

REVIEW AND APPROVAL

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE
PEA ISLAND NATIONAL WILDLIFE REFUGE

MANTEO, NORTH CAROLINA

ANNUAL NARRATIVE REPORT

Calendar Year 1991

Jim C. Johnson 3/16/92 Karen S. Cartledge 3/18/92
Refuge Manager Date Refuge Supervisor Review Date

Harold W. Bassm 4/2/92
Regional Office Approval Date

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

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

INTRODUCTION

Location

Alligator River National Wildlife Refuge lies at the eastern end of a broad, flat, and swampy peninsula in northeastern North Carolina. Most of the 145,100 acre 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 Albemarle Sound, on the east by Croatan and Pamlico Sounds, and on the south by Pamlico Sound and Pamlico River.

Background

Alligator River Refuge and the surrounding areas were first inhabited by native Indians. The first attempt at English settlement was made on nearby Roanoke Island in 1587. The largest settlement by whites was made in the late 1700's or early 1800's at a community called Beechlands near Milltail Creek (within the refuge).

In 1885, three lumbermen from Buffalo, New York purchased 168,000 acres of Dare County's mainland to set up a lumber industry and camp at Buffalo City on Milltail Creek. The land changed owners several times over the years and eventually was obtained by the West Virginia Pulp and Paper Company. In 1974, the land was sold to McLean Industries in a large farming experiment called First Colony Farms. Prudential Life and McLean entered into a joint venture (Prulean Farms) to develop 23,000 acres of wetlands in Dare County to farmland. Approximately 5,100 acres were developed. Prulean was unable to obtain the necessary permits for conversion of the remainder of the 23,000 acres of forested wetlands to cropland. After two failures, Prudential Life Insurance Company obtained all of the Prulean Corporation land as well as some of First Colony Farms land. Prudential eventually decided to donate 118,000 acres to the Service on March 15, 1984.

The acquisition of a 5,100 acre farming area in 1988 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. Acquisition goals for Alligator River NWR 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 one of the last strongholds of the black bear in North Carolina and the mid-Atlantic coast. The refuge also provides habitat for the endangered red-cockaded woodpecker and migrating bald eagle and peregrine falcon.

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

A. HIGHLIGHTS

Personnel changes were hot and heavy during 1991 (See Section E.1.)

Refuge Volunteer Program clocked almost 18,000 hours! (See Section E.4.)



*Outstanding Volunteer Award for 1991 was shared by Herb Lewis
(Mr. Turtle) and Don Perry (Mr. Bird) 12/91 BWS*

Coastal Wildlife Refuge Society approves **Run With the Red Wolf Project** to raise \$4.6 million for new visitor center/administrative complex. (See Section H.18. and informational packet.)

Wild-born pups now account for 65% of free roaming population of red wolves. (See Section G.2.)

Alligator River expands red wolf captive breeding program. (See Section G.2.)

Moist soil units expand to reach 1,157 acres. (See Section F.4.)

A functioning fire crew finally comes on board. (See Section F.9.)

Maintenance complex finally looms on the horizon..... (See Section I.1)

B. CLIMATIC CONDITIONS

Whew! Seems to be getting warmer around here! The average temperature during 1991 was 65.4 degrees, 3.6 degrees above normal with nearly every month having record breaking high temperatures. Average monthly rainfall was 5.37 inches, just about normal. The monthly high precipitation for the year, a "gully washing" 13.19 inches, occurred in August, while the 0.49 inch received in May captured honors for lowest precipitation. Winds generally were from the NE in the winter and the SW in the summer. The refuge rarely had a day that wasn't windy due to its location on and near the NC coast. Hurricane Bob paid a visit on August 18 and 19 with peak onshore winds of 74 mph. Fortunately, the refuge was spared a direct strike since winds near the eye were clocked at 110 mph (See Pea Island Narrative).

The most destructive storms on the Outer Banks in 1991, as is usually the case, were northeast storms of the fall and winter. The "Halloween Storm" occurred from October 30 - November 2 and was caused by 50 mph northeast winds coupled with 15 foot waves from Hurricane Grace (an offshore hurricane). Pea Island was badly damaged with most of the beach front dunes lost due to erosion. On November 8-10, another northeast storm buffeted the coast, causing more damage to the already battered dunes and impoundments. This storm was followed by the December 2-3 "nor'easter" which again buffeted Pea Island and finished removing the dune system along roughly 3 miles. On the bright side, the refuge had 2,847 hours of sunshine this year!

C. LAND ACQUISITION

1. Fee Title

In spite of efforts by the Dare County Commissioners to block

acquisition, the Service was able to complete the purchase of 35 acres on the north end of Roanoke Island for a visitor center/headquarters site. Purchase was completed in March for \$659,500 or \$18,843 per acre - probably seems expensive to the uninformed, but actually reasonable when one considers that 150' x 300' undeveloped lots commonly sell for \$25,000. The site is a great piece of property - completely forested with mature mixed/pine hardwoods and 2,128' of frontage along Highway 64.

Alligator River NWR (AR NWR) received funding for the purchase of inholdings during FY 1992. As a result, several Regional Office (RO) Realty Division staff visited the area during the latter part of 1991. Acquisition priorities were established and property records obtained during these visits. Appraisal activities are scheduled to get under way by spring, 1992 on at least the 10 top priority inholdings.

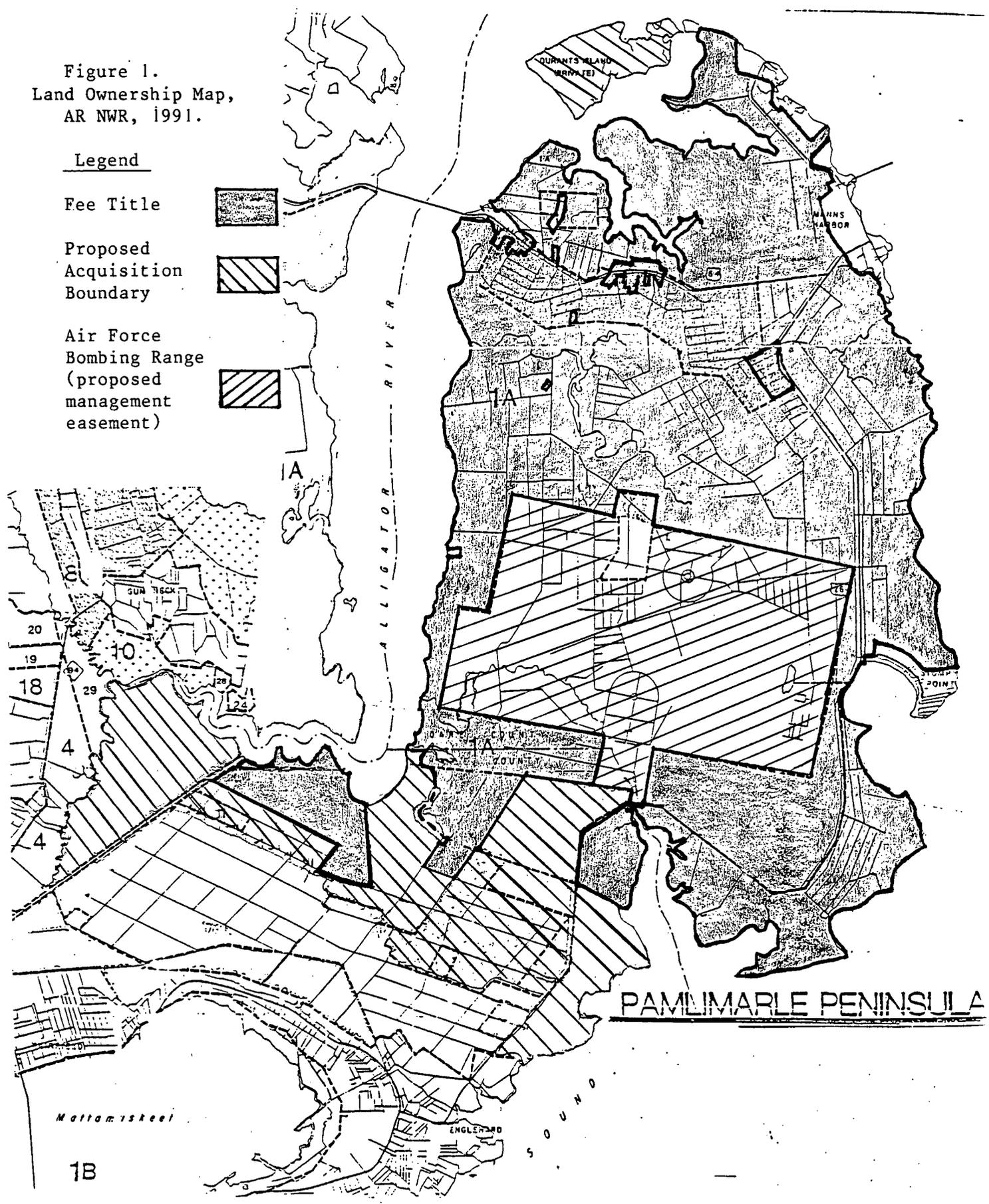
As instructed by RO, the refuge staff completed a draft EA and other documents which will become part of the PPP process establishing an approved acquisition boundary for this refuge. The 40 page document, submitted to Realty in August, established an acquisition boundary of 233,320 acres (including the 145,100 acres currently owned fee title). An approved acquisition boundary has never been established for this 7 year old refuge. (See Figure 1.)

AR NWR was the recipient of 10,000 acres, transferred fee title, during the year. This tract, a large inholding within the boundaries of Alligator River Refuge that had been retained by First Colony Farms, came to the Service as part of the land transfer that created Pocosin Lakes NWR (located on the west side of the Alligator River). The RO made a decision that all lands east of the Alligator River would be administered by this station and all lands west of the river by Pocosin Lakes. As a result, the 6,000 acre Frying Pan Unit of AR NWR, located on the west side of the river, was transferred to Pocosin Lakes. All actions received Director approval prior to changing these administrative responsibilities.

Figure 1.
Land Ownership Map,
AR NWR, 1991.

Legend

- Fee Title 
- Proposed Acquisition Boundary 
- Air Force Bombing Range (proposed management easement) 



2. Easements

During April 1989, the USFWS negotiated a lease with the owners of the 4,800 acre Durant Island. The lease cost \$1,001 in 1989 and provided the USFWS the legal right to release red wolves on the island. The lease was renewed during March 1990 for 3 years at a cost of \$1.

In addition to the lease agreement, the refuge negotiated a Memorandum of Understanding (MOU) with John Hancock Life Insurance (Philadelphia, PA). The MOU was signed on February 15, 1990 and designated approximately 45,000 acres of John Hancock property as a conservation easement of AR NWR. The easement is tremendously important in that, since September 1987, project personnel have retrieved four different wolves that on five occasions wandered onto lands covered by the easement. The errant wolves had to be retrieved in order for the project to maintain compliance with federal regulations.

Refuge personnel also pursued obtaining an easement on Lux Farms property, located immediately south of the boundary and east of the John Hancock land. This property contains excellent habitat and is used by wolves. The current owners have been asking for a prorated monthly fee and, to date, the refuge has not been able to procure the necessary funding to complete this agreement. Approximately 10,000 acres are in this ownership.

