 people participated in 11 bird walks as a part of this program.

On November 14, groups from N.C. Wesleyan and N.C. State University (Leopold Wildlife club) visited Pea Island for independent birding. Many, many other organized groups birded at Pea Island during 1989, however, no records are kept on such use.



# 11 - Typical bird walk... They need to understand how it all works together, right?  
8/87 BWS

#### 9. Fishing

In 1987, pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island. 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 878,932 AH (219,733 visits) were spent fishing on Pea Island during 1987.

#### 10. Trapping

The 1987 trapping program at Pea Island was the 5th 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 (N.C. 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.



# 12 - Prime wildlife photographic opportunities abound at Pea Island, but we still contend the trick is to be at the right place at the right time. 11/87 KCD

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 1987, an estimated 111,593 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 327,463 AH (225,025 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 as staff time allows for their maintenance and placement 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 1987, the use of Refuge photo blinds was limited by dike work and lack of staff time to place them, however, "wandering photography" was popular. Approximately 15,542 AH (3,884 visits) were spent with photography at Pea Island last year.

#### 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 1987.

#### 17. Law Enforcement

Staff participation in law enforcement was limited at Pea Island NWR during 1987. Due to a MOU with Cape Hatteras National Seashore, the National Park Service has the primary responsibility for non-wildlife related public use on Pea Island. For this reason, a law enforcement presence is maintained regularly, though not constantly, on the Refuge. Most enforcement by Refuge officers is incidental to other duties.

At Pea Island, many law enforcement problems are related to the high public use in the summer. National Park Service rangers assist by handling most of the problems stemming from non-wildlife oriented recreation. Car clouting, illegal parking, vandalism to the NPS restrooms, public nudity, littering, and dogs off a leash are among the most common problems.



# 13 - You guessed it! They didn't see any sign."

8/87 BWS

Pea Island's beach is a desolate place and has had drugs wash in from vessels whose cargo has been dumped at sea. In these cases, there are usually people on shore searching for the drugs, as well as Coast Guard and other officials. Pea Island's beaches are closed to vehicular traffic, but many trespass violations occur.

There are minor poaching problems at Pea Island; occasionally cars will stop and shots will be fired at waterfowl from the road. Occasionally, poachers slip in from Pamlico Sound to quickly shoot as many waterfowl as they can and speed away. Some illegal hunting may take place within the Proclamation Boundaries in the Pamlico Sound. These types of violations are difficult to detect, and the violators are difficult to apprehend.

The only violation handled by Refuge staff during 1987 was a vehicle trespass which was a \$50 fine.

Several other law enforcement related incidents occurred during the year on Pea Island:

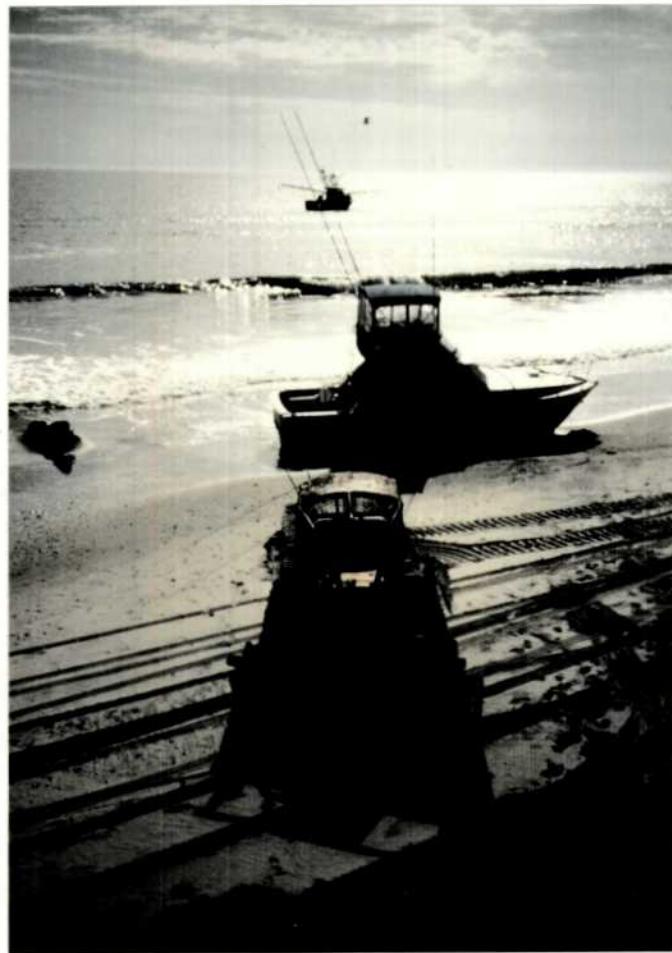
On April 2, a 35 ft. Bertram fishing vessel washed ashore at Pea Island. The boat had been stolen in Norfolk, VA and was removed from Refuge beaches the following day. The two thieves were apprehended on April 2.

