

REVIEW AND APPROVAL

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE  
PEA ISLAND NATIONAL WILDLIFE REFUGE

MANTEO, NORTH CAROLINA

ANNUAL NARRATIVE REPORT

Calendar Year 1995

_____ Refuge Manager	_____ Date	_____ Refuge Supervisor Review	_____ Date
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_____ Regional Office Approval	_____ Date
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**The 1995 Annual Narrative Reports  
for Alligator River and  
Pea Island  
National Wildlife Refuges  
are dedicated to the  
memory of**

**Victor J. "Kris" Kristoffersen**



In November, 1995, the Refuge lost a dedicated volunteer and a true friend and advocate. Kris Kristoffersen had been an active refuge volunteer for over 11 years and had accumulated over 2,600 hours of service. The North Pond Trail was dedicated in Kris's honor; he received many volunteer awards during his years of service. Kris will be missed.

BWS 11/94

## INTRODUCTION

Alligator River National Wildlife Refuge is approximately 152,000 acres in size and lies at the eastern end of a broad, flat, and swampy peninsula in northeastern North Carolina. Most of the refuge is located in the mainland portion of Dare County, with some land reaching southward into Hyde County. The refuge is part of a five-county region bounded on the north by the Albemarle Sound, on the east by Croatan and Pamlico Sounds, and on the south by Pamlico Sound and Pamlico River.

In the spring of 1984, Prulean Farms, the owner of most of what is now Alligator River NWR, withdrew its permit application for clearing forested wetlands and dissolved its organization. All property was transferred to Prudential Life Insurance Co. After more negotiation, Prudential decided to donate a total of 118,000 acres in Dare and Tyrrell Counties.

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

Since the decision to donate directly to the FWS was made rather abruptly, direct Service involvement did not occur until two weeks prior to the actual deed transfer. Although other management options existed, such as managing the area as a "coordination area" with the State, the decision was ultimately made to designate the area as a NWR and to move forward with appropriate funding and staffing. The 1988 acquisition of a functional farming area (approximately 5,100 acres in size) rounded out Alligator River's potential to include waterfowl management on a major level. This area is managed as moist soil units and cultivated fields (using cooperative farmers). Future management will include the restoration of some of the acreage into wooded swamp.

A portion of the original donated acreage (approximately 6,000 acres on the west side of the Alligator River) was transferred to Pocosin Lakes NWR in 1991 due to the close proximity of these lands to that refuge. At the same time, an additional 10,000 acre tract (the Dare Pocosin) was acquired in conjunction with the Pocosin Lakes property and added to Alligator River Refuge. Acquisition goals for Alligator River are to have contiguous land on the east/south sides of the Alligator River.

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 is the site of a re-establishment program for red wolves.

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1995

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

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A. HIGHLIGHTS

Dare County receives \$318,093 in revenue sharing. (See Section C.3)

Twelve year total for volunteer hours reaches 145,863; 1995 total is 26,038 hours. (See Section E.4)

Atlantic white cedar work continues... (See Section F.3)

Ducks Unlimited MARSH Project produces another 400 acres of moist soil... (See Section F.4 and I.1)

Fire Program gains steam... (See Section F.9)



There's nothing like a mother's  
love ... Red Wolf Project continues ...  
Copyright Joel Satore, Nat. Geo.

Spring fire season driest on record. "High" fire danger during 48 days of the season. (See Section F.9)

Mutual Aid Cooperative Agreement negotiated with North Carolina Forest Service. (See Section F.9)

Southern pine beetle outbreak threatens red-cockaded woodpecker habitat. (See Section F.10)

Minimum of 15 red wolf pups produced from minimum of 8 litters. (See Section G.2)

Cooperative black bear research study with University of Tennessee has resulted in 276 captures of 195 individual bears over first three years. (See Section G.8)

Milltail Creek Canoe/Kayak trails are a real hit... (See Section H.4)

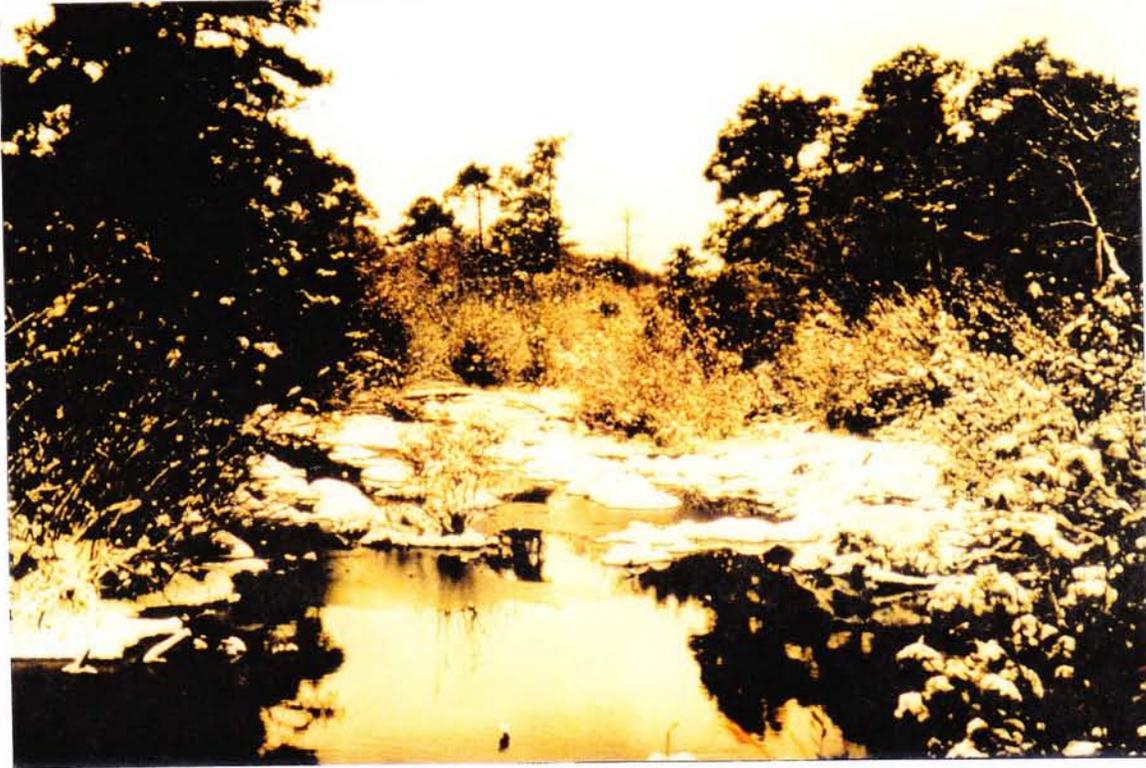
#### B. CLIMATIC CONDITIONS

The year started off with unseasonably warm temperatures and virtually no freezing. However, winter finally arrived in early February with roughly 3-4 inches of snow and temperatures below 20 degrees. All moist soil units froze. Spring was relatively mild and dry with rainfall 25% less than normal. As a result the fire danger climbed, and a state ban was placed on burning. Dry weather ended with a bang in June when remnants of Hurricane Allison brought 5.51 inches of rain within 30 hours. A total of 8.85 inches of rain in June ended 12-hour days and weekend work for the fire crew due. In August, weather was dominated by Hurricane Felix which threatened Pea Island NWR (see Pea Island NWR, Section B). Efforts to get ready for the storm and the subsequent returning of things to normal took a week and a half. Cooler temperatures arrived in September, along with just enough rain to hinder on-going work projects, but the rain was great for crops. The first frost occurred in early November and, by mid-December, freezing temperatures became a regular occurrence.

Table 1 depicts high and low temperatures, total rainfall for each month, and the previous year's information for comparison.

**TABLE 1**  
**ALLIGATOR RIVER NWR WEATHER DATA**

<u>MONTH</u>	<u>TEMP.</u> <u>HIGH</u> <u>1994</u>	<u>TEMP.</u> <u>HIGH</u> <u>1995</u>	<u>TEMP.</u> <u>LOW</u> <u>1994</u>	<u>TEMP.</u> <u>LOW</u> <u>1995</u>	<u>RAIN-</u> <u>FALL</u> <u>1994</u>	<u>RAIN-</u> <u>FALL</u> <u>1995</u>
January	64	73	13	14	6.71"	4.45"
February	72	71	27	14	1.68"	5.57"
March	82	79	28	26	7.38"	3.30"
April	89	85	33	41	1.43"	0.44"
May	89	89	43	39	5.47"	4.26"
June	96	90	51	56	1.45"	8.85"
July	98	98	66	63	16.07"	2.39"
August	91	95	52	53	4.94"	4.39"
September	91	88	45	54	4.57"	3.77"
October	84	85	41	40	5.48"	5.32"
November	81	78	28	26	4.88"	3.52"
December	74	70	44	20	4.90"	2.75"



Snow is rare indeed . . . 12/95  
USFWS

### C. LAND ACQUISITION

#### 1. Fee Title

The PPP package to expand the acquisition boundary finally received Regional Office approval in July. It was part of the Preliminary Project Proposal for the Proposed Expansion of Eastern North Carolina Refuges. During review of the document, several errors in the proposed acquisition boundary were noted and brought to the attention of District Manager Bill Grabill.

#### 2. Easements

A 5-year easement, initiated in 1993, with the owners of the 4,000 acre Durant Island authorizing the presence of wolves on their property and Service access remained in effect.

A Partner's Agreement with the owners of the 15,000-acre Mattamuskeet Ventures, Inc., authorizing wolves on the area and Service access, remained in effect.

A Partner's Agreement with the owners of the 6,500-acre Agri-East property authorizing wolves on the area and Service access remained in effect.

A Partner's Agreement with the owners of the 1,000-acre Holbert property authorizing wolves on the area and Service access remained in effect.

A Partner's Agreement with the owners of the 10,000-acre Lux Farms property authorizing the presence of wolves and Service access for management purposes was canceled at the request of the landowner.

Negotiations were conducted with several other large land owners (timber companies, corporate farms) during the year for easements or agreements authorizing the presence of wolves and Service access. These additional properties total approximately 195,000 acres and are important to the success of expanding the wolf reintroduction area west of the Alligator River.

### 3. Other

Although considerable progress was made, the Stumpy Point ball field issue remained unresolved. County Commissioner interest in a possible land exchange resurfaced in 1993, with the County finally submitting a formal request for an exchange in July, 1994. The land exchange appears to be in the works. RM Johnson completed the contaminant survey for the proposed exchange property on March 21.

The East Lake Methodist Church land issue also remained unresolved. This issue has been at the Solicitor's office since 1990.

The 1994 furor over revenue sharing (in lieu of taxes) caused by a reappraisal abated considerably in 1995. Dare County received \$318K+ in 1995 as compared to approximately \$175K in 1994 and \$360K+ in 1993. The 1994 figure represents revenue sharing based on reappraisal of Alligator River NWR lands only, while the 1995 figure represents reappraisal of both Refuges.

## D. PLANNING

### 2. Management Plan

Annual management planning completed and approved included the Water Management Plan, Cooperative Farming Agreements on 4,500 acres, and Prescribed Burning Prescriptions on 6,500 acres.

Many of the management actions on national wildlife refuges require pre-planning and coordination with other Federal, State, and local agencies, while some require permits issued by other agencies. In order to streamline the planning and permit process, and open lines of communication with all interested parties, The Blue Goose for Tomorrow, A Ten-year Habitat Management Plan for the National Wildlife Refuges of Northeastern North Carolina was completed and released in August. The purpose

of this plan was to identify those management actions needed over the next ten years to achieve the goals and objectives of each refuge and identify management intensity levels.

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

The Corps of Engineers and CAMA permits covering wetland hydrology restoration through the installation of water control structures was modified in December. The modification allows the installation of seven water control structures at road intersections on Dare County Range instead of along the Refuge boundary line. Refuge personnel requested permission from the Air Force for this change. The placement of structures at road intersections will provide more optimum water control capabilities.

#### 5. Research and Investigation

The cooperative agreement with the University of Tennessee to conduct black bear research on the Refuge was extended through May of 1996. The Air Force came up with a total of \$110,000 to complete this important project - originally initiated with discretionary Refuge funding in 1992 (that meant leaving a position vacant!). During 1995, the Refuge provided housing and logistical support for three researchers. When the research project is completed, Refuge staff expects to have sound biological data upon which to make black bear management decisions.

The joint Refuge/Air Force/NC Forest Resources reforestation of 3,000 acres of clearcuts with Atlantic white cedar continued to progress slowly. A 1993 cooperative agreement with the USDA Forest Service Seedtree Lab in Starkville, MS for developing cedar seed extraction techniques was completed. Another agreement was negotiated with the NC State University Forestry Department to examine impacts of competition on this shade intolerant species. This 5-year project is "plowing" new ground. The project tested herbicide effectiveness for release of cedar seedlings by aerial application of herbicides at different rates as a site prep method. Other site prep methods (mechanical, burning, and combinations of these methods) were ineffective because of the hydrological conditions at the test sites. Efforts to restore natural hydrology on clearcut areas by installing water control structures in canals constructed by timber companies prior to government ownership continued.

Duke University continued their project on sea level rise utilizing a segment of marsh adjacent to Long Shoal River. Soil profile and vegetative transect sampling will continue.

## 6. Other

Numerous requests were submitted for Engineering Services during the year.

### E. ADMINISTRATION

#### 1. Personnel

1. Jim Johnson, Refuge Manager, GM-13, EOD 05-05-91
2. C. Dwight Cooley, Refuge Manager, GS-12, EOD 04-02-95
3. Thomas G. Crews, Forester (FMO), GS-12, EOD 01-22-95
4. Vacant, Wildlife Biologist (Red Wolf), GS-12
5. Bonnie Strawser, Wildlife Interpretive Specialist, GS-11, EOD 12-31-80
6. Dennis Stewart, Wildlife Biologist, GS-11, EOD 3-6-94
7. Vacant, Refuge Operations Specialist, GS-9 (PI)
8. Elizabeth Fritsch, Refuge Operations Specialist, GS-7 (AR), EOD 1-12-94
9. Wendy Donoghue-Stanton, Wildlife Biologist, GS-7, EOD 10-16-94
10. Vacant, Supervisory Forestry Technician, GS-5/6/7/8
11. James Beasley, Range Technician, GS-07, EOD 05-26-85
12. Michael Morse, Wildlife Biologist (Red Wolf), GS-09, EOD 04-08-90
13. Arthur Beyer, Biological Science Technician (Red Wolf), GS-07, EOD 12-02-90
14. Jennifer Gilbreath, Wildlife Biologist (Red Wolf), GS-09, EOD 06-30-91
15. Jonathan Windley, Biological Science Technician (Red Wolf), GS-07, EOD 02-26-89
16. Janice Lane, Office Assistant, GS-06, EOD 03-25-90
17. Bernice Kitts, Office Automation Clerk, GS-05, EOD 04-02-95
18. J. Bruce Creef, Work Supervisor, WS-07, EOD 04-21-75
19. Alan Emery, Automotive Worker, WG-08, EOD 05-22-88
20. Jonathan Powers, Engineering Equipment Operator, WG-08, EOD 04-24-88
21. Murphy Peterson, Engineering Equipment Operator, WG-08, EOD 04-22-90
22. Eric Craddock, Engineering Equipment Operator, WG-08, EOD 02-21-93
23. Amy Midgett, Forestry Technician, GS-04, EOD 05-05-91
24. Bobby Govan, Engineering Equipment Operator, WG-08, EOD 10-06-91
25. Eric Meekins, Forestry Technician, GS-05, EOD 10-04-92
26. Thomas Eagle, Jr., Forester (Term Appt.), GS-07, EOD 04-30-95

Temporary Part-Time

27. Nolan Ambrose, Engineering Equipment Operator, WG-08, EOD 10-04-92
28. Lonnie Ford, Jr., Forestry Aid, GS-03, EOD 03-19-95
29. Alfred L. Jackson, Forestry Aid, GS-03, EOD 03-19-95
30. Craig S. Scheibel, Forestry Aid, GS-03, EOD 04-16-95
31. Russell Campbell, Biological Aid (White Cedar), GS-03, EOD 05-95 (Terminated 07-05-95)
32. Sarah Culhane, Biological Aid (Cedar Project), GS-03, EOD 07-05-95 (Terminated 08-23-95)
33. Rhonda Dorsey, Biological Aid (Cedar Project), GS-03, EOD 07-03-95 (Terminated 08-11-95)
34. Kristina Fair, Biological Aid (Cedar Project), GS-03, EOD 07-03-95 (Terminated 09-29-95)
35. Peter Schneider, Biological Aid (Cedar Project), GS-03, EOD 07-07-95 (Terminated 08-17-95)



1995 Staff  
 1st Row (kneeling): 25, 34, 9, 8, 5  
 2nd Row: 1, 6, 13, 17, 16, 18, 26, 19  
 3rd Row: 3, 21, 20, 22, 12, 2

After the mass exodus of personnel during 1994, the Refuge finally started filling some of its vacant positions. The "welcome mat" was laid out for Dwight Cooley, Deputy Project Leader; Bernice Kitts, Office Automation Clerk; Tom Crews, Forester/FMO; Tom Eagle, Forester (Atlantic White Cedar Project); and Lonnie Ford, Alfred Jackson, and Craig Scheibel, Forestry Aids (Fire Crew). In addition, five Bio Aids were hired for the summer to work with the Atlantic White Cedar Project.