3. Other

The Stumpy Point Ball Field issue continued to plague refuge staff throughout the year. Prior to the establishment of the refuge, citizens in the Stumpy Point area periodically mowed and used a 4-5 acre field for soft ball games with no formal authorization. The field became refuge property (part of a larger holding) in 1986, and the good citizens immediately began efforts to get the field deeded to them or acquire an SUP for community use as a ball field. Virtually all reason evaporated over the issue with repeated Congressionals rolling in. The County Commissioners finally gave tentative verbal approval in September for a land exchange - approximately 35 acres of refuge land, including the 5 acre field, for 35 acres of forested wetlands owned by the County

immediately adjacent to the refuge farm unit. Such a trade will certainly benefit the refuge since the field and adjacent lands in question are virtually surrounded by residential development and offer very little suitable wildlife habitat. RO Realty Division has scheduled appraisals for both tracts in 1992 in order to initiate the process.

Another thorny problem pertaining to lands which persisted throughout the year involved the East Lake Methodist Church. The church had originally been deeded approximately 5 acres from an adjacent landowner several decades ago. When Westvaco Corp., the original owner of roughly 110,000 acres in this area, acquired the remaining property of the adjacent owner, the deed description mistakenly included the area deeded to the church. The mistake remained unnoticed over the years as Westvaco lands changed owners several times, eventually becoming part of the refuge. The mistake came to light when the refuge began posting boundary. County officials were extremely ready to heap abuse, bad press, and twisted facts on the Service, resulting in many, many hours of staff time by the refuge answering questions and attempting to solve the issue. Refuge staff literally found East Lake Church a lawyer who would file the necessary paperwork (gratis) in U.S. District Court to reclaim this 5 acres for the church. The church is small and has no money for such action. The Regional Solicitor had all the necessary documents in hand as the year ended and has verbally agreed to the next step - cooperation with the church's attorney in filing suit in District Court. Maybe, just maybe, this issue can be put to rest in the next few months.

D. PLANNING

1. Master Planning

The existing master plan closed part of the refuge, specifically the Gum Swamp Unit, to use of all motorized road vehicles, and outboard motors. Subsequently, streams or tributaries within this unit were signed as closed to use of outboard motors, and refuge brochures reflected this same regulation. A solicitor's opinion of this closure indicated, among other things, that in the absence of a U.S. Corps of Engineers (USCOE) decision on navigability specific to each stream, the

refuge could probably enforce this regulation. The U.S. Attorney's Office and the Service Law Enforcement Division repeatedly questioned that part of the Solicitor's Opinion pertaining to use of outboards on these streams, realizing that several of them (Swan Creek and Whipping Creek, in particular) were obviously natural stream systems that had historically received boating use. The public has also been very outspoken in voicing opposition to this regulation since these streams have provided the only access to roughly 1,000 acres of open water lakes. In attempting to resolve this issue, RM Johnson and Special Agent Baker met with U.S. District Judge McCartney in October. The judge carefully reviewed refuge property deeds, maps, photos of the streams in question, and case law cited by the Solicitor and concluded that the refuge could not enforce the regulation prohibiting outboard use on these stream systems. As a result of this decision, signs prohibiting outboard use were removed. The master plan document itself will be revised to reflect this decision during the review process scheduled for 1993.

2. Management Plan

Annual burning prescriptions were completed, reviewed and commented on by Raleigh FWE, and approved by the RO. Raleigh FWE expressed concern that the proposed treatment required plowing fire breaks through pocosin habitat and that trees/brush (i.e., wetland vegetation) would be destroyed by this action.

The annual water management plans were completed, reviewed by District Biologist Florschutz, and approved by RO.

3. Public Participation

The annual hunt information meeting was held in September and attended by roughly 50 people. A lively discussion of refuge regulations for the 1991-92 hunting season ensued and was "enjoyed" by all.

4. Compliance with Environmental and Cultural Resource Mandates

National Park Service Archaeologist Benny Keel conducted a literature search and visited the proposed site of the headquarters/visitor center complex in June. Mr. Keel's report indicated that a full scale preliminary ground survey of the area was needed to identify specific sites that might require further investigation.

It seemed, to the administrative staff at least, that the last six months of 1991 were devoted entirely to developing various documents for proposed development projects. The whole process proved rather frustrating due to time delays in other offices/divisions or by other agencies. Most reading this would say - what's new?

Section C.1. above detailed the completion of a draft EA for Realty's use in completing the PPP process to establish a refuge acquisition boundary. The 40 page document was submitted to Refuges in RO for review/forwarding to Realty in September.

An EA, Section 7, and FONSI were completed for the installation of 38 large water control structures in August. The proposed action, once completed, will provide water control on roughly 60,000 acres, thus restoring natural hydrology by retarding water discharges through the myriad of canals constructed by prior landowners. At the same time, the project will replace roughly 30 unsafe wooden bridges with structures/fill and allow implementation of a large scale prescribed fire program. The entire package was submitted to Raleigh FWE in August, received back in late November (with no comments), and immediately submitted to RO. The RD signed off on the FONSI in mid-December, and application was made to USCOE for 404 permits covering this work. Draft copies of the application were circulated to all review agencies prior to initiating the permit process, and contacts began with county officials who vigorously opposed a similar project involving three structures in 1990.

A 404 permit application was submitted in October covering deposition of fill material in wetlands by plowing fire breaks to conduct prescribed burns. Public notice of the application was sent out in

November, but at year's end, permits had not been received. A Section 7 was also completed, since the treatment sites involved burning red-cockaded colony areas.

In a related issue, the refuge staff (primarily WB Noffsinger) initiated contact with USCOE about a general permit covering normal management activities such as plowing moist soil units and plowing fire lines on refuges in eastern North Carolina. After providing basic information to the Corps, a letter writing campaign was orchestrated from the refuges in question. State wildlife management areas also got in the act. USCOE eventually responded by releasing for public comment a general permit covering these activities if the activities are contained in an approved plan specific to the unit. Hopefully, this permit will be forthcoming by early spring, 1992.

A sediment and erosion control plan was submitted and approved by the N.C. Department of Environment (at a cost of \$110) which authorized the refuge to open a 5 acre borrow pit. The borrow pit will be used as a source of fill for water control structure installation and road rehabilitation. The pit location is on the refuge farm unit which is classed as prior converted wetlands with a cropping history, thus a 404 permit was not needed.

Contacts were made with USCOE and Dare County health officials about constructing a septic tank drain field on property that came to this refuge via a drug case seizure. A previous owner had partially cleared the property, constructed a small frame house, and hauled in fill - all within forested wetlands and without a permit. After a site visit by USCOE personnel and several phone calls and letters, the refuge received approval to proceed with installation of a mounded septic system at the site, contingent upon installing culverts to restore "natural" hydrology.

USCOE staff and County officials approached the refuge about re-using a site for deposition of dredged material immediately south of Stumpy Point Bay. A navigational channel clean-out operation was scheduled for Stumpy Point Harbor in January of 1992. The original disposal site for this channel was on what is now refuge property. A field trip to the

area revealed the disposal site containment levee still intact and the interior of the 90 acre area dominated by *Phragmites sp.* Following agreement by the Corps to install two large water control structures in the containment levee to facilitate water management following project completion, an SUP was issued authorizing use of the old site for deposition of dredged material from this project. USCOE personnel completed an EA, etc. for the work.

6. Other

Numerous requests for engineering services were submitted during the year. Among them were submittals for replacing 30 wooden bridges, construction of four miles of levee to enhance water management in moist soil units (DU Partners Project), construction of a two level, wheelchair accessible observation tower, construction of wheel chair ramps and rehabilitation of another tower, etc., etc. Most were acted upon within a reasonable period of time.

E. ADMINISTRATION

1. Personnel

1. John Taylor, Refuge Manager, GS-13, Transferred 1/14/91
2. Jim Johnson, Refuge Manager, GS-12, EOD 05-05-91
3. Alan Schriver, Supv. Refuge Opr. Spec., GS-12, Transferred 03-10-91
4. Robert Noffsinger, Supv. Refuge Opr. Spec., GS-12, EOD 04-13-87
5. R. Scott Lanier, Refuge Opr. Spec., GS-09, Transferred 08-02-91
6. Jonathan Windley, Refuge Opr. Spec., GS-07, EOD 02-26-89
7. Steven Fowler, Fire Mgt. Officer, GS-11, EOD 06-30-91
8. Michael Phillips, Refuge Biologist, GS-11, EOD 06-21-87
9. Bonnie Strawser, Refuge Ranger, GS-09, EOD 12-31-80
10. Angela Elmore, Refuge Technician, GS-07, EOD 04-19-82
11. James Beasley, Refuge Technician, GS-07, EOD 05-26-85
12. Chris Lucash, Refuge Technician, GS-06, Transferred 02-24-91
13. Michael Morse, Refuge Technician, GS-06, EOD 04-08-90
14. Arthur Beyer, Refuge Technician, GS-06, EOD 12-02-90
15. Beverly Midgett, Office Assistant, GS-06, EOD 10-06-71
16. J. Bruce Creef, Crane Operator, WG-09, EOD 04-21-75

17. Alan Emery, Automotive Worker, WG-08, EOD 05-22-88
18. Jonathan Powers, Eng. Equipment Oper., WG-08, EOD 04-24-88
19. Doak Wilkins, Eng. Equipment Oper., WG-08, EOD 02-28-88
20. Murphy Peterson, Tractor Operator, WG-05, EOD 04-22-90



*Left to right - Back row: 28, 23, 4, 20, 18, 26, 2
 Middle row: 17, 9, 10, 29, 15, 25, 6
 Front row: 16, 19, 24, 11*

Temporary Part Time NTE 1 Year

21. Janice Lane, Clerk Typist, GS-03, EOD 03-25-90
22. Rex Tillett, Eng. Equipment Oper., WG-08, EOD 05-05-91
23. Belton Gray, Jr., Motor Vehicle Operator, WG-05, EOD 05-05-91
24. Stephen Grant, Motor Vehicle Operator, WG-05, EOD 05-05-91
25. Amy Midgett, Motor Vehicle Operator, WG-05, EOD 05-05-91
26. Edward Zakrajsek, Motor Vehicle Operator, WG-05, EOD 05-05-91
27. Jennifer Dagen, Refuge Technician, GS-05, EOD 06-30-91
28. Bobby Govan, Motor Vehicle Operator, WG-05, EOD 10-06-91
29. Elizabeth Parks, Student Trainee, GS-04, EOD 01-12-92

Refuge Manager John Taylor and Supervisory Refuge Operations Specialist Alan Schriver transferred to Tennessee NWR.

Jim Johnson filled the Refuge Manager vacancy. He came to us from Lower Suwannee NWR.

Robert Noffsinger was selected to fill the Deputy Project Leader vacancy on 12-01-91. He was previously the Refuge Biologist. This vacant position was not filled during 1991.

Chris Lucash transferred to Endangered Species in Asheville, NC. He is currently assigned at Cades Cove, TN and heads up the red wolf reintroduction effort in the Great Smoky Mountains National Park.

Steven Fowler transferred from Mattamuskeet NWR and entered on duty as the new Fire Management Officer on 6/30/92.

R. Scott Lanier transferred to Tensas River NWR. This vacancy was also not filled during 1991.

James Beasley, Refuge Tech., was promoted to GS-07 on 01-27-91.

Michael Morse, Refuge Tech., was promoted to GS-07 on 06-02-91.

Arthur Beyer, Refuge Tech., was promoted to GS-06 on 12-02-91.

Jonathan Windley, Refuge Oper. Spec., was promoted to GS-07 on 12-15-91.