On May 30, an eight year old boy drowned in the U.S. Coast Guard harbor at the north end of Pea Island NWR. The harbor had been dredged over the winter months and currently has a 15 foot drop-off at the edge. The Coast Guard has requested that Refuge personnel close the area to public use; the Refuge has done so.

On June 24, a collision occurred between a lumber truck and a jeep on N.C. 12 near the comfort station at Pea Island.

On July 23, a jeep was stolen at Pea Island while its Virginian owner surfed.

On Wednesday, September 30, a small plane crashed in the Atlantic Ocean within a few hundred yards of the Refuge beach. Five people were killed in the crash. It appeared that the pilot was flying low, tipped the plane to turn and one wing caught the water. The plane burst into flames on impact. On October 2, the body of one of the September 30 plane crash victims washed up on the Pea Island beach about 2 miles north of Rodanthe. For several days, staff were occupied with beach patrols looking for airplane parts or bodies. The cause of the crash was never determined.



# 14 - "I paid \$600 a day for this?  
7/87 AJE

#### I. EQUIPMENT AND FACILITIES

##### 2. Rehabilitation

Once again, dike construction and dike repair at New Field occupied the majority of the staff's time during the spring and summer months. This work is a result of two hurricanes suffered in 1985 and 1986. This year the crew, with help from Mattamuskeet NWR staff, completed the bulkheading around the future pump head site and neared completion of the reinforcement of the coffer dam at New Field. Tidal flow in and out of the impoundment has been halted, but a pump is not yet in place. The staff also spent considerable time replacing the damaged pump and platform at North Pond. By the summers-end water from Pamlico Sound was being pumped into North Pond.



# 15 - Repairing storm damage.

7/87 BWS

Recently, the Refuge has experienced problems with the ground eroding from underneath the pumphouse platforms and from behind the bulkheading at the pump sites. Pumping rates were reduced because of this problem. Technical assistance from Engineering has been requested to help alleviate this problem.

The Refuge residence received new paint, carpet, and baseboards after Assistant Manager Lanier moved in. Considerable time was spent rehabing the house, due to the fact that it had been unoccupied for quite some time.

##### 5. Communications Systems

The telephone lines at Pea Island are in constant disrepair. Carolina Telephone and Telegraph Co. has spent considerable time attempting to repair them, however, they do not stay "fixed" for very long. Salt, wind, and water are assumed to be the culprits.

##### 7. Energy Conservation

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



# 16 - "Down the hatch..." 8/87 KCD

#### J. OTHER ITEMS

##### 1. Cooperative Programs

The Corps of Engineers (Wilmington) has been conducting beach profile studies since 1983 under a special use permit which was renewed again this year.

A special use permit was issued to the Carolina Raptor Center again this year. After carefully explaining the rules, regulations, and conditions, an on site inspection revealed the use of mourning doves and brown headed cowbirds as bait. Special Agent Curtis was on site that day and is checking things out further.

A five year special use permit was reissued to the U.S. Coast Guard to utilize well points on the Refuge to provide water to the Oregon Inlet Station.

A special use permit was issued to the State of North Carolina, Department of Transportation to stabilize the shoreline on the south bank of Oregon Inlet where the Bonner Bridge is anchored.

3. Items of Interest

Assistant Refuge Manager Lanier lost his singularity among Alligator River managers after he married Jamie Poole in September. Scott and Jamie reside in the Refuge quarters at Pea Island.

4. Credits

This narrative was a joint effort by all the Refuge staff with special kudos to ORP Strawser for "production" and Secretary Midgett for deciphering our penmanship.

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.

