

REVIEW AND APPROVAL

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE
PEA ISLAND NATIONAL WILDLIFE REFUGE

MANTEO, NORTH CAROLINA

ANNUAL NARRATIVE REPORT

Calendar Year 1996

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

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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.

A. Highlights

Dare County receives \$271,075 in revenue sharing. (See Section C.3)

Thirteen-year total for volunteer hours reaches 175,508; 1996 total is 30,645 hours. (See Section E.4)

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

Fire Program continues to gain steam. (See Section F.9)

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

Southern pine beetle outbreaks continue to threaten red-cockaded woodpecker habitat. (See Section F.3)

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



Gary Peeples was presented the Department of the Interior Valor Award for the heroic rescue of a family of four he performed while interning at Pea Island NWR in the summer of 1995. 7/96 GP

B. CLIMATIC CONDITIONS

The year started off with seasonable temperatures and a snow event in mid-January. In early February there were unusually cold temperatures, freezing at least part of the sound and most of the moist soil units. Spring was relatively mild and dry; as a result, the fire danger remained high during April and May. Dry weather ended in June and July with over 9" of rainfall each month. Hurricane Bertha stayed just off the coast and caused minor flooding in July. In August and September, weather was dominated by Hurricanes Edouard and Fran, 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 lot of staff time. Average high temperature for the year was 84.8° F; the average low was 39.5° F. Average rainfall was 5.10".

C. LAND ACQUISITION

1. Fee Title

The Preliminary Project Proposal for the Proposed Expansion of Eastern North Carolina Refuges, approved in 1995, was included in a larger, landscape-scale land protection planning effort by the Roanoke-Tar-Neuse-Cape Fear (RTNCF) Ecosystem Team.

2. Easements

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

A Partner's Agreement with the owners of the 18,000-acre Mattamuskeet Ventures, Inc. authorizing red 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 red 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 red wolves on the area and Service access remained in effect.

Negotiations were conducted with several other large land owners (timber companies, corporate farms) for easements or agreements authorizing the presence of red 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

The Stumpy Point Ballfield issue was finally resolved. 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. Acting Refuge Manager Cooley conducted a Level I Contaminant Survey on the proposed exchange lands on February 8. The land exchange finally occurred on March 8. The Refuge received 34 acres of Dare County property south of U.S. 64 in East Lake in exchange for the 34 acres in Stumpy Point. This property is adjacent to our Twiford Farm Unit.

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

D. PLANNING

2. Management Plan

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

4. Compliance with Environmental and Cultural Resource Mandates

U.S. Army Corps of Engineers (USCOE) and Coastal Area Management Act (CAMA) permits covering wetland hydrology restoration through the installation of water control structures were modified. The modification allows for additional time to install water control structures on the Refuge.

5. Research and Investigation

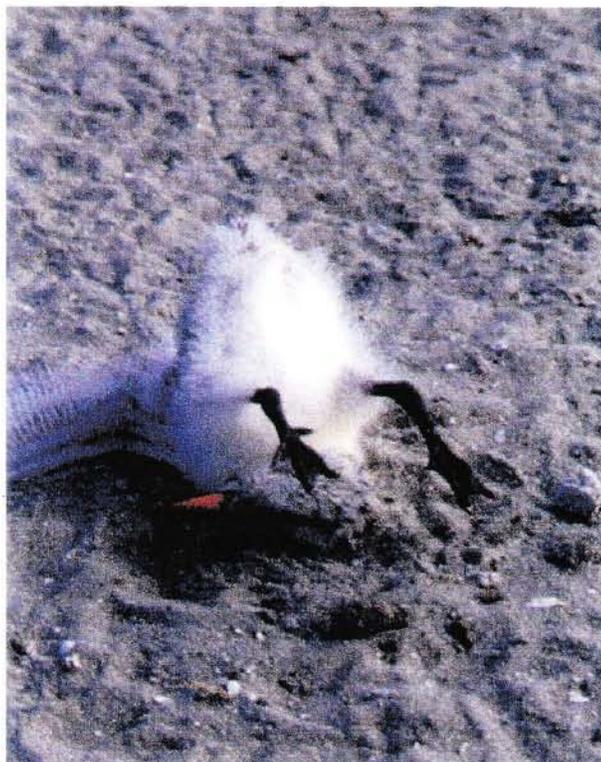
The cooperative agreement with the University of Tennessee to conduct black bear research on the Refuge was extended through May. The U.S. Air Force came up with a total of \$110,000 to complete this important project - originally initiated with discretionary Refuge funding in 1992 (that meant leaving a position vacant!). During 1996, the Refuge provided housing and logistical support for two researchers. The research project was completed in August. We are now awaiting a final report and the completion of two master thesis'. We are hopeful that we will then 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. 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 preparation method. Other site preparation methods (e.g., mechanical, burning, and combinations of these methods) were ineffective because of the hydrological conditions at the test sites. Efforts continued to restore natural hydrology on clearcut areas by installing water control structures in canals constructed by timber companies prior to government ownership.

Duke University continued their project on sea level rise using 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.



We could empathize with this little fellow. Seems like the way many of us have felt lately. 7/96 BWS

E. ADMINISTRATION

Kneeling: 18, 8, 16, 30, 23, 10, 5; Back Row: 25, 13, 2,
12, 20, 14, 3, 17, 28, 24, 19, 34, 26, 6, 22, 11, 27, 1 12/96

1. Personnel

1. Michael R. Bryant, Refuge Manager, GS-13, EOD 04-17-96
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,
9. Wendy Donoghue-Stanton, Wildlife Biologist, GS-7,
EOD 10-16-94
10. Glen Stratton, Fire Control Officer, GS-8, EOD 09-05-96
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
27. Donald M. Harris, Engineering Equipment Operator, WG-08, EOD 01/11/96

Temporary Part-Time

28. Kristina Fair, Biological Science Aid, GS-03, EOD 03/03/96, Resigned 07/26/96; Forestry Aid, GS-03, EOD 09/30/96
29. Craig S. Scheibel, Forestry Technician, GS-04, EOD 04-16-95
30. Janice Tripp, Biological Science Aid, GS-03, EOD 04/18/96
31. Lonnie Ford, Forestry Technician, GS-04, EOD 03/19/95, Resigned 01/07/97
32. Clifton J. Fox, Biological Science Aid, GS-03, EOD 03-17-96, Resigned 04-18-96
33. Marcie Holda, Park Ranger, GS-03, EOD 05-26-96, Terminated 12-22-96
34. Gary Peebles, Volunteer, 09/96-02/97

Refuge Manager Jim Johnson departed for Felsenthal NWR on January 19. The Refuge staff hosted a going away party for Jim and his family on January 13. A large group of his co-workers and friends showed up to give Jim and his family a big send-off.

Mike Bryant arrived from Lower Rio Grande Valley NWR on April 17 to assume the duties of Refuge Manager.

Donald Harris was hired as a career seasonal Engineering Equipment Operator effective January 11.

Three Biological Science Aids were hired to work on the "Cedar Crew". Kristina Fair arrived on 03/03 and resigned on 07/26. Clifton Fox arrived on 03/17 and resigned 04/18. Janice Tripp arrived on 04/18.

Clifton Fox arrived on 03/17 and resigned 04/18. Janice Tripp arrived on 04/18.

ROS Elizabeth Fritsch and Range Technician Jim Beasley returned to duty on April 1. Liz returned after 7 months of maternity leave and Jim returned after 18 months of medical leave.

Marcie Holda was hired as a Park Aid for the Pea Island NWR Visitor Center on May 26. Funds for this position were donated by the Coastal Wildlife Refuge Society.

Glen Stratton was chosen for the Fire Control Officer (FCO) Forestry Technician position and transferred from Merritt Island NWR on September 5.

Bobby Govan was selected to fill a career seasonal Engineering Equipment Operator position. Bobby had been in a temporary position with us for several years and we were very happy to finally be able to hire him as a permanent employee.

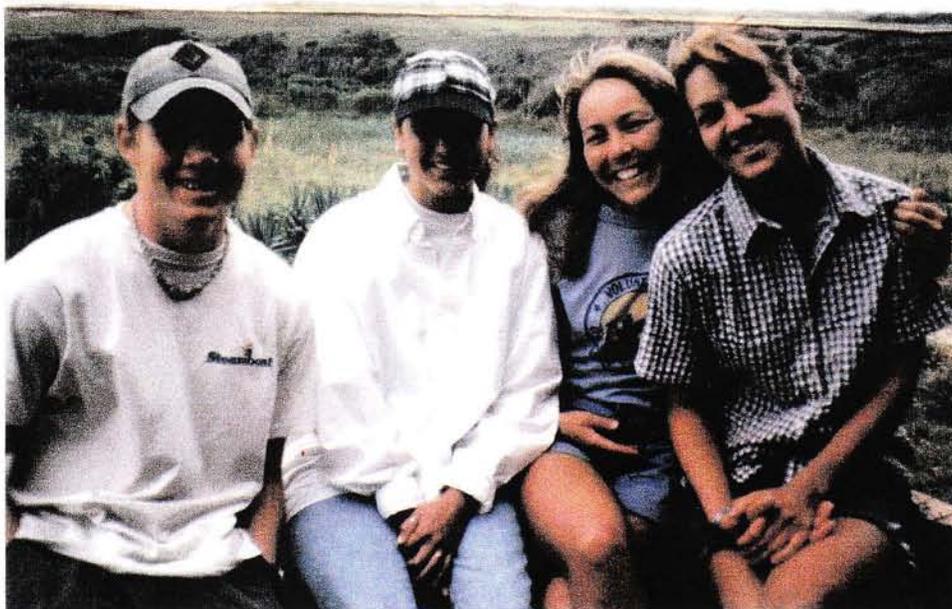
Kristina Fair resigned her position as a Biological Science Aid and applied for one of our Forestry Aid vacancies. She was selected and reported for duty on September 30.

The responsibility of recruiting temporary positions was passed down to field station level this year. While this has helped speed up the whole process of recruitment, it has also added a tremendous amount of work on an already heavy workload.

4. Volunteer Program

During 1996, 291 volunteers contributed 30,645 hours of service in the following areas: maintenance, 5,000; resource support, 15,500; public use, 8,000; and administrative support, 2,500. These hours bring the thirteen-year total of hours contributed to 175,508!

The Red Wolf Project has continued to draw a number of college students and recent graduates who volunteer large blocks of time (3-4 months). During 1996, we had over 4,000 hours of volunteer time by four interns and several regular volunteers in red wolf caretaking positions and other red wolf related positions (wolf house building, etc.). Seven long-term volunteers and interns worked with black bear, Atlantic white cedar, and other projects.



Joe Stevens, Gina Ferrell, Roni Collier, and April Goodwin. Our intern program increased to four--a preview of things to come... 8/96 UNK

Again, recruitment activities for 1996 were not major, but spontaneous efforts were made whenever the opportunity presented itself. Most new volunteers continued to be recruited by current volunteers. Again during 1996, Refuge volunteers continued to work through their non-profit organization, the Coastal Wildlife Refuge Society, to benefit the Refuge. For details of their accomplishments 1996, see Section H.18.