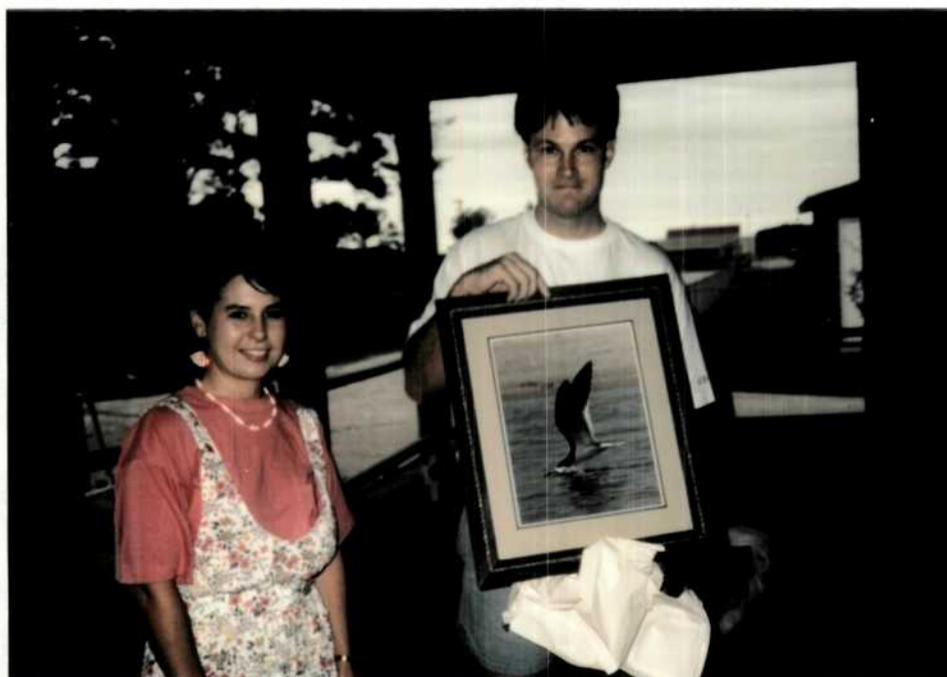
Office Assistant Midgett and Crane Operator Creef received their 20 year certificates.

Alligator River had 6 firefighters during FY 91. Five were Motor Vehicle Operators, and one was an Equipment Engineering Operator.

Jennifer Dagen, GS-5 Refuge Technician (NTE 1 yr), was hired on 6/30 to complete preliminary mapping of red-cockaded colonies.



*Beverly Midgett receives 20 year service award from Jim Johnson.
10/91 BWS*



Scott and Jamie Lanier head off to Tensas River! 7/91 BWS

2. Youth Programs

The 1991 YCC program involved only one enrollee. Robert Sawyer had worked on the refuge during the 1990 program and was rehired as a Youth Leader for the 1991 program. No other enrollees were employed.

Robert was utilized as an assistant/helper to individual staff as the need arose. Because of his excellent work habits, this method worked very well. Robert proved to be a tremendous asset to the refuge during his 10 week tenure. When not in his "assistant" role, Robert worked on general maintenance/management projects with the fire crew. Among their assignments were trail maintenance, litter pick-up, signing, installation of wcs's, and participation in several bird banding trips.

4. Volunteer Programs

Another banner year for the AR NWR Volunteer Program! A total of 17,814 hours were donated by 396 individuals. A categorization of volunteer hours for FY 1991 follows: 2,700 - maintenance; 10,540 - biological support; 3,574 - public use; and 1,000 - administrative.

The Red Wolf Project drew a number of college students and/or recent graduates to volunteer blocks of time to the project. During 1991, 5,948 hours of volunteer time were donated by four individuals in red wolf caretaking positions.

The refuge utilized five student interns during 1991. Four worked with the Red Wolf Project, as indicated above; the other intern was a Master's Degree student in Public Administration who wanted to "write" for the refuge and "gain experience in administrative paperwork". He completed drafts of two Hurricane Preparedness Plans and two brochures and collected information for a Hunt Plan. In addition, he assisted with many other projects during his eight-week stay.

Volunteers provided support in almost every facet of refuge work. Several "receptionists" worked at the Alligator River office answering the phone and assisting with assorted office duties. Some wrote columns and handled public inquiries. The volunteer program also

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provided volunteer assistance for Pea Island NWR. For details on these activities, see Section E.4. of the Pea Island narrative.

Major volunteer recruitment activities were not made during 1991. Spontaneous efforts were made whenever the opportunity presented itself. At this point, most of our new volunteers are recruited by current volunteers.

The "Take Pride in America" (TPIA) recognition program has given groups more incentive in volunteering their efforts to benefit public lands. RR Strawser has acted as the County Coordinator for TPIA for several years. She continued in this capacity during 1991.

In February, several volunteers and RR Strawser traveled to Raleigh to receive an award naming the Refuge Volunteer Program as a winner in the North Carolina TPIA Program. Mid-year, RR Strawser and Volunteer Keely Noffsinger traveled to Washington to accept a Director's Award from John Turner. The AR NWR Volunteer Program received recognition for being a finalist in the National TPIA Program.

Late in 1991, we received notification that the Alligator River NWR Volunteer Program and refuge volunteers "Kris" Kristoffersen and Herb Lewis had each been selected as a Take Pride in America winner on the State level. Their nominations will be forwarded to Washington for competition at the national level.

In September, the annual Awards Ceremony of the Dare Voluntary Action Center was held, and the Refuge Volunteer Program again received an award as an outstanding volunteer organization.

Refuge volunteers continued to work through their non-profit organization, the Coastal Wildlife Refuge Society (CWRS). For details of their accomplishments during 1991, see Section H.18. of this report.

Cumulative hours tallied through September 30, 1991 yielded the following awards:

100+ hour certificate: Bill Ackiss, Micou Brown, Bertha Burris, Pam Costenbader, Sarah Downing, Nancy Gaul, Michelle Honeycutt, Kirstie Zakrajsek, Clyde McFadyen, Jane

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In February, several volunteers and RR Strawser traveled to Raleigh to receive an award naming the Refuge Volunteer Program as a winner in the North Carolina TPIA Program. Mid-year, RR Strawser and Volunteer Keely Noffsinger traveled to Washington to accept a Director's Award from John Turner. The AR NWR Volunteer Program received recognition for being a finalist in the National TPIA Program.

Late in 1991, we received notification that the Alligator River NWR Volunteer Program and refuge volunteers "Kris" Kristoffersen and Herb Lewis had each been selected as a Take Pride in America winner on the State level. Their nominations will be forwarded to Washington for competition at the national level.

In September, the annual Awards Ceremony of the Dare Voluntary Action Center was held, and the Refuge Volunteer Program again received an award as an outstanding volunteer organization.

Refuge volunteers continued to work through their non-profit organization, the Coastal Wildlife Refuge Society (CWRS). For details of their accomplishments during 1991, see Section H.18. of this report.

Cumulative hours tallied through September 30, 1991 yielded the following awards:

100+ hour certificate: Bill Ackiss, Micou Brown, Bertha Burris, Pam Costenbader, Sarah Downing, Nancy Gaul, Michelle Honeycutt, Kirstie Zakrajsek, Clyde McFadyen, Jane



Annual Volunteer Awards Banquet 12/91 BWS



On behalf of the AR NWR Volunteer Program, Win Copeland accepts TPIA Award from NC Governor Jim Martin. 4/91 BWS



Bob Noffsinger described the refuge farm/moist soil units for participants in the Farming for Wildlife Workshop. 9/91 BWS

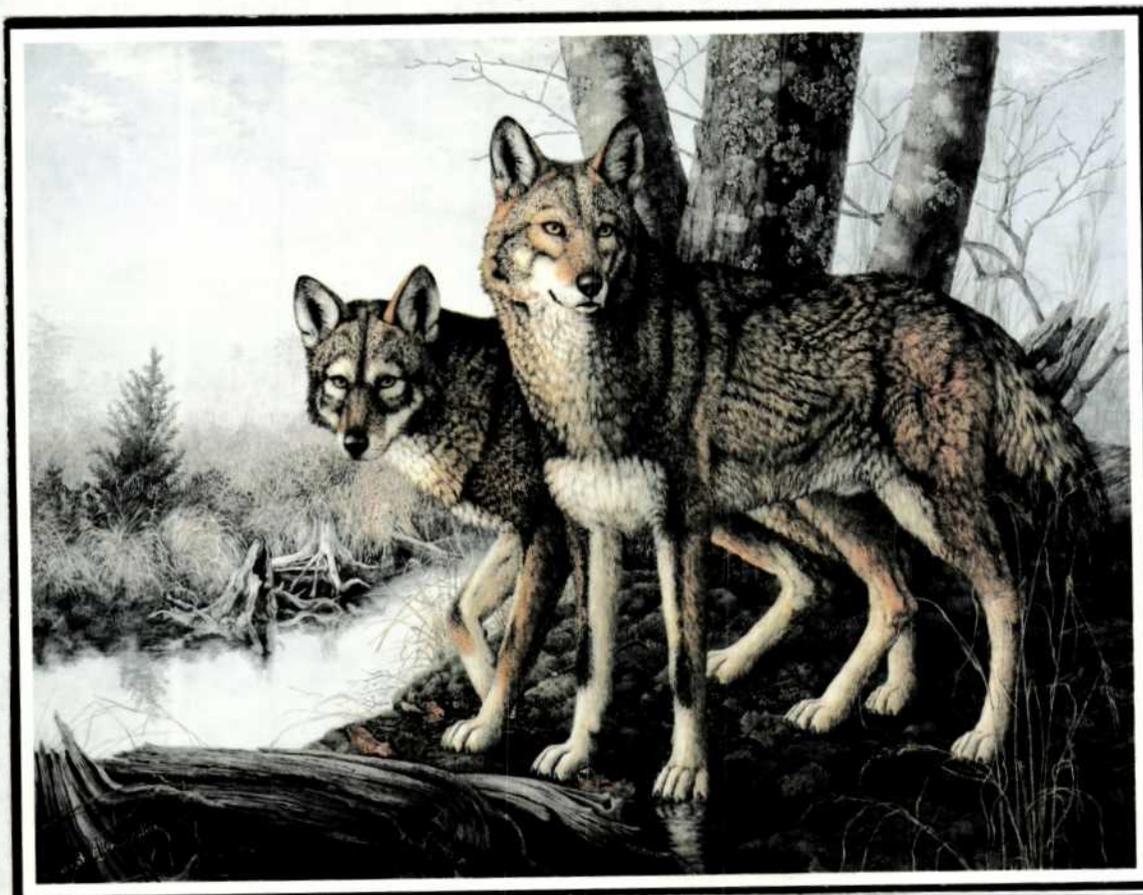
During March, RB Noffsinger and RR Strawser served as judges for the Manteo and Cape Hatteras High School Science Fairs.

8. Other

The Red Wolf Project has drawn quite a bit of interest from artists desiring to help raise funds for the project. In 1990, Steve Jackson donated 500 copies of a red wolf print to the USFWS. The National Fish and Wildlife Foundation committed \$40,000, proposing to match funds raised by the sale of the Jackson print or other ways, dollar for dollar. Unfortunately, few of the Jackson prints have sold; therefore, much of the possible \$80,000 remains out of the grasp of the project.

During 1991, North Carolina artist Janet Walker joined in the campaign. Ms. Walker pledged to donate 50% of the purchase price of limited

edition prints of an original acrylic painting entitled "Return to the Wild - Red Wolf". By the end of the year Ms. Walker had donated \$3,200. This amount was deposited into the National Fish and Wildlife Foundation Challenge Grant Fund. Other fund raising efforts were carried out by the Coastal Wildlife Refuge Society and are covered in Section H.18. of this report.



Make checks payable to "Return to the Wild" and send to AR NWR, P. O. Box 1969, Manteo, NC 27954. (Regular Artist Proofs are sold out.)