JJ knights Cooley as his final official  
act as Project Leader! BWS 1/96

Dwight came to us from Mississippi Sandhill Crane NWR; Tom Crews came from the Forest Service, also in Mississippi. The staff suspects a conspiracy since Jim Johnson is a Mississippi boy and seemed to want to surround himself with folks that spoke "his language"!

At last, the Refuge was able to convert some of the temporary fire crew to 3 career-seasonal status. Amy Midgett, Bobby Govan, and Eric Meekins, all of whom had been at the Refuge for several years, were promoted to those positions. What a good thing for the Refuge that these fine folks will now be with us for the duration!

Bernice Kitts transferred from Roanoke River NWR, where she was Office Assistant. Tackling Alligator River after working on a 3-

person refuge was quite an adjustment, but she is very much up to the job! Tom Eagle was selected to head the Atlantic White Cedar Regeneration Project. His appointment is for a 2-year term.

ROS Liz Fritch was on maternity leave a portion of the year. She is expected back early in 1996.

Several months ago, the employees were saddened to learn that our fearless leader, Jim Johnson, would transfer to Felsenthal NWR in January. Jim has done a tremendous job at this Refuge and will be sorely missed by the entire crew.

#### 4. Volunteer Programs

During 1995, 268 (down from 314 in 1994) volunteers contributed 26,038 (up from 23,974 hours in 1994) hours of service in the following areas: maintenance - 3,038; resource support - 13,000; public use - 7,500; and administrative support - 2,500. These hours bring the twelve year total of hours contributed to 145,863!



Outstanding Volunteers for 1995 - Jimmy  
Hayes and Lee Yoder. BWS 11/95

The Red Wolf Project has continued to draw a number of college students and/or recent graduates that volunteer large blocks of time (3-4 months). During 1995, over 4,000 hours of volunteer time were donated by 4 interns and several regular volunteers in red wolf caretaking positions and other red wolf related positions (wolf house building, etc.). Seven long-term volunteers/interns worked with bear/Atlantic White Cedar/etc. projects.

At the administrative office in Manteo, most days were covered by a volunteer receptionist answering the phone and assisting with assorted office duties. Some wrote letters and handled public inquiries. The volunteer program also provided volunteer assistance for Pea Island NWR. For details on these activities see Section E.4. of the Pea Island narrative.

Again, recruitment activities for 1995 were not major, but spontaneous efforts were made whenever the opportunity presented itself. Most new volunteers continued to be recruited by current volunteers. During 1995, no volunteers were gained through the Dare County Action Center.

Refuge volunteers continued to work through their non-profit organization, the Coastal Wildlife Refuge Society, to benefit the Refuge. For details of their accomplishments 1995, see Section H.18.

Cumulative hours tallied through September 30, 1995 yielded awards which were presented at the annual Volunteer Awards Banquet on November 18. The following volunteers received awards:

Certificates (100+ hours): Christy Allen, Gail Anderson, Ed Bradley, Linda Bradley, Dorothy Fink, Katy Fitzgerald, Robert Hannan, Joyce Hannan, Irma Leake, Matthew Partin, Jennifer LaBranche, Betty Peck, Gary Peeples, Bel Pitcher, Penny Roderick, William Stewart, Shelia Silver, Chuck Stutz, Neill Yelverton, Amy Lane, Marcie Holda.

Pins without rockers (250+ hours): Micou Brown, Dee Derr, Richard Derr, Katy Fitzgerald, Carlos Gomez, Robert Hannan, Joyce Hannan, Sherri Lemnios, Jennifer LaBranche, Matthew Partin, Gary Peeples, Penny Roderick, William Stewart, Anna Strawser, Chuck Stutz, Neill Yelverton, Rose Kurz, Marcie Holda.

Pins with 500 hour rockers: Neill Yelverton, Chuck Stutz, Al Valentine, Bob Webster, Penny Roderick, Gary Peeples, Jimmy Hayes, Adele Mathers, Marianne Dubresson, Katy Fitzgerald, Bill Ackiss, Marcie Holda.

Pins with 1000 hour rockers: Rae Braudaway, Katy Fitzgerald, Jennifer LaBranche, Penny Roderick.

Pins with 1500 hour rockers: Rae Braudaway, Bertha Burris, Marie Vansickle.

Pins with 2000 hour rockers: Don Perry

Plaque for 2,500+ hours: Warren Davis, Joe Folta.

Plaque for 7,000+ hours: Todd Allen

The Outstanding Volunteers for 1995 were Lee Yoder and Jimmy Hayes. Their names were added to the permanent plaque in the office, and each received a plaque. In addition, special plaques were given to Bob Dolan, Rocky Creef, and William Stewart for outstanding volunteer service.

Establishing the volunteer program for Alligator River and Pea Island NWR's required much time and effort in the beginning. Keeping the program going demanded ongoing effort and money commitment; however, the Refuges received far more than they gave to the volunteers. Receiving specific volunteer funds through RO has been a lifeline for this volunteer program. Without a minimum amount of recognition and support, keeping morale high is difficult. We appreciate this financial support, as well as the moral support received. Hats off to Richard Mattison and the Atlanta crew for remembering how much these volunteers accomplish and how little the refuge is able to do for them!

As always, we owe a debt of gratitude to our dedicated Refuge volunteers. They set a fine example for all who see them. Without them, so much work would be left undone and the Refuges would not be the same.

## 5. Funding

For FY 95, Alligator River NWR received the following funding:

<b>Program Area</b>	<b>Dollars (in thousands)</b>
Initial Allocations (1261/1262/1113)	1017.0
Challenge Grant	6.0
Watchable Wildlife	12.0
Volunteer Support	6.0
Small Maintenance Projects	180.0
Reimbursable Agreements:	
DU Moist Soil Units on AR	56.1
USCOE PI Beach Monitoring	37.9
Red Wolf Prey Species Ecology	75.0
Initial Allocations (9110/9120)	96.6
Fire Seasonal Staffing	130.0
Fire Equipment Purchase	115.0
Fire NUS	10.0
Fire Equipment Maintenance	20.0
Prescribed Burning	8.0

Table 2. Four Year Funding Comparison

	<u>1995</u>	<u>1994</u>	<u>1993</u>	<u>1992</u>
1261	483.7	479.7	463.2	460.1
1262	163.3	283.7	222.9	182.0
1113	370.0	385.0	240.0	220.0
1971	169.0	844.1	709.5	141.5
2821		0.0	258.2	362.1
7201		0.0	9.0	
9110	256.6	49.1	62.1	52.4
9120	33.0	261.3	378.6	327.9

## 6. Safety

The safety officer for 1995 was Liz Fritsch. Liz was responsible for organizing and directing monthly safety meetings and for identifying unsafe working conditions, habits, and attitudes on the Refuge. Topics for monthly safety meetings included first aid, eye safety, hearing conservation, office safety, tractor safety, back strain, lyme disease, large equipment safety, chainsaw safety, treatment for poison ivy, and snake bite treatment.

Alligator River and Pea Island NWR's ended the year with 11,600 hours worked since the last lost-time accident. AW Alan Emery received a knee injury in September while disposing of crates in the back of a truck. FF Lonnie Ford received an eye injury in July while clearing vegetation. Cedar crewperson Rhonda Dorsey was bitten by a spider in August while conducting cedar inventories. RT Jim Beasley continued to be out of work during all of 1995 with a back injury which led to Jim having back surgery. We're all hoping Jim will be back on his feet soon. No other accidents occurred on the Refuges.

## 7. Technical Assistance

Under a Cooperative Agreement with the U.S. Air Force, the Refuge continued to provide technical assistance to the adjacent Dare County Bombing Range on wildlife management. Some of the activities included the black bear study, red-cockaded woodpecker surveys, alligator surveys, and white cedar study (see Sections F. and G.). Refuge staff also provided assistance to Air Force personnel with the selection of locations for water control structure installation - the intent of this project was to implement hydrological restoration on Air Force forestlands, similar to the work being done on Alligator River NWR.

## F. HABITAT MANAGEMENT

### 1. General

Five categories of natural, vegetated habitat are found on Alligator River NWR: marsh, pocosin, mixed-hardwood pine swamp, hardwood swamp, and white cedar swamp. These are classified as wetlands based on vegetation present, degree of soil saturation, and hydro-period. The 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 humans, large portions have undergone changes in vegetation composition and hydrology caused by ditching and canal dredging for access and logging purposes. The purchase of the Prudential farmlands in March of 1988 added agricultural land to the list of habitats.

### 2. Wetlands

The installation of water control structures (WCS) to restore ditched areas to a more natural hydrological regime continued during 1995. As usual, efforts were limited due to equipment and inclement weather. This year, risers were installed at two locations. A new structure was installed at the intersection of Pump Road and Laurel Bay Road on the west side of the Refuge, and a double structure was installed on Point Peter Road on the east side of the Refuge.

The structures and associated fill allow for the safe movement over the canals of equipment and better water management for wildlife, fire suppression, and prescribed burning activities. The pipes and risers replaced severely deteriorated wooden bridges, primarily at road intersections. Boards were placed in the risers up to the ground level of the adjacent swamp/pocosin. A request for an extension of the Section 404 permit deadline was approved by the Corps of Engineers, and wetland restoration of ditched areas will continue with installation of additional structures in 1996.

Table 3 presents acreage by vegetative community/land use currently under fee title ownership. See previous narratives for in-depth descriptions of the various vegetative types.

**Table 3**  
**Habitat Types**  
**Alligator River NWR**

Habitat Type	%	Approximate Acreage		
		Dare	Hyde	Total
White Cedar Swamp	5.6	6,900	1,568	8,468
Hardwood Swamp	8.0	11,600	636	12,236
Mixed Hardwood				
-Pine Swamp	7.5	6,108	5,272	11,380
Cypress Hardwood	.9	1,300	--	1,300
Shrub Pocosin	12.1	17,810	612	18,422
Cane Pocosin	1.5	2,300	--	2,300
Tree Pocosin	25.3	33,072	5,512	38,584
Mixed Pine	18.4	28,100	--	28,100
Flood Killed	10.1	15,300	--	15,300
Lakes/Open Water	.8	754	398	1,152
Marsh	6.5	9,904	--	9,904
Farmland and Moist Soil	3.3	5,100	--	5,100
<b>Totals</b>	<b>100</b>	<b>138,248</b>	<b>13,998</b>	<b>152,262</b>

This year approximately 1,800 acres of moist soil conditions were produced in prior converted farmland on the farm unit. Approximately 1,200 acres of this were burned in the spring, and 600 acres were disced. Approximately 800 acres of the 1200 acres burned were also disced. This is the fifth year fire has been used in the moist soil units, and results continue to be very promising. Approximately 200 acres scheduled to be burned, disced, or both did not receive any treatment for various reasons. These units are dominated by broomsedge, soft rush, woolgrass, and other undesirable species.

Overall, the production of desirable plants (wild millet, smartweed, fall panicum, switchgrass, foxtail, etc.) in the moist soil units was greatly improved over the previous 3 years. One unit, known locally as "permanent pond", was flooded during spring and summer, but was drawn down during the fall and winter for burning and discing to control cattail, wool grass, and Phragmites. This unit was burned in December, but discing could not be done due to wet weather. Some units will be burned and disced again in 1996.

### 3. Forests

The Atlantic White Cedar (AWC) Forest Restoration Project, funded by the Department of Defense Legacy Resource Management Program, is progressing on schedule. Partners in this project are the

Dare County Air Force Bombing Range, the North Carolina Division of Forest Resources (NCDFR) Research Section, and the USFWS.



Forester Eagle inventoring a cedar clear cut.  
KF 7/95

An inventory of white cedar habitat is being conducted to determine current plant communities and associations occurring on these sites. Data will also be of value when making decisions as to future management for AWC on each of the sites. As part of the inventory, permanent plots will be established in several of the cut-over areas for the purpose of monitoring competition, species composition, and AWC growth and mortality.



Cedar crew "GPSing" it along a transect.  
TE 8/95

The contract for services to inventory 3,000 acres of old AWC cut-over areas on the Refuge and Range was canceled because bids from firms with acceptable proposals greatly exceeded estimated costs and amounts budgeted. During the spring, the Refuge hired a forester with primary responsibilities of overseeing the AWC field operations and conducting many tasks related to the AWC restoration project. In early summer, 5 Biological Science Aids were hired for a 3-month term to do the inventory work. After this 3-month term, two of the summer employees were hired by an Air Force sub-contractor so the cedar inventories could continue during the fall. Future plans are to hire a three-person field crew on NTE One Year Appointments. This will likely take place during the spring of 1996. Approximately 360 acres of AWC clearcuts were inventoried during the summer and early fall.



Cedar cone collection ... TE 10/95



... and the results. TE 10/95

Global Positioning Systems (GPS) and Geographic Information Systems (GIS) are being utilized to conduct inventory work. A permanent GPS community base station was installed on the USAF Dare County Bombing Range for the purpose of acquiring more accurate satellite data with the rover GPS units. Rover GPS units with hand-held data loggers are used extensively in the field to record plot data and get accurate coordinates of each plot's location. GIS is being used to digitize a detailed map of the entire Refuge and Range. When completed, all forest inventory and reforestation data will be displayed.

Once again, several members of the Refuge staff had the pleasure of collecting Atlantic white cedar cones. Approximately 60 gallons (126 pounds) of AWC cones were collected during the fall of 1995. Cones were sent to the NCDNR Nursery for seed extraction and germination testing. Some of the seed may be planted in nursery seed beds to satisfy our 1996-97 planting needs while most of the seed will be stored to serve as the beginning of an AWC "seed bank".

Contract work being performed by Dr. Frank Bonner at the Southern Forest Experiment Station Seed-Tree Lab in Starkville, Mississippi regarding AWC seed germination and viability was completed, and a final report was submitted. This study entailed development of seed extraction and cleaning techniques for AWC, as well as germination tests. Some of the conclusions from this study were that AWC seeds remain viable in the soil profile for at least two years and that seed yield and viability of seed from young trees (< 10 yrs) were equal to that of seeds from older trees. Results from this work greatly enhanced the Refuge's ability to meet the demand for AWC, seedlings which had been a major limiting factor in the regeneration of this species since the onset of restoration efforts.

To date, approximately 95 acres have been planted or replanted in AWC, including a 5-acre genetic study plot and a 3-acre Refuge seed orchard. Approximately 85 acres of this reforestation was done on the Range.

#### 4. Croplands

The acquisition of the 10,000 acre Prudential Farms inholding in March, 1988 gave the Refuge even greater diversity of habitats and a great potential for managed habitat for waterfowl, shorebirds, and wading birds. The tract included 5,100 acres of cropland. Prudential had developed the area from forested wetlands by encircling it with dikes and constructing drainage ditches. The area was drained by 5 pumps located at 2 pump stations. Each pump had the capability of removing 250,000 gallons of water per minute from the farm fields. Routine pumping was required to keep the area dry enough to farm.



Construction of moist soil unit dike. Funds provided by Ducks Unlimited. DS 1/95

Reconversion of the area to a wetland habitat type was basically simple - don't pump the areas where plans call for permanent water, or reduce pumping on moist soil areas. This action was accomplished by the judicious placement of flashboard risers in conjunction with existing dikes and building relatively small, permanent cross dikes. To date, about 1,800 acres have been converted to moist soil units. A dike construction project to enhance management capabilities on approximately 400 acres of cropland was completed during 1995. Construction began in January, 1995 and had to be postponed by the end of the month because of wet weather. Construction resumed in July and was completed by early August. Ducks Unlimited provided funding on a 50:50 cost share basis. Total project cost was \$56,112.

Refuge cooperative farmers had moderate production during 1995. Soybeans planted early had highest yields (30-35 bushels/acre). Soybeans planted over wheat stubble late in the planting season had relatively poor yields of 10-15 bushels/acre. Except for remnants of Tropical Storm Allison, rainfall was nearly normal during the growing season.



Development of moist soil requires dike construction and water control structure placement. DS 7/95

## 9. Fire Management

The Fire Management Program at Alligator River saw many transitions during 1995. Personnel changes and cooperative relations were two issues that seemed to dominate all others throughout the year. On January 20, Tom Crews arrived from the Biloxi Ranger District on the DeSoto National Forest and began getting oriented to the Service and his new responsibilities as Fire Management Officer. Some of the challenges facing the program at the beginning of the year were:

- The NC Forest Service and FWS were at an impasse over the terms of a Cooperative Agreement, and relationships seemed to be at an all time low.
- The fire crew, consisting of 10 temporary employees, experienced a 60% attrition rate from the previous year, and new employees had to receive the basic fire training.
- The first springtime drought in over 5 years began in March in eastern North Carolina and continued until May, when the effects of the season's first tropical weather were felt.
- The NC Forest Service deactivated three fire towers and diverted all aerial detection flights away from Refuge lands in eastern North Carolina.