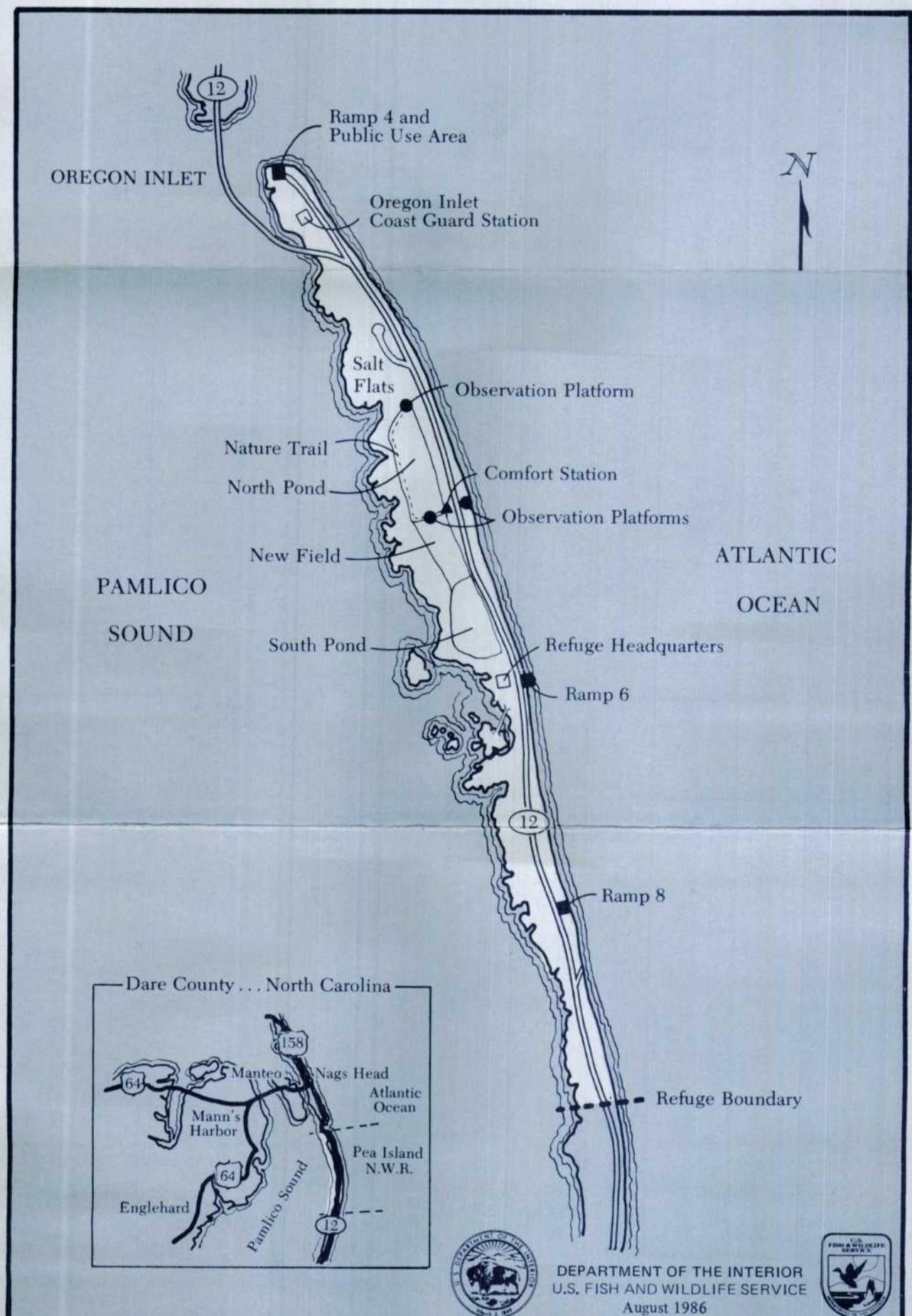
Fires are prohibited.

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.