Return to the Wild *Red Wolves*

by
Janet Allen Walker

Limited Edition Reproduction	25 in. × 28 in.
Image Size	18 in. × 24 in.
750 Signed and Numbered	\$ 85.00
25 Regular Artist Proofs	\$100.00
50 Color Remarqued Artist Proofs	\$185.00
NC Residents Add 6% Sales Tax	
Shipping (per order)	\$ 5.00

F. HABITAT MANAGEMENT

1. General

Five categories of natural, vegetated habitat are found on AR NWR: marshes, pocosins, mixed-hardwood pine swamps, hardwood swamps, and white cedar swamps. These are classified as wetlands based on the vegetation present, the degree of soil saturation, and the hydro-period. AR NWR represents one of the last remaining large tracts of pocosin type habitat along the east coast. Although much of the refuge is relatively unaltered by man, large portions have undergone changes in vegetative composition and hydrology caused by ditching and canal dredging for access and logging purposes. The purchase of the Prudential farmlands in March of 1988 added agricultural land to the list of habitats.

2. Wetlands

After an involved struggle for 404 permits in 1990, 3 stoplog water control structures, purchased earlier with fire funds, were installed during the spring. They allow safe movement over the canals by fire equipment and better water management for fire suppression and prescribed burning. The risers replaced deteriorating wooden bridges at the intersections of Milltail Road and Koehring Roads, Alligator and Beechland Roads, and Koehring and Long Curve Roads. Boards were placed in the risers up to the ground level of the adjacent swamp/pocosin. These structures have restored a more natural hydrological regime on approximately 4,400 acres of wetlands and partially restored another 3,000 acres (these will need additional risers or small ditch plugs to completely close off drainage of the areas).

Twelve additional structures and fill material for their installation were purchased this year with bridge replacement funds. A pre-project meeting with USCOE resulted in a request by them that the refuge identify all such work planned in the next five years and apply for one permit for all the work. An environmental assessment and Section 7 consultation for installation of 38 structures was completed by RB Noffsinger in September. This was approved by Endangered Species and

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Table 1. presents acreages by vegetative community/land use currently under fee title ownership. See previous narratives for indepth descriptions of the various vegetative types.

Habitat Type	%	Approximate Acreage		
		Dare	Hyde	Total
White Cedar Swamp	5	6,900	1,000	7,900
Hardwood Swamp	11	11,700	3,700	15,400
Mixed Hardwood-Pine Swamp	29	36,000	6,000	42,000
Low Pocosin	12	18,100	--	18,100
Cane Pocosin	2	2,300	--	2,300
Tree Pocosin	19	25,500	2,600	28,100
Lakes/Open Water	1	1,000	--	1,000
Marsh	17	25,200	--	25,200
Farmland and Moist Soil	4	5,100	--	5,100
Totals	100	131,800	13,300	145,100

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Marsh	17	25,200	--	25,200
Farmland and Moist Soil	4	5,100	--	5,100
Totals	100	131,800	13,300	145,100

3. Forests

Alligator River swamp forests (excluding pocosin communities) can be categorized into three general types: mixed pine/hardwood, hardwood swamp, and Atlantic white cedar. Previous narratives provide detailed descriptions of these communities.

This station does not currently have a forest management plan. No active manipulative management actions have been implemented since Service ownership. Major needs exist in this area, such as revegetating 8-10 K acres of white cedar stands clearcut under timber reservations by previous landowners. The staff will be moving toward developing the needed documents and implementing the needed actions over the next 3-5 years.

4. Croplands

The acquisition of the 10,000 acre Prudential Farms inholding in March, 1988 gave the refuge even greater diversity of habitats and a great potential for managed habitat for waterfowl, shorebirds, and wading birds. The tract included 5,100 acres of cropland. Prudential had developed the area from forested wetlands by encircling it with a dike and placing parallel drainage ditches at 300 foot intervals. These ditches, in conjunction with large receptor canals, move water to two large pump stations. The pumps had the ability to remove 250,000 gallons of water per minute from the farm fields. Pumping was required to keep the area dry enough to farm. The reconversion of the area to wetland habitat was basically simple - don't pump the areas where plans call for permanent water or reduce pumping on moist soil areas. This action was accomplished by judicious placement of flashboard risers in conjunction with existing dikes and building small, permanent cross dikes and temporary rice dikes. In 1988 and 1989, management efforts concentrated on the Twiford Unit (1,355 acres) where the best water control existed. In 1990, efforts expanded into the Creef Unit with the installation of 3 water control structures which allowed flooding an additional 300 acres. Another structure was added in the Twiford Unit restoring 100 acres. Six miles of dikes were improved and revegetated.

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This year, the refuge farm unit had 1,157 acres of moist soil along with 65 acres of jap millet and 109 acres of corn left in the field. About 50 acres of the corn were flooded within refuge impoundments, and the remainder had rice dikes constructed to catch rainwater. Another 45 acres were double cropped with early soybeans followed by millet left in the field .



Good crops of wild millet, smartweed, and fall panicum were produced in the moist soil units.

7/91 REN

9. Fire Management

In July of 1991, the District Fire Management Officer, formerly at Mattamuskeet NWR, joined the staff at AR NWR. During the year, there were five seasonal firefighters and one seasonal firefighting equipment operator (FFEO) at AR NWR. Efforts are underway to increase this allotment by three additional firefighters and one additional FFEO for a total dedicated fire staff of eleven.



Ducks Unlimited MARSH Project on North Twiford Unit - creation of moist soil impoundments on prior converted farmlands. 5/91 REN

In 1991, Ducks Unlimited matched refuge funds through their MARSH program to convert drained swamp and agricultural land in the North Twiford Unit. DU's share of the costs was \$22,500. Seven water control structures with sand-cement bag headwalls were installed and approximately 20,000 feet of dike constructed and seeded, creating 4 units with separate water level control. One unit was a drained swamp (96 ac.), and three units were prior converted agricultural lands (108, 135 and 65 acres). One of the units (65 ac.) was farmed. Millet was planted for the refuge on 30 acres, and this, along with crop residues, was flooded in December. The other two units were managed as moist soil and were flooded in October along with the wooded unit.



Sunflowers were tried as an alternative crop for Coop Farmers. Unseasonal rains caused production and harvesting problems. 7/91 REN



Corn was produced for crop and some was left standing and/or mowed for waterfowl and other wildlife. 7/91 BWS

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As is typical with any organized firecrew, much of the season was spent in preparation for wildfire and prescribed burn activities. This included classroom and field training exercises, converting an existing building into a passable fire cache, ordering and organizing cache supplies, and refurbishing and maintaining equipment.

Fire management planning and fire equipment acquisition were pursued with renewed interest in 1991. This ecosystem has been shaped by fire and will continue to require the application of fire for its maintenance both in terms of wildlife habitat manipulation and hazardous fuel reduction.

Implementation of a complete fire management program requires equipment, some of which is highly specialized. This year, dedicated fire money was made available to begin purchasing a nucleus of heavy equipment, including a D-6 LGP Caterpillar, Terreveah (specialized high floatation tracked vehicle), fire plow, bat-wing mower, boom-axe, and 3/4 ton pick-up truck. In addition, a great deal of other essential equipment, such as radios, fire weather stations, personnel protective equipment (PPE), and associated cache items, was either acquired or the process of acquisition was initiated.

Prescriptions were written and RO approved for burns at Alligator River and Pea Island NWRs for 1991. Snags in the permitting process relating to wetlands prevented action on two of the AR prescriptions; however, some field burning was accomplished. At Pea Island, all four burns were successfully completed in one day. Overall results were good although an accelerated frequency of fire will be needed to reduce the heavy loading of brush resulting from years of no burning.

The fire crew also provided assistance to the National Park Service on their burns at Bodie Island.

On a district level, the Alligator River crew participated in prescribed burns at Swan Quarter and Pocosin Lakes NWRs as well.

Wildfires occurred at many refuges in this district last year; the Alligator Crew was dispatched to five of those. One Inter-Agency

dispatch was received for the Rocky Top Complex in Tennessee during the rash of fires which occurred in the southern Appalachians last fall. AR NWR firefighters were combined with National Park Service and U.S. Forest Service personnel to form a twenty man Type II Crew. The experience and skills derived from these actions were invaluable to overall efforts in fire management. The crew received an excellent rating from fire overhead for their performance.

The Service and State of North Carolina entered into a new Cooperative Agreement during 1991 regarding fire management. Pursuant to this agreement was the establishment of a joint Fish and Wildlife Service and North Carolina Forest Service Overhead Team committed to managing wildfires in pocosin habitats. The foundation for this team was laid in October of 1990, and a joint training exercise was conducted at the NCFS facility in Kinston, NC. A primary function of this team is to eliminate some of the problems encountered by bringing in conventional overhead teams unaccustomed to dealing with peat fires and the many peculiarities of pocosins.

The fire staff ended the year in true firefighter tradition by spending the holiday season on the Triangle Fire at Pocosin Lakes NWR. It was a difficult fire and a tough time of the year to be away from family and friends. However, all personnel performed well, and it is certainly hoped that these valued people will return for the upcoming spring fire season.

G. WILDLIFE

1. Wildlife Diversity

AR NWR and its surrounding waters support a variety of resident and migratory wildlife. Of these, 48 species are fish, 145 are birds, 48 are reptiles and amphibians, and 40 are mammals. The interior lakes and streams on the refuge support fish species characteristic of black-water or oligohaline systems. The refuge's large size and habitat diversity provide for forest dwelling, as well as marsh and shrub dwelling, avian and mammalian species.

2. Endangered and/or Threatened Species

a. Federally Listed Endangered and Threatened Species

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

American Alligator (Threatened): American alligators reach the northern extent of their range on the refuge and probably were never very numerous in the area. A few have been seen each year in the marshes, ponds, streams, and canals. The U.S. Air Force contracted with the refuge to survey the Dare County Bombing Range for alligators in 1988, 1990, and again in 1991. One of the survey routes was on Whipping Creek and Whipping Creek Lake and was partly on refuge lands. This five mile route has had the highest population index in the three years it has been surveyed (1.6, .6 and 1.0 alligators observed per mile in 1988, 1990 and 1991 respectively) and the highest population estimate of all routes. Information on number of alligators observed per mile for all routes on the Refuge and Bombing Range for 1991 and for all survey years are given in Tables 2. and 3.

The staff was very pleased to finally document successful 'gator nesting in 1991. Based upon the experience this year, the strategy for conducting nest searches will be changed. Efforts to locate nests, i.e., document reproduction, will concentrate on locating young in September since they are easier to find than nests. Many, many hours of searching finally resulted in finding the nest on Lost Lake in 1991 and then only after practically stepping on it. The nest on Whipping Creek was difficult to find even after locating the young. The grunts of the young alligators as they communicate with each other gave them away. Night surveys in September to locate the young followed by daylight searches of specific locations where young were found will probably result in improved success of this effort. The young apparently hatch in this area in early September.