-The Alligator River and Pocosin Lakes NWR's had not had a serious fire in over 10 years. Fuels had built up to reach critical levels throughout the Refuges creating conditions in which normal levels of fire suppression would not likely be successful in containing a fire during a high fire danger day of the spring fire season.

-Equipment needs remained a high priority and received very little funding. Most critical were the needs for an additional tractor/trailer hauling unit and lightweight crawler tractor.

-Prescribed burning on organic soils in eastern North Carolina remained in the initial developmental stages. The NC Forest Service seemed very skeptical and unsupportive of this program effort.

The Refuge Fire Management Program was greatly affected by these issues throughout the year. Some of the issues have since been resolved, while others will be facing the Refuge again in 1996.

The initial push early in 1995 was to try to remodel the Alligator River NWR fire staffing pattern. The plan was to have a core of experienced and well-trained fire personnel to form the backbone of the fire crew. Fires in this part of the country require the operational interface of heavy equipment and aircraft in the face of potentially explosive fire behavior. Sending out inexperienced and/or minimally trained fire personnel to respond to such fires is not an option. The training of new personnel year after year is also draining to the Refuge and regional resources. After some careful analysis and discussion, the Refuge received approval to advertise for a Permanent Fire Control Officer, two career seasonal fire equipment operators, and two career seasonal firefighters (to serve as crew boss and assistant). In addition, there would routinely be four to five temporaries hired, depending upon availability of funding. This arrangement allows the Refuge to retain the more experienced personnel for longer periods, thereby allowing for a safer, more effective wildfire suppression organization. At year's end, all approved positions, with the exception of the Fire Control Officer, had been filled. All but one position were filled with personnel from the existing fire crew.

The spring fire season was in full stride in mid-March, with burning indices of 50 to a 100. Realizing that there was no longer a cooperative agreement with the State and for the first time, FWS had the primary initial attack responsibility at Alligator River, Refuge staff lost no time in preparing the fire organization for initial attack. Because of the high hazard fuels and poor trafficability soils in this area, standard operating procedures required deployment of two tractors together in a strike team. The Mattamuskeet and Mackay Island bombardiers were prepositioned on Alligator River and Pocosin Lakes NWR's in order to organize a strike team of two flextracked tractors on each of the respective refuges. The Alligator River flextrack

proved to be dependable for the first time in three years. Okefenokee NWR sent Doug Nuss and Howard McCollugh to assist in staffing during the early part of the season. They brought with them a tractor/trailer and Nodwell tractor. Ray Farinetti made two trips up from Merritt Island NWR to provide coverage for our FMO who attended training and needed assistance during this time. These key personnel provided the much needed experience in fire fighting, and Refuge firefighters learned much from them.

Local NC Forest Service personnel provided much assistance, considering the lack of a formal cooperative agreement. Communications between Refuge fire personnel and NC Forest Service District 13 personnel were maintained daily, discussing availability of resources and relaying fire weather data. With the State's permission, a lookout was posted in the East Lake fire tower; the tower was manned most of the season. Flying aerial detection flights twice daily on high fire danger days was begun, using an OAS pilot and aircraft. When this proved not to be dependable, the National Park Service (NPS) was approached to use the Cape Hatteras National Seashore aircraft and pilot. A total of 48 days occurred with a "high" fire danger level during the spring fire season, indicating the need for many flights.

By mid-April, the NC Forest Service, FWS, and US Forest Service recognized that the spring fire season was not a "business as usual" season but one "ripe for disaster". A command decision was made by Cal Gale, Regional Fire Management Coordinator, USFS in Asheville, and the Raleigh Office of the NC Forest Service to establish a tanker base in Kinston. This base was less than an hour's striking distance from Alligator River, Pocosin Lakes, and the Croatan National Forest and strategically located to provide coverage to State jurisdictional lands in eastern NC. The tanker played a major role in wildfire suppression strategy.

On Sunday, May 6, the Dare County Bombing Range had a fire in a pocosin block about 3/4 mile south of the Alligator River boundary. The Refuge offered use of the FWS helicopter stationed at Pocosin Lakes, but due to the lack of a formal cooperative agreement, the offer was turned down. The Refuge also offered assistance in equipment and manpower, which was refused. The Refuge "pre-staged" personnel about a mile from the fire and notified the Dare Bombing Range Ranger that personnel were ready to respond. After consultation with the State Regional Forester, the Refuge offer was accepted, and FWS became a full partner on this fire that was capable of burning onto Refuge lands. The Refuge provided use of the helicopter, burnout and holding crews, engines, tractors and operators, terratorch, 18 inch volume lift pumps, 6 inch irrigation pumps, and 6 inch irrigation system, as well as the portable FTS weather station.

The fire burned intensively, with much crown fire, torching, and intense burning. Fortunately, the fire was driven only by light and variable winds, and little spotting was observed. During the course of the fire, every tractor got stuck at least once, and on

one occasion there were at least six stuck. By 2:00 AM on May 7, the fire was contained at 325 acres with very crudely plowed lines in very deep organic soils. With a weather forecast of 25-30 mph winds and 30% relative humidity for the day, there was no certainty that the containment lines would hold. The contingency plan called for battling a 30,000 acre fire that stretched across the Bombing Range onto Refuge lands to the south. Fortunately, by using air attack, the fire was held within the containment lines. To prevent the fire from creeping out through the organic soils, one end of the fire was flooded. The remaining lines were completely surrounded by 6-inch irrigation pipe and sprinklers driven by three pumps. (This is the largest deployment of such an irrigation system on record.)

Roughly 40% of the operational resources used on the Navy Eastside Fire were FWS personnel and equipment from the eastern NC Refuges. Although the fire was officially out within a week after it had started, it had far reaching consequences. It helped "set the stage" for a new era of cooperative relations between the NC Forest Service and the FWS in eastern NC.

Ultimately, the State Forester and his staff are due credit for their willingness to take a fresh approach to viewing a new cooperative relationship with the FWS. In May, not long after the smoke had cleared from the Navy Eastside Fire, Refuge staff began serious discussions with the NC Forest Service on how to bridge the differences between the two agencies and build on the commonalities. The result was a cooperative agreement that should serve as a foundation on which to build during the next several decades.

An Annual Operating Plan was written that allows the Refuge to assist the State on any fires threatening the refuges and streamlines ways that the State can assist refuges. An Eastern North Carolina Interagency Overhead Team was established through the framework of the Operations Plan. This team gives refuge managers an additional choice between handling a fire with local resources and calling in a National Overhead team. It also provides FWS personnel the opportunity to gain fire management experience and develop skills on State fires, as well as on Refuge lands.

Equipment funding decreased dramatically during 1995; however, late in the year, Region gave Alligator River NWR funding to procure a new tractor/trailer hauling unit. For the first time, the Refuge had the capability for hauling an entire strike team, complete with tractor plow units, bridge unit, and dozer (to set the bridge trailer). The funding came from monies originally allocated for the pre-suppression agreement with the NC Forest Service. Once a light-weight powerful crawler tractor and an initial attack boat are obtained, this Refuge will have most of its needed fire equipment.

With the assistance of the personnel at Felsenthal and Okefenokee NWR's, AR staff members were able to obtain four surplus military fulltracked carriers from the Red River Military Arsenal at no cost. With some retrofitting, these vehicles will provide considerable support functions, including carrying firefighters, pumps, hoses, supplies, and perhaps even performing wildland fire engine duties. The Refuge also obtained a military truck tractor for use in hauling the bridge trailer.

At year's end, the Mattamuskeet Bombardier and AR Terreveh were in need of some retrofit in order to make them better suited as initial attack tractors. Some work was done to the Mattamuskeet tractor during 1995. New 250 gallon aluminum tanks were built, and Honda pumps were mounted to provide a lightweight economical pumper for these tractors. The pumpers were designed to hold up in the heavy fuels and rough terrain that Wajax-designed pumpers could not handle. They serve as a contingency in case of emergency during a fire and can also allow these tractors to be used in direct attack with water on very small fires or spot fires and in mop-up operations. All equipment was supplied with lowband and highband radios as a prerequisite for being fire ready this spring. Additional work is planned in 1996.



Fireline maintenance using "fulltrack".  
TC 9/95

The prescribed burning program did not progress as well as was planned. Late summer and early fall dry weather turned into a very wet late fall and winter season. AR fire crews accomplished

all the burning planned in the moist soil and agricultural units this year and burned approximately 1/4 of the planned area at Pea Island. In addition, one burn in association with the Atlantic Cedar Regeneration project was completed. Appropriate conditions to burn the Blueberry unit have not occurred: moderate fuel moistures, and weather and wind within prescribed parameters. In addition, it was difficult to catch a period of time between furloughs when enough personnel were on board to accomplish the burns. AR staff also found that obtaining a helicopter was very difficult since the situation did not involve several thousand acres with a variety of wind directions prescribed for burning. The Refuge is trying to coordinate with the Croatan National Forest to obtain a helicopter for prescribed burning.

The NC Forest Service has shown strong support in recent months for the Refuge prescribed burning program. They have offered to send firefighters and equipment, when they can, in support of Refuge burning efforts.

#### 10. Pest Control

During 1995, cooperative farmers used herbicides and insecticides for pest control on croplands. Pesticide Use Proposals and Pesticide Use Reports were submitted in accordance with Service policy and guidelines. Extra effort was required to control Phragmites communis in farm fields and moist soil units. These efforts included herbicides, burning, and discing where possible.

The 1995 southern pine beetle outbreak certainly affected Alligator River NWR. Numerous beetle spots were detected throughout the year, concentrated south of Alligator Road. Unfortunately, many of the spots were in the vicinity of our red-cockaded woodpecker clusters where access was extremely difficult. Accordingly, treatment of these spots was almost impossible within existing resources. The staff developed a funding proposal and submitted it to the Forest Pest Program of the US Forest Service. If funded, treatment of the outbreaks will be accomplished in 1996.

### G. WILDLIFE

#### 1. Wildlife Diversity

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.

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

species which are important from both a regional and a national standpoint. It's large size and dense vegetation makes the Refuge a haven for species which avoid man, such as the black bear. Also, the Refuge harbors many species adapted to living in forested habitat, as opposed to disturbed areas, such as field edges. The Refuge also provides habitat for the endangered red-cockaded woodpecker and migrating bald eagle and peregrine falcon. Alligator River NWR also lies at or near the northern limit of ranges for several vertebrate species, most notably, the American alligator.

## 2. Endangered and/or Threatened Species

Five endangered species have been documented on the Refuge. Management programs are in place for the red wolf and red-cockaded woodpecker. An inventory program is in place for the American alligator. There are no plans to manage specifically for or inventory bald eagles or peregrine falcons.

### a. Federally Listed Endangered and Threatened Species

**American alligator (Threatened)**: American alligators reach the northern extent of their range on the Refuge and probably were never very numerous in the area. The highest density alligator population has been found consistently on Whipping Creek Lake. A few 'gators have been seen each year in the marshes, ponds, streams, and canals. The US Air Force contract to conduct alligator surveys was not renewed in 1995. Consequently, alligator surveys were not conducted due to insufficient funding and staffing.

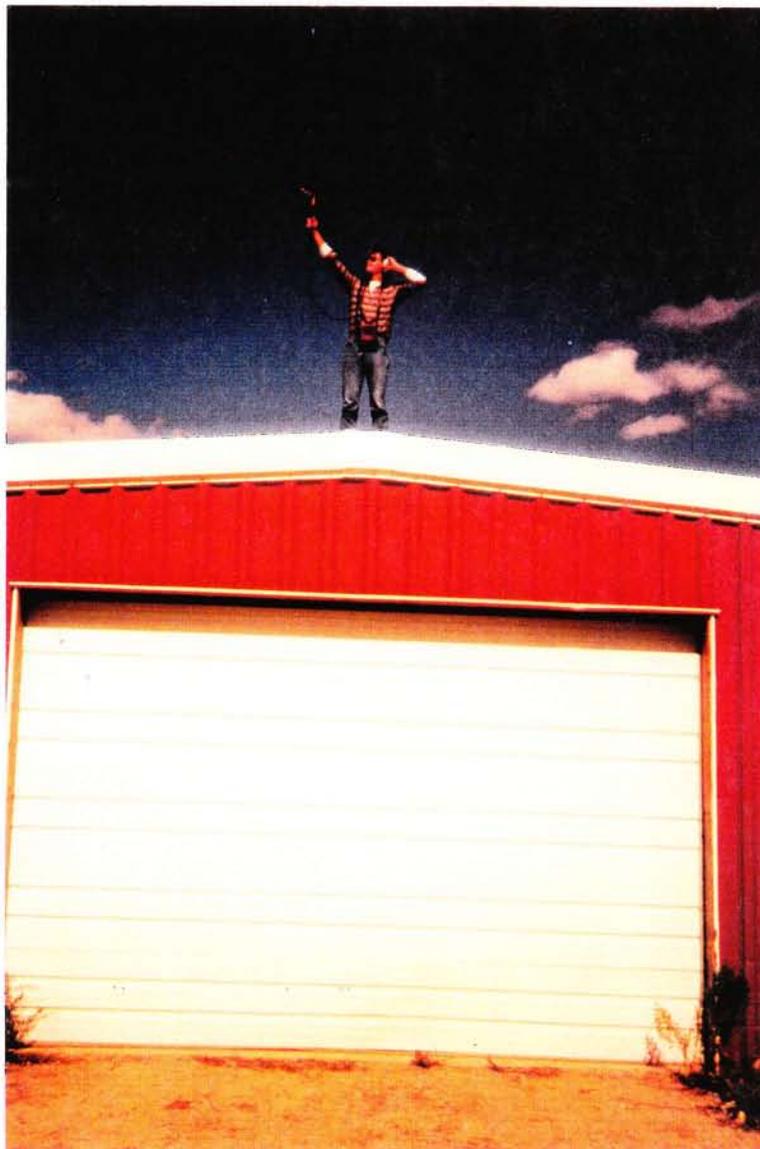
**Bald eagle (Endangered)**: An eagle nest was discovered on the west side of the Alligator River; however, it was not on federal land. Although located on very remote lands, FWS staff determined that the nest produced one fledgling during 1995. Unfortunately, the large loblolly pine died in late fall, probably from a lightning strike or pine beetle infestation. Refuge staff documented 2 adult bald eagles and one juvenile flying over the refuge in the fall of 1995 on several occasions.

**Peregrine falcon (Endangered)**: Peregrine falcons are known to move through the Refuge during migration. No reports of peregrine falcons occurred during 1995.

**Red-cockaded woodpecker (Endangered)**: The US Air Force did not renew the DoD Legacy Funding Contract in 1995. Consequently, due to insufficient funding and staffing, surveys of red-cockaded woodpecker clusters were not conducted.

**Red Wolf (Endangered)**: During 1995, staff released 6 wolves west of Alligator River on Pocosin Lakes NWR: (3 adult pairs) 464M/505 released 02/23/95; 663M/561F released 03/16/95; and 675M/593F released 04/06/95. Only two adults released were captive born (464M, 561F). The remaining four wild born adults were captured

in an effort to produce releasable pairs. Of the six wolves released, at year's end, four were free-ranging (505F, 593F, 663M and 675M); 561F was returned to captivity on 03/22/95 due to showing tolerance towards humans. Adult 464M was killed by gunshot while trying to dig into a dog pen on 04/22/95. More releases are planned for Pocosin Lakes NWR during 1996.



Radio tracking presents its own set of difficulties. BWS

During 1995, a minimum of 15 pups were produced from a minimum of 8 litters. These births were offset by the death of 13 wolves.