Cumulative hours tallied through September 30, 1996 yielded awards which were presented at the annual Volunteer Awards Banquet in November. Awards were presented to volunteers as follows:

Certificate (100+ hours) - to Polly Hoag and Jeanne Folta

250 Hour Pin - Dee Derr, Dick Derr, Dorothy Fink, Bob Hannan, Joyce Hannan, Irma Leake, Bel Pitcher, Dana Powers, Sheila Silver, Jeanne Folta, and Anna Strawser

500 Hour Pin - Rose Kurz, David Leake, Bob Webster, Lee Yoder, Erica Strawser, and Jeanne Folta

1000 Hour Pin - Jimmy Hayes, Veda Jones, and Patsy Zoll

1500 Hour Pin - Win Copeland

2000 Hour Pin - Ritchie Buckingham, Bert Burris and Marie Vansickle

Plaques were presented for the following hours above 2,000:

Don Perry	2739 plaque-2700+
Warren Davis	3062 plaque-3000+
Marilyn Knight	4600 plaque 4600+
Joe Folta	9246 plaque-9000+

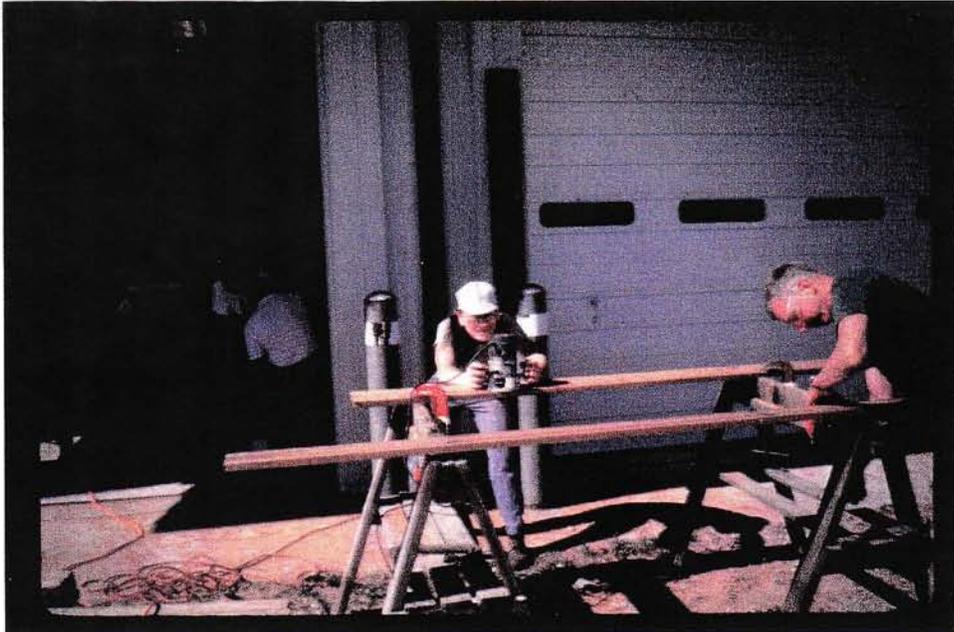
1996 Refuge Intern Program Awards:

April Goodman	480 cert/pin-250/pin-500
Gina Ferrell	593 cert/pin-250/pin-500
Joe Stevens	613 cert/pin-250/pin-500
Roni Collier	567 cert/pin-250/pin-500
Shannon Smith	1751 cert/pin-250/pin-500 /pin-1000/pin-1500
Kim Romain	3540 cert/pin-250/pin-500 /pin-1000/pin-1500/pin-2000 /plaque-3500+
Aubrey White	1740 cert/pin-250/pin-500 /pin-1000/pin-1500
Marjorlain Van Polanen	1890 cert/pin-250/pin-500 /pin-1000/pin-1500

The Outstanding Volunteers for 1996 were Bel Pitcher and Rose Kurz. Their names were added to the permanent plaque in the office, and each received a plaque. In addition, special plaques were given to Ken Dyar and Don Perry for dedicated service. DRM Manager Cooley received the staff award for Outstanding Volunteer Support.

Don Perry was selected as the 1995 Volunteer of the Year by the National Wildlife Refuge Association and the National Fish and Wildlife Foundation. He and WIS Strawser traveled to the reception and award presentation at the North American Wildlife and Natural Resources Conference in Oklahoma in March of 1996.

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 the Regional Office 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!



Each year in October, a Sierra Club Work Group spends a week with us. What a group of dedicated workers!
10/96 BWS

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 96, Alligator River NWR received the following funding:

Program Area	Dollars (in thousands)
Initial Allocations (1261/1113)	1,074.3
Volunteer Support	6.6
Small Maintenance Projects	20.0
Forest/Pest Funds (S. Pine Beetle)	20.0
Reimbursable Agreements:	
USCOE PI Beach Monitoring	37.9
Hydrology Restoration	230.6
Contributed Funds (PI Ranger)	10.0
Initial Allocations (9251/9252)	113.4
Fire Seasonal Staffing	181.2
Fire Equipment Purchase	1.7
Fire NUS	5.0
Fire Equipment Maintenance	10.0
Prescribed Burning	8.0

Table 2. Four Year Funding Comparison

	<u>1996</u>	<u>1995</u>	<u>1994</u>	<u>1993</u>
1261	688.8	483.7	479.7	463.2
1262	0.0	163.3	283.7	222.9
1113	370.0	370.0	385.0	240.0
1971	268.5	169.0	844.1	709.5
2821	0.0	0.0	258.2	362.1
7201	10.0	0.0	0.0	9.0
9110/9251	291.3	256.6	49.1	62.1
9120/9252	30.0	33.0	261.3	378.6

6. Safety

Monthly safety meetings on a wide range of topics were presented at the Manteo Office or at the maintenance facility. All Refuge staff were required to attend. In April, a first aid course was taught by two Red Cross certified CPR volunteers. The course was offered to all Refuge personnel. Refuge first aid kits were inventoried, restocked, and replaced where necessary. Surplus supplies are stored at Alligator River NWR Shop, Manteo Office, and at Pea Island NWR Headquarters.

In April, Jessie Williams from Mattamuskeet NWR instructed a course in safety and operation of large equipment. Refuge personnel attending the course were tested and certified on various pieces of large equipment.

Other objectives accomplished by the 1996 Safety Committee included the following: (1) updated the Alligator River NWR Safety Contingency Plan; (2) provided hearing tests, tetanus shots, and blood sugar tests from the Dare County Health Department; and (3) installed safety bulletin boards at the maintenance facility and Manteo Office to post upcoming meetings and safety concerns.

Accidents for 1996 included one case of eye irritation, four back strain injuries, five cases of cut, smashed, or punctured extremities, and one bruised foot. Parties involved in the accidents were instructed on proper safety procedures. Refuge staff had zero time loss accidents for the year

7. Technical Assistance

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

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 Atlantic white cedar swamp. These are classified as wetlands based on vegetation present, soil type, and hydro-period. Alligator River NWR contains some 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 1996. As usual, efforts were limited due to equipment and inclement weather. This year, risers were installed at four locations. New structures were installed at the intersections of Bluebill Road, Sassafras Road, and Poplar Ridge Road with Alligator Road and at the intersection of Possum Road and Dry Ridge North Road.



Even though most visitors have never heard the word "pocosin" before, they all agree, it offers a gorgeous sunset!

11/96 BWS

The structures and fill allow safe movement over the canals by fire equipment and better water management for fire suppression and prescribed burning activities. Pipes and risers replace severely deteriorated wooden bridges, primarily at road intersections. Boards can be placed in the risers up to ground level of the adjacent swamp/pocosin as needed. A request for an extension of the Section 404 permit deadline was approved by the USCOE and wetland restoration of ditched areas will continue with installation of additional structures in 1997.

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 - 1996

Habitat Type	%	Approximate Acreage		
		Dare County	Hyde County	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	0.9	1,300	0	1,300
Shrub Pocosin	12.1	17,810	612	18,422
Cane Pocosin	1.5	2,300	0	2,300
Tree Pocosin	25.3	33,072	5,512	38,584
Mixed Pine	18.4	28,100	0	28,100
Flood Killed	10.1	15,300	0	15,300
Lakes/Open Water	0.8	754	398	1,152
Marsh	6.5	9,904	0	9,904
Farmland and Moist Soil	3.3	5,100	0	5,100
Totals:	100.0	138,248	13,998	152,246

This year approximately 1,800 acres of moist soil were produced in prior-converted farmland on the farm unit. Approximately 500 acres were burned in the spring and 200 acres were disced. This is the sixth year fire has been used in the moist soil units and results continue to be very promising. Wet conditions, beginning in the middle of June, affected our ability to burn and disc most of the moist soil management unit acreage. Some units that did not receive any treatment resulted in poor waterfowl food production and low use by waterfowl. It is becoming increasingly apparent that moist soil management will require some degree of disking or burning or both on an annual basis.

2. Forests

Atlantic White Cedar Restoration:

Atlantic White Cedar (AWC) Forest Restoration Project has come a long way since the 1995 field season. Due to our strong partnership with the USAF Dare County Bombing Range (DCBR), the hiring of temporary field technicians has become less problematic, which in turn has increased sampling productivity. Other partners in this project include the North Carolina Division of Forest Resources (NCDFR) Research Section, Kelly N. Davis of Wildlife Management Consulting, and of course the Service.

The inventory of 3,000 acres of AWC cut-over areas on the Refuge and DCBR is nearly 50 percent complete. An impressive 862 acres were sampled during the 1996 field season which brings the total area sampled to approximately 1,215 acres. Due to several conflicts with hiring and retaining field crew members, we did not obtain a complete crew until almost the middle of the field season. The final crew consisted of one Service NTE 1 year Biological Science Aid and two Forestry Technicians who were hired by Kelly Davis and funded by the USAF. Another obstacle which hindered our sampling was the extremely high water levels which plagued the entire Refuge and DCBR. Some stands were completely inundated by nearly one foot of water. Despite all of the problems experienced this field season, the hard work and determination of the AWC field crew led to the accomplishment of an enormous amount of work. We are looking forward to working with some of the same crew members during the 1997 field season along with several additional field personnel who are hopefully as dedicated as the 1996 crew. The Refuge is also in the process of developing a large internship program for the summer of 1997 which will provide the AWC project with at least two additional field personnel for a minimum of 12 weeks. If all of our plans work out, the 1997 field season may be our best yet.

The inventory is being performed to determine current plant communities and associations occurring on these sites and to help make informed decisions as to the 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. The data collected will serve as a baseline of information necessary for making decisions regarding AWC forest restoration and development as well as long term management activities to be implemented on these sites. Global Positioning Systems (GPS) and Geographic Information Systems (GIS) are both being used to conduct the inventory work. Rover

GPS units with hand-held data loggers are used to record plot data and geographic location of each plot. GIS is being used for the purpose of digitizing a detailed and accurate base map of the entire Refuge and DCBR to which all forest inventory and reforestation data will be geographically displayed. Restoration and/or regeneration activities will be recommended and performed on a stand by stand basis as the inventory of a given stand is completed and the data is analyzed.

An additional 12 acres of AWC was planted in march of 1996 bringing the total acreage to approximately 107 acres planted or replanted in AWC. These plantings consist of a 5-acre genetic study plot, a 3-acre seed orchard located on Refuge property and 99 acres of reforestation performed on DCBR property. Results from the most recent surveys revealed that there is a near 90 percent survival rate among all of the planted sites except for the 3-acre seed orchard. Deer predation has taken its toll on most of the seedlings planted in the open field. Replanting of this site will take place once we are able to enclose the area with an electric fence.

Once again, the AWC crew and several other members of our staff had the pleasure of collecting AWC cones. Due to the high water levels most of the low-lying cedar stands became stressed and therefore did not produce a harvestable cone crop. However, those trees which are growing on higher ground along the roadsides were quite prolific this year and produced a healthy crop of cones. This year, approximately 53 gallons (105 pounds) of AWC cones were collected during the month of October. Cones were sent to the NCDNR Nursery for seed extraction and germination testing. Seed collected this season will be stored at the nursery until our needs demand that they are planted for seedling production.

Future AWC projects include the following: (1) inventory and map all remnant AWC stands on the Refuge; (2) carry out prescribed silvicultural activities to help restore several of the cut-over areas; (3) locate sites on the Refuge for additional AWC planting; and (4) provide assistance to other neighboring refuges with regards to AWC management.

Southern Pine Beetle Activity:

Southern Pine Beetle Activity was once again running at epidemic levels throughout 1996. Over 100 southern pine beetle (SPB) spots were recorded with the major spots mapped by helicopter with GPS equipment. The largest spots were over 400 acres and the smallest was less than an acre. They were scattered across the Refuge, including the Roanoke Island tract. Some chainsaw slashdown was accomplished earlier in the year in the Whipping Creek RCW colony stands and on Roanoke Island. Additional work was performed using a combination of chainsaw slashdown and "Verbanone" treatments. Verbanone is a synthetic SPB pheromone designed to trick beetles into not attacking a tree because it smells like it is already filled with beetles. (A chemical "no-vacancy" sign would be a good analogy for this treatment.) The verbanone treatments were performed in conjunction with research at Virginia Tech University.

This was the third year of the large infestation, which is usually the year that SPB populations collapse due to genetic breakdowns and predator populations catching up with the beetles. In fact, checkered beetles (the primary SPB predators) were observed on most of the infested trees, and populations appeared to be relatively high. A large-scale chainsaw slashdown contract was planned for the remaining "Whipping Creek RCW" infestation, but before it could be advertised, Hurricane Bertha dropped 4-8 inches of rainfall on the Dare County mainland, flooding the woods with up to 12 inches of water. The work was tabled until the woods dried out significantly during the late summer. Unfortunately, Hurricane Fran dropped another flood of water and caused the water levels in the sounds to rise so high that there was no drainage from the woods in the Whipping Creek area for the remainder of the year. The chainsaw project was canceled.