Table 2.
Alligator Surveys, AR NWR, 1991

Survey Route	Maximum Number Observed	Alligators Observed Per Mile	Population Estimate for Route	Population Estimate Per Mile
Whipping Creek (5 mi.)	5	1.00	16-25	3.2-5.0
Air Force Target Area (7 mi.)	1	0.14	3-5	0.4-0.7
Navy Target Area (8.3 mi.)	1	0.12	3-5	0.4-0.6
Milltail Creek (7.6 mi.)	1	0.13	3-5	0.4-0.7
South Lake (5.3 miles)	0	0.00	--	--
Swan Lake (5.5mi.)	1	0.18	3-5	0.5-0.9
Sawyer Lake (2.2mi.)	0	--	--	--
Laurel Bay Lake (1.2mi.)	0	--	--	--
Lost Lake (2.3mi.)	2	0.88	7-10	3.0-4.4

The young on Whipping Creek were marked by notching tail scutes. Future captures of these alligators should enable staff to determine growth rates and dispersal patterns. Table 5 gives the sizes and marking patterns for the young alligators that were marked. Two age classes of young were found at the Lost Lake site. The larger young

**Table 3.
Yearly Comparison - Alligator Surveys,
AR NWR, 1991**

Survey Route	Alligators Observed per Mile			
	1988	1989	1990	1991
Whipping Creek	1.6	--	0.6	1.0
Air Force Target Area	0.07	--	0	0.14
Navy Target Area	0.07	--	0.12	0.12
Lake Worth	0	--	--	--
Milltail Creek	0.39	0.13	0.13	0.13
South Lake	--	--	--	0
Swan Creek	--	--	--	0.18
Sawyer Lake	--	--	0	0
Laurel Bay Lake	--	--	--	0
Lost Lake	--	--	--	0.88



Lost Lake drain represents one of the many secondary tributaries that traverse the refuge. 9/91 JHB

(19 in.) were observed but not caught and marked. The assumption was that the bigger alligators were hatched in 1990. Subsequent captures of reptiles marked in 1991 should clarify this question by defining growth rates. It is possible that the larger (19 in.) alligators were from two years ago. Two greater than 3' were caught and marked but the scales available would not weigh them. They were in the 5-10 pound range.

The presence of herring in Lost Lake and Creek was of interest. On two separate trips into the Lake, the staff noted juvenile herring in the bottom of the john boat after making the trip in. The creek is unusual for this area in that it has a very apparent flow where in most other creeks, the flow is usually almost imperceptible. The creek appears to cut through a sill that separates the lake from Swan Creek, and the difference in elevation behind this sill is enough to produce a gradient that causes significant flow from Lost Lake into Swan Creek. The herring possibly represent a good and apparently abundant food source for alligators.

Bald Eagle (Endangered): Refuge staff sighted a mature bald eagle on February 15. The sighting was on the south Twiford Unit, near Milltail Road.

Peregrine Falcon (Endangered) - Although no sightings were reported for 1991, peregrine falcons are known to move through the refuge during migration.

Red-cockaded Woodpecker (Endangered) - Prior to the refuge's existence, users had reported four active colony sites on what's now Service property - two along Whipping Creek Road, one near the intersection of Cedar and Koehring Roads, and one along Chip Road. These were all reported from 1981 to 1983. The reported sightings were plotted on maps and aerial photographs as closely as the descriptions would allow. The Chip Road colony was located during 1987, and the hardwood understory, which was within one foot of the only active cavity tree, was removed by a YCC crew. There were no active cavity trees at this site in 1991. The cavity tree on the south side of Chip Road was located in 1989 with the help of one of the individuals who originally located it in 1982. It's also in need of

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Table 4.
Nestling Alligators Marked During 1991,
AR NWR, 1991

Marking*	Weight (lbs.)	Total Length (in.)	Snout Length (in.)	Tail Length (in.)
1-----	.22	11 1/8	7/16	5 1/2
-2-----	.21	10 9/16	3/4	5 6/16
--3-----	.25	11 5/8	3/4	6
---4-----	.25	11 9/16	3/4	6 1/16
----5-----	.25	11 3/4	3/4	6 1/8
-----6-----	.22	10 7/8	5/8	5 3/4
-----7---	.23	11 1/2	5/8	6 1/16
-----8--	.25	11 1/5	3/4	6
-----9-	.25	11 3/4	5/8	6 1/8
-----0	.23	11 1/2	3/4	6
1-3----- *	.24	11	3/8	6

* Position number 1 is at the front of the tail; number 10 is at the rear of the tail.

Location: Whipping Creek, 1/4 mile below creek exit at south end of lake.
 Date: October 18, 1991 Air Temp: 20 C. Water Temp: 17 C.
 Estimated age at marking: 2 months Time: 12:00 pm - 1:00 pm.

Marking*	Weight (lbs.)	Total Length (in.)	Snout Length (in.)	Tail Length (in.)
-2-4-----	0.15	10 1/2	3/4	5 1/4
12-----	0.21	11	3/4	5 1/2
1-3-----*	0.21	11 1/4	5/8	5 3/4
1--4-----	0.20	11 1/4	9/16	5 1/2
1---5-----	0.20	11 1/4	3/4	5 3/4
--3-5-----	--	38 1/2	3	19
-23-5-----	--	38 1/2	3	20

* Mistakenly used twice.

Location: Lost Lake, South side of Lake directly south of creek exit.
 Date: November 20, 1991. Air Temp: 29 C Water Temp: 18 C
 Estimated age at marking: 3 months for small ones unknown for larger.
 Time: 1:30 pm - 2:30 pm.

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Nestling Alligators Marked During 1991,
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---4-----	.25	11 9/16	3/4	6 1/16
----5-----	.25	11 3/4	3/4	6 1/8
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Time: 1:30 pm - 2:30 pm.

understory removal, but the refuge staff was unable to accomplish this in 1990 and 1991. In 1991, Section 404 permits for plowing firebreaks could not be obtained in time to allow for burning the colony sites. A helicopter survey done in conjunction with the Air Force located ten cavity trees approximately 1000 feet south of the known cavity tree on Whipping Creek. Three other cavity trees were seen further south and west. All of these are in a roadless area with extremely heavy understory vegetation. It will be difficult to find them from the ground. This same helicopter survey located 19 cavity trees on Air Force Bombing Range lands.

The staff still has not located the site on the north side of Chip Road or the site near the intersection of Koehring and Cedar Roads. Additional efforts will be made to locate these and other colonies as time and personnel are available. It appears that the hardwood understory has grown above the cavity that was spotted on the north side of Chip Road in 1982.

Locating RCW colonies will continue to be a major problem on AR NWR. The understory is so thick in the area that a trail has to be cut in order to walk. Even so, the adjacent shrubs are so high that even nearby trees are obscured. A trail has to be cut to each pine tree and an area must be cleared all around the base of each tree to allow a view of the bole to check for cavities. Needless to say, ground surveys are not very practical. Helicopter surveys appear to hold the best potential but cost is prohibitive. With a fire program being put in place, the next challenge will be to set up burn regimes for the colony sites in order to control hardwood understories. The refuge has been extremely negligent in not aggressively implementing management actions to at least maintain suitable habitat conditions at the known colony sites.

Red Wolf (Endangered) - 1991 marked the fourth year of the five-year experiment to reintroduce red wolves at AR NWR. By almost every measure, the experiment has been successful. Currently, a plan is being developed to expand the objectives of the reintroduction program.

Population Size -

The size of the population ranged from a low 14 animals during

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Population Size -

The size of the population ranged from a low 14 animals during

February to a high of 26 animals during August. During late December, there were 20 radio-collared wolves in eastern North Carolina. Half of the wolves inhabited refuge and adjacent Department of Defense land, while half inhabited private land south of the refuge. Population size fluctuated because of management decisions (e.g. releases, retrievals, etc.), births, and deaths.

Management of Population and Releases

Trapping was a common field activity during 1991. Refuge staff captured wolves in order to manage potentially deleterious situations and to place/replace radiocollars. Twenty-four wolves were captured 45 times, including the first-time captures of 1 wild-born pup from 1990 and 11 wild-born pups from 1991. Four of the animals were captured in an acclimation pen that was modified to act as a trap; the



*Wildborn pups are captured, processed, collared and released each year.
2/91 MKP*

remainder were captured in leghold traps (modified #3 soft-catch traps). None of these wolves evinced significant injury from the leghold traps, including 1 individual that was captured 4 times during a 2-week period. All of the animals were in excellent physical condition at the time of capture. Most captured wolves were re-released immediately after processing. However, 4 wolves were held in captivity for a few days as we tried to capture other members of the pack, and 2 females were returned to captivity after capture.

The only release of 1991 occurred on August 13 and involved an adult pair (352M and 337F), their 4 pups (459M, 460M, 461M, and 462F), and an adopted pup (466F). The release area consisted of good habitat that was not being used by wolves. Unfortunately, only 337F survived through the end of September.

During the first couple of weeks after release, all members of the group restricted their movements to the release site. However, by early September all had made sojourns to an area inhabited by the long-established Gator Pack, which consisted of two adults (319M and 300F), 3 yearlings (442M, 443F, and 444F), and an unknown number of pups. By September 15, the 4 related pups had been killed by one or more members of the Gator Pack, and the adult male and the adopted pup had been killed by vehicles.

By mid-October, 337F had begun to restrict her movements to an area near East Lake, NC. Concerned that a management problem would be created, she was captured on the 25th and returned to captivity. Hopefully, she will be re-released sometime in the future.

Only one other significant management event surfaced during 1991. From June 11 through the end of the month, the staff investigated reports of wolf sightings along NC State Road 1311, an area of small farms and many homes. In addition to sightings, residents indicated that domestic cats were disappearing from the area. Although some residents expressed concern over the safety of children with wolves in the area, all were supportive of the reintroduction program.

By late August it became apparent that 313F was once again frequenting NC State Road 1311. Apparently being captured and translocated away from this area during late June was not an unpleasant enough experience to keep her from coming back. On September 18, 313F was again captured and returned to captivity; she will not be re-released in the area.

Unfortunately, the removal of 328M and 313F had an effect on the cohesiveness of their pack. By October, the remaining members of the pack (yearling 430F and wild-born pups 496F, 497M, and 498F) had infrequent contact with one another. By December, 497M and 498F had dispersed from the pack's territory.

497M wandered over 40 miles to the west. At one point he was at least 24 miles west of the reintroduction area. Fortunately, by the end of the year, he had moved back east.

498F wandered about 8 miles south of the reintroduction area. She was hit and killed by a vehicle on December 15.

The decision was made to let 497M and 498F wander rather than capturing them due to the valuable information being generated about dispersal. Project staff will probably opt for a similar "hands-off" policy when future situations permit.

Since 1987, project personnel have studied the movements of 23 pups (7 captive-born and released, and 16 wild-born). All but 3 of these animals restricted movements to their parents' home ranges at least through their first fall and winter. One wolf that deviated from this pattern stopped associating with his parents within 2 weeks after being released. Thus, 497M and 498F's movements are considered atypical and were probably due to the removal of their parents (328M and 313F).

Reproduction

During 1991, all 4 pairs of free-ranging adults produced litters in the wild. A minimum of 12 pups were born. Project staff captured 11 of them and determined that 10 survived through the end of the year. It is

important to note that 344F was born in the wild during 1988. Thus, her 1991 litter represents the first group of second generation free-ranging wolves produced in eastern North Carolina. Specifics of reproduction in the wild during 1991 are presented in Table 5.

Since the reintroduction began, 16 wild-born pups have been captured. These pups were members of 6 litters produced by 11 adults (6 males and 5 females) during 3 years (1988, 1990, and 1991). Of the 11 adults, 10 were captive-born-and-reared and 1 was wild-born. No pups were born in the wild during 1989, because there were no adult pairs together during the breeding season. Additionally, another 4 to 6 wild-born wolves (i.e. 1 pup from an unstudied litter produced in 1990 and probably 3 to 5 pups from an unstudied litter produced in 1991) have not yet been captured. Thus, probably 20 to 22 wolves have been born in the wild since 1987. Wild-born animals now account for 65% of the population (13 of 20).

Although project staff have no way of determining the survival of very young pups, survival of pups that reach a few months of age has been good. Indeed, of the 16 wild-born pups that were captured, only 1 has died. Clearly, captive-born-and-reared adults released in eastern North Carolina can (and will) produce viable offspring.

Mortality

Some reproduction was offset by the death of 9 wolves during 1991. Five died as a result of injuries sustained during fights with other wolves, whereas 4 died after being hit by vehicles. In previous years, intraspecific strife and vehicles were also important sources of mortality.