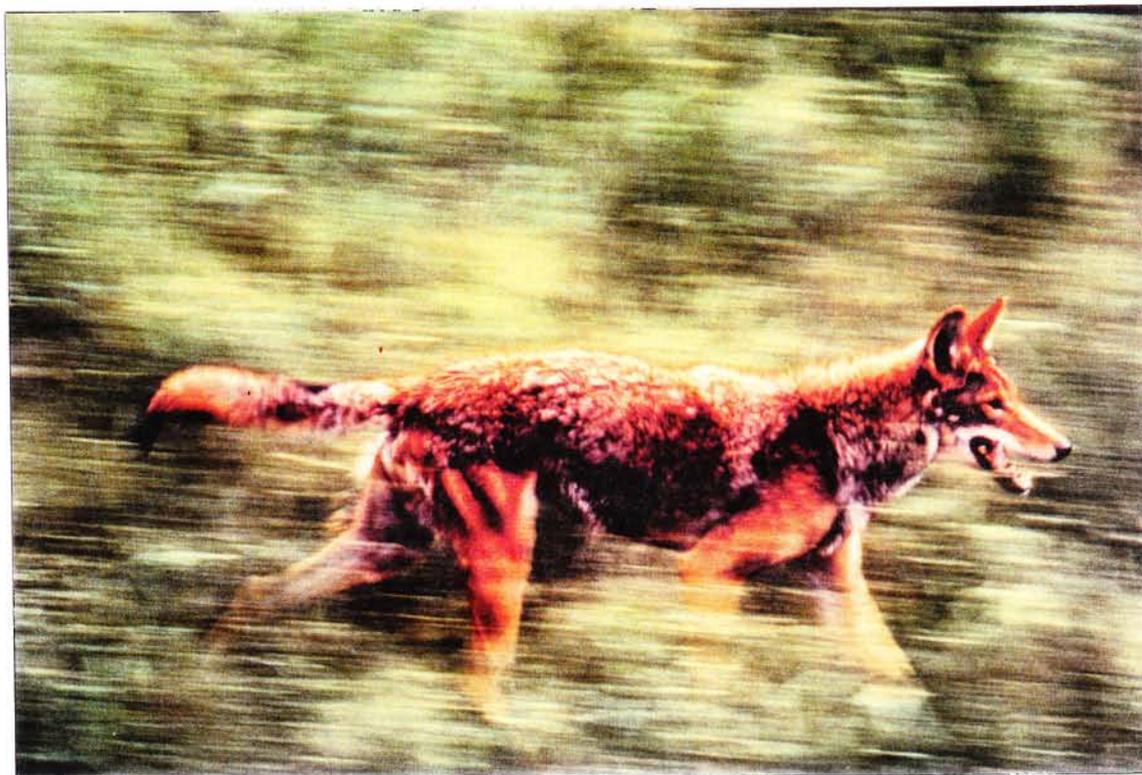


WB Gilbreath "processing" . . . USFWS

Table 4. Red Wolf Mortality During 1995

Wolf	Date of Death	# Mos in Wild	Cause of Death
698F	01/27/95	9.6	drowned in a local's trap
374M	02/23/95	8.25	euthanized due to blindness
764F	03/16/95	10.5	ingestion of an agricultural poison
464M	04/22/95	12.0	gunshot
661M	05/17/95	26.0	unknown (only hair and bones left)
773M	06/26/95	14.0	killed in collision with vehicle
443F	07/01/95	62.75	killed in collision with vehicle
507M	08/01/95	50.6	impacted colon
754M	09/15/95	12.5	unknown (only hair and bones left)
379F	11/05/95	60.5	gunshot
759M	11/20/95	19.8	intraspecific aggression
755M	12/09/95	20.3	gunshot
809F	12/17/95	8.5	unknown

As a result of releases, births, deaths and some management actions, the free-ranging red wolf population fluctuated on nearly a monthly basis.



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Table 5. Monthly Free-Ranging Red Wolf Population

Month	Minimum Population	Month	Minimum Population
January	41	July	39
February	39	August	38
March	41	September	37
April	41	October	36
May	38	November	34
June	41	December	36

As of December 31, the population included a minimum of 36 wolves that had been in the wild for an average of 33 months. By the end of 1995, 89% of the free ranging population was wild born.

Table 6. Free-Ranging Red Wolves In Eastern North Carolina  
As of December 31, 1995

Wolf# & sex	Birth location	Age <sup>a</sup> (mos)	# Mos. in wild (mos) <sup>b</sup>	Location of home range	Comments
331M	captivity	92.25	83.2	federal land	consorting with 394F (off air)
382F	captivity	79.5	40.9	federal land	lone female
392M	captivity	80.0	76.7	private land	consorting with 344F (off air)
442M	wild	67.7	67.7	private land	consorting with 508F
444F	wild	67.7	67.7	federal land	lone female
500F	wild	56.0	56.0	private land	consorting with 519M
502F	wild	56.0	56.0	private land	consorting with 506M (off air)
503F	wild	56.0	56.0	federal land	consorting with 670M (off air)
505F	wild	56.1	56.1	private land	lone wolf
508F	wild	56.1	54.5	private land	lone female
519M	captivity	43.5	40.9	private land	consorting with 500F
582F	wild	44.1	44.1	private land	lone female
593F	wild	32.6	32.6	private land	consorting with 675M
662M	wild	32.5	32.5	federal land	pack member
663M	wild	32.5	32.5	private land	lone male
665F	wild	32.0	32.0	private land	pack member
666M	wild	32.0	32.0	private land	pack member
671M	wild	32.0	32.0	private land	consorting with 673F
673F	wild	32.0	32.0	private land	consorting with 671M
674M	wild	32.0	31.5	private land	consorting with 760M
745M	wild	20.8	20.8	federal land	pack member
746M	wild	20.8	20.8	federal land	pack member
752M	wild	20.0	20.0	federal land	pack member
756F	wild	20.0	20.0	private land	pack member
760F	wild	20.5	20.5	federal land	consorting with 674M
761F	wild	20.5	20.5	private land	lone female
763F	wild	20.1	20.1	private land	pack member
768M	wild	20.6	20.6	federal land	pack member
772M	wild	20.0	20.0	private land	pack member
774F	wild	20.0	20.0	private land	pack member
795M	wild	20.0	20.0	private land	pack member

Table 6. Continued

Wolf# & sex	Birth location	Age <sup>a</sup> (mos)	# Mos. in wild (mos) <sup>b</sup>	Location of home range	Comments
803M	wild	.8	.8	private land	pack member
804M	wild	.8	.8	private land	pack member
810F	wild	.8	.8	private land	pack member
811F	wild	.8	.8	private land	pack member

<sup>a</sup> - Age was calculated relative to December 31, 1995.

<sup>b</sup> - Number of months in the wild did not necessarily span the period from the date of release for animals born in captivity or from birth for animals born in the wild, as some wolves were placed in captivity for varying periods of time and subsequently re-released.



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During February of 1996, Refuge staff expects about 7 red wolf pairs to breed in the wild. These breedings should result in the production of 21 to 25 pups that mature to an age of self-sufficiency. Thus, by December of 1996, the red wolf population should include 65 to 75 animals of which over 90% will have been born in the wild.

During 1995, 12 to 19 captive wolves were maintained at the Alligator River breeding facility. As of December 31, 19 wolves resided at the facility.



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Captive breeding on the Refuge has become an increasingly important component of the restoration effort. Since 1986, 121 wolves have been maintained at the facility's 15 pens for varying periods of time. Additionally, 30 captive adult pairs were maintained through breeding seasons. Eleven of these pairs bred successfully and produced 47 pups.

The wolf crew was very active in educating the public concerning the Red Wolf Program during 1995. Public programs conducted by this group are included in Section H.6. of this report.

### 3. Waterfowl

Historically, large numbers of waterfowl have not utilized Alligator River NWR but the refuge does support a substantial year-round population of wood ducks utilizing the numerous ditches, canals, creeks, lakes, natural openings, and swamps. A large number of waterfowl species can be found on the Alligator River and the associated sounds. The addition of the 5,100 acres

of farmland in 1988 substantially increased opportunities for waterfowl management. This management has been achieved primarily by converting farm fields, classified as prior converted wetlands, to moist soil management units.

The results of this year's surveys are given in Table 7. Peak numbers during the 1994-1995 survey period were 1000 mallards, 250 blacks, 4624 pintails, 4200 green-winged teal, and 496 ring-necked ducks. This compares to 590 mallards, 4432 pintails, 4200 green wing teals, and 4040 ring-neck ducks during the 1993-1994 season. It is interesting to note that tundra swan use is steadily increasing.

It appears that overall waterfowl use decreased substantially during the 1994-1995 survey period. Use by mallards, gadwalls, and mergansers increased, whereas use by most other species declined. Although many explanations may be offered for this "trend", perhaps one of the most significant is that all surveys during the 1994-1995 period were ground surveys. Aerial surveys were not conducted due to insufficient funding.

**Table 7**  
**Waterfowl Survey, ARNWR Fall 1994 - Spring 1995**

Waterfowl Type	Nov *	Dec 1	Dec 8	Dec 24	Jan 24	Feb 7	Feb 14	Feb 23	Feb 24	Mar 2
Mallard		248	781	252	504	1000	366	140	620	210
Black duck		0	10	2	4	250	0	5	184	14
Pintail		1793	1340	1795	3335	3540	800	4432	2680	855
Widgeon		12	35	26	0	150	0	12	10	70
GW Teal		1955	1500	271	158	4200	1020	762	905	352
Wood duck		107	49	39	74	316	125	13	120	120
Ring-necked duck		496	258	409	0	450	0	14	295	35
Gadwall		0	0	200	0	0	0	0	362	0
BW Teal		2	0	0	0	0	0	0	0	0
Shoveler		0	0	0	0	0	86	0	0	0
Coot		63	4	63	107	82	205	106	0	165
Canada goose		0	0	0	1	0	0	0	0	0
Tundra swan		6	0	358	488	475	21	276	238	110
Snow/Blue goose		0	0	0	0	0	0	0	0	0
Redhead		0	0	0	0	0	0	0	0	0
Canvasback		0	0	0	0	0	0	0	0	0
Scaup		0	0	0	0	0	0	0	0	0
Ruddy		0	0	0	0	0	0	0	0	0
Bufflehead		0	0	0	0	0	0	0	0	0
Merganser		2	0	0	0	0	6	0	0	0
Unknown		0	0	14	0	212	24	36	0	122
<b>TOTALS</b>		<b>7515</b>	<b>3138</b>	<b>1794</b>	<b>2666</b>	<b>9135</b>	<b>2774</b>	<b>4624</b>	<b>4744</b>	<b>2730</b>

\* No survey data

The Wood Duck Nest Box Program was inactive during 1995 due to insufficient funding and staffing.

#### 4. Marsh and Waterbirds

Although management of moist soil units is specifically focused on waterfowl, numerous other marsh and waterbird species can be observed in these units. Herons, egrets, and rails appear to be most numerous. Killdeer, woodcock, and snipe are common. The kingfisher is often seen adjacent to canals with deeper, more permanent water. During 1995, there were no formal surveys for these species.

#### 6. Raptors

Many raptor species can be observed on the Refuge. Among the most common species are the red-tailed hawk, red-shouldered hawk, and northern harrier. The American kestrel and merlin are also common species. Owl species include great-horned, barred, short-eared, and screech. Of special interest was the discovery of saw-whet owl presence on the Refuge during 1995. Although this species may winter as far south as Alligator River NWR, typical wintering and breeding range is much further north and west. The species was discovered on the Refuge during the summer of 1995. It is not known if this was a disjunct population or if the owl has extended its breeding range.

#### 7. Other Migratory Birds

The refuge is host to a diversity of migratory species. The vast expanse of relatively unfragmented forested habitat on the refuge provides for a wide range of neotropical migrant birds. There are tentative plans to begin neotropical migrant bird surveys as soon as budgets and staffing permit.

## 8. Game Mammals

White-tailed deer, perhaps the most popular game species, are relatively common on the Refuge. Although carrying capacity for pocosin habitat is considerably less than bottomland hardwoods, deer populations appear to be doing well and continue to provide sportsmen with considerable recreational opportunity.

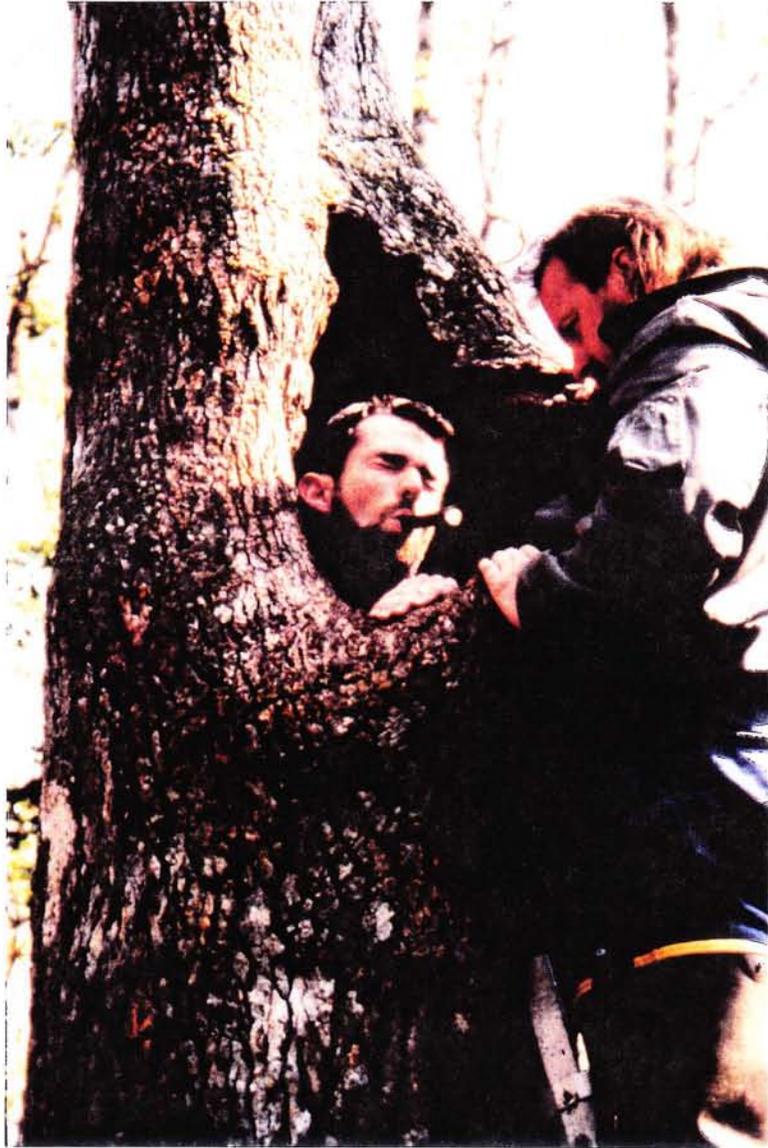
In 1995, the Refuge continued the cooperative black bear research study with the University of Tennessee. The Air Force continued as a partner in the effort and transferred funds to help continue and expand the project. Information, such as sex and age distribution, age at primiparity, birth rate, survival, and density of the bear population will continue to be gathered. Since the study began in September of 1992, 363 trap sites were used for 4,104 trap nights and produced 276 captures of 195 different bears. Because male bears dominated captures, trapping was shifted away from roads during 1994 and 1995. This resulted in capturing a higher frequency of female bears. During the fall of 1994 and in 1995, radio collars were placed on 43 different bears on 44 occasions. Twenty-one of these bears had active collars at the end of 1995. The project is scheduled for completion in May, 1996.



The trick is to get close enough to reach  
the bear... JF 7/95



. . . without the bear reaching you.  
JF 7/95



Removing cubs from a den can be a challenge... JF 6/95



... but well worth it! JF 6/95

#### 10. Other Resident Wildlife

Three wild turkeys were observed on the refuge during 1995. Although the exact origin of these birds is unknown, the most logical speculation is that they moved along the Atlantic Intracoastal Waterway/Alligator River corridor. It is hoped that a viable population will become established on the refuge.

#### 16. Marking and Banding

Wood duck banding efforts resulted in capturing 160 ducks in six attempts with a 3-rocket net. Of the total captured, 140 were banded; 20 were recaptures.

During December, Geo-Marine, Inc., a private consulting firm, trapped and banded 15 tundra swans on Refuge cropland. Twelve of the swans were fitted with radio transmitter backpacks. Geo-Marine has been conducting a Bird Aircraft Strike Hazard (BASH) research project for the US Air Force at the nearby Dare County Bombing Range for several years. The project is scheduled to end in March of 1996, and results will be published shortly thereafter.



Biologist Stewart finally approaches a quota!  
USFWS

#### H. PUBLIC USE

##### 1. General

In the Public Use Program of Alligator River, 1994 taught patience; 1995 taught more patience! Major public use projects such as Creef Cut and Sandy Ridge Trails begun and "almost completed" during 1993 remained in limbo during most of 1994. At 1995's year end, though both projects were very near completion, NCDOT portions remained incomplete. During 1995, DOT accomplished all their commitments, except the enlargement of the parking area at the south end of Buffalo City Road and the addition of a 200 foot area at the south end of Buffalo City Road. Many follow up calls were made. Finally, the truth surfaced--that with personnel changes, hurricane damage, and other impediments, the project had fallen through a crack and

would need to be requested again--from scratch! So, 1996 promises to be a new beginning! (See Section H.4. for details). The good news is that Creef Cut is completed and looks great! And, the Refuge has not given up on the Buffalo City Road Parking Area for the Milltail Canoe/Kayak Trails and Sandy Ridge Wildlife Trail!

The public use program of this Refuge remains primarily consumptive in nature, with the hunting program being most active. Public use trends are moving upward in the non-consumptive areas; however, major non-consumptive use is not anticipated in the future. The Milltail Creek Canoe/Kayak Trail System has been very popular. The Refuge has experienced an increase in non-consumptive use since the trails were completed and word has spread!

Total visits to the refuge in 1995 were estimated to be 12,447. Administrative offices for the refuge remained in the GSA leased office space in Manteo. A few visitors continued to locate the office, but most information was disseminated by telephone, correspondence, or through the news media. During 1995, the refuge continued to focus on providing a greater number of media contacts while keeping the messages short and simple. A total of 10 news releases and 6 radio/TV spots were done.