Plans to salvage the timber in the Blueberry loblolly pine plantation were made earlier in the year. The timber was shown to at least four timber purchasers, with Weyerhaeuser finally committing to purchase it for "boiler fuel" if we could get someone to cut and haul it. We were showing the tract to another logger when it got flooded out for the season by Hurricane Bertha.

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 Farms had developed the area from forested wetlands by encircling it with dikes and constructing drainage ditches. The area is drained by five pumps located at two pump stations. Each pump removes 250,000 gallons of water per minute from the farm fields. Pumping is required to keep the area dry enough to farm.

Reconversion of the area to a wetland habitat type is basically simple - do not pump the areas where plans call for permanent water or reduce pumping on moist soil areas. This action is accomplished by judicious placement of new dikes and 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.

Refuge cooperative farmers had moderate production in 1996. 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. Above normal rainfall during the 1996 growing season affected crop production and harvest. Cooperative farmers were still harvesting soybeans under very wet conditions in January. Crops were planted on 2,420 acres in 1996, and were primarily soybeans and wheat. Farmers disced approximately 100 acres in the Refuge moist soil units.

The Refuge portion of the crop produced for 1996 was decreased to 10.0 bushels of corn per acre farmed due to an increase in the price per bushel of corn of over \$3.00 per bushel. A decrease in the rent rate was determined to avoid overcharging cooperative farmers. In 1993, the Refuge received 10 bushels of corn per acre and in 1994 this increased to 12 bushels/acre. After 1994 the rent rate was to increase to 13.5 bushels/acre until 1997 when the long term agreement is to be renewed. Since a good corn yield on this land is 100 bushels/acre this is believed to be a reasonable rate. However, the rent rate is governed largely by the "going rate" for similar land and when corn prices result in an excessive rent charge, it is prudent to modify the rate.

9. Fire Management

Fire Management Program Overview:

Hard work and planning from previous years were showing signs of maturation in 1996 with the Alligator River NWR Fire Program. Personnel actions to convert two firefighter Engineering Equipment Operators, EEO Harris and EEO Govan, and two firefighters, FT Meekins and FT Midgett, to career seasonal positions were the most positive events the fire program has ever experienced. These actions have slowed down the attrition of qualified personnel. It has allowed us to focus on providing advanced training opportunities to our fire crew. This prevents having to give the basic training courses over and over. The members of the Alligator River NWR Fire Crew are becoming seasoned firefighters and prescribed fire experts as we have afforded ample opportunities for obtaining experience in these respective areas. The net result is safer and more effective fire operations in both wildfires and prescribed burning activities. This past fall, we were able to add Glen Stratton as our new Alligator River NWR Fire Control Officer (FCO). FCO Stratton has brought some critical skills new ideas and lots of energy and enthusiasm to our program. This has afforded FMO

Crews to function more as a District Resource than in past years. It is also preparing us to begin a "landmark year" in our District burning program.

Prescribed Burning Activity:

The Alligator River NWR Fire Crew has contributed to a much increased program of burning in 1996. We waited all winter for the right conditions to complete the south Pea Island NWR prescribed burn. We needed moderate to strong northeast winds, but without the usual complement of wet, rainy weather. On March 11, we experienced a very blustery Nor'Easter with unusually low dew points. Winds were blowing at a steady 20 to 25 miles per hour, with gusts up to 30 mph. The fire crew assembled on the south end of Pea Island NWR. They burned seven miles north to South Pond waterfowl impoundment. A total of 1,200 acres was burned that day. Due to the extreme conditions near the upper end of the prescribed wind range, the fire carried across the brush flats where it had failed to burn in previous years. WS Creef, who has been burning at Pea Island NWR for 20 years stated that he felt that it was the most successful burn experienced in many years. An additional 3,200 acres of waterfowl impoundments, moist soil units, and agricultural fields were burned at Alligator River NWR. The Alligator River NWR Fire Crew, assisted by personnel from Mattamuskeet NWR and Pocosin Lakes NWR, conducted two helicopter burns at Cedar Island NWR. A total of 2,300 acres was burned in this manner in October and December. By the end of the calendar year, we were well on our way to exceeding our goal of 15,000 acres of prescribed burning for the new fiscal year. We completed our first helicopter burn in this Fire Management District with the Cedar Island NWR burns. We developed prescriptions for Swan Quarter NWR, as well as Alligator River NWR and Pea Island NWR for the upcoming winter burning season.

Wildfire Activity:

While we experienced a "light" year with only a few small wildfires in 1996 at Alligator River NWR, the potential for a large fire was there. The spring fire season was characterized by dry, windy weather across the eastern part of North Carolina. Readiness for wildfire was high during this time. Staffing classes were running high in the Readiness Plan 4 and 5 days. Personnel and equipment from the Refuge were used to assist the Croatan National Forest on a 400-acre wildfire in April. As the season progressed into the summer fire season, with drought indices running in the 500 KBDI range, we started getting significant thundershower activity. Alligator River NWR ended up getting mostly rain showers, but neighboring Swan Quarter NWR and Pocosin Lakes NWR got mostly thunder and lightning!

On June 14, a lightning storm swept across the Hyde County area. This produced lightning fires on DeHoog Road at Pocosin Lakes NWR and in the Juniper Bay section of Swanquarter NWR. Pocosin Lakes NWR initial attack stopped the DeHoog Road Fire at 2 acres. Due to the remoteness of the Juniper Bay Fire, it took 22 hours just to get personnel and equipment to the fire. By this time it was around 600 acres. The AX-4 fire tractor and all available firefighters were deployed from Alligator River NWR on this fire. It was controlled a week later at 660 acres. Tractor AX-4 performed well during the initial stages of this fire, including the 13-mile trek into the fire through Gull Rock State Gamelands. Toward the end; however, it received extensive damage to the winches, bumpers and frame from being stuck and having to be winched out so many times. AX-4's plow had relatively narrow tires which caused the plow to sink in soft conditions. This was like dragging an anchor, causing the tractor to mire down.

The Eastern North Carolina Interagency Overhead Team was called in and used on the Juniper Bay Fire. FMO Crews, served as a Unified Incident Commander along with Mike Hendricks from the NC Forest Service (NCFS). Don Temple, Refuge Manager at Mattamuskeet, Swan Quarter and Cedar Island Refuges, was Line Officer. The incident objectives were met in a safe and timely manner. This was the first use of the Eastern N.C. Interagency Incident Management Team. It was a resounding success.

On June 28, around 1500, the Pungo Lake Fire was reported at Pocosin Lakes NWR, near Allen Road. It was already 20-30 acres in size and spreading rapidly. Initial Attack was made with the combined resources from the USFWS and NCFS, featuring a heavy tractor-plow flank attack, supported by air attack with retardant by NCFS single engine air tankers (SEATS), and directed by a scout plane. The wildfire was contained by 1730 at around 100 acres during the first burning period, but because of groundfire and the weather forecasts, there was eminent danger of escape. A Type 3 ICS team was established with personnel from NCFS, USFWS, and USFS, filling the positions of logistics, finance, and plans as well as IC and operations. The overall suppression strategy was to keep the fire contained,

control the groundfire, and to complete 100% mop-up with no serious accidents. By July 8, all suppression objectives were met, and the fire was turned back over to Pocosin Lakes NWR personnel. Alligator River NWR contributed heavily from its Operations and Maintenance staff as well as the few fire crew members that had not been laid off prior to the end of the spring fire season.

Alligator River NWR supported the national mobilization of the Western Wildfire Suppression Activities by providing five personnel for three week details each. FMO Crews went out as an assistant Crew Boss with a Georgia Interagency Crew, and FT Meekins, FT Midgett, EEO Govan, and FT Scheibel went as crew members on a NC Interagency Crew. All personnel ended up on California wildfires.

Fire Management Planning:

Fire Management Planning has been ongoing in 1996. Due to time constraints and not having an FCO until late in the year, plans were largely tabled until 1997. There has been much development in our ability to prescribe burn portions of the Refuge and the plans will reflect these developments. Consultations on Fire Management Planning issues have been discussed with many of our cooperators and the public during the year.

Fire Training:

Fire training in 1996 included sending personnel away to receive critical courses. Earlier in the year, S-270 was taught to most of our District fire personnel, along with the OAS Basic Aviation Safety. S-211 Wildland Powersaws was taught in Columbia by Chris Farinetti, for the benefit of the AmeriCorps Program there, with personnel from Alligator River NWR and Pocosin Lakes NWR attending. Standards for Survival, Tractor and Plow Safety (TAPS) along with SA-290 "Look UP, Look Down, Look Around" were taught to around 50 District Personnel prior to the Spring Fire Season. NCFS D-13 personnel helped provide excellent instruction for these courses. We closed the season out by teaching S-290, Intermediate Fire Behavior to 40 personnel, including three from Camp LeJeune, NC. The S-290 instructor cadre included Fire Weather Meteorologist Jim Merrell, from the National Weather Service - Raleigh; NCFS Fire Behavior Analyst Gary Curcio, and U.S. Marine Corps Camp Lejeune Forester Danny Becker, as well as FMO Crews. Coaches included Assistant Refuge Manager David Kitts from Pocosin Lakes NWR and FCO Stratton. S-130, 190, I-200, the basic firefighting courses were taught by FCO Stratton and other District personnel in December.

10. Pest Control

Cooperative farmers use 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 efforts are required to control Phragmites

communis in farm fields and moist soil units. These efforts include herbicides, burning, and discing where possible.

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. Its large size and dense vegetation make 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 is consistently found on Whipping Creek Lake. A few have been seen each year in the marshes, ponds, streams, and canals. Alligator surveys were not conducted in 1996 due to insufficient funding and staffing.

Bald eagle (Endangered): During the course of the year immature and adult eagles have been observed on the Refuge. Although eagle sightings are becoming more common, no eagle nests have been confirmed on the Refuge to date.

An injured eagle was captured and taken to a local veterinarian for treatment. After a couple of weeks the veterinarian felt that the eagle was ready to release. After unsuccessful releases, the bird was recaptured and transported to the Carolina Raptor Center for further rehabilitation. The bird is scheduled to be released in early March, 1997.

Peregrine falcon (Endangered): Peregrine falcons are known to move through the Refuge during migration. No reports of peregrine falcons occurred during 1996.

Red-cockaded woodpecker (Endangered): Aerial surveys by Jay Carter and Associates for the USAF resulted in the location of a previously unknown cluster with several cavity trees. Rapidly spreading infestations of Southern pine beetle are threatening cluster sites and foraging habitat. Attempts to control the Southern pine beetle outbreak will continue.

Red wolf (Endangered): During 1996, staff released eight wolves in the NC reestablishment area: 675M/760F (adult pair) released at Pocosin Lakes NWR on May 21, 1996 and 753M/807F (adult pair) released at Mattamuskeet NWR on June 24, 1996. Four wolves were released as single animals (765F, 640M, 769M, and 808F). Three released adults (675M, 753M, and 760F) were wild born wolves that were captured in an effort to produce releasable pairs. The remaining five wolves were produced at island propagation sites: (1) Bulls Island NWR - 640M, 807F, 808F and (2) St. Vincent NWR - 765F, 769M. Of the eight wolves released, three are currently free-ranging (675M, 753M, and 808F); 640M was returned to captivity on May 26, 1996 due to showing tolerance towards humans/highways. More releases are planned for eastern NC in 1997.

During 1996 a minimum of 13 pups was produced from a minimum of seven litters. These births were offset by the death of seven wolves.



A small, but vocal group of people have made efforts to gain support for a "no red wolves" cause. The actions of this group have not resulted in any major problems for the program.