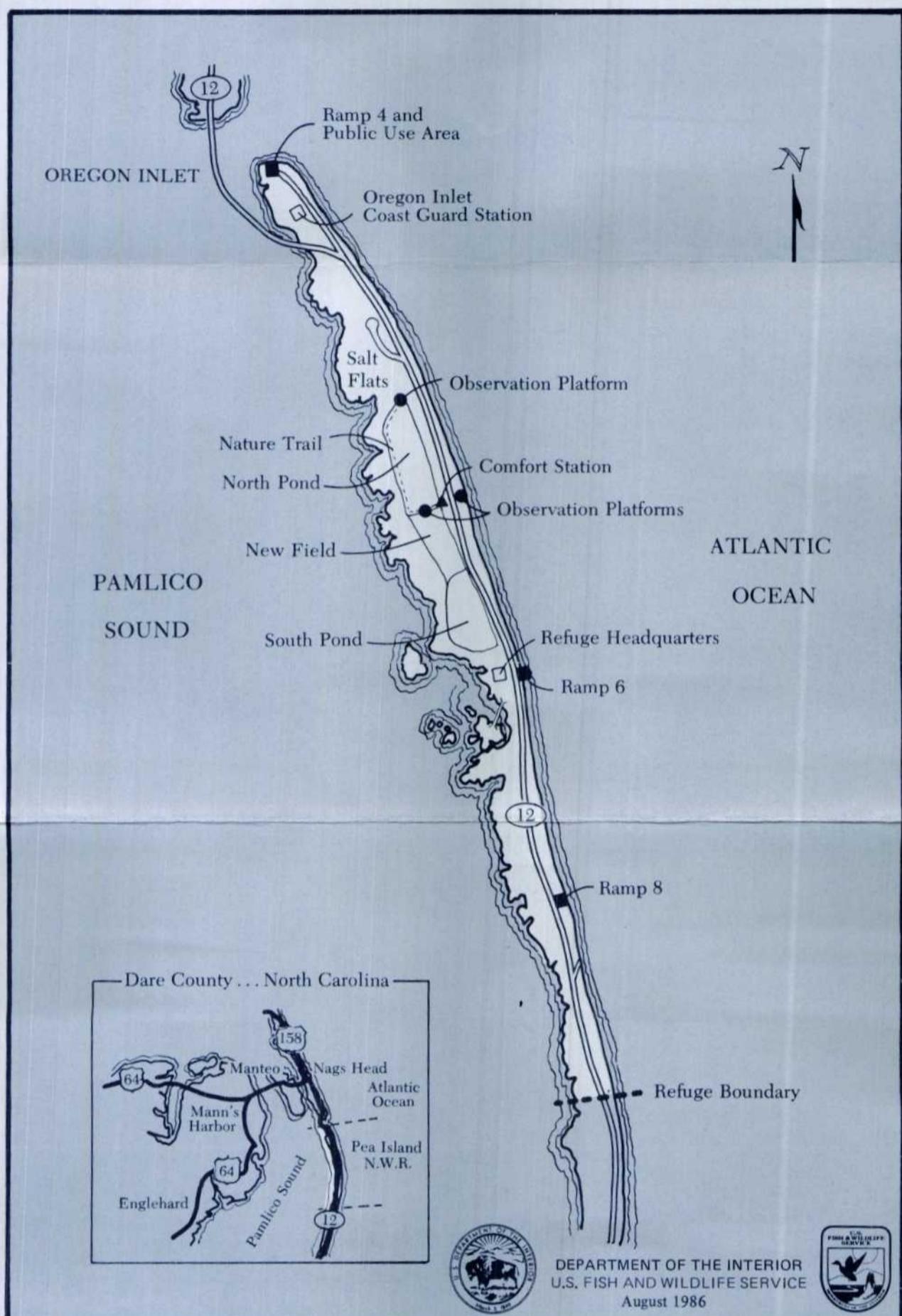
# Pea Island National Wildlife Refuge



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## 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**. Warbler 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.