## 2. Outdoor Classrooms - Students

Many teachers have established regular patterns in their utilization of the marshes of Pea Island for independent use with their classes. More recently, classes have begun to show an interest in visiting Alligator River NWR. More independent use by classes is anticipated once the trails and interpretive materials are in place and become to be known. Occasional requests are received for staff/volunteer led programs on the Refuge. At this point, most of those requests are related to the Red Wolf Program.

Trained volunteers continue to be available to conduct wildlife programs in area classrooms. Programs on the Red Wolf, Birds, Mammals, Amphibians, Reptiles, Fish and Animals without Backbones and Bird Banding and Migrations are available. During 1995, these educational programs were presented to 1,233 students.

## 3. Outdoor Classrooms - Teachers

There were no local requests for teacher training workshops during 1995. Since Alligator River and Pea Island Refuges are located in an area rich in conservation education/interpretation agencies, these refuges do not receive the requests common on other stations that are often the sole sources available. The North Carolina Aquarium, Jockey's Ridge State Park, Nags Head Woods Ecological Preserve, and Cape Hatteras National Seashore offer environmental education and teacher training activities.

Teachers here are hounded constantly to attend such functions. For this reason, the Refuge has chosen to focus more on other educational needs rather than attempt to compete with other conservation agencies. The Refuge took the lead in coordination of a joint leaflet to provide teacher assistance in planning field trips (see informational packet). Late in 1995, a committee was established to coordinate and sponsor an environmental conservation continuing education program for NC teachers. Hopefully, this program will become established during 1996.

#### 4. Interpretive Foot Trails

Two trails were begun in 1992; one was still partially incomplete at the end of 1995. Creef Cut Wildlife Trail and Fishing Area was completed during 1995. Final touches included installation of the interpretive signs, directional signs, curbing, and bollards. The landscaping has required more maintenance than had been anticipated; however, several volunteers have undertaken overall maintenance of the trail and parking area.

Sandy Ridge Trail is complete, except for the installation of the sandblasted trailhead signs and the interpretive trail signs. The Milltail Creek Canoe/Kayak Trails are also complete. In addition, a short trail leading from the parking area to an overlook viewing Milltail Creek is complete. Unfortunately, the NCDOT has not completed the enlargement and marling of the parking area. At this point, it seems the project has been lost in the shuffle of personnel and projects. Toward the end of 1995, the refuge was advised to re-apply for assistance.

The Milltail Creek Canoe/Kayak Trail System continues to be quite popular. On most days, there are several folks using the trail. If there were a local place to rent canoes or kayaks, use would increase dramatically; however, there is not a demand great enough to consider a concession for this purpose. Two businesses were issued special use permits to conduct guided canoe or kayak tours on the Milltail Creek Trail System during 1995. Approximately 250 visitors participated in guided tours provided by the holders of these SUP's.

During 1995, approximately 2,795 people utilized the Alligator River trails. Of these, fewer than 500 used the walking trails. But, it is anticipated that there will be a continued increase in trail (foot) use on this refuge for some time to come.

#### 6. Interpretive Exhibit/Demonstrations

Refuge staff manned displays and exhibits at some of the usual annual events around Dare County and eastern North Carolina. Unfortunately, due to staff shortages, many requests were denied for this type of activity. Educational Programs for the refuge during 1995 are shown in Table 8.

Table 8  
ALLIGATOR RIVER PUBLIC USE PROGRAMS\*

Program Type	On/Off Refuge	#Programs	Participants
General for Adult Groups	Off	8	625
General for Public	On	10	395
General for Public	Off	8	315
School or School Related Gr	On	5	300
School Groups	Off	28	1,235
N.C. State Fair	Off	1 staff for 4 days	
International Wolf Symposium	Off	2 papers	500
N.C. Zoo Exhibit Opening	Off	2 days	2,000
Booth - NC Museum of Nat. Hist.	Off	2 days	500
Engelhard Seafood Festival	Off	1	1,000
Dixie Deer Classic	Off	1	10,000
Scuppernong River Festival	Off	1	500
Fossil Rim Wildlife Center	Off	2	500
Farm Days Exhibit	Off	1	250
Pathway to Fishing	Off	1 (2 staff)	120

\*Includes complex off-refuge programs and Alligator River NWR on-refuge programs.

#### 7. Other Interpretive Programs

Red wolf howlings have proven to be popular programs on the refuge. Because of overwhelming demand for howlings, a decision was made to schedule 10-12 howlings each year and decline requests from individual groups for this program.

A number of off-refuge programs were conducted during 1995 by staff and volunteers. Many dealt with the Red Wolf Program; others addressed specific and general refuge related topics. These programs and other related off-refuge programs are shown in Table 8.

#### 8. Hunting

With approval of the master plan shortly after establishment, the refuge was divided into 3 basic public use areas, with several additional safety or management zones closed to all hunting. As new areas have been acquired, they have been added to 1 of the 3 existing categories, or (in the case of the farm fields) put into a newly created category. The farm fields were designated as open to all authorized uses during September and October (except waterfowl hunting) but closed to public entry during all other times. With additions and deletions of land in the Refuge, the ratio of land designated for hunting with chase dogs and land designated as closed to use of chase dogs has remained relatively

constant (1:1). The 5-year review of the master plan took place during 1993. Some changes in the hunting area designations resulted; however, the ratios remained approximately the same. Public reaction to the changes were favorable.



Success . . . BWS 11/95

For the fourth season, Refuge hunting permits were required for all hunts. The permit system has also been accepted readily by hunters. Again this year, the hunt leaflet contained the permit; signing the permit acknowledged having read and understood the leaflet. This system has worked well on this Refuge and has reduced the effort required to change regulations significantly.

White-tailed deer continued to be the most sought after game species on Refuge lands. Since Alligator River contains over 150,000 acres of habitat traversed by more than 150 miles of logging roads, and because many of these roads share junctions with State roads, it is difficult to establish effective hunter check stations. The NCWRC again required hunters to register hunter-killed deer with a local wildlife cooperator agent; however, they assume that an estimated 40% go unreported. In past years, the figures reported by the State have been utilized and extrapolated to provide more realistic estimates. At the time of this writing, State figures had not been compiled for 1995. According to Big Game Biologist Dave Rowe, approximately 200 deer were harvested on the refuge during the 1995-96 season.



Typical deer hunting on Alligator  
River NWR. BWS 11/95

This year was Dare County's fifth annual bear season since the NCWRC and County Commissioners reinstated a bear season. The 9 day bear season ran November 13-18 and December 11-13; no bears were documented as taken in Dare County during 1995.

Most of the brochure boxes labeled with signs stating "Hunter Information" survived the winter and needed just a bit of sprucing up and stuffing. The new hunt leaflets arrived on time and were clear and correct. Again this year, extra effort was made throughout the seasons to ensure that leaflets were always available, since the brochure contained the required hunting permit. The effort was minimal, since routine patrols took refuge officers by the boxes frequently.

September 11, bow season began along with the usual weekend patrol assignments for refuge officers. Muzzle loader season came in on October 9, and regular gun season started on October 16. As always, on November 1, the farm field gates were closed and locked. For the rest of the year (and through September, 1995), this area was closed to all public entry.

Waterfowl seasons were October 5-7, November 20-25, and December 11 - January 20. A limited amount of waterfowl hunting took place on the refuge, but most occurred over open water in the sounds and in Milltail Creek. The farm fields were open to public use during October; however, the area was closed to waterfowl hunting.

Though the regional hunting policy for youths has been difficult to enforce, the fact that Dare County Schools already had the State Hunter Safety Course as a part of the seventh and eighth grade curriculum certainly helped. Since 1991, North Carolina has required all first-time hunters to successfully complete the Hunter Safety Course. In addition to the courses offered in the public schools, NCWRC Officer Brinkley and his associates conducted several extra classes to enable other youth/adults in the area to qualify to hunt on the Refuge. The Refuge staff has yet to hear of a person who has needed the course and was unable to find a class.

Estimated public hunting activity appears below:

Activity	Visits
Duck	274
Big Game	2,023
Upland Game	393

There are very few places to quail or rabbit hunt on the Refuge. Small game hunting is primarily for raccoon, squirrel, and rabbit.

## 9. Fishing

The heaviest recreational fishing effort in the vicinity on the Refuge is 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. Angling for bluegill, crappie, chain pickerel, channel catfish, flier, largemouth bass, and yellow and white perch is considered good. During 1995, there were an estimated 1,235 fishing visits to the Refuge. The construction of the handicapped accessible fishing dock at Creef Cut is expected to increase fishing numbers eventually; however, little use of the structure was observed during 1995.



A relaxing afternoon ... could life be better?  
BWS 10/95

#### 10. Trapping

Furbearer trapping was allowed under North Carolina regulations. Since trapping is considered a commercial use of the Refuge, neither visits nor activity hours are normally recorded under public use. For the 1995 trapping season, no special use permits were issued for Refuge trapping.

#### 11. Wildlife Observation

Canoeists enjoyed paddling on Milltail and Whipping Creeks and observing an occasional alligator, wood duck brood, or other wildlife in the area. The Milltail Creek Canoe/Kayak Trail has encouraged folks to come to the Refuge for wildlife observation.

Wildlife photographers utilized the Refuge to some extent for a chance at bear, deer, or any number of birds and other animals. General habitat scenes were popular for an adventuresome few. The following figures represent wildlife/wildlands observation during 1995:

Activity	Visits
Foot	2,678
Vehicle	5,996
Boat	1,273
Photography	219

### 17. Law Enforcement

Refuge collateral duty officers numbered four for the 1995-96 hunting season. Because of staff shortages, in general, the officers were already under heavy work loads before the hunting season began. This situation made the Alligator River season a long one!

Officers Johnson, Strawser, Cooley, and Windley attended the annual LE Refresher in Tallahassee and requalified midyear. The following NOV's were written by Refuge Officers:

<u>Violation</u>	<u>Number</u>
No Federal Duck Stamp	4
No Refuge Permit	4
Transporting Loaded Firearm	8
Destruction of Federal Property	1
Operation of ATV in Area Closed to ATV Use	1
Operating Vehicle in Area Closed to Vehicles	2
Unplugged Gun	1
Hunting Over Bait	2
Hunting in Closed Area	2
Lead Shot	1
Firelighting	1
Trespass in a Closed Area	1

In addition, NCWRC Officers wrote the following State NOV's for violations occurring on the Refuge:

<u>Violation</u>	<u>Number</u>
Firelighting	3
Take with aid of vehicle	1

### 18. Cooperating Associations

FY 1995 for the Coastal Wildlife Refuge Society noted the following accomplishments:

--The Pea Island Visitor Center exhibits were added through a Watchable Wildlife grant made possible primarily because of the many partners involved in the total Visitor Center Project. CWRS funded "final touches" for the Visitor Center, including signs, furnishings, a microwave, etc.

--CWRS provided stipends for two summer interns for the Public Use Program on Pea Island.

--CWRS purchased materials to build the photoblind on North Pond at Pea Island. Matt Partin, Neill Yelverton, and Gary Peebles provided the manpower, guided by Refuge Volunteers Warren Davis, Lee Yoder, Don Perry, and Kris Kristoffersen. The blind looks

great and will provide excellent wildlife viewing once the North Pond pump is repaired this winter!

--The **Run with the Red Wolf** Committee printed 6,000 "Red Wolf, YES!!" bumper stickers to assist in raising public awareness of the red wolf reestablishment project in North Carolina. Over 3,500 were distributed through 1995.

--One thousand copies of each of the quarterly issues of Wings were printed by the Manteo High School Graphic Arts Department and funded by the CWRS.

--A new Texas Instruments MicroLaser 600 printer was purchased for the Public Use Program.

--A cellular phone was purchased for the Red Wolf Project.

--An upgrade was accomplished on North Pond Trail; CWRS rented the equipment and the USFWS provided the operator (Go, Murphy!!) and funded the material.

--Creef Cut Trail was completed and officially opened.

--Additional work was done on Sandy Ridge Trail; parking area work by NCDOT is still pending.

--All refuge leaflets, except the Alligator River Hunt leaflet and the Pea Island Wildlife lists, were printed by CWRS.

--During 1995, the Visitor Center Book Store inventory grew from \$16,722 to over \$44,000. This was a necessary increase in order to gain better discounts on purchases made for resale and to provide a better selection, especially in books and T-shirts. Gross sales income for 1995 totaled \$81,850.07; net income was \$36,860.87. In the future, net sales income is expected to exceed \$50,000 annually.

For FY 1996, the Board of the CWRS has committed to building an addition to the Visitor Center and funding a part-time Public Use employee for the Refuge whose primary duties will involve the Pea Island Visitor Center and Book Store. See Tables 9 and 10 for sales and financial information for FY 1995.

Table 9. Sales Report - FY 1995

Current Inventory

Books	20,753.95
T's/sweats/bags	19,099.40
Misc (jewelry/bookmarks/patches/etc.)	4,237.75
 Total Inventory September, 1995	 44,091.10
 Inventory on hand in September, 1994	 16,722.00
Cost of Goods during 1995	68,891.44
Total Inventory Available for Sale during 1995	85,613.44
Total Inventory September, 1995	44,091.10
Total goods sold during 1995	41,522.34
 Actual Gross Income from Sales for FY 1995 (includes tax)	 81,850.07
less sales tax	3,466.86
Gross Income after tax	78,383.21
 Net from Sales (FY 1995)	 36,860.87

Table 10. Financial Report FY 1995

## Donations

General - undesignated	17,061.25	
North Pond Trail - donation box	1,146.00	
Visitor Center - donation box	1,365.76	
Designated - Red Wolf	175.00	
Designated - Run	3,578.00	
Designated - Visitor Center	1,762.00	
Designated - Sea Turtles	667.00	
Total Donations		25,755.01
Interest		123.47
Gross Sales Income		
Non-taxable	91.47	
Taxable	81,553.41	
Total Gross Sales Income		81,644.88
Total Income		107,523.36
Expenses		
Administrative Costs	258.29	
Membership Fees	50.00	
Refuge Purchases		
General	5,572.31	
Run	1,786.24	
Visitor Center	2,136.47	
Total Purchases for Refuge		9,495.02
Sales Expenses		
Costs of Goods	68,891.44	
Misc.	4.00	
Sales Tax	3,466.86	
Total Sales Expenses		72,362.30
Total Expenses		82,165.75
Total Income/Expense		25,357.75

I. EQUIPMENT AND FACILITIES1. New Construction

In June 1994, an RES was submitted for an oil/paint storage building to be constructed at the East Lake Maintenance Facility. The RO-Engineering estimate to construct the building was

\$40,000. Construction bids were accepted and in September of 1994, a \$24,000 contract was awarded to Morgan Construction of Atlanta. The remaining bids received exceeded the available funds for this project. A preconstruction conference was held in November of 1994. However, Morgan Construction did not complete any work in 1994. Because construction of the building was not initiated in a timely manner, CGS issued a default notice in early January of 1995. The contractor hand delivered most of the submittals for the building to RO-Engineering on the last day before default set by CGS. Construction was not initiated by April 1, at which time CGS agreed to forfeit the contractor. CGS readvertised construction of the building in July. The only bid submitted was well in excess of funds available for the project and negotiations with this bidder were unsuccessful. Subsequently, RO-Engineering suggested that CGS readvertise. To date, a potential contractor has not been identified. The Refuge still does not know when, or if, construction of the building will begin.

In 1994, this Refuge received DU Marsh funding to construct an additional 400 acres of moist soil units. A contract was awarded to Greenville Paving, Greenville, NC in late September 1994. The project consisted of constructing 4 miles of levee (estimated 34,000 yd<sup>3</sup>.) along with the purchase and installation of 4 water control structures. Refuge staff completed the survey work and set grade stakes. The contractor was unable to begin until January. Immediately following initiation of construction, the decision was made to increase the width of the levee. The narrow widths of older levees were causing inordinate maintenance problems. As a result, by the end of January, approximately 2.5 miles of levees were complete, but over 90 per cent of the funds available had been expended. In February, the refuge requested and received a verbal commitment for additional funding from DU based on levee configuration changes. The project was completed in August. Total DU project cost was \$56,000 and included purchase and placement of 4 water control structures and construction of 3.5 miles of levee involving 75,000 yd<sup>3</sup> of material. The addition of this 400-acre unit brought the total moist soil acreage on the refuge to 2,200 acres.

## 2. Rehabilitation

Very little progress was made on the bridge replacement/wetland restoration project during 1995 due to high fire danger during the dry time of the year and wet conditions at other times. Three structures were installed at odd times during the year - 2 structures along Point Peter Road and 1 at South Twiford Road and Permanent Pond. The Point Peter Road structure turned into a major project due to continual road problems. The effort took slightly over a month with approximately 1,600 yd<sup>3</sup> of fill hauled. This structure controls 8,000 acres and completed hydrological restoration along the east side of the Refuge. The overall hydrological restoration project will take at least another 3 years to complete and will replace 28 unsafe wooden

bridges (30-50' in length) with approximately 36 large water control structures and fill. These efforts will eventually restore natural hydrology on 60,000 acres of drained wetlands and at the same time provide much needed access for management purposes. A total of 14 structures has been installed to date, which restores hydrology on roughly 30,000 acres along with eliminating some very unsafe bridges.