11/96 BWS

Red Wolf Mortality During 1996:

Wolf	Date of Death	# Mos in Wild	Cause of Death
760F	05/24/96	23.75	vehicle strike
796M	05/24/96	13.5	unknown
519M	06/22/96	47.75	unknown
765F	07/03/96	6.25	unknown
807F	09/29/96	3.0	infection
849F	10/14/96	6.5	vehicle strike
769M	12/06/96	7.0	vehicle strike

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

Monthly Red Wolf Population (Free-Ranging):

Month	Population	Month	Population
January	40	July	39
February	40	August	37
March	44	September	36
April	40	October	38
May	40	November	42
June	40	December	38

As of December 31, 1996, the population included a minimum of 38 radio-collared wolves that had been in the wild for an average of 42.8 months. The total estimated red wolf population in

eastern NC at the end of 1996 was between 55 and 65 wolves. By the end of 1996, 87% of the collared, free ranging population were wild born.

FREE-RANGING RED WOLVES IN EASTERN NORTH CAROLINA
AS OF 31 DECEMBER 1996

Wolf# & sex	Birth location	Age ^a (mos)	# Mos. in wild (mos) ^b	Location of home range	Comments
331M	captivity	104.25	95.2	federal land	consorting w/ 394F
382F	captivity	91.5	52.9	federal land	consorting with unknown male
392M	captivity	92.0	88.7	private land	consorting with 344F (off air)
394F	captivity	92.0	88.7	federal land	consorting w/ 331M
442M	wild	79.7	79.7	private land	consorting w/ 508F
444F	wild	79.7	79.7	federal land	consorting w/ 752M
502F	wild	68.0	68.0	private land	consorting with 506M (off air)
503F	wild	68.0	68.0	federal land	consorting with 670M (off air)
505F	wild	68.1	68.1	private land	consorting with unknown male
508F	wild	68.1	66.5	private land	consorting w/ 442M
582F	wild	56.1	56.1	private land	lone female
662M	wild	44.5	44.5	federal land	consorting w/ 815F
663M	wild	44.5	44.5	private land	lone male
665F	wild	44.0	44.0	private land	consorting w/ 768M
666M	wild	44.0	44.0	private land	consorting w/ 756F
671M	wild	44.0	44.0	private land	consorting w/ 673F
673F	wild	44.0	44.0	private land	consorting w/ 671M
675M	wild	44.0	44.5	private land	consorting with 593F (off air)
746M	wild	32.8	32.8	federal land	pack member
747F	wild	32.8	32.8	federal land	pack member
752M	wild	32.0	32.0	federal land	consorting w/ 444F
753M	wild	32.0	32.0	federal land	consorting w/ 808F
756F	wild	32.0	32.0	private land	consorting w/ 666M
763F	wild	32.1	32.1	private land	pack member
768M	wild	32.6	32.6	private land	consorting w/ 665F
772M	wild	32.0	32.0	private land	pack member
774F	wild	32.0	32.0	private land	consorting with unknown male
795M	wild	32.0	32.0	private land	lone male
798F	wild	12.8	12.8	private land	pack member
799M	wild	12.8	12.8	federal land	pack member
800F	wild	12.8	12.8	federal land	pack member
804M	wild	12.8	12.8	private land	lone male
806F	wild	12.8	12.8	private land	lone male
808F	wild	12.8	12.8	federal land	consorting w/ 753M
813M	wild	12.8	12.8	private land	lone male
815F	wild	56.0	56.0	federal land	consorting w/ 662M
873F	wild	12.8	12.8	private land	pack member
874M	wild	20.0	20.0	private land	pack member

^a - Age was calculated relative to 31 December 1996.

^b - 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.

During February 1997, staff expects about 11 red wolf pairs to breed in the wild. These breedings should result in the production of about 22 to 33 pups that will mature to an age of self-sufficiency. Thus, by December 1997, the red wolf population should include 75 to 85 animals, of which over 95% will have been born in the wild.

During 1996, 12 to 15 captive wolves were maintained at the Alligator River NWR breeding facility. As of December 31, 15 wolves resided at the facility.

Captive breeding at the Refuge has become an increasingly important component of the restoration effort. Since 1986, 135 wolves have been maintained at the facilities' 15 pens for varying periods of time. Additionally, 30 captive adult pairs have been maintained through several breeding seasons. Eleven of these pairs bred successfully and produced 47 pups.

Public Information and Education:

Public education programs continue to be a major priority in effectively reestablishing a population of red wolves to eastern North Carolina. During 1996 red wolf crew members presented 59 public information programs (including 14 howling safaris) in addition to responding to countless media request for wolf project updates. The project also established a red wolf web page and field journal entries through Scholastic New Media, Inc., which was accessed by hundreds of school children nationwide during November, 1996. The web site is stored in the Scholastic Network web site archives.

3. Waterfowl

Historically, large numbers of waterfowl did not use the area that is now Alligator River NWR because of its forested character. However, the Refuge supports a substantial year-round population of wood ducks that use the numerous ditches, canals, creeks, lakes, natural openings, and swamps. A large number of waterfowl species can be found on the Alligator River NWR 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.

Results of this year's surveys are given in Table 4. Peak numbers during the 1995-1996 survey period were 1,901 mallards, 1,580 black ducks, 15,310 pintails, 2,393 green-winged teal, and 1,103 ringneck ducks. This compares to 1,000 mallards, 4,624 pintails, 4,200 green-winged teal, and 496 ringneck ducks during the 1994-1995 season. It is interesting to note that tundra swan peak use has steadily increased from 448 in 93-94, 488 in 94-95, and 1,100 in 95-96.

It appears that overall waterfowl use increased substantially during the 1995-1996 survey period. Species such as mallard, black duck, gadwall, wigeon, pintail, and shoveler showed increases in use. Other species such as green-winged and blue-

winged teal, wood duck, and ringneck duck showed decreases in use.

Table 4
Waterfowl Survey, Alligator River NWR, Fall 1995-Spring 1996

Waterfowl Type	Nov 3	Nov 9	Dec 15	Jan 4	Jan 26	Feb 14	Feb 28	Mar 6	Mar 15
Mallard	82	74	1050	1025	1901	943	503	911	318
Black duck	123	343	675	295	1580	335	215	36	38
Pintail	10	830	1933	3170	15310	11220	338	513	223
Wigeon	68	25	0	0	2530	394	312	233	113
GW Teal	0	0	0	0	1870	2393	838	921	858
Wood duck	13	9	0	290	530	16	6	19	20
Ringneck duck	0	0	0	120	1103	3	146	136	17
Gadwall	0	0	0	150	4520	0	0	0	0
BW Teal	0	0	0	0	0	0	0	1	1
Shoveler	0	0	0	0	20	78	145	186	111
Coot	0	0	67	0	0	76	10	0	8
Canada goose	40	0	0	0	0	14	26	20	0
Tundra swan	0	0	684	475	1100	743	782	696	0
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	0	0	0	0	0	0	1	0	0
Unknown	200	50	0	550	0	0	60	160	58
TOTALS	526	1331	4409	6075	30464	16215	3382	3832	1765

The Wood Duck Nest Box Program was inactive during 1996 due to insufficient funding and staffing.

4. Marsh and Waterbirds

Although management of moist soil units is focused on waterfowl, numerous other marsh and waterbird species are readily observed in these units. Herons, egrets, and rails appear to be the most numerous. Killdeer, woodcock, and snipe are also common. The belted kingfisher is often seen adjacent to canals with deeper, more permanent water. At the present time, there are 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 (marsh hawk). The kestrel and merlin are also common species. Owl species include great-horned owl, barred owl, short-eared owl, and screech owl.

7. Other Migratory Birds

The Refuge is host for many migratory species such as the mourning dove. In addition, 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, 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 are providing hunters with considerable recreational opportunity.

Field work for the cooperative black bear research study between the University of Tennessee (UT), the USAF (Dare County Bombing Range), and the Refuge ended in 1996. Graduate students returned to campus and began the process of data analysis and thesis preparation. Information on sex and age distribution, age at primiparity, birth rate, survival, and density of the bear population was gathered. Since the study began in September, 1992, 413 trap sites accounted for 4,683 trap nights and produced 330 captures of 214 different bears. Males dominated the capture sample during all trapping periods (162 males vs 52 females). Trapping along roads and using modified capture loops may have biased the sample towards males. Radio collars were placed on 46 different bears on 47 occasions. Nineteen of these bears had active collars at the end of sampling in 1996. From the data collected, a bear management strategy will be developed.

10. Other Resident Wildlife

None of the three wild turkeys observed on the Refuge during 1995 were seen during 1996. Feathers from an immature hen turkey were found in April, 1996. Based upon the quantity of feathers found and other evidence, it appeared that the hen was taken by an avian predator.

15. Animal Control

Beaver numbers are rapidly increasing and so are all of the associated problems. Beaver population management practices have been implemented and will most likely become a permanent component of Refuge management activities.

16. Marking and Banding

Wood duck banding efforts were not successful due to interference by bears. Bears continuously occupied the bait site during the banding period, which resulted in wood ducks avoiding the site. However, three bears were trapped, tattooed, and tagged at the "wood duck" banding site.

Post-season tundra swan banding efforts were also affected by bears and an early spring. Basically, swans migrated at about the same time they started coming to bait. Only six swans were trapped and banded.

H. PUBLIC USE

1. General

The public use program on the 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 1996 were estimated to be 16,414. Administrative offices for the Refuge remained in the General Services Administration (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 1996, the Refuge continued to focus on providing a greater number of media contacts while keeping the messages short and simple. A total of eight news releases and five radio/TV spots was done.

WIS Strawser participated as a member of the Roanoke-Tar-Nuese-Cape Fear (RTNCF) Ecosystem Outreach Committee, the Outer Banks Interpreters Group, the Coalition for Continuing Education, and the planning team for a partnership-sponsored Eco-Tourism

Workshop. WIS Strawser was the primary writer of the RTNCF Outreach Plan and was selected as a presenter on "Access to Federal Lands" at the Eco-Tourism Workshop scheduled for early in 1997.

2. Outdoor Classrooms - Students

Many teachers have established regular patterns in their utilization of the marshes of Pea Island NWR 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 come 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. A program called Animals Without Backbones as well as programs about bird banding, migration and red wolves are available. During 1996, these educational programs were presented to 690 students.

3. Outdoor Classrooms - Teachers

There were no local requests for teacher training workshops during 1996. Since Alligator River NWR and Pea Island NWR 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. WIS Strawser worked with the Outer Banks Interpreters Group throughout 1996. This group focuses on identifying environmental education and interpretive needs in the community as well as surrounding areas.

4. Interpretive Foot Trails

Sandy Ridge Wildlife Trail and Creef Cut Wildlife Trail continue to be used. However, full potential for these trails has not been reached. The wooden pallets used on Sandy Ridge Wildlife Trail have been minimally functional. A full-fledged boardwalk is definitely in the future plans for this trail.

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 (SUP) to conduct

guided canoe or kayak tours on the Milltail Creek Canoe/Kayak Trail System during 1996. Approximately 350 visitors participated in guided tours provided by the holders of these SUP's.

Approximately 11,499 people used Alligator River NWR trails during 1996. It is anticipated that there will be a continued increase in trail 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 1996 are shown in Table 5.

Table 5. Alligator River NWR Public Use Programs*

Program Type	On/Off Refuge	#Programs	#Participants
General for Adult Groups	Off	6	236
Howlings	On	12	890
General for Public	Off	1	55
School or School-Related Grp.	On	5	155
School Groups	Off	36	1,655
N.C. State Fair	Off	1 staff for 4 days	
Defenders of Wildlife "Wolves of America" Conf.	Off	2 staff- 2 papers	500
Engelhard Seafood Festival	Off	1	1,000
Dixie Deer Classic	Off	1	10,000
Fossil Rim Wildlife Center	Off	1	250
Farm Days Exhibit	Off	1	250
Swan Days	Off	2 days	500

*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 1996 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 5.