## 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

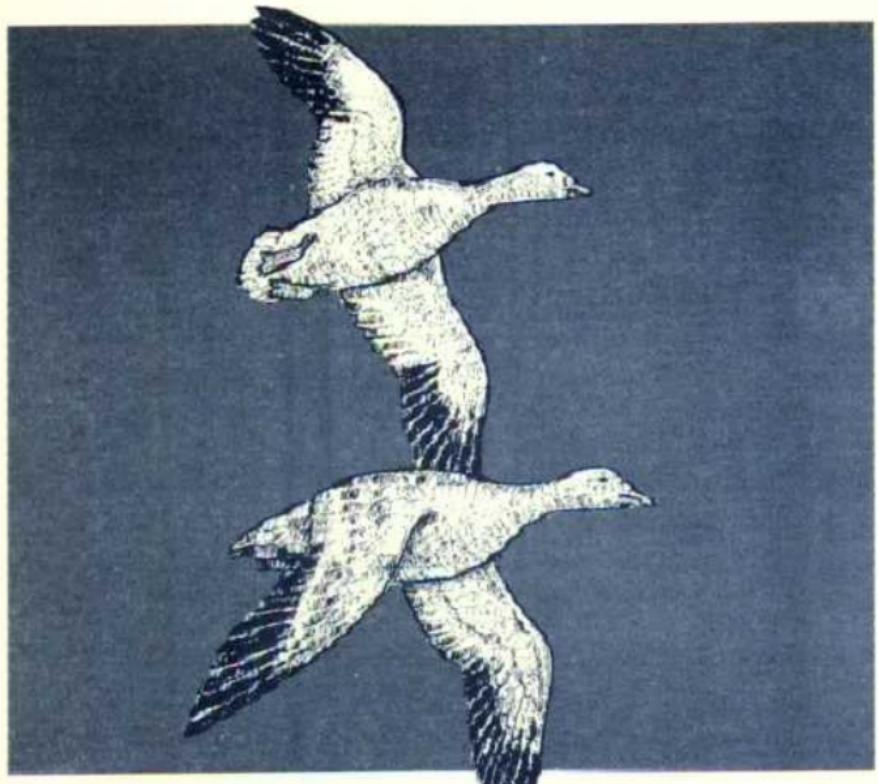
*DON'T LITTER, HELP KEEP OUR WILD AREAS CLEAN.*

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

# Calendar of Wildlife Events



Pea Island  
National Wildlife Refuge



# **WILDLIFE**

**PEA ISLAND  
National Wildlife Refuge**

- General Information
- Amphibians
- Reptiles
- Mammals
- Birds
- Birds
- Birds

## **General**

Pea Island National Wildlife Refuge, located in Dare County, North Carolina, is one of over 400 national wildlife refuges nationwide administered by the U.S. Fish and Wildlife Service. Though each refuge was established to provide habitat for certain primary species, each is managed to provide for a diversity of wildlife and opportunities for public enjoyment of these natural resources. Wildlife observation is a popular pastime for millions of people each year. This publication is designed to help refuge visitors observe and identify the wildlife of Pea Island National Wildlife Refuge.

Established in 1938 as a wintering sanctuary for waterfowl, Pea Island contains 5,915 acres of coastal barrier island and 25,700 acres of Proclamation Boundary Waters in the Pamlico Sound. Management of the refuge provides diverse habitat types including beach, dunes, salt marsh, fresh and brackish water ponds and salt flats.

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**
- **Reptiles**
- **Mammals**
- **Birds**
- **Birds**
- **Birds**

## **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.



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**

- **Mammals**

- **Birds**

- **Birds**

- **Birds**

## Reptiles

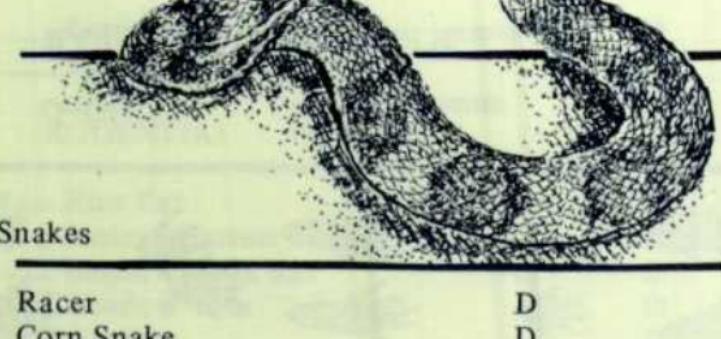
Many reptiles are as at home in water as they are on land. All are covered with scales or plates. Besides protecting these animals from injury and disease, this adaptation is an effective means of preventing water loss. Consequently, many reptiles live and thrive in the salty refuge environment.

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

## 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

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## • Reptiles

## • Mammals

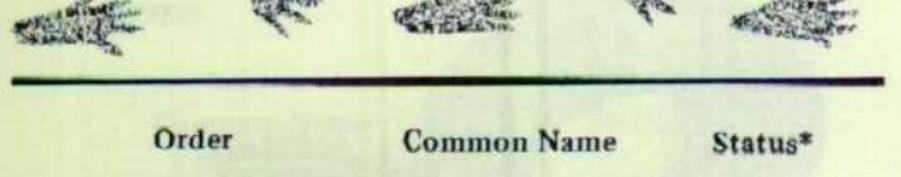
## • Birds

## • Birds

## 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)

— Opossum D

### INSECTIVORA: (Shrews and Moles)

— Southeastern Shrew D  
— Least Shrew E  
— Eastern Mole E

### CHIROPTERA: (Bats)

— Silver-haired Bat D  
— Eastern Pipistrelle E  
— Red Bat E  
— Hoary Bat E  
— Evening Bat E

### LAGOMORPHA: (Rabbits)

— Eastern Cottontail D  
— Marsh Rabbit D

### RODENTIA: (Rodents)

— Rice Rat D  
— Eastern Harvest Mouse E  
— Hispid Cotton Rat E  
— Meadow Vole D  
— Muskrat D  
— Norway Rat D  
— House Mouse D  
— Nutria D

### CARNIVORA: (Meat Eating Mammals)

— Gray Fox E  
— Raccoon D  
— Mink D  
— 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.