Food Habits

Cursory analysis of the 316 scats collected during 1991 indicated that white-tailed deer, raccoons, and rabbits continue to be important food items for wolves in eastern North Carolina.

Assistance to Other Projects

As in the past, the wolf crew at Alligator River was detailed to other projects of the recovery program in order to provide technical

assistance. A total of eight separate trips were made by refuge staff during 1991 in this regard.

Captive Breeding Program

During 1991, 28 wolves were involved in the captive program at AR NWR. The number of animals simultaneously held at the facility ranged from 10 to 20.

One litter of 5 pups was produced by 352M and 337F while in captivity. One pup died soon after birth. The remaining 4 pups, their parents, and an adopted pup were released on August 13.



RT Morse processed captive born pup which was later released with family unit near the "Gator Pack".

5/91 JLL

**Table 5.
Red Wolf Reproduction,
AR NWR, 1991**

Adult Pair	Pups Produced/Comments
331M/205F	505F, 506M, 507M; all survived through end of year
328M/313F	496F, 497M, 498F; 498F died mid-December, other two survived through end of year; a 4th pup was observed with 313F during June but fate remains unknown
392M/344F	500F, 501F, 502F, 503F, and 504M; all survived through end of year
319M/300F	telemetry data indicated that 300F denned, but no pups had been observed or captured by the end of 1991

**Table 6.
Red Wolf Transfers
AR NWR, 1991**

Date	Wolf(ves)	Comments
01/15	378F	Shipped to the Great Smoky Mountains National Park, TN
03/18	372M	Arrived from Horn Island, MS
07/23	464M,465M, 466F	Arrived from Great Smokey Mountains National Park, TN
11/14	357M	Arrived from Graham, WA
11/22	408F,409F	Arrived from Fossil Rim Wildlife Center, Glen Rose, TX
11/23	304F	Shipped to North Carolina Nature Center, Asheville, NC
12/19	205F,328M	Shipped to Graham, WA

280M was the only other captive wolf that died during 1991. His death was caused by complications associated with handling as he was prepared for transport to the North Carolina Nature Center, Asheville, NC.

The 11 wolves that were shipped to or from Alligator River during 1991 are listed in Table 6.

Future

The reintroduction experiment has progressed well. As mentioned earlier, 20 radiocollared wolves and a few unmarked individuals inhabit the reintroduction area (refuge and adjacent private land). Unfortunately, the reintroduction area, which covers approximately 250,000 acres, probably cannot support all these wolves; some young animals will disperse outside the area. Indeed, dispersal has already begun and will continue well into the future as 13 wolves (65% of the population) are \leq 21 months-of-age. In addition to dispersal, the wolf population is threatened by various stochastic events (e.g. disease outbreaks).

Threats to the wolf population can be minimized by increasing its size, and clearly the size of the reintroduction area limits the size of the wolf population. Fortunately, the reintroduction area can be enlarged by integrating Federal, State, and private lands to the south and west into the program. For example, Pocosin Lakes NWR is an ideal addition because of its remoteness, proximity to AR NWR, and healthy prey populations. Inclusion of Pocosin Lakes NWR would provide the Service the impetus and justification to query citizens about allowing wolves to inhabit remote private land adjacent to or near Pocosin Lakes NWR. Additionally, the North Carolina Wildlife Resources Commission could be queried about allowing wolves to inhabit State land in the 3 counties (e.g. Gull Rock State Game Lands). Through inclusion of Pocosin Lakes NWR, and with cooperation from private citizens and the North Carolina Wildlife Resources Commission, the reintroduction area could come to encompass over 500,000 acres of ideal wolf habitat. With adequate funding (approximately \$250,000 per year), it is reasonable to expect that 50 to 100 wolves could be restored to such an area within 5 to 10 years.

The significance of such a population is three-fold. First, an important objective of the Red Wolf Recovery Plan is to maintain 225 animals in the wild. The "Northeastern North Carolina Red Wolf Project" could singlehandedly assume responsibility for 25% to 50% of that objective. Since such a project would utilize the infrastructure that the Service created for the AR reintroduction, a significant monetary savings would be realized over a 5 to 10-year period compared with the cost of developing a similar population elsewhere in the southeast. Second, at the species level a population of 50 to 100 wolves would provide significant protection to the red wolf's already limited genetic diversity. Third, at the population level, a group of 50 to 100 wolves would be able to withstand many stochastic events that threaten smaller populations.

3. Waterfowl



Wood ducks heavily utilized the myriad of streams, sloughs, and other wetland communities throughout the year.

Large numbers of waterfowl have not utilized AR NWR historically, but the refuge does support a substantial population of wood ducks year-round that utilize the numerous ditches, canals, natural openings, and swamps. Diving species such as scaup, canvasback, redhead, bufflehead, and mergansers can be found on the Alligator River and the associated sounds.

The fourth year's management of the farm fields attracted fair numbers of waterfowl. Unusually warm temperatures seemed to reduce the numbers of waterfowl in the area in general. Peak numbers were 175 blacks, 732 mallards, 5,080 pintails, 1,973 green-winged teal and 1,921 ring-necked ducks. Peak total was 10,143 from the aerial survey done on February 19.

The staff is eagerly anticipating more waterfowl use in coming years as more and more of the farmland is brought into waterfowl management. The results of this year's surveys are given below in Table 7 and 8. The survey route (Sawyer Lake Road) runs along the southern edge of the South Twiford Unit.

Aerial surveys were flown, on January 17 and February 19. Based on these flights, ground surveys were missing a lot of birds and probably gave, at best, some trend data. The dense moist soil vegetation and long distances across some of the flooded areas (up to 3000 feet) made it impossible to accurately estimate bird numbers. Assuming that the numbers of waterfowl did not change drastically between the aerial survey and the closest ground survey, it appeared that ground counts were under-estimating numbers by 50% to 75%. The ground count on January 17 was only 56% of the aerial count on January 25 while the ground count on February 15 was only 21% of the aerial flight on February 19.

**Table 7.
Sawyer Lake Road Waterfowl Survey
South Twiford Unit, AR NWR, 1991**

Species	Jan 10	Jan 25	Feb 15	Mar 9	Mar 14	Oct 9	Nov 1
Mallard	43	133	110	105	124	10	58
Black Duck	32	67	40	108	74	0	34
Pintail	250	1,600	600	25	0	60	318
Widgeon	0	0	2	0	0	0	0
Gr. Winged Teal	1,050	1,250	910	556	69	0	312
Wood Duck	28	133	64	122	124	189	252
Ring-Necked Duck	220	700	177	382	108	0	20
Shoveler	30	0	0	0	0	0	0
Gadwall	0	0	0	0	0	0	0
Coots	0	0	0	0	0	0	0
Canada Geese	0	0	25	0	0	0	0
Tundra Swans	0	0	0	0	0	0	0
Other Waterfowl	158	775	246	222	51	25	238
Totals	1,913	4,658	2,174	1,520	550	284	1,232

**Table 8.
Sawyer Lake Road Waterfowl Survey
Twiford Unit, AR NWR, 1991**

Species	Nov 23	Nov 27	Dec 6	Dec 12
Mallard	136	37	100	283
Black Duck	75	51	85	126
Pintail	208	0	0	620
Widgeon	0	0	0	0
Green-winged Teal	450	440	400	1,925
Wood Duck	224	99	146	183
Ring-necked Duck	200	188	230	410
Shoveler	0	0	0	0
Gadwall	0	0	0	0
Coots	5	0	8	0
Canada Geese	0	0	0	0
Tundra Swans	2	0	0	83
Other Waterfowl	125	630	2,278	559
Totals	1,425	1,445	3,247	4,197

Species	Aerial Jan 17	Ground Jan 25	Aerial Feb 19	Ground Feb 15
Mallard	560	133	732	110
Black Duck	175	67	114	40
Pintail	3,620	1,600	5,080	600
Widgeon	0	0	0	2
Green-winged Teal	1,900	1,250	1,973	910
Wood Duck	275	133	34	64
Ring-necked Duck	1,605	700	1,921	177
Shoveler	0	0	50	0
Gadwall	0	0	0	0
Coots	0	0	0	0
Canada Geese	50	0	0	25
Snow Geese	0	0	0	0
Tundra Swan	0	0	0	0
Other Waterfowl	155	775	239	246
Totals	8,240	4,658	10,143	2,174

8. Game Mammals

In 1988, the refuge and the Department of Defense initiated a cooperative study of black bear movements and habitat use in the refuge. This study continued at a much reduced level during 1991 because of limited funds. All animals were located about once every 2 to 4 weeks. All the animals were "on the air" at the end of September when funding ran out.

Since 1972, there has been a prohibition on hunting black bears in Dare County. This local ordinance was justified on the claim that sport

hunting had nearly decimated the population prior to 1972. During the last 17 years, the bear population has apparently increased in size. During January 1990, local politicians rescinded the 1972 ordinance prohibiting hunting of bears in Dare County. The North Carolina Wildlife Resources Commission established a bear season for Dare County in 1991 at the request of the County Commission.

At this point, the U.S. Fish and Wildlife Service does not plan to allow bear hunting in the refuge because insufficient data are available upon which to develop a harvest strategy. Information such as sex and age distribution, age at primiparity, birth rate, survival, and density of the bear population is necessary to predict results of bear-related management actions such as hunting. Numerous researchers have shown that the reproductive rate of black bears is low because animals are slow to mature, litters are small (probably no more than 1 to 1.5 cubs per litter), and the reproductive interval is long (probably 2 - 3 years). Thus, a black bear population cannot respond quickly to excessive hunting pressure and is relatively easy to over-harvest.

Significant controversy surrounds black bear populations in the southeastern Atlantic Coastal Plain, including Dare County. Habitat modification resulting from peat mining, forestry, and agriculture has effectively fragmented bear habitat throughout the region. Mainland Dare County is an excellent example. Here, tracts of pocosins and associated coastal plain habitats are surrounded by extensive acreage of cleared lands. Dare County black bears effectively live in an island of suitable habitat surrounded by inhospitable environs. The potential of the unharvested population to act as a reservoir for black bear reproduction and dispersal in the Atlantic Coastal Plain is unknown. In recent years, development of land in and around Dare County has accelerated. This, along with the initiation of bear seasons in Tyrell and Hyde Counties, perhaps makes Dare County a vital sanctuary for bears.

Unfortunately, the bear population in Dare County may not be secure biologically. Data on bear populations in areas similar to Dare County indicate a very small "effective size". For example, the effective size of the bear population in the Great Dismal Swamp NWR is 56, which is

only slightly above the recommended size of 50 for short-term survival and well below the 500 recommended for preservation of genetic variability and long-term survival. Thus, the U.S. Fish and Wildlife Service will maintain the prohibition on bear hunting in the refuge until data are available to design a harvest strategy that ensures the continued existence of the population. This prohibition is commensurate with the legal mandate of the Wildlife Refuge System.

It is likely that the U.S. Fish and Wildlife Service will continue to receive pressure to permit bear hunting in the refuge. Unfortunately, the current telemetry study will not provide the data needed to make intelligent decision. A study of the demographics and productivity of the bear population is needed. This could be best accomplished by contracting a University (i.e. graduate student) to initiate an extensive capture/recapture study. Experienced bear researchers from North Carolina State University, University of Tennessee, and Virginia Polytechnic Institute and State University have expressed interest in such a study.

H. PUBLIC USE

1. General

Hunting is the major public use activity on AR NWR. Little non-consumptive public use occurs, and public use is not expected to increase substantially. A vast majority of the refuge is inaccessible without 4X4 vehicles. Public use plans will concentrate on providing a few accessible areas and focusing the public on those spots. Total visits to the refuge in 1991 were estimated to be 10,197.