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8. Hunting

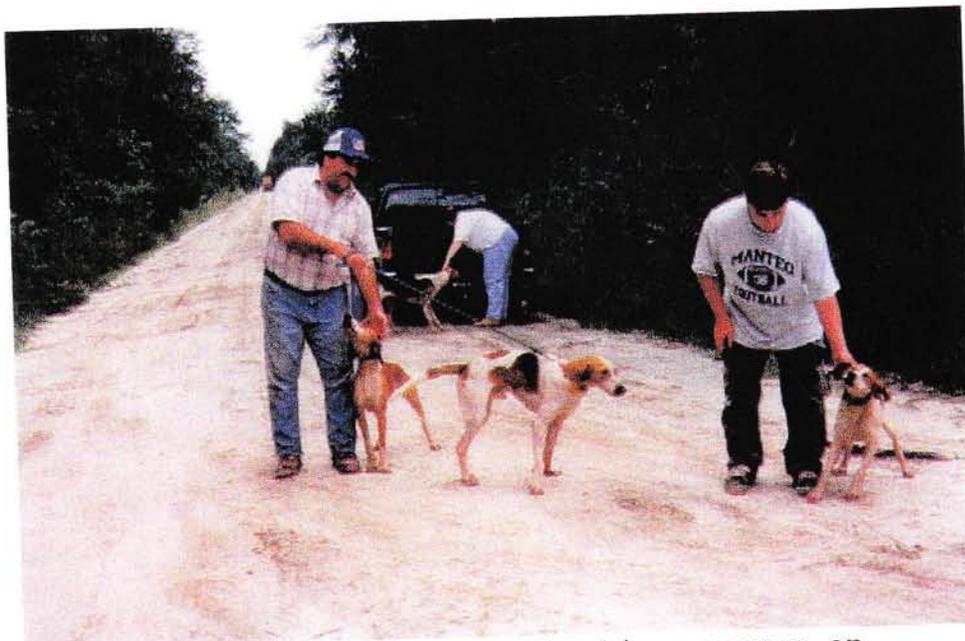
With approval of the Master Plan shortly after establishment, the Refuge was divided into three basic public use areas, with several additional safety or management zones closed to all hunting. As new areas have been acquired, they have been added to one of the three existing categories, or (in the case of the farm fields) put into a newly created category. The farm fields were designated, during September and October, as open to all authorized uses except waterfowl hunting. They are closed to public entry at 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.

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

White-tail deer continue to be the most sought after game species on Refuge lands. Alligator River contains over 150,000 acres of habitat, traversed by more than 150 miles of unimproved roads. These factors make it difficult to establish effective hunter check stations. The North Carolina Wildlife Resources Commission (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 used and extrapolated to provide more realistic estimates. Using these figures, provided by the NCWRC, it was estimated that 314 deer were taken during the 1995-96 hunt.

This year was Dare County's sixth annual bear season since the NCWRC and County Commissioners reinstated a bear season. The 9-day bear season ran November 11-16 and December 16-18; two bears were documented as taken in Dare County during 1996. Bear hunting is not allowed on the Refuge.



A common sight during deer hunting season on Alligator River NWR. 10/96 BWS

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 9, archery season began along with the usual weekend patrol assignments for Refuge Officers. Muzzle loader season started on October 7. Regular gun season began October 14. As always, on November 1, the farm field gates were closed and locked. For the rest of the year (and through September, 1996), this area was closed to all public entry.

Waterfowl seasons were October 3-5, November 25-30, and December 9 - January 18. 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 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 Earl 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:

<u>Activity</u>	<u>Visits</u>
Waterfowl	310
Big Game	2,304
Upland Game	633

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 of effort. Angling for bluegill, crappie, chain pickerel, channel catfish, flier, largemouth bass, and yellow and white perch is considered good. During 1996, there were an estimated 2,778 fishing visits to the Refuge. Frog gigging is allowed on the Refuge by special use permit.



Traditional fishing on Alligator River NWR.

10/96 BWS

10. Trapping

Since trapping is considered a commercial use of the Refuge, neither visits nor activity hours are normally recorded under public use. For the 1996 trapping season, no special use permits were issued for Refuge trapping.

11. Wildlife Observation

Canoeists enjoyed paddling on Milltail Creek and Whipping Creek 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 observations.

Wildlife photographers used the Refuge to some extent for a chance at black 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 observations during 1996:

<u>Activity</u>	<u>Visits</u>
Foot	3,935
Vehicle	2,440
Boat	1,273

17. Law Enforcement

Refuge collateral duty officers, again, numbered four for the 1996-97 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 NWR season a long one!

Officers Bryant, Strawser, Cooley, and Windley attended the annual Law Enforcement Refresher in Tallahassee, Florida and requalified with their firearms midyear.



Look closely for the Refuge boundary signs...And, no, we didn't ticket that 4-wheeler for being on the Refuge. It reminded us of the importance of having a clearly marked boundary and good sign maintenance!

11/96 BWS

A summary of the 1996 Annual Law Enforcement Program Report follows:

Offense	Total # Offenses	# Offenses Reported By Other Agencies	Cleared by Arrest or Exceptional Means	Monetary Loss To Gov't
Burglary - Forceable Entry		5		
Motor Veh. Theft - Auto	1		1	
Vandalism	40		3	\$5,000
Nat. Res. Violations	60			
Educ. Service Incidents	10			
Other Service Incidents	25			

18. Cooperating Associations

FY 1996 for the Coastal Wildlife Refuge Society (CWRS) noted the following accomplishments:

The primary thrust for the 1996 fiscal year was the construction of the Visitor Center addition on Pea Island NWR. This project was accomplished and was officially opened in September. The total spent on the addition during the fiscal year was \$44,995.06. A TV/VCR with wildlife tapes and an interactive computer exhibit have yet to be purchased and installed. Once the CWRS has spent the minimum \$60,000 on the project, it will be reimbursed by a \$30,000 grant from the Dare County Tourist Bureau. The computers, TV, VCR, and tapes will be purchased as soon as the funding is available, bringing the total to the minimum required for the matching grant.

During the year, the CWRS made the following purchases for or donations to the Refuge:

- stipends (\$50 per week) and travel funds for five interns;
- a 4-wheeler for Turtle Patrol;
- printing costs for four issues of Wings (2,000 copies each), 30,000 copies of Birds of the Outer Banks, 10,000 copies of Pea Island NWR general leaflets, 5,000 copies of Alligator River NWR general leaflets, and 10,000 copies of the Milltail Creek Canoe/Kayak Trails map;
- printing costs for 2,000 red wolf bumper stickers;
- a weed-eater, Roundup herbicide, and other tools and supplies necessary for trail maintenance;
- \$10,000 to the Service to fund an Interpretive Assistant position;
- building, contents, and liability insurance for the Pea Island NWR Visitor Center;
- Power Mac computer system for the Public Use Program (invoice did not arrive until FY 1997!); and
- the Pea Island NWR Visitor Center Addition.

The CWRS accepted a \$95,000 donation (i.e., a Right-of-Way fee from the NC Power Company) for Currituck NWR. It has also been instrumental in assisting other stations in the RTNCF Ecosystem, as requested.

The CWRS amended its agreement with the Service early in the year to allow a cooperative canoe trip program. Refuge volunteers guided canoe tours using Refuge canoes on both refuges for a fee. At the last Board meeting, the 1997 budget was approved, including a line item to donate canoe-generated funds to the Service to fund additional public use positions. The budget also appropriated funding to establish a home page on the World Wide Web (WWW), primarily to assist with fund raising and educational information for outreach.

Additional plans for 1997 will focus on completing the exhibits section of the Pea Island NWR Visitor Center addition, soliciting grants to fund two AM radio stations, paying back the NFWF grant (\$15,000, unless it has been forgiven -- word has not been received to date), and beginning serious work toward phasing in the Alligator River NWR Visitor Center/Administrative Complex on Roanoke Island.

Memberships have been arriving regularly through the year. CWRS membership now totals 561.

The following tables show CWRS sales and financial information for FY 1996:

Table 6. CWRS Sales Report- FY 1996

Current Inventory (October 1, 1996)

Books	14,949.85
Shirts, T-Shirts, & Caps	22,495.88
Other	15,887.21
Total Inventory October 1, 1996:	53,332.94
Inventory on Hand October 1, 1995	44,091.10
Cost of Goods during FY 96	56,353.65
Total Inventory for Sale during FY 1996	100,444.75
Total Inventory October 1, 1996	53,332.94
Total Goods Sold during FY 1996	47,111.81
Actual Income from Sales during FY 1996 (includes sales tax)	89,725.91
Less sales tax	(-)4,935.53
Gross Income after Tax	84,790.38
Net from Sales for FY 1996	\$37,678.57

Table 7. 1996 Financial Report- Coastal Wildlife Refuge Society

<u>Income</u>	
Donations	
Currituck NWR ROW	95,000.00
VC Addition	8,242.00
Run	870.00
Red Wolf	950.00
Sea Turtles	1,020.00
General	
NPT Donation Box	1,037.00
VC Donation Box	1,137.70
Soft Drinks	743.82
Raffle	377.00
Un-designated	8,524.30
Total General	11,442.82
Canoes	
Fees Received	2,305.00
Special Use Permits	1,675.00
Total Canoes	3,980.00
Total Donations	121,881.82
Administrative adjustment	929.60
Interest	462.36
Net Sales Income (from sales report)	37,678.57
Total Income	\$160,952.35
<u>Expenses</u>	
Sales Expense	
Credit Card Fee	644.68
Administrative Costs	84.90
Total Sales Expense	729.58
Purchases for Refuge	
Assistant Interpretive Spec.	10,000.00
VC & Addition	46,193.75
4-Wheeler for Turtle Patrol	4,674.00
Intern Stipends/Travel	2,560.00
Bumper Stickers	609.50
Leaflet Printing	6,340.85
VC Insurance	4,885.00
Miscellaneous	580.57
Total Purchases for Refuge	75,843.67
Total Expenses	\$76,573.25
Balance as of 10/1/96	\$103,174.12
(\$95,000 in CD; \$8,174.12 in CWRS account)	

I. EQUIPMENT AND FACILITIES

1. New Construction

No new construction projects have been accomplished this year. To date there has not been an oil/paint storage building constructed at the East Lake Maintenance Facility. The Refuge does not know when or if the construction of the building will begin. In June of 1994, a Request for Engineering Services (RES) was submitted for the construction of this building. The RO-Engineering estimate to construct the building was \$40,000. After the bid was awarded, the construction company didn't initiate any work in the allowed time frame and CGS issued a default notice in early 1995. CGS agreed to forfeit the contractor and readvertise. The only bid submitted was well in excess of funds available for the project and negotiations with this bidder were unsuccessful.

2. Rehabilitation

Three water control structures were installed at different times during the year: structures on Possum and Dry Ridge North, and within a 160-acre moist soil impoundment unit. Two risers were installed on Butler Road and Sawyer Lake Road. The overall hydrological restoration project will take at least another two years to complete and will replace 28 unsafe wooden bridges (30' to 50' in length) with approximately 36 large water control structures and fill. The 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 19 structures has been installed to date, which restores hydrology on roughly 50,000 acres along with eliminating some very unsafe bridges.

Throughout the year approximately 200 miles of roads were graded, 12 miles of roads were disced, and roughly 40 miles of roads, canal banks, and ditches were boomaxed. Two miles of canals were cleaned out using the dragline.

3. Major Maintenance

Improvements to the primary Refuge road system continues to be a high priority item. Work on major rehabilitation of the entire 50 miles of primary roads began in 1992. By the end of 1995, most of the 50 miles has been completed. Work now focuses on maintaining these roads and rehabilitating the secondary roads. Approximately 11 miles of road were partially completed by removing all road shoulder vegetation (using crawler tractor with a KG blade and discing), recrowning, and hauling fill material for holes in low spots.

Equipment repairs are a never ending problem, partially due to a lot of heavy use, but primarily due to using some old equipment. Samples of corrective measures for these problems

follows: (1) replaced head gasket on road grader; (2) replaced turntable shims on road grader, (3) replaced cutting edges on grader and dozier blades, (4) routine service at 250-hour intervals, and (5) fixed or replaced numerous flat or worn out tires on equipment and vehicles.

4. Equipment Utilization and Replacement

Refuge equipment was loaned on several occasions to other northeastern North Carolina Refuges. Likewise, Alligator River NWR borrowed equipment on occasion. On several occasions equipment was also loaned to the NC Forest Service and the National Park Service.

Fire Equipment Development:

Alligator River NWR reached a new height in equipment development during 1996. The flex-tracked fire tractor AX-4 (Mattamuskeet's Bombardier Gotract GT-1000) was pulled into the shop for a major overhaul following the Juniper Bay Fire. EEO Harris, with help from the fire crew, redesigned and retrofitted the machine for optimal use as a fire tractor. The machine was shortened to optimize ground clearance in the rear, repositioning the winch to a better height and location to improve performance. All glass was removed and replaced with heavy duty metal screens for safety. A new bumper and brush guards were installed and all vulnerable components were shielded to allow for operation in heavy timber and brush. In all, approximately 1,500 pounds were removed from the tractor, which should improve performance in wet soil conditions. The tractor has proven itself to be an excellent fire tractor on several occasions since. Mattamuskeet NWR Refuge Manager Don Temple and O&M personnel helped provide oversight and many of the materials for the retrofit.