## • Mammals

## • Birds

## • Birds

## 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.

S S F W

—	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 . . . . .			o
—	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

## • Birds

		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)	c		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
—	Yellow Rail				
—	Black Rail	r	r	r	r
—	*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	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	u	
—	*Laughing Gull	a	a	a	u

## • Birds

## • Birds

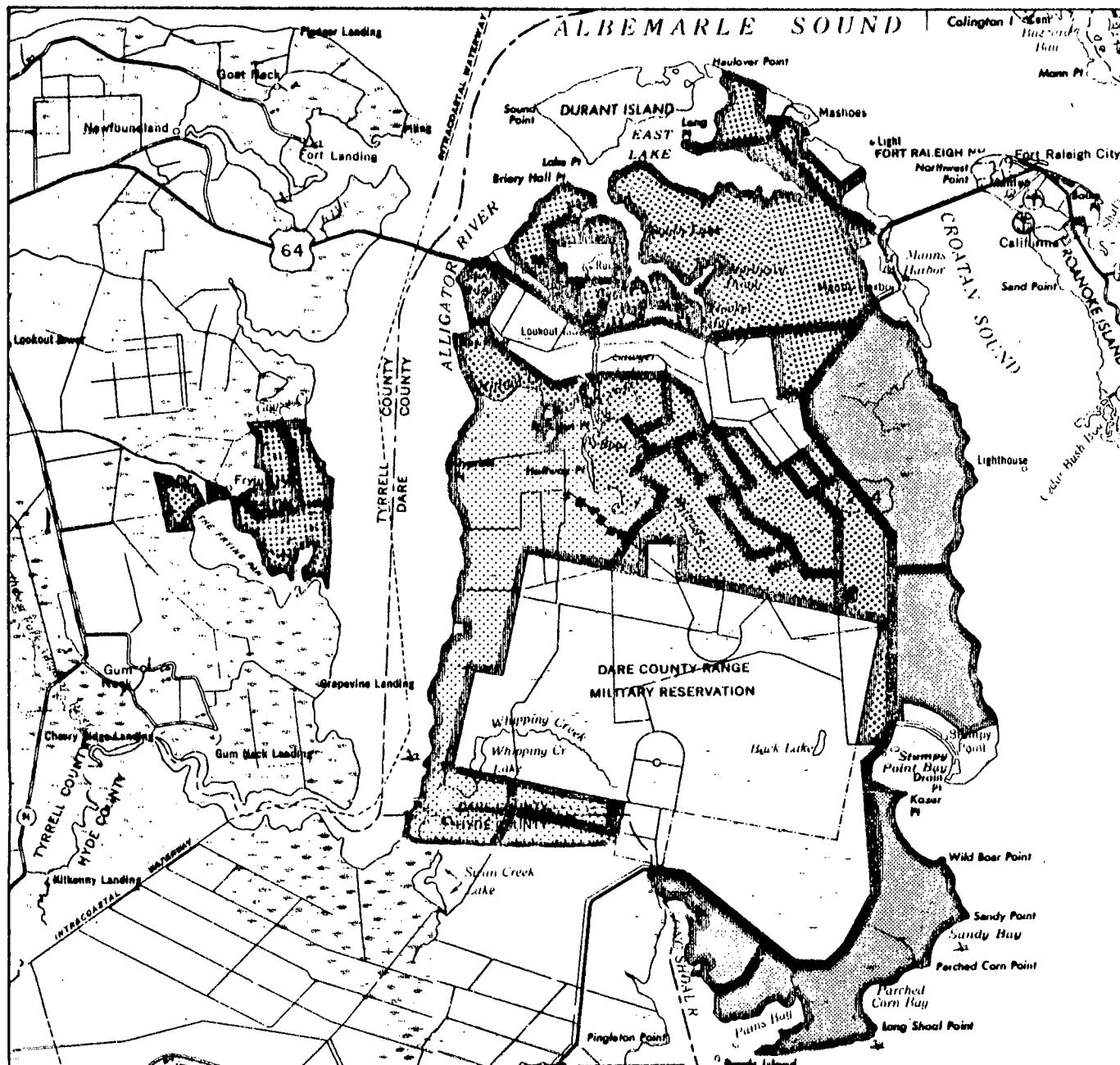
— Little Gull . . . . .				
— Common Black-headed Gull . . . . .				
— Bonaparte's Gull . . . . .	c	u	c	
— Ring-billed Gull . . . . .	a	c	a	a
*Herring Gull . . . . .	a	c	a	a
— Iceland Gull . . . . .				
— Lesser Black-backed Gull . . . . .				u
— Glaucous Gull . . . . .	r		r	
*Great Black-backed Gull . . . . .	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	e
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 . . . . .				
Scissor-tailed Flycatcher . . . . .				
Horned Lark . . . . .	r	r	r	
Purple Martin . . . . .	u	u	c	
Tree Swallow . . . . .	c	u	a	u
Northern Rough-winged Swallow (Rough-winged) . . . . .	r	r		
Bank Swallow . . . . .	o	u		
Cliff Swallow . . . . .	r			
*Barn Swallow . . . . .	a	a	a	
Blue Jay . . . . .	r	r	r	
American Crow (Common) . . . . .	u	u	u	u
*Fish Crow . . . . .	c	c	c	c
*Carolina Chickadee . . . . .	u	u	u	u
Red-breasted Nuthatch . . . . .	c	c		
White-breasted Nuthatch . . . . .	r	r		
Brown Creeper . . . . .	o	c	u	
*Carolina Wren . . . . .	c	c	c	c
House Wren . . . . .	u	c	u	
Winter Wren . . . . .	o	u	o	
Sedge Wren (Short-billed Marsh Wren) . . . . .	c	c	c	
*Marsh Wren (Long-billed Marsh Wren) . . . . .	c	c	c	
Golden-crowned Kinglet . . . . .	u	c	u	
Ruby-crowned Kinglet . . . . .	c	c	c	
Blue-gray Gnatcatcher . . . . .	o	u		
Veery . . . . .	u	u		
Gray-cheeked Thrush . . . . .	o	u		
Swainson's Thrush . . . . .	o	c		
Hermit Thrush . . . . .	o	c	o	
Wood Thrush . . . . .	r			
American Robin . . . . .	u	u	c	c
*Gray Catbird (Catbird) . . . . .	a	a	a	c
*Northern Mockingbird (Mockingbird) . . . . .	u	u	u	u
*Brown Thrasher . . . . .	u	u	u	u
Water Pipit . . . . .	u	u	u	
Sprague's Pipit . . . . .				
Cedar Waxwing . . . . .	u	u	c	
Loggerhead Shrike . . . . .			r	r
*European Starling (Starling) . . . . .	c	c	c	a
*White-eyed Vireo . . . . .	u	c	c	
Philadelphia Vireo . . . . .			o	
*Red-eyed Vireo . . . . .	u	u	u	
Blue-winged Warbler . . . . .				
Tennessee Warbler . . . . .	r	u		
Orange-crowned Warbler . . . . .	u	u	c	
Nashville Warbler . . . . .			u	
Northern Parula (Parula Warbler) . . . . .	c	c		
*Yellow Warbler . . . . .	u	c	c	
Chestnut-sided Warbler . . . . .			r	
Magnolia Warbler . . . . .			c	
Cape May Warbler . . . . .			c	
Black-throated Blue Warbler . . . . .	u	c		
Yellow-rumped Warbler (Myrtle) . . . . .	a	a	a	
Black-throated Green Warbler . . . . .			u	
Blackburnian Warbler . . . . .			r	
Yellow-throated Warbler . . . . .			r	
Pine Warbler . . . . .			u	
*Prairie Warbler . . . . .	u	a	a	

# ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

UNITED STATES  
DEPARTMENT OF THE INTERIOR

DARE AND TYRRELL COUNTIES, NORTH CAROLINA

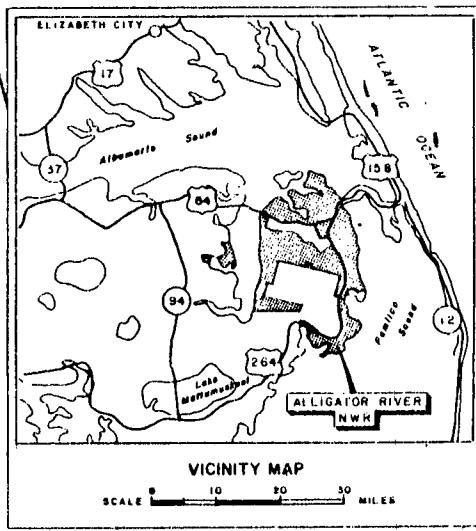
UNITED STATES  
FISH AND WILDLIFE SERVICE



## PUBLIC USE MAP

- Figure 3
- 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.
  - Roads open to motorized vehicles.
  - Roads seasonally open to motorized  
vehicles.

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





ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE  
PUBLIC USE 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 being transported by a vehicle or motorboat.
- 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 areas.
- Camping is prohibited.
- Wood gathering is by permit only.
- No commercial guiding is permitted.
- The construction and use of permanent blinds, platforms, and ladders is prohibited. Blinds and tree stands must be removed from the refuge after each day's hunt.
- The training of dogs is permitted only during the corresponding hunting seasons.