During 1991, administrative offices for the refuge remained in the GSA leased office space in Manteo. A few visitors actually located the office, but most information was disseminated by telephone, correspondence, and through the news media. The staff responded to approximately 3,200 public inquiries and issued 45 news releases (including columns). In addition, staff members participated in routine radio "spots" about the red wolf project, hunting, and other wildlife

refuge topics. Most video and/or major magazine articles featured the red wolf project.

The media continued to express strong interest in the wolf project throughout 1991. In addition to countless phone interviews given throughout the year, some members of the media visited the project. Among the more notable were Hunter Jenkins (Assistant Editor, American Hunter), Mary Ellen Riddle (reporter from radio station WOBR, Wanchese, NC), representatives from Tri-Star Pictures (considering producing a feature-length movie about wolf reintroduction), and Suzanne Shoemaker (collected background material for a children's book about red wolves).

For the past 6 years, the weekly column "What's Happening with Wildlife - A Refuge Point of View" has proven to be a valuable tool for disseminating information as well as fostering good will in the community. During 1991, the column appeared less frequently in the Coastland Times. Discussions with the editor indicated a space problem. Refuge staff decided to continue writing the column and emphasize urgency to the editor whenever an important, timely issue was involved. This method seems to work; all emphasized columns have been printed in a timely manner.

The Coastal Wildlife Refuge Society funded an eight page tabloid for the complex at the end of 1990. The tabloid, actually received in February, 1991, was printed on newsprint and designed to provide information about both Alligator River and Pea Island NWRs, the Red Wolf Project, and the Coastal Wildlife Refuge Society. A total of 15,000 copies was printed. They were distributed through the Pea Island and Alligator River offices, Whalebone Information Center (NPS-Cape Hatteras National Seashore), the Dare County Tourist Bureau, and by mail, on request.

2. Outdoor Classrooms - Students

In more recent years, teachers have begun to utilize the marshes of Pea Island for independent use with their classes. Classes have begun to show an interest in visiting AR NWR. To date, few classes have had the

confidence to plan and execute a trip to Alligator River for Service defined "environmental education".

The draft environmental education package, written during 1989 for North Carolina Notebook and sponsored by the N.C. Wildlife Resources Commission was published in 1990. This publication was distributed to approximately 10,000 teachers by the NCWRC. The refuge keeps copies of the publication and distributes them to interested teachers, scout leaders, etc. (Copy included in narrative information packet.)

To encourage contact between the classes and the refuge and to ensure a reasonable level of "wildlife literacy" in the local public schools, a core group of volunteers have prepared and stand ready to present in-classroom programs on assorted wildlife and refuge topics. Programs on the Red Wolf, Birds, Mammals, Amphibians, Reptiles, Fish and Animals without Backbones, and Bird Banding and Migrations were available during 1991. Since these programs do not qualify as "environmental education", figures are included in Section H. 7. of this report.

In December, RR Strawser attended a meeting in Atlanta to discuss the need for a proto-type Environmental Education Handbook for certain key refuges in the region. As minimal accessibility needs are met, certainly Alligator River will feel the demand from schools for this type of educational packet. We hope the prototype being contracted by Bayou Sauvage will be useful in developing a refuge specific handbook for this refuge in the future. When the Visitor Center is built and refuge trails established, an AR NWR Environmental Education Handbook will be essential.

3. Outdoor Classrooms - Teachers

There were no requests for teacher training workshops in 1991. Since Alligator River and Pea Island Refuges are located in an area rich in conservation education/interpretation agencies, these refuges do not receive the requests common on other stations that are often the sole sources available. The North Carolina Aquarium, Jockey's Ridge State Park, Nags Head Woods Ecological Preserve, and Cape Hatteras National

Seashore offer environmental education and teacher training activities. Teachers here are hounded constantly to attend such functions. For this reason, the staff has chosen to focus more on other educational needs rather than attempt to compete with other conservation agencies.

4. Interpretive Foot Trails

Currently, no official trails exist on AR NWR; however, many visitors enjoy wandering around Buffalo City Road. An old logging road leads through the old town of Buffalo City where remains of the old structures can still be seen.

A 1992 Public Use Review will identify (hopefully) potential areas for public use development. Certainly, interpretive foot trails are a high priority for public use planning.

6. Interpretive Exhibits/Demonstrations

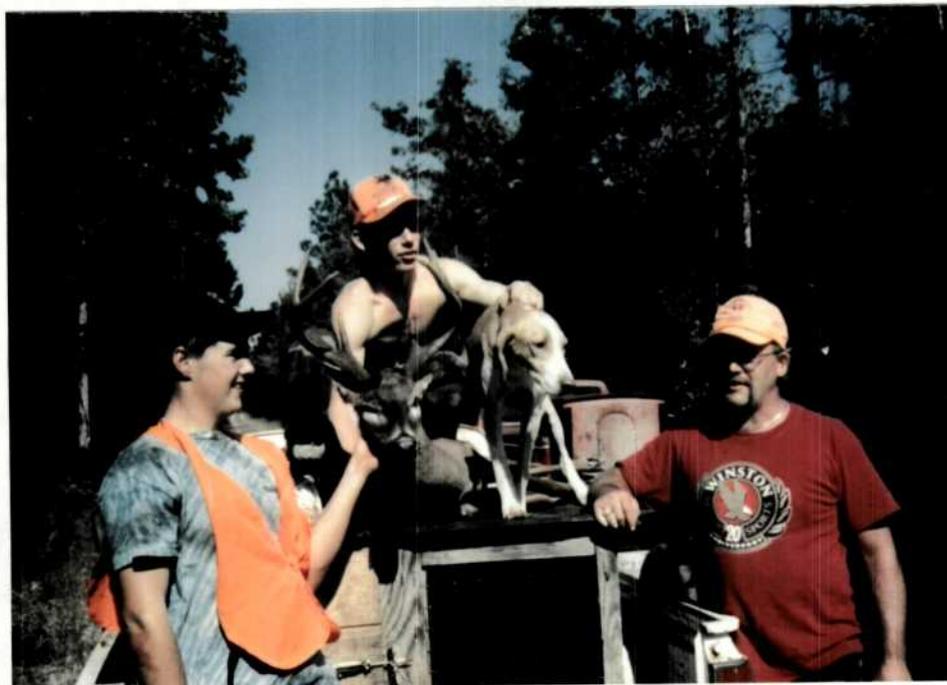
Refuge staff manned displays and exhibits at the usual annual events around Dare County and eastern North Carolina. These included the Job Fair, Dare Day, several Conservation Field Days, Earth Day, the Dixie Deer Classic, and an assortment of other community outreach functions. Staff also served as judges in several middle and high school Science Fairs.

7. Other Interpretive Programs

A number of other refuge programs were conducted during 1991 by staff and volunteers. Many dealt with the Red Wolf Program; others addressed specific and general refuge related topics. Programs were presented to 111 groups containing approximately 2,230 individuals during 1991. Approximately half of these programs were presented to groups organized by the refuge or other agencies setting up a series of programs in a limited amount of time (i.e. Discovery Trails, NC Natural Heritage Week, National Wildlife Week, etc.). During this type of activity, it is not unusual to present the same program to 10-12 groups in a day.

8. Hunting

With approval of the master plan, the refuge was divided into three basic public use areas and several additional safety or management zones closed to all hunting. As new lands were acquired, they were 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 open to all authorized uses during September and October (except waterfowl hunting), but closed to entry during all other times. (See map in hunt brochure in information packet). 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 the use of chase dogs remained relatively constant (1:1).



*Chase dog deer hunting remains the most visible form of public use.
10/92 BWS*

For the purposes of the hunt program, the 6,000 acre Frying Pan unit in Tyrrell County remained under the jurisdiction of Alligator River for

the 1991-92 season. However, this area has officially been transferred to Pocosin Lakes NWR. Alligator River included this land in the 1991-92 hunt brochures and erected a hunt information board there. Enforcement on the area was accomplished by the Pocosin Lakes staff. For the 1992-93 season, this section will be omitted from the AR NWR hunt program.

White-tailed deer are the most sought after game species on refuge lands. Since Alligator River contains over 145,100 acres of habitat traversed by more than 150 miles of logging roads, many of which share junctions with State roads, it is difficult to establish effective hunter check stations. The N.C. Wildlife Resources Commission requires hunters to register hunter-killed deer with a local wildlife cooperator agent; however, an estimated 40% go unreported each year. In past years, refuge staff has taken the figures reported by the State and extrapolated more realistic estimates from them. For 1991, the State changed their methods of retrieving the deer harvest log books. At this writing, they have only 30% of the log books and have no data compiled. They anticipate a severe reduction in data collected this year and don't expect to have any data compiled until summer. The best estimate indicates approximately 120 deer were harvested on the refuge during the 1991-92 season.

In September, the annual hunter information meeting was held at the Manns Harbor Community Center. Approximately 50 people attended. Although there were no significant changes in the refuge regulations this year, there were routine comments concerning youth hunting regs, waterfowl unit management, road maintenance, areas open to chase dogs, roads open to motorized vehicles, etc. NCWRC Officer Earl Brinkley was also present to provide current information about State and Gamelands Regulations. This meeting provided the hunters a good opportunity to meet and talk with the new Refuge Manager, Jim Johnson, who had arrived in May.

This year, for the first time in many years, the State opened a bear season in Dare County. During the comment period (prior to the opening of the season), refuge staff produced appropriate letters and phone calls in an attempt to halt the opening of the season. These efforts

were to no avail. Dare County hosted a 5 day bear season November 11-16.

The biological justification opposing the season was presented in Section G.8. Any reasonable logic would conclude maintaining a closed season if for no other reason than the following: there are 190,625 acres on the Dare County mainland. USFWS owns 131,800, and the Bombing Range owns 46,656. Both are closed to bear hunting. The remaining 12,169 acres primarily make up the four communities of East Lake, Stumpy Point, Manns Harbor and Mashoes and are owned by the 1,500 residents who live there. Never-the-less, politics prevailed, and the Dare County Commissioners got what they wanted - a bear season. There was no reported harvest during the season; however, the season placed an extra work load on the refuge officers.

Bow season began on September 9, along with the usual weekend patrol assignments for refuge officers. August was spent re-vamping the 16 hunter information boards on the refuge.

Muzzle loader season came in on October 7, a 3-day duck season occurred October 10-12, and regular gun season started on October 14. On November 1, the farm field gates were closed and locked. For the rest of the year (and through September, 1992), this area was closed to all public entry.

Waterfowl seasons continued November 28-30 and December 12-January 4. 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 new regional hunting policy for youths has been difficult to enforce, the fact that Dare County Schools already had the State Hunter Safety Course as a part of the seventh and eighth grade curriculum certainly helped. Beginning in 1991, North Carolina requires all first-time hunters to successfully complete the Hunter Safety Course. In addition to the courses offered in the public schools, NCWRC Officer Brinkley and Volunteer Jeff Nycze conducted several extra classes to

enable other youths in the area to qualify for hunting on the refuge. Refuge staff have yet to hear of a person who has needed the course and was unable to find a class.

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

Activity	Visits	Activity hours
Duck	236	1,030
Deer (gun)	1,800	10,800
Deer (bow)	334	1,679
Small Game	285	1,200
Upland Game Birds	86	262
Totals	2,741	14,971

9. Fishing

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

During 1991, there were an estimated 1,542 fishing visits to the refuge with 6,171 activity hours spent participating in this activity.