The flex-tracked fire tractor AX-2 (Alligator River Terreveh T-10) was modified to improve "in-woods performance". FT Meekins, fire crew leader, constructed a heavy duty bumper and track retention bar for this tractor, with some additional minor modifications to the windows and body. EEO Govan cleaned and painted the tractor to look like new.

The first of our military surplus M-548 Cargo/Personnel Carriers was retrofitted by EEO Harris and FT Meekins. These tracked carriers (also known as full-tracks), are lightweight (14,000 pounds) high-performance amphibious vehicles powered by a large Cummings diesel engine matched with a dependable Allison transmission. They are designed for rapid deployment of personnel over rough and flooded terrain with a soft-ride FMC track system. (The U.S. military purchased these machines at \$250,000 per copy in the mid- to late 1970's.) With direction from the Fire Management Team at Alligator River NWR, FT Meekins and EEO Harris designed and built an all-aluminum, three-quarter cab protective top to allow this vehicle to operate in

the woodland and brush lands environment. Bench seats with tool storage compartments were mounted to allow a total of 10 persons and gear to be transported in this vehicle at once. A removable aluminum water tank (250 gallons) with 5 HP pump and 100-gallon Terratorch (flamethrower) have been mounted on this vehicle to increase its versatility for prescribed burning or wildfire operations. Highband and lowband radios were installed to allow for communications. This new tractor was painted up in NIFC-yellow and identified as Fire Tractor AX-5. This vehicle's primary purpose will be for hauling personnel and equipment safely across rough pocosin terrain to assist in holding and mop-up suppression operations or prescribed burns. An interesting note: AX-5 was constructed on a "shoe-string" budget with most of the aluminum sheeting contributed by Mattamuskeet NWR. Total cost for the retrofit was less than \$3000, not counting the radios or contributed metal.

A second full-track is on the "drawing-board" to be retrofitted for an "off-road" tracked wildland engine capable of laying down long foam lines and performing burnout operations. We are even considering the idea of development of a 500-gallon capacity water tank that can be refilled with bucket drops from a helicopter.

J. OTHER ITEMS

3. Items of Interest

DRM Manager Cooley and WB Stewart attended the Shorebird Ecology and Management Workshop in Georgetown, SC, May 7-10.

RM Bryant attended Team Effectiveness Training June 11-13, as part of the RTNCF Ecosystem Team.

RM Bryant was subpoenaed to appear July 1, 1996 in State Superior Court in Manteo, NC and testify in a lawsuit trial. The lawsuit brought by the Friends's of Roanoke Island (FRI) challenged actions of the Dare County Commissioners Court in rezoning lands adjacent to Service property on Roanoke Island. The Regional Solicitor advised RM Bryant not to testify. Upon hearing this FRI attorneys declined to call RM Bryant to the stand.

RM Bryant and DRM Cooley delivered a \$271,075 revenue sharing check to Dare County in July.

The Refuge hosted the RTNCF Ecosystem Team Meeting, October 9-10.

Department of Interior's Service budget analyst Steve Guertin visited the Refuge October 31 - November 1.

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 1996

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

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| 6. Computer Systems..... | NTR |
| 7. Energy Conservation..... | NTR |
| 8. Other..... | NTR |

J. OTHER ITEMS

- | | |
|------------------------------|-----|
| 1. Cooperative Programs..... | NTR |
| 2. Other Economic Uses..... | NTR |
| 3. Items of Interest..... | NTR |
| 4. Credits..... | NTR |

K. FEEDBACK NTR

L. INFORMATION PACKET - - - (inside back cover)

A. HIGHLIGHTS

Sandbags finally gone! (Section D.4)

Refuge participates in "Geese in Space". (Section D.5)

Visitor Center addition complete. (Section H.1)

The Coastal Wildlife Refuge Society (CWRS) has a banner year!
(Section H.18 of Alligator River Narrative)



Regional Director Noreen Clough cuts ribbon to open the new visitor center addition.

9/96 BWS

B. CLIMATIC CONDITIONS

Pea Island NWR enjoyed fairly mild temperatures throughout the year. In July, August and September, Hurricanes Bertha, Edouard, and Fran provided all staff with plenty of work and excitement. Refuge hurricane preparations began in July when Bertha threatened. The refuge sustained approximately 50-60 mph winds and only minor sound side flooding. Dare County ordered mandatory evacuation and it immediately became almost impossible to travel on the main highways due to traffic (3+ hours travel time from Pea Island NWR headquarters to Manteo). Hurricane precautions remained in place at Pea Island NWR throughout August and September with continued threats from Edouard and Fran.

C. LAND ACQUISITION

2. Easements

The saga of the Oregon Inlet Coast Guard station continued through 1996. This 10-acre in-holding and old station building was quit-claim deeded to Dare County in 1992. Early in 1993, a group of individuals claiming to be heirs of the original owner (who sold the land in 1878 to the U.S. Coast Guard) filed a deed to the property based upon a "reversionary clause" in the U.S. Coast Guard title, posted the site, and moved a caretaker into the building. They threaten to sue if the county attempts to exercise its quit-claim deed. The group now has placed the property on sale for \$1 million. Rumor has it that local developers are considering purchase and construction of condominiums - in the middle of a National Wildlife Refuge. That part of the site that was refuge property under easement to the U.S. Coast Guard has now reverted back to refuge management. The U.S. Coast Guard finally issued a contract for removal of all their improvements (a building, pier, seawall, etc.) in December of 1994 - a condition of their easement agreement. Further checks into the status of the 10-acre in-holding revealed that the National Park Service (NPS) had instituted a taking of all land contained inside the boundaries established for the Cape Hatteras 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 quit-claimed 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.

In November 1996 the case was retried in the North Carolina Superior Court. The judge ruled that ownership belonged to Dare County. Although the family is predicted to appeal the decision, this cannot occur until after the final judgement has been officially signed. According to the Dare County attorney, Al Cole, the final judgement had not been officially signed as of January 1997. Stay tuned for the next addition of the narrative for results.

The 3.3 mile section of relocated NC Highway 12 was opened for traffic in December 1995. All North Carolina Department of Transportation (NCDOT) right-of-ways for the old section of road were abandoned after asphalt and sandbags were removed and natural conditions restored as per Coastal Area Management Act (CAMA) and Service ROW and Special Use Permits. The final inspection for asphalt removal from the old road bed was

completed in April, 1996. After a long delay from court deliberations, the sandbags were removed in December 1996. However, the construction of the secondary berm has been postponed. See section on compliance with environmental and cultural mandates for details.

D. PLANNING

2. Management Plan

The 1996 annual water management plan was completed and implemented for all impoundments.

Compatibility determinations were completed on all secondary uses.

3. Public Participation

Many volunteers participated in the turtle patrol and turtle watch programs. See Atlantic loggerhead sea turtle under section G2a for details.

4. Compliance with Environmental and Cultural Resource Mandates

Several meetings were attended by refuge staff and NCDOT concerning sandbag removal, the construction of a secondary berm west of the present sandbag area, and mining for sand at the Oregon Inlet Groin. In the original SUP for NC Highway 12 relocation, the refuge mandated the removal of the sandbags within 60 days following the removal of asphalt. In 1995 extreme high tides caused by Hurricane Felix and other storm events caused some pooling of ocean water next to the new section of NC Highway 12. In 1996 extreme high tides caused from a combination of spring tides and the presence of Hurricane Edouard offshore inundated the newly relocated section of NC Highway 12 parallel to New Field pond. To prevent ocean overwash from minor to moderate storm events, the construction of a secondary berm was proposed to refuge staff in 1995 by NCDOT as an alternative to leaving the sandbags and placing culverts along the new stretch of highway. The sand required to construct the secondary berm would be mined from the Oregon Inlet groin. Pressure from Dare County politicians postponed the sandbag removal based on concerns that NC Highway 12 would regularly flood in absence of a sandbag barrier. In early January, 1996, Dare County obtained a temporary restraining order (TRO) in State Superior Court preventing NCDOT removal of the sandbags. Refuge manager, Jim Johnson, developed an affidavit for the State Attorney General Office. Superior Court Judge Tillet received affidavits from interested parties and heard motions until January 19th. In February, Judge Tillet ruled in favor of Dare County and instituted a preliminary

Injunction preventing NCDOT from removing the sandbags. This resulted in the US District Attorney petitioning the US District Court for a motion to intervene. The District Court Judge ruled that requirements to the Refuge SUP be met. Consequently, removal of sandbags was completed in December. However, during the months of postponing the sandbag removal, NCDOT's funding for the construction of the secondary berm was deferred. As of



The controversial sandbag removal project was completed in December 1996. 11/96 WDS

January 1997, the refuge is still awaiting the outcome of the secondary berm construction saga.

Refuge staff attended meetings with USCOE, NCDOT, NPS, NC Division of Water Resources, and local interests to discuss maintenance dredging of a navigation channel in Rodanthe. Although the project is located off refuge property, disposal of dredged material on the refuge had been proposed. If the dredge material is compatible with Pea Island sand, it may be used to reinforce eroded dunes along NC Highway 12.

The North Pond pump construction was completed in July. The dike system around the pump station was restored and heavily seeded to reduce erosion. The next day, 35 resident Canada geese were observed feeding heavily on the seeds! Only a few of the seeds survived to germinate.

Contractors for NCDOT sank test pilings for the Bonner Bridge Replacement Project over Oregon Inlet. Local politicians are trying to tie the bridge replacement project into the Oregon



North Pond pump construction; pilings for bulkhead
being installed. 7/96 WDS

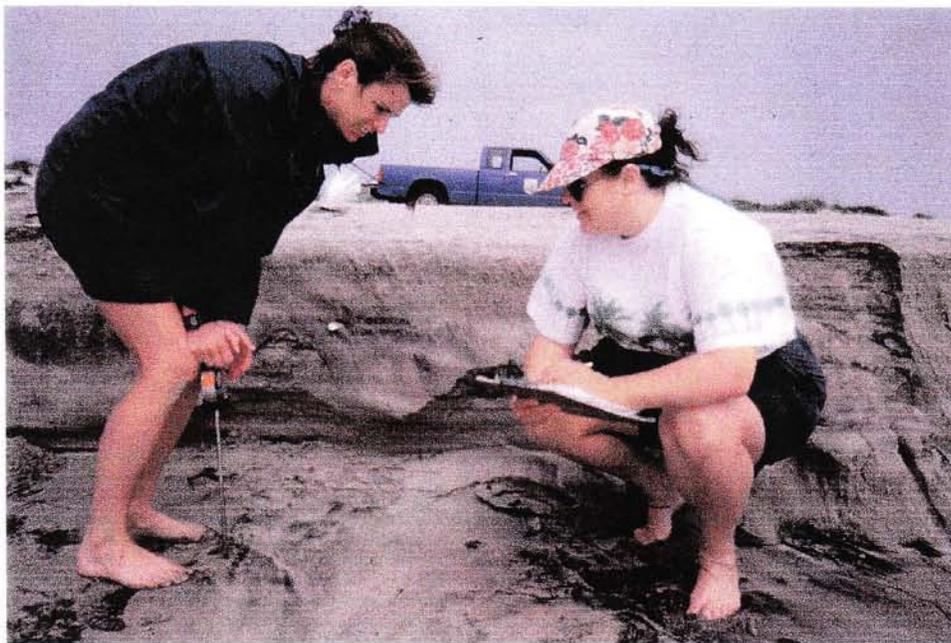
Inlet Jetty Project, using jetty construction as justification for protecting the new bridge.

Several pages of text could easily be written summarizing the activities/actions associated with Oregon Inlet Jetties, beach nourishment, dune construction, and relocating parts of NC Highway 12. Refuge staff participated in many, many meetings with USCOE, NCDOT, ES, other state agencies, and local officials over the course of the year.