Two water control structures along Sawyer Lake Road, controlling about 200 acres of moist soil units, were repaired in January by digging out, backfilling, pouring concrete, etc. This project turned out to be time consuming - proximity to the perimeter canal system prohibited direct equipment access. Lots of shovel work along with hauling a lot of fill on Mackay Island NWR's flex track! Several other levee leaks were also repaired.



Milltail Road Bridge in "fair" condition.  
DCD 1/96

Inspections of Refuge bridges were finally conducted by Foothill Engineering Consultants and Range Engineering of Denver on February 7. Surprisingly, both the Milltail Creek and Navy Shell Road bridges were found to be in "fair" condition. The Milltail Bridge was found to be structurally and safety feature deficient with an estimated remaining life of 5-10 years and a replacement cost of \$457K+. The Navy Shell Road Bridge was structurally sound, but safety feature deficient, with an estimated remaining

life of 5-10 years and a replacement cost of \$268K. Load capacity (12 tons), one lane bridge, and object marker signs were recommended for Milltail while narrow bridge and object marker signs were recommended for Navy Shell. Required safety signs were ordered, were received, and will be installed.

### 3. Major Maintenance

Boundary posting continued to be a high priority item. Approximately 100 miles of exterior boundary remain to be posted.



Road grading is a constant need on Alligator River NWR. JJ 6/95

Improvements to the primary Refuge road system continued to be a high priority item. Most Refuge roads have become impassible even to 4x4's; this lack of access severely impacts the Refuge's ability to conduct management and public use programs. Work on major rehab of the entire 50 miles of primary roads began in 1992. By the end of 1994, approximately 30 miles had been completed. These efforts continued during 1995 with work concentrating on Possum, Chip, Point Peter, and Pamlico Roads. Only slightly over 50% of the planned work was completed due to extended high fire danger during the dry part of the year and wet

conditions at other times. Slightly over 8 miles of road were partially completed by removing all road shoulder vegetation (using KG blade and crawler), recrowning, and hauling approximately 3,200 yd<sup>3</sup> of fill for holes and low spots.



Canal maintenance in farm units. DLS 7/95

Equipment repairs are a never ending problem, partially due to a lot of hard work and partially due to using some old equipment. A small sample of corrective measures for these problems follows: turned pins and bushings on D-3, replaced shims on grader circle, rebuilt fuel injection system on dragline, and replaced radiator and fan shroud on Terrevah.

#### 4. Equipment Utilization and Replacement

Refuge equipment was loaned on several occasions to other northeastern North Carolina refuges. Likewise, Alligator River borrowed equipment on occasion.

Several pieces of equipment were purchased during the year. These included: Ford LT 9000 Truck/Tractor, Fontaine 50 Ton Lowboy, and John Deere 6446 Front End Loader.



New Ford LT 9000 was sorely needed. CDC 1/96



John Deere 5400 farm tractor. CDC 1/96



New John Deere 644G put to use immediately.  
CDC 01/96

Several pieces of heavy equipment were obtained from excess property sources. These included: Fiat Crawler Tractor, Terrax Forklift, and four full-track personnel carriers from DRMO to be used in fire operations.



Fulltracks obtained from excess property  
at Red River Arsenal will increase our  
maintenance and fire management capabilities.  
CDC 1/96

The Refuge provided trade-ins for other stations in order to obtain access to the vehicles they were replacing - their junkers were better than a lot of our regular vehicles!

#### J. OTHER ITEMS

##### 3. Items of Interest

Project Leader Johnson served as a team leader for the Roanoke-Tar-Neuse-Cape Fear Ecosystem through September.

North Carolina Refuge cluster meeting was held at Alligator River on October 11.

The Refuge revenue sharing check of \$318,093 was distributed to Dare County.

Numerous Air Force personnel visited the Refuge during the year to discuss various items - ranging from water management to endangered species management.

A seemingly endless string of university professors, graduate students, state agency and other federal agency personnel visited to discuss research projects, environmental compliance issues, etc.

#### 4. Credits

The Narrative Report was a joint effort by the entire staff.

## INTRODUCTION

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. At the last survey, the refuge contained 5,915 acres of beach, dunes, high marsh, dikes, salt marsh, impoundments, ponds, and salt flats; however, severe ocean overwash and beach erosion have caused the loss of a portion of the beach/dune acreage. 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, NC and 225 miles southeast of Washington, DC.

Pea Island's climate is generally moderated by the ocean, thus it is cooler in the summer and warmer in the winter than the NC 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 winds are usually from the northeast in the winter.

The diversity and abundance of bird life 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 bird species can be found at Pea Island during the winter months and during spring/fall migrations. During the summer months, several species of herons, egrets, ibises, terns and gulls, along with American avocets, willets, black-necked stilts, other wading and shore birds and a few species of ducks nest on the refuge. Peregrine falcons, bald eagles, piping plovers, and loggerhead sea turtles are among the endangered or threatened species that utilize the refuge.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1995

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

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## A. HIGHLIGHTS

CWRS has a banner year! (See Section H.18 of Alligator River Narrative)

Approximately 65,000 yd<sup>3</sup> of material dredged from Oregon Inlet deposited on refuge beach. (See Section D.5)

Hurricane Felix threatened landfall on August 12... (See Section F.1)

A photoblind at last.... (See Section H.12)

## B. CLIMATIC CONDITIONS

Pea Island NWR enjoyed fairly mild temperatures throughout the year. Below average spring rains combined with only one pump station adversely affected water levels in refuge impoundments. In August, Hurricane Felix provided all staff with plenty of work and excitement. Refuge hurricane preparations began on the 8th with predicted landfall on the 10th. Dare County ordered mandatory evacuation at noon on the 8th. It immediately became almost impossible to travel on the main highways due to traffic (3+ hours travel time from Pea Island headquarters to Manteo). The storm eventually moved north along the "Banks", never coming ashore. The area was pounded by 8-12' seas for 72 hours, and NC Highway 12 was closed due to overwash at several locations.

## C. LAND ACQUISITION

### 2. Easement

The saga of the old Oregon Inlet Coast Guard Station continued through 1995. This 10-acre inholding and old station building, after abandonment by the U.S. Coast Guard (USCG), was quitclaim deeded to Dare County in 1992 by the Secretary of Transportation, as directed by Congress. Early in 1993, a group of individuals claiming to be heirs of the original owner who sold the land in 1897 to the USCG, filed a deed to the property based upon a "reversionary clause" in the USCG title. They posted the site, and moved a caretaker into the building. They threatened to sue if the County attempted to exercise it's quitclaim deed. The group then placed the property for sale - for \$1 million. The part of the site that was refuge property under easement to the USCG reverted back to Refuge management. As a condition of their easement agreement, the USCG finally issued a contract for removal of all their improvements (buildings, pier, seawall, etc.) in December of 1994. Further research into the status of the inholding revealed that the National Park Service (NPS) had instituted a taking of all land contained inside the boundaries established for the Cape Hatteras National Seashore by Congress in 1959. This taking document, along with the title work provided by the "heirs" was submitted to the Regional Solicitor

for a ruling on who held legal title. In the Solicitor's opinion, based upon the 1959 condemnation, fee title to the property was legally quitclaimed to Dare County in 1992. However, the County has yet to record or formally accept the deed. Under its bylaws, the County may be required to formally accept the deed before title passes to it. Therefore, title may still be in the United States with jurisdiction lying with NPS. The purported heirs have continued their law suit against Dare County.



North End of Pea Island NWR with several of  
the on-going delimmias - Coast Guard Station,  
Terminal Groin, etc. DLS 1/96

The new 3.3 mile section of relocated NC Highway 12 was opened to traffic the week of December 11. All North Carolina Department of Transportation (NCDOT) rights-of-way for the old section of road will be abandoned after asphalt and sandbags are removed and natural conditions restored as per CAMA and Service ROW and Special Use Permits. This should be completed in 1996. However, Dare County obtained a temporary restraining order (TRO) in Superior Court in early January, 1996, preventing NCDOT removal of the sandbags. Further deliberations will determine if the TRO will be lifted or an injunction granted, If an injunction is granted preventing NCDOT removal of the sandbags, the Department of Interior will seek removal of the case to Federal Court for consideration.

## D. PLANNING

### 2. Management Plan

The Water Management Plan written in 1993 was used for 1995 water management in the three impoundments.

A Burning Prescription and Section 7 covering 1181 acres was written and approved.

Compatibility Determinations were completed on all secondary uses.

A Sea Turtle Nest Report summarizing results of the 1995 nesting season was completed.

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

Refuge staff attended monthly meetings during the year with NCDOT associated with the relocation of 3.3 miles of NC Highway 12. Relocation of this highway segment was absolutely essential since most of it literally sat atop the beach. Even lunar tides often resulted in water on the pavement in several locations. Frequent storms resulted in highway closure for days during each storm event, stranding the 7 villages that occur south of the Refuge. Refuge staff have been proponents of relocating this highway segment for years.

Several meetings were attended by Refuge staff and NCDOT concerning the construction of a secondary berm west of the present sandbag area and mining for sand behind the Oregon Inlet Groin. Sandbag removal was mandated by CAMA, ROW Permit and Refuge Special Use Permit. Following extreme high tides caused by Hurricane Felix and other storm events, some pooling of ocean water occurred next to the new section of Highway 12. To prevent ocean overwash from minor to moderate storm events, the construction of a secondary berm was presented to Refuge staff by NCDOT as an alternative to leaving the sandbags and placing culverts along the new stretch of highway. Many politicians in the Dare County area opposed the removal of the sandbags.

The Refuge staff attended one meeting during the year with the USCOE pertaining to the Oregon Inlet Jetties. The primary subject of this meeting was the sand bypassing plan. In February, Congressman Walter Jones proposed legislation to give the USCOE 100 acres of DOI land (35 acres of Refuge, 65 acres of seashore) for jetty construction at Oregon Inlet. The proposed legislation would exempt the project from all other permit requirements (including NEPA??). This proposal resulted in numerous contacts by environmental groups and news media.

CAMA and USCOE permits were obtained for construction of the North Pond pump. In June, the pump head and engine were refurbished, and flanges were installed on the new pipe. A negotiated contract was issued to a local contractor for the pump construction in September. Bulkhead and pump materials were on site, and vegetation was removed in preparation for new bulkhead. The furlough and problems with construction specifications resulted in a delay in the actual site work by the contractor. The project will be completed in 1996.

Plans for the new addition to the Pea Island Visitor Center are under way! Since no permits were required, the construction of the 28' x 24' addition will begin in spring of 1996.

Refuge staff participated in numerous meetings with USCOE, NCDOT, ES, other State agencies, and local officials over the course of the year, dealing with activities/actions associated with Oregon Inlet Jetties, beach nourishment, dune construction, and relocating parts of NC Highway 12.

These and other issues will continue due to proximity of the Refuge to Oregon Inlet, presence of NC Highway 12 as the only access to 7 villages south of Nags Head, and the political power of the Outer Banks politicians.

#### 5. Research and Investigation

Refuge staff continued data collection along Refuge beaches on two occasions this year as part of the monitoring plan examining effects of USCOE disposal of dredged material. The USCOE planned to dredge 300,000 cubic yards of material from the Oregon Inlet navigational channel and outer bar. This material was to be hydraulically placed between miles 1 and 3 south of Oregon Inlet. Hurricane Felix and other severe weather conditions limited the time frame of the dredging operation. Great Lakes Dredging contractors deposited 65,000 cubic yards of material between 2500 and 2800 feet south of the old Coast Guard Station.



Pipe dredging operation on north end  
Pea Island NWR. WDS 9/95

A hopper dredge was used to remove 168,000 cubic yards of material from the navigation channel. This dredged material was deposited in 10 to 14 feet of water parallel to the Refuge beach. The monitoring plan, developed by the Refuge, was modified this year to cover 6 miles of beach for pre-dredged material disposal monitoring, and 1 mile of beach for post-dredged disposal monitoring and the 6 months following the completion of dredged material disposal. This one mile included the 300' disposal site and areas north and south of the site to serve as controls.

Sediment sampling, along with beach slope, composition, scarp, and fauna data were collected along transects. In addition, sand compaction was measured with a cone penetrometer prior to and after dredged material disposal. Identifying environmental conditions that influence fauna populations will assist in evaluating effects directly associated with nourishment. All data were delivered to Coastal Research Associates (CRA) of Charlottesville, VA, for analysis and report writing. CRA was issued a contract for this project using USCOE transfer funds.



Volunteers collecting beach nourishment data.  
WDS 9/95

Refuge personnel collected sand compaction readings and 5 sand samples at each sea turtle crawl to develop baseline data for use in imposing special conditions on SUP's issued to USCOE and NCDOT for beach nourishment.

#### 6. Other

Following Hurricane Felix, normal high tides were inundating sections of Highway 12. NCDOT was issued authorization to make emergency repairs on sections of damaged dune line. Due to a lack of sand, the Refuge suggested mining behind the Oregon Inlet groin or using some of the stockpile material from the mitigation site. The stockpiled material was to be used only for this emergency situation.

### E. ADMINISTRATION

#### 4. Volunteer Programs

Again during 1995, volunteers at Pea Island formed the hub, in spirit, for the entire Alligator River Volunteer Program. The Host/Hostess Program continued year round, tapering off to four days a week during the winter months. From April through November, the Visitor Center was open from 9 to 4, seven days

each week. During the remaining months, it was open 9 to 4 on Thursday - Sunday.

The bulk of volunteer hours at Pea Island involved staffing the Visitor Center, conducting programs, and working with sea turtles (both **Turtle Patrol** and **Turtle Watch**). Volunteers also constructed a photo-blind during late summer. Two summer interns, Neill Yelverton and SCA Intern Gary Peeples, worked full time in the Public Use Program at Pea Island during 1995; a third, Matt Partin, was shared between the Pea Island and Alligator River Public Use Programs.



Gary Peeples, Don Perry & Neill Yelverton  
during fall bird walks. BWS 11/95

Summer and fall bird walks and summer Children's Wildlife Discovery programs were conducted by volunteers as were special programs requested by schools and other groups. In fact, essentially all public programs conducted during 1995 at Pea Island NWR were done by Refuge volunteers.

Two beach clean up operations occurred during 1995. In April, the NPS, USCG, and FWS sponsored a beach clean-up to celebrate Earth Day. In September the "Big Sweep" was completed.

For additional information about the Volunteer Program, see Section E.4. of the Alligator River NWR Narrative.

## 6. Safety

Monthly safety meetings were presented at the Manteo Office. All Refuge staff attended.

## F. HABITAT MANAGEMENT

### 1. General

Pea Island, a coastal barrier island, consists of 7 basic habitat types. The most recent survey revealed 456 acres of ocean beach; 518 acres of barrier dune; 630 acres of sand ridge, brush, and grassland; 3,024 acres of irregularly flooded salt marsh; 328 acres of salt flat; and 3 brackish water impoundments totaling 940 acres. Beach and dune acreages change from year to year.

Hurricane Felix's approach to the Outer Banks on August 8-17 provided the staff with plenty of work and excitement. The Hurricane Contingency Plan was activated on the 8th - all buildings were boarded up, staff was evacuated, impoundment unit water control structures were opened to begin dewatering, etc. This effort was unnecessary since Felix headed north on the 17th. Heavy surf pounded the Outer Banks for 10 days resulting in extensive beach erosion and additional breaches in the primary dune line. Highway 12 was closed for 2 days. Large pools of ocean water occurred along sections of the new Highway 12. The turtle safe zone was inundated for several days resulting in 14 drowned turtle nests. Fortunately, no direct damage to Refuge real or capitalized property was sustained.

A draft of the final report for the Beach Renourishment Monitoring Project (Contract 1448-0004-93-036) was completed in March. Four major conclusions were noted: (1) sand from Oregon Inlet is compatible with Refuge beach sand; (2) the placement of large quantities of material on beaches produces steep beach slopes; (3) sand placement results in a short term (6-8 months) reduction in productivity or a loss of virtually all micro-fauna;

and (4) sand placed on the beach migrates into the sediment budget. In addition, these steep slopes appear to be undesirable for turtle nesting.

As 1995 came to a close, NCDOT had completed the new Highway 12 segment and most of the mitigation site located 3.5 miles south of headquarters. The relocated section of NC Highway 12 opened to traffic the week of December 11th. The restoration of the old section of highway to natural conditions and final grading and planting compatible plant species in the mitigation site and grain field will continue into 1996.