Only the following may be hunted:

mourning doves, geese, swans, ducks, snipe, woodcock, squirrels, rabbits, quail, raccoons, opossums, and deer.

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

Take Pride in America's Wildlife Resources.

Report Wildlife Violations.

1-800-662-7137



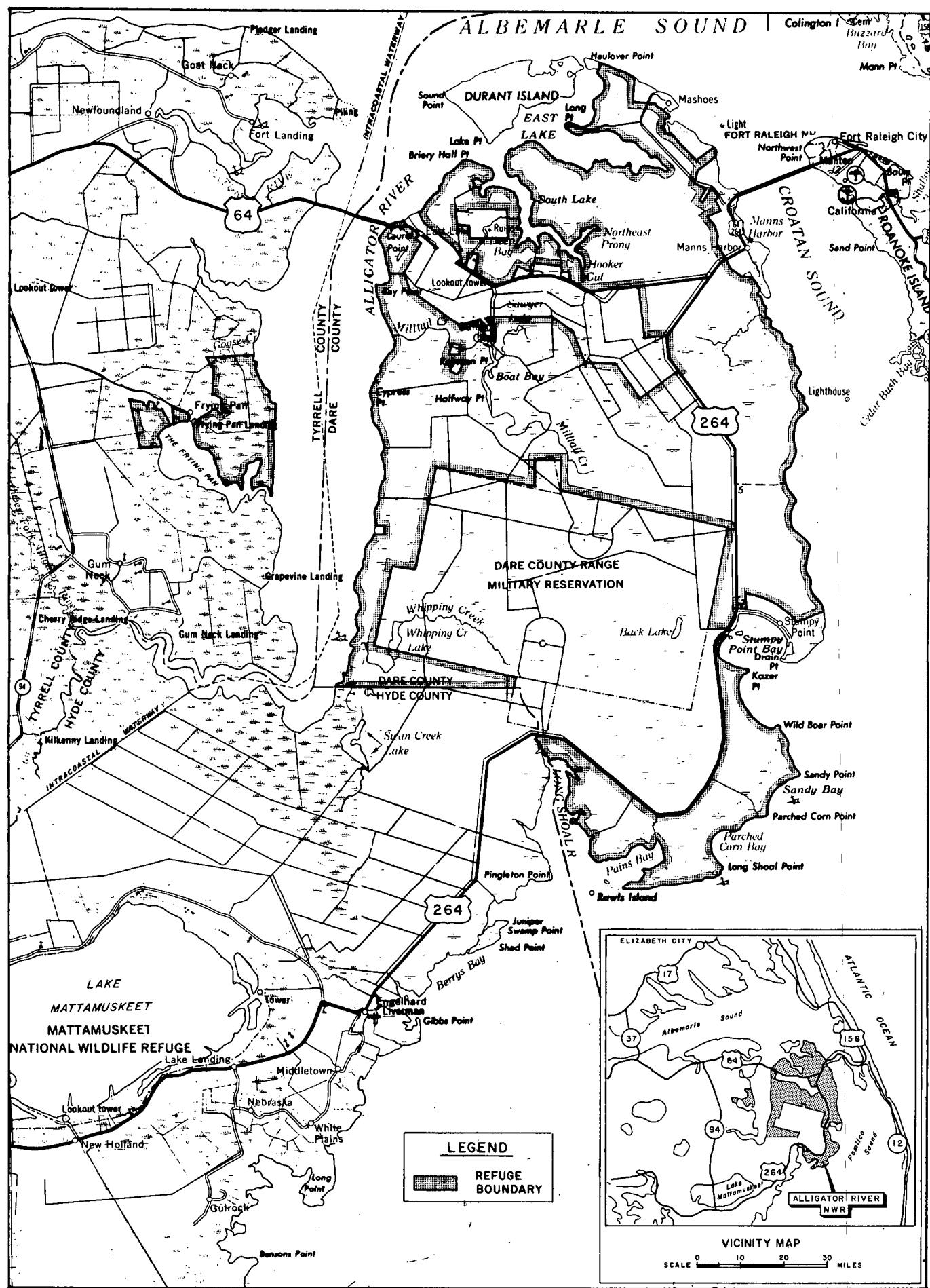
(See map on reverse side for dog and vehicle restrictions.)

UNITED STATES  
DEPARTMENT OF THE INTERIOR

# ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

DARE AND TYRRELL COUNTIES, NORTH CAROLINA

UNITED STATES  
FISH AND WILDLIFE SERVICE



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

0 10560 21120 42240 FEET  
0 2 4 6 8 MILES