More to come in '97, for sure! These and other issues will continue due to proximity of the refuge to Oregon Inlet, presence of NC Highway 12 - the only road to 7 villages south of Nags Head - and strong political clout from 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 dredge material. The USCOE planned to dredge approximately 260,000 cubic yards of material from the Oregon Inlet Navigation Channel and outer bar. This material



Sand compaction readings with a cone penetrometer were conducted on Refuge beaches. 7/96 WDS

was removed by a hopper dredge and deposited in 10 to 14 feet depths of water parallel to the refuge beach. The monitoring plan developed by the refuge covered six miles of beach for the pre- and post- dredge disposal monitoring data. Sediment sampling data, along with beach slope, composition, scarp, and fauna data were collected along transect lines. In addition, sand compaction was measured with a cone penetrometer prior to and after dredge material disposal. Identifying environmental conditions that influence fauna numbers will assist in evaluating effects directly associated with nourishment. Upon the agreement of a new contract, all data samples, etc., will be delivered to Coastal Research Associates, UVA, for completing analysis and report writing. Coastal was issued a contract for this project using USCOE transfer funds.

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

Refuge personnel met with Dr. Jaime Collazo of NC State University to discuss shorebird management at Pea Island NWR. The ecosystem shorebird project was discussed. Dr. Collazo will coordinate shorebird data entry from all Atlantic coast refuges into a database for analysis, and will develop a research proposal for future work.



Refuge Biologist Dennis Stewart hauling buckets of corn to bait sites for "Geese in Space" project.

2/96 WDS

In a joint effort with NC Wildlife Commission and Dr. Richard Maleki of Cornell University, refuge staff have baited and attempted to capture and band the maritime subpopulation of Canada geese. These geese will be fitted with satellite tags and monitored to learn more about migratory routes and breeding ground activities. The project is referred to as the "Geese in Space" project. As of January, 1997, we were unsuccessful in attracting migrants to bait. Our joint efforts to capture these birds will continue throughout the winter.

6. Other

Extreme high tides caused from a combination of spring tides and the presence of hurricane Edouard offshore inundated the newly relocated section of NC Highway 12 parallel to New Field pond. NCDOT was issued authorization to pump flood water east of the dune line and make emergency repairs on sections of damaged dune line. Due to a lack of sand, damaged dunes were repaired on a case by case basis with sand located ocean side of the dunes.

E. ADMINISTRATION

4. Volunteer Programs

Again during 1996, volunteers at Pea Island NWR 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 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 NWR involved staffing the Visitor Center, conducting programs, and working with sea turtles (both Turtle Patrol and Turtle Watch). One summer intern, April Goodman, worked full time in the Public Use Program at Pea Island NWR during 1996; a second, Roni Collier, worked the turtle program at Pea Island NWR. Two additional interns, Gina Ferrell and Joe Stevens were shared between the Pea Island NWR/ Alligator River NWR Public Use Programs and the Bear and Cedar Projects at Alligator River.

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, most public programs conducted during 1996 at Pea Island NWR were done by Refuge volunteers.

One beach clean up operation occurred during 1996. In September, the "Big Sweep" was completed.

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

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 acreage change from year to year.

The 1996 hurricane season provided the staff with plenty of work and excitement. The Hurricane Contingency Plan was activated on two occasions - all buildings were boarded up, staff was evacuated, impoundment unit WCS's were opened to begin dewatering, and equipment and computers were moved to the Manteo Office. Following the second occasion, boards were removed from the visitor center and office windows. The remaining three buildings were left boarded up. Fortunately, all four hurricanes bi-passed Hatteras Island. Strong winds from Hurricane Bertha buried the entire southern nesting bird colony with 2 to 3 feet of sand. No re-nesting occurred after this event. Extreme high tides caused by Hurricanes Edouard, Fran, Bertha, and Lilly resulted in minimal beach erosion, but inundated the turtle safe zone on at least three occasions. Fortunately, no standing water remained on the nests. Only three turtle hatchling deaths could be contributed to possible drowning.

In early 1996, NCDOT restored the old section of NC Highway 12 to natural conditions and completed the final grading and planting of compatible plant species in the mitigation site and grain field. The mitigation site and grain field will require additional planting in 1997 due to salt water inundation from storm events and heavy grazing from greater snow geese.

2. Wetlands

In 1995, a lack of pumping capabilities and predominantly northeast winds made it difficult to maintain target salinity and water levels in the impoundments resulting in high salinities and low productivity during the 1995 growing season. Southwest winds were required to allow gravity inflow of water into the impoundments. The beginning of 1996 marked the second year in a row for above average salinities. In April 1996, water in North Pond was drawn down to expose mudflats for migrating shorebirds. A shorebird survey conducted in May tallied more than 20,000 shorebirds in North Pond alone.

A positive effect of Hurricane Bertha's rain and southwest wind tide was realized in the three brackish impoundments. Water levels were established at or above target and salinity ranges were at or below target. Average annual salinity levels for North Pond was 9.2 ppt, New Field was 13 ppt, and South Pond was 10 ppt. The 1996 SAV production was excellent!

Wetlands in the Salt Flats are flooded and dewatered by natural ebb and flow in wind/tides 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 patens.

The two 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., Scirillus sp., and Cyperus sp. Waterfowl use is moderate and appears to be increasing.

4. Croplands

Much of the plantable area of New Field has been affected by sand deposited by overwash and salt concentration. During 1995, the field was bisected by the relocated section of NC Highway 12. Portions of the field were restored after the removal of pavement from old NC Highway 12 in early 1996.

In August, a combination of spring high tides, strong northeast winds, and presence of Hurricane Edouard offshore inundated the newly planted grain field and new section of NC Highway 12. The majority of the vegetation was killed.

6. Other Habitat

The SUP issued to NCDOT for the construction of the secondary berm included the removal of pavement remnants of the old highway, located on the north stretch of beach. The pavement removal would benefit nesting habitat for the threatened loggerhead sea turtles. The pavement was to be removed with convict labor in 1996. This project along with the construction of the secondary berm has been deferred until further notice. See Section 4 on Compliance with Environmental and Cultural Resource Mandates for details.

9. Fire Management (See Alligator River Narrative)

G. WILDLIFE

1. Wildlife Diversity

Pea Island NWR has a high natural diversity of habitat types. Habitat management practices, such as prescribed burning, moist soil management, discing, brush removal, and green browse planting, serve to enhance habitat and wildlife diversity. Pea Island NWR provided habitat for a wide variety of mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans during 1996. This diversity was especially evident in birds; more than 315 species of birds have been identified in the area.



Living on the edge?

2/96 TC

2. Endangered and Threatened Species

a. Federally Listed and Endangered Species

American bald eagle (Endangered): Bald eagles, *Haliaeetus leucocephalus*, often pass over Pea Island NWR. No bald eagles were observed in 1996.

Peregrine falcon (Threatened): The Arctic peregrine, *Falco peregrinus tundrius*, is the subspecies of peregrines most often seen at Pea Island NWR. Five peregrine falcons were sighted on the refuge in November and December, 1996.

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 1986. In 1996, the first documented piping plover nest with two adults was sighted on the fringes of a nesting shorebird colony on the north end of the refuge! Two weeks later, one hatchling was observed with an adult in the same vicinity.

Atlantic loggerhead sea turtle (Threatened): Pea Island NWR has had an average of 14 nests per year. The 1994 nesting season had a record high of 35 nests and 41 false crawls. The 1996 nesting season resulted in 8 nests and 15 false crawls occurring on the Refuge.

Pea Island NWR 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 1996, all nests found on the refuge were relocated to the turtle safe zone. This safe zone was the widest stretch of beach on Pea Island NWR. From 7 of the 8 nests, 569 hatchlings were escorted to the ocean. One of the nests was completely infertile. The overall hatch rate and hatchlings to ocean rate excluding the infertile nest was 71% and 100%, respectively. The overall hatch rate including the infertile nest was 61%.

For 1996 ghost crabs continued to be the primary predator problem. During the week of August 4th, egg shell fragments were observed on the surface of two incubating nests in the turtle safe zone. Following this incident, predator guards, made from hardware cloth, were deployed to protect the nests. Predator guards were modified this year to enclose a larger area and were buried six to eight inches below the surface around the nest. These modifications reduced the number of ghost crabs entering the nests and prevented hatchlings from emerging outside of the predator guard.

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 and continued during 1996 to reduce turtle hatchling predation via ghost crabs. The turtle watch program began on the 55th day of incubation. Predator guards placed around the nests had a small trap door which directed hatchlings into a trench leading to the ocean. A drift fence was installed behind the nests and along the south border of the trench down to the high tide line. The trench and drift fence served two purposes. First, it minimized the hatchlings' visibility to ghost crabs.

on both carcasses. Measurements were collected and recorded for all stranded turtles and sent to Ruth Boettcher, the North Carolina Sea Turtle Coordinator.

Green sea turtles (Threatened): In 1993, the first green sea turtle (Chelonia mydas) nested on Pea Island NWR. For 1996, two green sea turtle false crawls were found on the Refuge beach.

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 1996, four osprey nests were observed on the refuge. One of these nests was on the Department of Defence microwave tower. All four nests produced fledglings. Volunteer Don Perry built an osprey platform to be installed at North Pond in 1997.

Least tern (Special Concern): Historically, least terns have nested 1.5 miles south of the Pea Island NWR Headquarters. For 1996 nesting colonies were observed at the Oregon Inlet terminal groin and at 1.7 miles south of headquarters. Unfortunately, strong winds from Hurricane Bertha destroyed the southern bird nesting colony. Re-nesting did not occur. Many least terns were observed during the summer shorebird surveys.

3. Waterfowl

Waterfowl surveys were conducted from September through April. Waterfowl numbers peaked at 16,650 during December. Percent difference compares use days by species for the 1995-1996 season versus the mean use days by species for the past 10 years (Table 1). Black ducks, gadwall, American wigeon, northern pintail, green-winged teal, blue-winged teal, northern shoveler, ringneck, scaup, ruddy ducks, and American coots showed an increase in number of use days for the 1995-96 season; all remaining species showed a decline (Table 1).



Flock of greater snow geese grazing along newly
relocated section of NC Highway 12. 11/96 WDS

Ground brood count surveys were conducted in conjunction with the shorebird surveys. Two black duck broods were observed in North Pond and one black duck brood was observed in New Field pond.

Table 1
Composition of Wintering Waterfowl, Pea Island NWR
1995-1996

SPECIES	PEAK PERIOD	Survey Peak #	# USE DAYS 1995-96	USEDAYS 1995-96 %	USEDAYS % diff from 10 yr avg
Tundra Swans	Nov	823	34937	1.4	-75
Canada Geese	Sept	192	23945	1.0	-62
Snow Geese	Oct	1112	84319	3.4	-44
Mallard	Dec	76	4970	0.2	-57
Black	Sept	2992	176414	7.2	50
Gadwall	Feb	2132	268011	11.0	256
Wigeon	Oct	5385	352099	14.4	40
Pintail	Dec	4352	498204	20.4	78
GWT	Feb	1286	157535	6.4	48
BWT	Sept	1902	42933	1.8	322
Shoveler	Dec	2906	254600	10.4	254
Ringneck	Dec	247	13690	0.6	68
Redhead	Nov	6	100	0.0	-94
Canvasback	Feb	8	235	0.0	-89
Scaup	Oct	835	46113	1.9	106
Bufflehead	Nov	61	2306	0.1	-93
Ruddy	Dec	1113	83953	3.4	237
Merganser	Dec	790	43576	1.8	104
Coots	Nov	3181	130955	5.4	61
Total	Oct	27115	2444743	100	63

4. Marsh and Wading Birds

Marsh and wading bird surveys were conducted from April through October. Bird numbers peaked at 488 during June. In November, thousands of double-crested cormorants were observed migrating over Pea Island NWR. Some of the other commonly occurring species include great and snowy egrets, various heron species, white and glossy ibises, double-crested cormorants, American bittern, and clapper rail.

Brown pelican numbers have continued to increase over the past few years as the species has expanded northward into coastal North Carolina and Virginia. 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.

5. Shorebirds, Gulls, Terns, and Allied Species

Shorebird surveys were conducted from May through October. Shorebird numbers peaked at 23,807 in May. This peak was the highest in 5 years. The water draw down of north pond provided excellent shorebird habitat. Over 22,000 shorebirds were observed on the exposed mudflats in this pond alone! Some of the commonly occurring species include semi-palmated and western sandpipers, semi-palmated plovers, sanderlings, whimbrels, American oystercatchers, Black skimmers, various terns and gull species, dowitchers, marbled and Hudsonian godwits, willets, dunlins, black-bellied plovers, ruddy turnstones, American avocets, and black skimmers. During the summer months, piping plovers were observed on four occasions on the north beach.