Aerial view of mitigation site. DLS 1/96

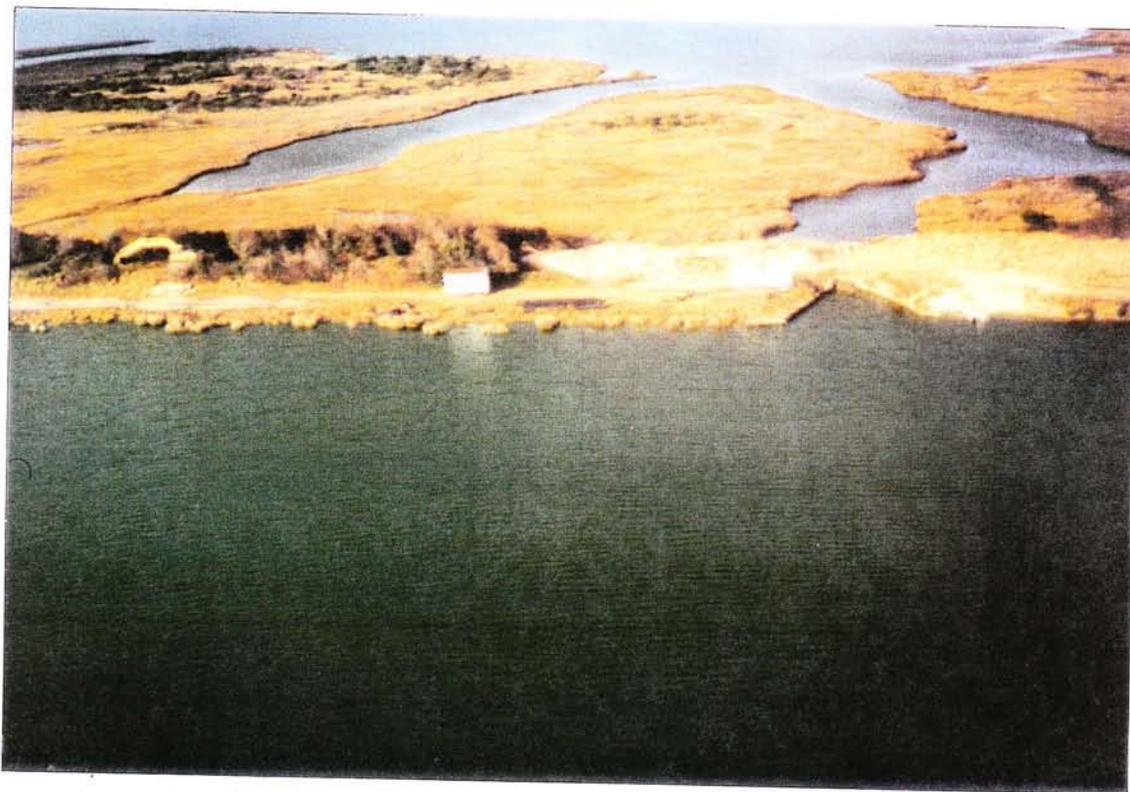


Greater snow geese graze next to the recently opened  
NC Highway 12. WDS 1/96

## 2. Wetlands

A lack of pumping capabilities made it difficult to maintain target water levels in South and North Ponds resulting in low productivity during the 1995 growing season. In addition, water inflow into the impoundments by wind tides was restricted to strong southwest winds and high tides. Most of the winds throughout the spring and summer months were from the northeast and east directions. This pushed ocean water into the Pamlico Sound resulting in an increase in salinity levels and limited the amount of water inflow into the ponds.

In North Pond, widgeon grass and other species considered good or fair waterfowl foods were found on 25% of the transect plots. The remaining 75% of the plots consisted of bare ground or plant species of little or no food value for waterfowl. Fair to good food value species were found on 54% of the plots in South Pond. The remaining 46% of the plots consisted of bare ground with little or no food value species.



North Pond pump site - hopefully finalized  
by early 1996! DLS 1/96

Although New Field Pond pump was operational, the high salinity levels (> 20 ppt) from the sound adversely affected the submerged aquatic vegetation. Many of submerged aquatic plants observed were either dead or highly stressed. Vegetation present on 54% of the plots in New Field consisted of fair to good food value and 46% of the plots consisted of species with little or no food value and bare ground.

Wetlands in the Salt Flats were flooded and dewatered by natural tidal ebb and flow and by rainfall/runoff. Vegetation has remained relatively unchanged for many years in this area. The predominant vegetation is glass wort (Salicornia sp.), sea oxeye, and S. patens.

The 2 small mitigation ponds near the southern boundary created by NCDOT again produced good widgeon grass. The pond fringes also continued to produce stands of Bacopa sp., Scirpus sp., and Cyperus sp. Waterfowl use was moderate and appeared to be increasing.

#### 4. Croplands

Much of the plantable area of New Field has been affected by sand deposited by overwash and by salt concentration. During 1995, the field was bisected by the relocated section of Highway 12. Portions of the field will be restored after the removal of pavement from old Highway 12 in 1996. The "new" New Field will be planted to a permanent pasture with turf-like species.

#### 6. Other Habitat

The SUP issued to NCDOT for the construction of the secondary berm included the removal of pavement which was a remnant of the old highway located on the north stretch of beach. The pavement will be removed with convict labor during 1996. The pavement removal will improve nesting habitat for the threatened loggerhead sea turtles.

#### 9. Fire Management

Approximately 200 acres of the south end of Pea Island were burned on December 5, 1995. The remaining 850 acres in the burn units will be burned in 1996.



Flames from the prescribed burn light up the sky!

WDS 12/95

## G. WILDLIFE

### 1. Wildlife Diversity

Pea Island has a high natural diversity of habitat types. Habitat management practices, such as prescribed burning, discing, brush removal, and green browse planting, serve to enhance habitat and wildlife diversity. Pea Island provided habitat for a wide variety of mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans during 1995. This diversity was especially evident in birds; more than 315 species of birds have been identified in the area.

### 2. Endangered and Threatened Species

#### a. Federally Listed and Endangered Species

**American bald eagle** (Endangered): Bald eagles, Haliaeetus leucocephalus, often pass over Pea Island. No bald eagles were documented in 1995.

**Peregrine falcon** (Threatened): The Arctic peregrine, Falco peregrinus tundrius, is the subspecies most often seen at Pea Island. Peregrine falcons were documented near North Pond on 2 occasions in March and August.

**Piping plover** (Threatened): The Atlantic coast population of piping plover, Charadrius melodus, was listed as a threatened species under the Endangered Species Act in January of 1986. In 1995, up to 3 piping plovers were observed in South Pond on several occasions by Refuge staff.

**Atlantic loggerhead sea turtle** (Threatened): Pea Island has had an average of 14 nests per year in recent years. A record high of 35 nests and 41 false crawls was documented in 1994. The 1995 nesting season resulted in 17 nests and 5 false crawls. In addition, the NPS relocated 5 nests to Pea Island.

Pea Island has a severe beach erosion problem resulting in a narrow beach and frequent overwash. In 1994, Refuge personnel determined that the best management strategy to optimize survival of turtle hatchlings was to move nests to a turtle safe zone. In 1995, all Refuge nests and those brought from Cape Hatteras National Seashore were relocated to the turtle safe zone. This safe zone was the widest stretch of beach on Pea Island. Despite these efforts, 14 nests drowned from inundation caused by extreme high tides from Hurricane Felix. From the 8 nests that did survive, 614 hatchlings were escorted to the ocean. The overall hatch rate and hatchlings to ocean rate based on the 8 surviving nests, were 94% and 66%, respectively.

Unfortunately, upon excavation of nests PI01 and PI02, it was discovered that several of the hatchlings attempted to emerge at the same time, became stuck in the wire mesh placed over the nests, and died. Eight hatchlings were trapped by the wire mesh in the two nests. Six additional dead hatchlings were found below the wire mesh in PI01. It appeared they had been blocked by their stuck siblings. Apparently the wire mesh had been used for many years in Pea Island's sea turtle program, with no evidence of mortality. The wire mesh will be eliminated from all future nests relocated on Pea Island NWR.

Ghost crabs continued to be the primary predator. In previous years, many turtles hatched out of nests but never made it to the water. "Reinforcement" crabs actually formed a line along the uprush zone to capture the few turtles that had managed to crawl safely through a beach covered with hungry, hunting ghost crabs. A **Turtle Watch Program** was implemented in 1991 to reduce turtle hatchling predation via ghost crabs.

**Turtle Watch** began on the 55th day of incubation of the first nest. It involved digging a 10" deep by 10" wide trench from the nest to the ocean. The trench minimized the hatchlings' visibility to ghost crabs and reduced hatchling disorientation from light pollution from a nearby amusement park in Rodanthe approximately 2 miles away. Volunteers arrived just before dusk to open predator guards and inspect and repair the trench. To further reduce hatchling disorientation from light pollution, flashlights with red filters were used in a leap frog fashion to guide turtles down the trench. During 1995, the use of drift fences were temporarily implemented to increase the efficiency and effectiveness of escorting turtles to the ocean. Unfortunately, the night they were installed, extreme high tides from Hurricane Felix destroyed sections of the drift fence. Drift fences remaining around the nests were effective in reducing light pollution and provided a second barrier against the intrusion of ghost crabs into the nests.

Monitoring nests involved intensive effort by both staff and volunteers. However, it played a vital role in greatly increasing survival of hatchlings from nest to ocean. Observations in the past indicated that, on some nights, as many as 75% of hatchlings were lost to ghost crabs. Survival rates to the ocean after trenching approached 100%. If the same narrow beach is evident next year, a similar program will again be implemented.

Numerous stranded turtles washed up on Pea Island's beaches during 1995. Approximately 22 dead loggerheads and 2 leatherback turtles were measured, recorded, and marked. Most of the turtles were already severely decomposed when found making cause of death determination impossible. One exception to this was a stranded loggerhead that had a heavy crate tied to it's right foreflipper. Evidence suggested that this turtle most likely drowned. One

leatherback had deep lacerations extending the length of it's carapace, indication of a propeller strike. Data from stranded sea turtles were sent to the North Carolina Sea Turtle Coordinator.



Stranded loggerhead sea turtle found on Pea Island.  
Note crate tied to right foreflipper. GEP 6/95

**Green sea turtles** (Threatened): In 1993, the first green sea turtle (*Chelonia mydas*) nested on Pea Island. No green sea turtle nests were reported for 1995.

b. State Listed Endangered and/or Threatened Species

Of the other species that occur on the Refuge, the State of North Carolina lists 7 as threatened and 26 as species of special concern. Although the Refuge is not managed for all these species, present practices do provide benefits for many of them. Species specifically managed for are:

**Osprey** (Special Concern): During 1995, 4 osprey nests were observed on the Refuge. Three of these were on platforms, one of which was destroyed during a thunderstorm before the eggs hatched. The fourth nest was on the Department of Defense microwave tower. The surviving 3 nests produced fledglings.

**Least tern** (Special Concern): Historically, least terns have nested 1.5 miles south of the Pea Island NWR Headquarters. During 1995, nesting colonies were observed at the Oregon Inlet terminal groin and at 1.5 miles south of Headquarters. Many least terns were observed during the summer shorebird surveys.

### 3. Waterfowl

Waterfowl surveys were conducted from September through April. Waterfowl numbers peaked at 12,225 during December. Table 1 depicts Pea Island waterfowl composition during 1994-1995. Gadwalls, wigeon, blue-winged teal, shoveler, ruddy ducks, and American coots showed an increase in number of use days. All other species showed a decline. Snow geese began using the 200 acre burned area following the December 5th prescribed burn.

Ground brood surveys were conducted in conjunction with the shorebird surveys. One black duck brood was observed in South Pond and three were observed in North Pond.

**Table 1**  
**Composition of Wintering Waterfowl, Pea Island NWR**  
**1994-1995**

SPECIES	PEAK PERIOD	Survey Peak #	# USE DAYS 1994-95	% USE DAYS 1994-95	USEDAYS % diff from 10 yr avg
Canada Goose	Nov	261	26590	2.1	-70
Snow Goose	Dec	3332	157180	12.1	0
Tundra Swan	Dec	1535	75019	5.8	-51
Mallard	Feb	552	13127	1.0	-25
Black Duck	Feb	769	45046	3.5	-67
Gadwall	Apr	2642	146040	11.3	126
Wigeon	Nov	3742	251947	19.44	1
Pintail	Dec	3255	215326	16.6	-26
GWT	Feb	218	13596	1	-87
BWT	Oct	2753	25147	1.9	192
Shoveler	Feb	1227	88757	6.8	37
Wood Duck	Nov	5	187	0.0	1236
Ringneck	Dec	163	7212	0.6	-26
Redhead	Oct	2	51	0.0	-99
Canvasback	Nov	3	83	0.0	-99
Scaup	Dec	159	5146	0.4	-77
Coots	Nov	2636	141891	1.9	90
Bufflehead	Feb	522	8252	0.6	-81
Ruddy Duck	Dec	660	49866	3.8	137
Merganser	Feb	528	17398	1.3	-15
Unknown	Dec	190	8217	0.6	-68

#### 4. Marsh and Wading Birds

Marsh and wading bird surveys were conducted from April through October. Bird numbers peaked at 1220 during August. A great

white heron, native to south Florida, was frequently observed in North Pond during 1995. Some of the other commonly occurring species included great and snowy egrets, various heron species, white and glossy ibises, double-crested cormorants, American bittern, and clapper rails.

Brown pelican numbers have continued to increase over the past few years as the species has expanded northward into coastal North Carolina. These birds were previously listed as a threatened species in this state and were rarely observed.

Several adult and immature black-crowned night herons were observed on the finger islands in the impoundments during the summer. This suggested nesting activity; however, no nests were confirmed. A white ibis rookery was observed on the finger islands in North Pond. A total of 5 adults and 11 immatures were observed.

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

Shorebird surveys were conducted from May through October. Shorebird numbers peaked at 10,628 in July, the highest in 4 years. Some of the commonly occurring species included least, semipalmated and western sandpipers, semipalmated plovers, sanderlings, whimbrels, American oystercatchers, various terns and gull species, dowitchers, marbled godwits, willets, dunlins, black-bellied plovers, ruddy turnstones, American avocets, red knots, greater and lesser yellowlegs, and black skimmers.

During 1995, black terns, Wilson plovers, a red-necked phalarope, and Curlew, white-rumped, stilt and spotted sandpipers were observed on the Refuge. In addition, 3 piping plovers were observed in South Pond in April.

A large colony of nesting black skimmers and least terns was observed on the beach about 1.5 miles south of Refuge Headquarters. Sooty terns were consistently noted in the colony area though no nests were found. A second large tern colony was observed at the pan that formed behind the groin at Oregon Inlet. Both areas were posted as closed to public access.

During the months of June and early July, a total of 30 sick and dead greater shearwaters was found along the Refuge beach. Necropsies were conducted on 3 carcasses at the National Wildlife Health Center in Madison, Wisconsin. The only obvious sign of a problem was severe emaciation; the cause of death could not be determined.



Black skimmer chick on spoil island near Pea  
Island NWR. JLL 7/95

#### 6. Raptors

The Carolina Raptor Center did not band this year. Also, see Section G.2. for information on peregrine falcons and bald eagles.

#### 7. Other Migratory Birds

The diversity of bird life on Pea Island is so high that it is sometimes referred to as a "birder's paradise". This is especially true for passerine species. Some 115 different species of song birds migrate through Pea Island.

#### 8. Game Mammals

Cottontail and marsh rabbits are fairly common on Pea Island. A decline in numbers noted a few years ago seems to have reversed. Raccoon tracks and scat have been observed with increasing frequency. In the past, raccoons were incidentally captured in cat traps.

Presence of scat, tracks, and road kills indicate a continued presence of foxes and opossums. The presence of these species, as well as feral house cats, may be one of the causes for the decline in pheasant populations (see Section G. 10).

Deer tracks have frequently been observed around North Pond, New Field, South Pond, and in the Salt Flats.

River otters have been observed in the impoundments. Muskrats, nutria, and mink are also present.

#### 9. Marine Mammals

In March, a juvenile, male humpback whale was found on the Pea Island beach. National Marine Fisheries Service was contacted and performed the required necropsy. The whale was severely decomposed and cause of death could not be determined.

A dead gervais beaked whale was found on the beach in June. This species is rare and usually found only in deep ocean water. Unfortunately, the carcass was severely decomposed, and only the head and boney tissues were salvageable. All samples were collected by National Marine Fisheries Service and transported to the Smithsonian Institute.

Earlier this spring, 2 dead bottlenosed dolphins were found on Pea Island. Although necropsies were not performed on the dolphins, various measurements were collected and recorded by Refuge personnel.

#### 10. Other Resident Wildlife

In past years, ring-necked pheasants were occasionally observed in salt marsh, brushland, dunes, and in the Pea Island grain field. Sightings have decreased in recent years. One sighting of a female in the grain field east of New Field pond was reported by a NCDOT employee in November. The status of the pheasant population is unknown.

#### 15. Animal Control

Feral cats continue to be a problem preying on nesting birds, waterfowl, and turtles. Seven feral cats were trapped and removed near the Oregon Inlet bridge in December.

#### 16. Marking and Banding

Refuge staff and staff from the North Carolina Wildlife Resources Commission participated in the sub-species Atlantic Flyway Canada Goose Study for the 1994-95 season. Although 4 sites were baited and rocket nests were installed, conditions were unfavorable to catch geese.