A large colony of nesting black skimmers and least terns was observed on the beach about 1.5 miles south of refuge headquarters. This colony was destroyed by strong winds from Hurricane Bertha. No re-nesting occurred. A second large nesting tern colony was observed at the pan that formed behind the rock revetment at Oregon Inlet. The first documented piping plover nest on the refuge was observed in this colony! One piping plover hatchling with an adult was observed. Both areas were posted as closed to public access during the nesting season.

6. Raptors

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 NWR is so great that it is sometimes referred to as a "birder's paradise". This is especially true when considering the passerine species. Some 115 different species of song birds migrate through Pea Island NWR.

8. Game Mammals

Cottontail and marsh rabbits are common on Pea Island NWR. Declines in numbers from a few years ago seem to have reversed. Raccoons, tracks, and scat have been observed with increasing frequency.

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 ring-necked pheasant populations.

Deer tracks have frequently been observed around North Pond, New Field, and South Pond, and in the Salt Flats. Staff members have seen both does and bucks on Pea Island NWR.

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

9. Marine Mammals

In 1996, six bottlenose dolphins, one unknown porpoise species, and one sperm whale calf were found stranded on Pea Island NWR. Necropsies were performed on two of the dolphins and on the sperm whale. Causes of death were not determined. The porpoise species was unidentified because the carcass was found decapitated on the beach. Measurements and observations were recorded and sent to Vicki Thayer, the marine mammal stranding coordinator.

10. Other Resident Wildlife

In past years, ring-necked pheasants were occasionally observed in salt marsh, brushland, dunes, and in the Pea Island NWR grain field. Sightings have decreased in recent years. In 1995, an NCDOT employee observed a female pheasant in the New Field grain field. No sightings were reported during 1996. The exact status of the pheasant population is unknown.

14. Scientific Collections

Five dead loggerhead sea turtle hatchlings were collected and preserved for educational purposes.

15. Animal Control

Feral cats continued to be a problem with nesting birds and waterfowl. This summer cat tracks were observed in the dunes behind the turtle safe zone.

16. Marking and Banding

Pea Island NWR staff and personnel from the North Carolina Wildlife Resources Commission participated in the "Atlantic Population" portion of the Atlantic Flyway Canada Goose study for the 1995-96 season. Although two sites were baited and rocket nets were installed, conditions were unfavorable to catch geese during this season.

In October 1996, the cooperative project continued. Three trap sites were prepared in the salt flats and baiting began in November. As of January 1997, no migrant Canada geese have been captured.

Refuge personnel positioned and monitored four Gypsy Moth Pheromone Traps around Pea Island NWR. Three male moths were captured in a trap located at New Inlet.

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 John and his crew banded 1,088 brown pelicans, 2,022 royal terns, and 302 sandwich terns.

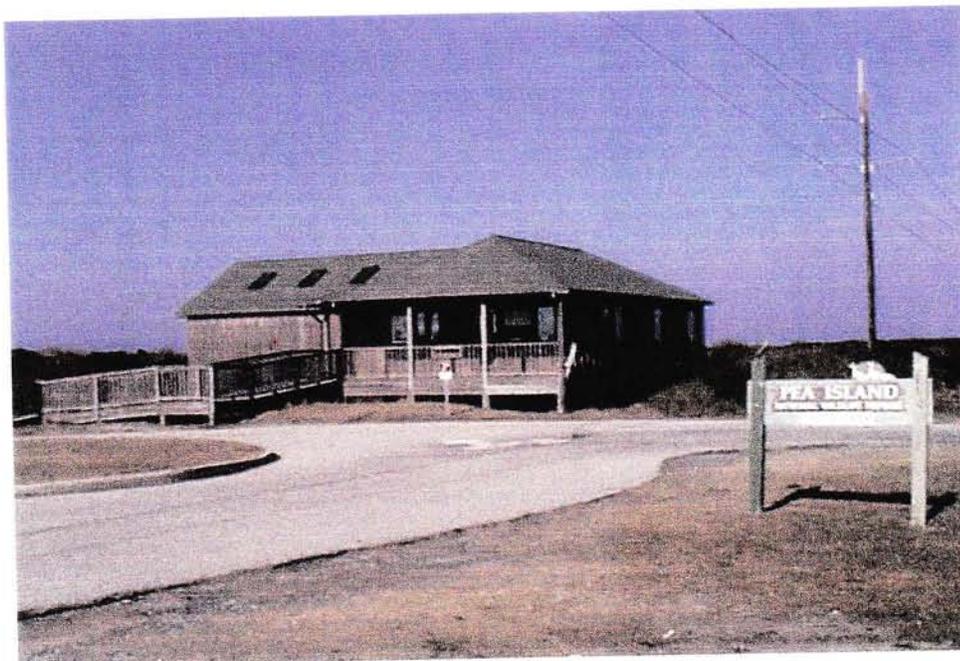
H. PUBLIC USE1. General

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 1996 was 1,946,374. 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 the summer of 1996, a much needed and appreciated addition was completed, providing



Visitor Center with new addition...inside (check out the view)... 9/96 BWS

a "wing" set aside for exhibits and three huge windows providing an awesome view of North Pond. Refuge visitors continue to comment on the quality of exhibits, the "hominess" and "warmth" of the Visitor Center as a whole, and the friendliness of the folks who work there. The Visitor Center is the perfect hub for the interpretive/ educational programs of this Refuge. (See Section H.6. for details)



...and out!

9/96 BWS

During 1996, as a result of a \$10,000 donation from the CWRS, a GS-3 Interpretive Assistant was hired to oversee the operation of the Visitor Center and public interpretive and educational programs. Marcie Holda filled the position for the summer months and through November, providing the much needed coverage.

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. An ever increasing challenge is for Pea Island NWR and Hatteras NS to provide undeveloped beach for Outer Banks visitors. At Pea Island NWR, 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.

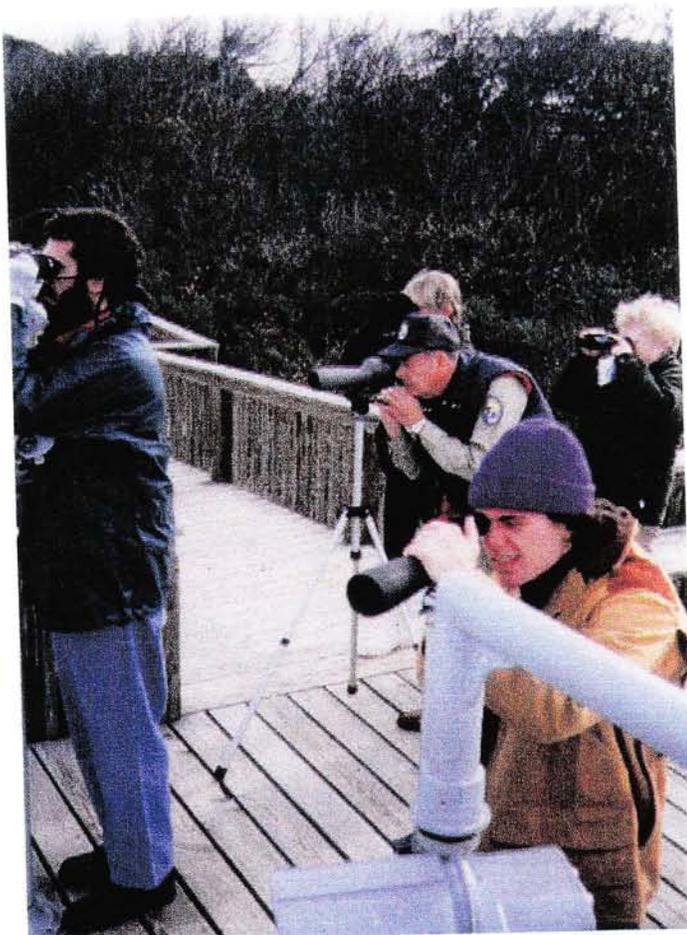
2. Outdoor Classrooms - Students

The emphasis on non-staff conducted activities continued during 1996. 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 NWR, 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. On the whole, this type of use continues to increase on Pea Island NWR.

4. Interpretive Foot Trails

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 339,346 visitors utilized North Pond Trail.



It's a birder's paradise. 11/96 BWS

6. Interpretive Exhibits/Demonstrations

The two 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. Two major exhibits were added to the Visitor Center along with the new addition: a nesting osprey exhibit and an interactive



"Wildlife in Art"

10/96 BWS

computer exhibit. The National Audubon Society CD-ROM - "Bird Identification" is available in the computer exhibit. The already-existing exhibits were moved to the new addition and spaced to allow easier viewing. During National Wildlife Refuge Week, an exhibit - Wildlife in Art - was on display at the Visitor Center. This exhibit featured local artists' paintings, photography, carvings, etc.

7. Other Interpretive Programs

Special programs presented off-refuge during 1996 are included in Table 5 of the Alligator River Narrative. Most regularly scheduled interpretive programs during 1996 were conducted at Pea Island NWR by Refuge volunteers. Four bird walks and two 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 #Partic.</u>
Summer Bird Walks	48	480
Fall Bird Walks	10	104
Other Bird Walks	41	26
Children's Wildlife Discovery	22	488
School/School Related Groups (on-refuge)	116	217
Adult Groups (on-refuge)	3	84
Canoe Tours	5	40

Note: Off-refuge programs included in Table 5 of ARNWR.

9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island NWR during 1996. Bluefish, spot, pompano, croaker, and trout were the major fish caught. A total of 337,658 visits were spent fishing. The annual Fishing Rodeo was held the second Saturday in June with approximately 90 participants.

11. Wildlife Observation

Pea Island NWR 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 NWR, 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 1996. 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 the big "birder migration" things have remained calm!

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 two 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

The new photo-blind, installed during 1995, was utilized fully during 1996, since water levels in North Pond were up to their more historic levels. However, it is still our contention that the best photographs at Pea Island NWR 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 NWR 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 NWR, 1996 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 NWR and along other beaches in Dare County, including Cape Hatteras National Seashore, there are some concerns that increasing human activity on beaches may adversely affect bird use of this important habitat. Refuge beach areas that show any evidence of nesting activity are closed to public entry.

16. Other Non-Wildlife Oriented Recreation

Because Pea Island NWR 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

In a Memorandum of Understanding (MOU) with Cape Hatteras National Seashore, the National Park Service (NPS) has the primary responsibility for non-wildlife related public use on Pea Island NWR. For this reason, a NPS law enforcement presence is maintained regularly, though not constantly, on the Refuge.

Again during 1996, there was no FWS LE presence on Pea Island NWR on a regular basis. RB Donaghue-Stanton continues to be the only PFT staff assigned to Pea Island NWR, and she does not hold an LE commission. The addition of a temporary public use position for the summer months helped, since there were more eyes available to see violations and call the Park Rangers. However, the need for a FWS LE presence at Pea Island NWR continues to be evident.

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

Pea Island NWR's beach is an isolated 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 U.S. Coast Guard and other officials.

There are minor poaching problems at Pea Island NWR; 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 NWR.

Incidents and violations at Pea Island NWR were included in the LE section of the Alligator River ANR.

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 NWR.

The sales unit at the Visitor Center continued it's activity during 1996. With the addition of the new "wing", not only did exhibits and education receive a boost, sales also benefitted. The addition was completed during August. November sales were greater than July's sales! That tells us there are big things in the future for sales at the Pea Island NWR Visitor Center.

Gross sales for 1996 totaled \$89,725.91. It is anticipated that 1997 will be a really big year for sales at the Visitor Center.

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 NWR 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 was completed in 1996. The approximately 40,000 cubic yards of excavated material was used to fill in the old NC Highway 12 roadbed. During November and December 1996, large flocks of greater snow geese were observed grazing in the newly planted mitigation site. By the end of December, only a mudflat was left as all the vegetation was consumed!

Construction of the new North Pond pumphouse was completed in 1996. For the last three years, water into North Pond was restricted to gravity inflow of water associated with strong southwest winds. Consequently, water management in this impoundment was severely limited. The new pump will greatly increase water management capabilities for North Pond.

2. Rehabilitation

Routine mowing and boomaxing around the impoundments, residence, office, and pole shed were the highlights at Pea Island NWR. No other major projects were accomplished.

J. Other Items

4. Credits

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