Refuge personnel positioned and monitored 4 gypsy moth pheromone traps around Pea Island. No moths were captured in those traps. The State also placed and monitored numerous traps throughout the Refuge along Highway 12. Results from 1993 monitoring revealed a

relatively high number of moths, which is not surprising since Pea Island is located within the quarantined area.

Every summer, Refuge volunteers and staff accompany John Weske to band brown pelicans, royal terns, and sandwich terns on spoil islands located behind Oregon Inlet. This year 1,088 brown pelicans, 2,022 royal terns, and 302 sandwich terns were banded.

#### H. PUBLIC USE

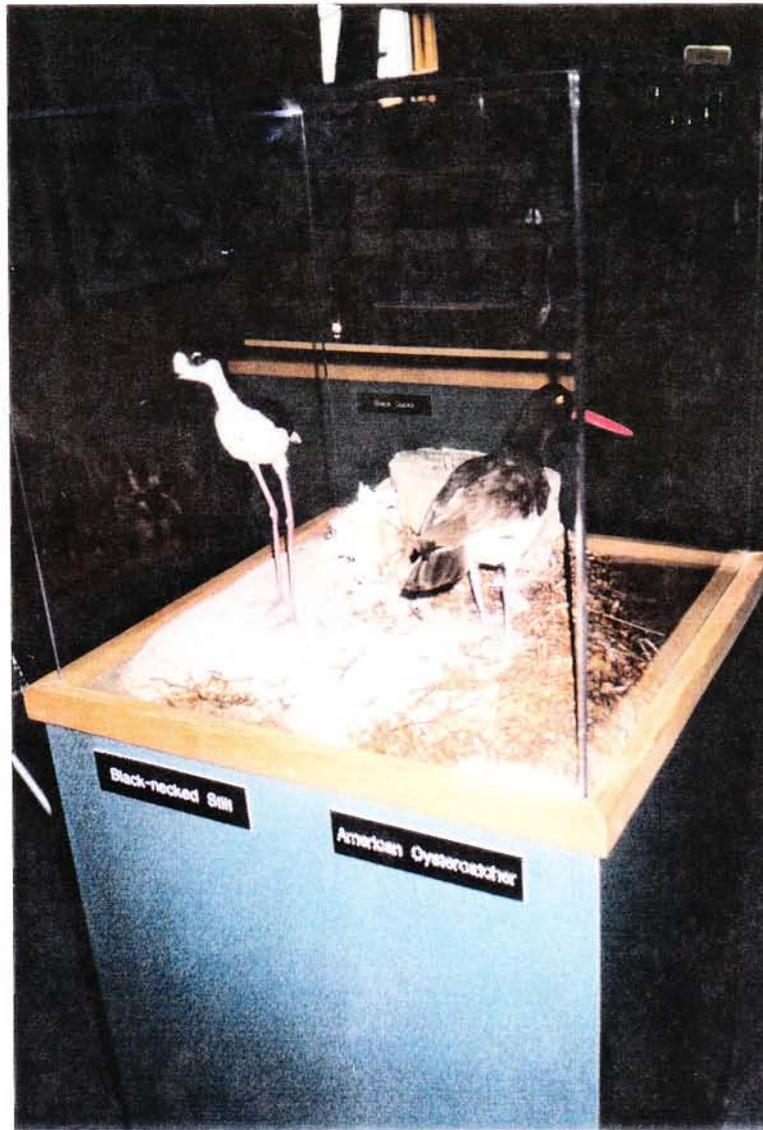
##### 1. General

Based on the NPS vehicle counter at Bodie Island and adjusted according to new configurations from RMIS (which continue to boggle the mind!), estimated visitation to Pea Island NWR during 1995 was 1,813,003. The Host/Hostess program continued to provide visitor information and operate the Coastal Wildlife Refuge Society's sales unit at the Visitor Center daily from April-November and week-ends during the winter months. The new Visitor Center has improved the quality of experience for Refuge visitors immensely. The Center is bright and cheerful - just right to match the folks who work there! In January of 1995, the interpretive exhibits were installed. As always, Wilderness Graphics did a great job at a reasonable price. Many Refuge visitors have commented on the quality of the exhibits. The Visitor Center is the perfect hub for the interpretive/educational programs of this Refuge. (See Section H.6. for details)

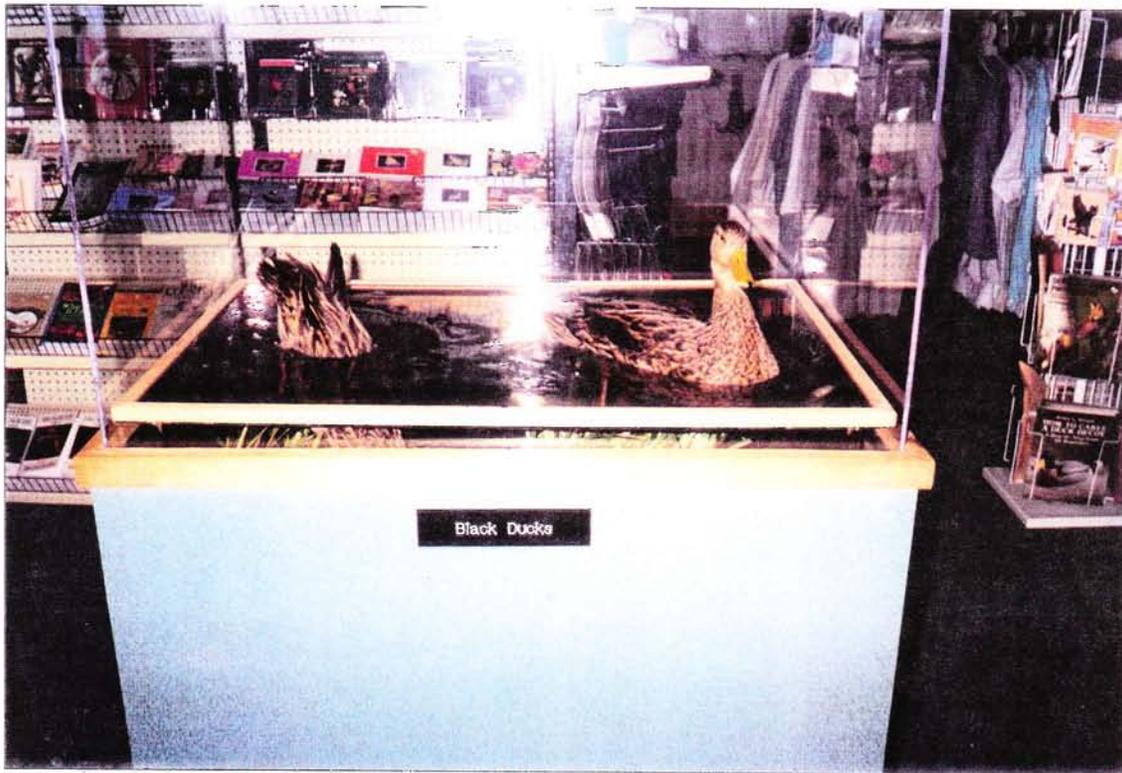


The Pea Island Visitor Center has been a focal point during 1995. BWS 12/95

As in the past, public demand for beach access has increased and the amount of undeveloped beach frontage property locally available has decreased. Towns and villages in the area are supported almost entirely by the tourist industry, yet the burden to supply services for these visitors is thrust toward the federal government. The NPS expands its services as the budget allows. The Pea Island Master Plan established a maximum number of parking spaces on the Refuge. At Pea Island, public use efforts continue to be governed by the limits set up in the Master Plan, thus providing some relief from the constant demand for more and more access. Refuge efforts continue to aim toward a high quality visit, as opposed to more visits.



The habitat cubes developed by Wilderness Graphics have been a big hit. BWS 1/96



Let's play the "can you find the turtle" game.  
BWS 1/96



The only thing missing here is the bright  
smile that's usually present. BWS 1/96

During 1995, the section of NC 12 from just south of the Visitor Center to just north of New Inlet was relocated. This action placed NC 12 on the west side of the Pea Island shop and the residence. Due to the proximity of Refuge equipment and the isolation of the area in relation to general traffic, it was decided to close the headquarters parking area to the public. As a part of the mitigation for impacts to the Public Use Program of Pea Island, the NCDOT constructed a new parking area comparable to the combined sizes of the headquarters and Lifesaving Station parking lots that were closed to the public. The kiosk and the NPS Pea Island Lifesaving Station exhibits were moved to the new parking area, which is located just north of New Inlet.



New parking area provided by NCDOT . . . .  
BWS 1/96



. . . to replace parking area at headquarters,  
now closed to public use. DLS 1/96



Aerial view of new parking area.  
DLS 1/96

## 2. Outdoor Classrooms - Students

The emphasis on non-staff conducted activities continued during 1995. 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 Visitor Center. Table 8 in the Alligator River Narrative includes off-refuge educational programs conducted associated with Pea Island, as well. Since no registration was required for the use of outdoor classrooms, the Refuge has no record of the actual number of such uses that occurred. Volunteer and staff lead programs are listed with interpretive programs in Table 8. On the whole, this type of use continues to increase on Pea Island.

## 4. Interpretive Foot Trails

It seems each year produces another need for the North Pond Trail. During 1995, the CWRS purchased clay to resurface the trail. Sand pits had blown into the surface in many areas, making the trail difficult to maneuver for wheelchairs, strollers, etc. Refuge maintenance staff spread the clay. The new surface has received many compliments. A wheelchair is available at the Visitor Center for use on North Pond Trail and has been utilized and greatly appreciated by a number of people who could not have enjoyed the trail otherwise.



The Senior Class of Carolina Day School  
had a Volunteer Work Day at Pea Island NWR.  
BSW 10/95



There's always some jobs around . . .  
BWS 10/95



. . . that requires lots of hands.  
WS 10/95



That's where groups like this come in  
to help. BWS 10/95

Many visitors comment that North Pond Trail is the nicest trail they've used in the eastern United States. It offers full handicapped accessibility, 7 permanently mounted spotting scopes, and 4 major observation structures. The new Visitor Center at its trail head provides just the right opportunity to offer information to Refuge visitors and teach the message of the Service. Approximately 313,886 visitors utilized North Pond Trail.

#### 6. Interpretive Exhibits/Demonstrations

The 2 interpretive kiosks provide valuable information on a 24 hour basis for Refuge visitors. Panels located on the front porch of the Visitor Center are also available round the clock. For 1996, an addition is planned for the Visitor Center. A nesting osprey exhibit and a interactive computer exhibit will be added. The existing exhibits will be spaced to allow easier viewing. The interactive computer exhibit will be accessible both from the interior and the exterior of the Center.

#### 7. Other Interpretive Programs

Special programs presented off-refuge during 1995 are included in Table 8 of the Alligator River Narrative. All regularly scheduled interpretive programs during 1995 were conducted at Pea Island by Refuge volunteers. Four bird walks and 2 Children's Wildlife Discovery Programs were scheduled each week during June, July, and August. Birdwalks were scheduled on Saturday mornings

during the fall. Participation in these regularly scheduled public programs and other special programs is presented in Table 2 of this report.

Table 2  
Pea Island NWR  
Interpretative/Educational Programs (On-Refuge)

<u>Program Type</u>	<u>#Programs</u>	<u>Total</u>	<u>#Partic.</u>
Bird Walks	50		973
Children's Wildlife Discovery	21		625
School/School Related Groups (on-refuge)	6		271
Adult Groups (on-refuge)	1		20

Note: Off-refuge programs included in Table 8 of AR ANR.

#### 9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island during 1995. Bluefish, spot, pompano, croaker, and trout were the major fish caught. A total of 312,312 visits were spent fishing. The annual Fishing Rodeo was held the second Saturday in June with approximately 100 participants.



Annual Fishing Rodeo. BWS 6/95



Fun for all! BWS 6/95

#### 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 NC 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 fall and winter, greater snow geese frequently feed on the road shoulders.

During 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 sign posts for resting and hunting.

The number of birders requesting special permission to bird in the closed areas of the Refuge continued to remain low during 1995, as was expected. During 1990, South Pond was drawn down for management purposes, creating excellent wading and shore bird habitat. Several rare species, including curlew sandpipers, white-winged terns, and others, attracted "life listers" from all over the country. Since then, things have continued to be calm.



The long awaited photo blind - back . . .  
BWS 12/95



. . . and front. BWS 12/95

Refuge trails and other access points are located to make wildlife observation (on foot) easy and enjoyable. In choosing the North Pond area for a focal point for public use and closing the areas around the other 2 impoundments, the needs of the public were seriously and diligently considered. There are many Refuge visitors who realize and support this policy.

#### 12. Other Wildlife Oriented Recreation

For the past few years, Pea Island has had no operable photo-blinds for the public to utilize. Finally, during late summer of 1995, the proposed photo-blind was completed and made operational. Unfortunately, loss of water management capabilities in North Pond lessened the effectiveness of the blind for the year. At this writing, the North Pond pumping station installation is under contract and projected to be completed by April 4. Hopefully, 1996 will be a banner year for wildlife photography on Pea Island.

However, it is still our contention that the best photographs at Pea Island have resulted from being in the right place at the right time with a camera in hand.

#### 15. Off-Road Vehicling

The use of ORV's on Pea Island is restricted to NC Highway 12. Illegal ORV traffic continues to plague the Refuge; however, probably due to rapid erosion of the beach and repeated ocean overwash of NC 12 on Pea Island, 1995 has been another year of few ORV-related violations. As long as there is a physical way for vehicles to reach the beach, there will always be some problems with ORV traffic there.

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 apparent for gulls, terns, shorebirds, and allied bird species. From weekly surveys conducted at Pea Island and along other beaches in Dare County, including Cape Hatteras National Seashore, it appears that increasing human activity on beaches is adversely affecting bird use of this important habitat. 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, sun-bathers, surfers, and fishermen are low. Refuge beach areas that show any evidence of nesting activity are closed to public entry.

#### 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. The Refuge provides no facilities and few services for these activities.

## 17. Law Enforcement

Due to a MOU with Cape Hatteras National Seashore, the NPS has the primary responsibility for non-wildlife related public use on Pea Island. For this reason, a NPS law enforcement presence is maintained regularly, though not constantly, on the Refuge.

During 1995, there was no FWS LE presence on Pea Island on a regular basis. RB Donaghue-Stanton is currently the only staff assigned to Pea Island, and she does not hold an LE commission. There is still an obvious need for more LE presence on the Refuge. Unfortunately, the outlook for 1996 in this area is grim.

The most common LE problems are car clouting, illegal parking, vandalism to NPS restrooms, public nudity, littering, and dogs off a leash.

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.

There are minor poaching problems at Pea Island; occasionally cars will stop and shots will be fired at waterfowl from the road. Poachers sometimes slip in from Pamlico Sound to quickly shoot as many waterfowl as they can and then speed away. Some illegal hunting may take place within the Refuge boundaries in the Pamlico Sound. These types of violations are difficult to detect and the violators are difficult to apprehend. On the whole, however, there are no major LE problems on Pea Island.

The following NOV's were written by FWS and NPS officers on Pea Island during 1995:

<u>Quantity</u>	<u>Agency</u>	<u>Offense</u>
5	FWS	Trespass- Closed Area
1	FWS	Metal Detector
1	NPS	Motor Vehicle Accident
1	NPS	Obstructing Traffic
6	NPS	Parking Violation
30	NPS	Speeding
4	NPS	Vandalism
8	NPS	Larceny
1	NPS	Driving Under Influence
1	NPS	Driving Off Road
1	NPS	Other Moving Violation
1	NPS	Illegal Substance
2	NPS	Abandoned Property
2	NPS	Camping

## 18. Cooperating Associations

Though the Coastal Wildlife Refuge Society is officially reported in the Alligator River Narrative, a great deal of it's activity relates to Pea Island.

The sales unit at the Visitor Center continued it's activity during 1995. With the Visitor Center open for its first full year, sales hit a record high (\$81,000 in gross sales!!)

The bulk of CWRS activity (income and expenditures) to this point have been associated with Pea Island. 1996 will see the completion of the Visitor Center addition. At that point, the focus will move toward Roanoke Island!

For full details of CWRS activities for the year, see Section H.18. of the Alligator River Narrative.

## I. EQUIPMENT AND FACILITIES

### 1. New Construction

The Refuge authorized NCDOT to construct approximately 13.3 acres of wetlands located 3.5 miles south of Pea Island Headquarters. This project was for mitigation of impacts to wetlands from the relocation of NC Highway 12. The site utilized was upland shrub/grassland communities with no wetland values. The final grading and planting of compatible marsh species will be completed in 1996. The approximately 40,000 cubic yards of excavated material will be used to fill in the old Highway 12 roadbed and for the construction of the secondary berm.



NCDOT mitigation site will be completed in 1996!  
WDS 10/96

## 2. Rehabilitation

This summer the rusty nozzle and corroded digital meter were replaced on the diesel fuel tank at the Headquarter site. A manual flip-number meter was installed in place of the digital meter. The digital meter on the gasoline tank had been replaced with a manual flip-number meter in 1993.

## J. Other Items

### 4. Credits

The Narrative Report was a joint effort by the entire staff.