10. Trapping

Furbearer trapping was allowed under North Carolina regulations. Since trapping is considered a commercial use of the refuge, neither visits nor activity hours are normally recorded under public use. For the 1991 trapping season, no special use permits were issued for refuge trapping.

11. Wildlife Observation

Canoeists enjoyed paddling on Milltail and Whipping Creeks and observing an occasional alligator, wood duck brood, or other wildlife in the area. Wildlife photographers utilized the refuge to some extent for a chance at bear, deer, or any number of birds and other animals. General habitat scenes were popular for an adventuresome few.

**Table 11.
Wildlife/Wildlands Observation,
AR NWR, 1991.**

Activity	Visits	Activity Hours
Foot	2,085	4,171
Vehicle	5,201	10,403
Boat	731	2,925
Photography	185	555
Totals	8,202	18,054

17. Law Enforcement

Refuge colateral duty officers participated in considerably more LE patrols during the 1991-92 season than in the past. For the most part,

each hunting day had at least one officer working. Heavy use days involved all officers.

Information boards, complete with maps, regulations, and other pertinent information for hunting on the refuge, were updated and added to key access points. Extra efforts were made to ensure that appropriate regulatory signs were in place prior to the respective seasons and that hunt brochures were available at all entry points to the refuge.

All officers completed transitional training to convert to Sig-Sauer semi-automatic weapons, attended the 40 hour refresher training, and requalified, as required. Personnel actions dropped the number of colateral duty officers from 6 to 4 for the 1991-92 seasons. Even though extra effort was shown toward LE patrols, the shortage of officers was evident during hunting seasons.

Noteworthy incidents/actions are described below:

--On January 11, 1990, red wolf 395F (a 9-month-old pup) drowned after being captured in a steel leghold trap. Necropsy revealed that she was in excellent condition (weighed 45 lbs). A number of unanswered questions about the death prompted the Service to initiate an investigation. In the meantime, the State prosecuted the case. Due to a foul-up on the part of District Attorney, federal prosecution was ruled out. The case was referred to the Solicitor to pursue civil prosecution. At this point, the matter is still pending.

--Early in 1991, an Engelhard resident shot a red wolf on a dirt road off US 264. He was convicted, fined \$2,000, and ordered to serve 32 hours of community service with the Red Wolf Project. From December 17 - 21, he helped feed and handle wolves and constructed 6 whelping boxes.

--RM Johnson and Special Agent Jack Baker approached Federal Judge McCotter for a ruling on the issue of whether or not the refuge could enforce refuge regulations on some of the waters in the refuge in spite of state definitions of "navigable waters". The Judge indicated that we should withdraw the refuge regulation prohibiting motor boats on

certain waters, not because of navigability, but because of a deed restriction. He advised that all other special regs were enforceable. (See Section D.1. of this report for details).

--A refuge truck was broken into at the Red Shed. A number of items were stolen. No suspects were found.

Four NOV's were issued on the refuge during 1991, all for transporting loaded firearms. In addition, four State NOV's were issued on the refuge. Three of these were hunter orange violations and one was possession of pistol during bow season.

18. Cooperating Associations

In April of 1989, a group of refuge volunteers formed the Coastal Wildlife Refuge Society (CWRS), a non-profit support organization for refuge I&R functions. During 1991, the Society completed it's second full year of existence.

The North Pond Trail Renovation and Upgrade Project was the major project undertaken in 1991. At year's end, the trail project was 75% complete. Materials and scopes had been purchased to complete the two remaining phases. All that remained was the actual construction. (See Section H.18. of the Pea Island Narrative for details.)

The Sales Unit at the Visitor Contact Station of Pea Island was upgraded and new inventory added. During 1991, Pea Island patches and pins, duck stamp pins and key chains, insect repellent, wildlife note cards, seven styles of T-shirts, and 23 titles of wildlife-related books were on the sales list.

Late in 1990/early in 1991, an eight page tabloid was produced and 15,000 copies printed. The tabloid covered both Alligator River and Pea Island Refuges, the Red Wolf Project, and the CWRS. This publication has carried the refuge through the interim while awaiting the production and printing of the general refuge leaflets. The CWRS received permission from Cape Hatteras National Seashore to reprint their new bird list Birds of the Outer Banks and donated 5,000 copies to the

refuge. A Macintosh SE and Laserwriter printer were purchased for use by the Refuge Ranger and CWRs. By year's end, the system had been upgraded to include a Macintosh Classic as well.

Also during 1991, the CWRs voted to sponsor the "Run with the Red Wolf Project" - a first ever attempt to raise enough funds from private sources to build and furnish a Visitor Center/Administrative Complex for the refuge. (See informational package in back for promotional material.)

Donations to the Society for the year were categorized as follows:

General donations/membership fees	\$8,498.00
Donations designated for red wolf	\$ 119.50
Money for Jackson Red wolf print	\$4,280.00

Net income from the Sales Unit was only \$1,329.14; however, a large inventory to begin next year is on hand.

The CWRs spent \$9,982.78 on purchases for the refuge. In addition, \$8,299.50 was sent to the Fish and Wildlife Foundation to apply toward the Red Wolf \$40,000 matching funds.

It is anticipated that next year's funds will complete the North Pond Trail Project at Pea Island and support the "Run with the Red Wolf Project".

I. EQUIPMENT AND FACILITIES

1. New Construction

Now for the BIG NEWS - Alligator River is finally getting a maintenance facility! Contract #14-16-004-92-098 was issued in September to Wimco Corp. of Washington, NC for \$572,400 and includes a 40' x 108' shop/office building, a 24' x 80' vehicle storage building, fueling facility with two 2,000 gallon above ground tanks, security fencing, well, and all associated site work. The office section of the main building will have space for eight people along with a small wet lab,



Construction work on maintenance facility progressed with pouring of slabs..... *10/91 JCJ*



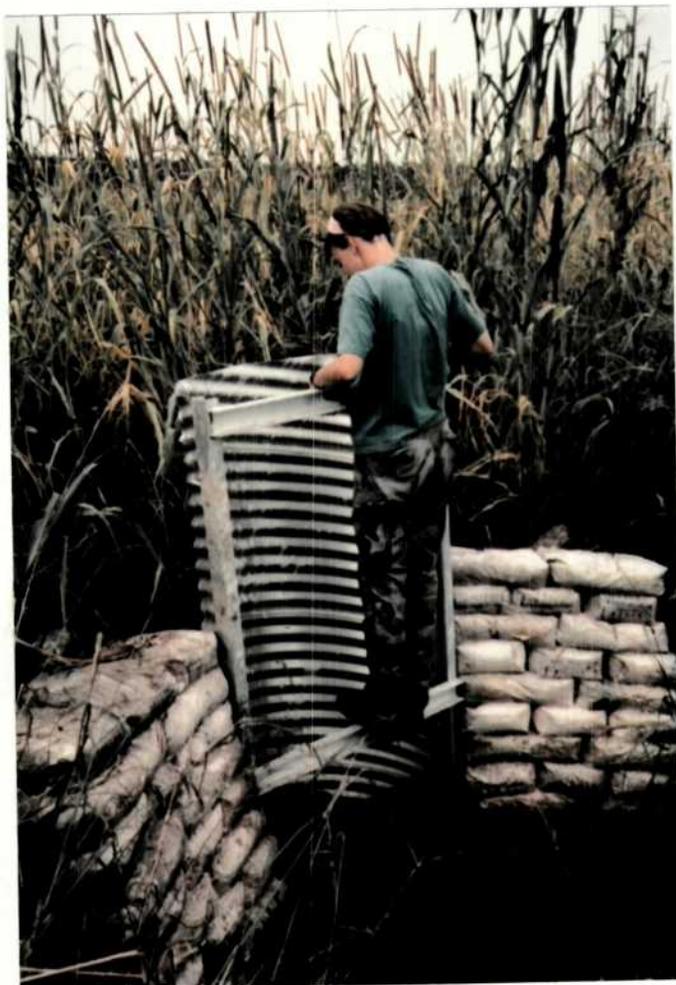
.....to the erections of structural steel by year's end. 12/91 JCJ

crew break room, etc. A significant part of the cost was site work - the entire three acre area had to be raised 3.5' to exceed the 100 year floodplain, even though the site is protected by a perimeter levee and pump units. Scheduled completion date is August, 1992. RM Johnson is the construction rep for the project.

Site work actually began on October 16, and the first problem occurred two days later. The specs called for removal of the top 6" of soil/vegetation from the area, compacting, and hauling in fill. The contractor immediately found an 18" - 2' thick organic layer over the entire site some 2" below the surface elevation. Foundation footings would have rested on and in this organic layer which could not be compacted nor was it stable. Somehow, Engineering missed this peat layer even though soil borings had been taken (prior to writing the specs). After considerable "deliberation(s)," the decision was made to excavate this peat layer 5' beyond the foundation line of all slabs. In addition, due to poor percolation of the clay soils below this peat, the 100' x 100' septic drain field was to be excavated 3' deep. All excavated areas were then back-filled and compacted. With the refuge doing all excavation and movement of material from site, this change order cost \$15,800. Shortly thereafter, modification #2 was issued for \$7,250 - upgrading electrical service from 200 amp to 400 amp and adding several control panels, 220 volt outlets, etc. The facility under construction had a designed electrical load of 178 amps which left no room for additional construction. Needless to say, the A & E contract for this facility left much to be desired!

After these initial problems were resolved, construction progressed quickly. By year's end, foundation footers had been poured. Most other problems encountered were minor - about typical for any construction project.

Other new construction completed during the year included completion of four miles of levee in the North Twiford Unit of the Farm. All the fields on Alligator River's Farm Unit had been land formed with a distinct mid-field crown sloping to 3' deep "V" ditches roughly 300' apart. The presence of this distinct crown hindered flooding more than roughly 40% of any given field. As a DU Partner's Project, levees (12'



One of seven small water control structures installed as a part of DU MARSH Project establishing 399 acres of moist soil units. 9/91 REN

top width and 5' high), were constructed by excavator and 7 small water control structures installed enabling the entire area to be flooded. The refuge staff "shot-in" all grade stakes, installed all structures, and constructed concrete bulkheads at the inlet end of the structures to stabilize the levee. This wetland restoration project enhanced 399 acres by conversion to moist soil units. The refuge now has about 1,157 acres of such moist soil units that can be flooded by gravity flow.

A septic tank drain field was constructed at a small frame house the refuge received as a result of seizure from a drug bust. The field was

mounded - built above ground - since the site was within wetlands (See D.4.). The finished system resulted in a mound 50' x 75', roughly 3.5' high.

2. Rehabilitation

Considerable staff time was devoted to road rehabilitation during the summer and fall of 1991. Alligator River has an estimated 100+ miles of roads open to the public with virtually all of it being accessible only to 4x4's at best. In fact, road conditions hinder many management programs with even the staff unable to access many areas. A core of about 50 miles of road was identified as the minimum necessary to implement various programs, including public use. Efforts were begun to upgrade these toward all weather status. The roads identified as part of this "core" included Milltail, Long Curve, Borrow Pit, Point Peter, Briar Hall, Deep Bay, Koehring, Pump, Whipping Creek, and Pamlico Roads.



Lack of maintenance has taken its toll on refuge roads. 8/91 REN

Initial efforts undertaken during 1991 concentrated on Briar Hall and Milltail. These roads (and virtually all the rest) had been overtopped by road shoulder vegetation resulting from years of neglect and lack of maintenance. Grading had resulted in an distinct berm between center-line and ditch line causing water to stand following even a moderate rain event. Under these conditions and with no gravel present, refuge roads quickly turned into a "quagmire" with any traffic at all. Road shoulder vegetation (trees, shrubs, etc.) was pushed down by crawler or cut by hand, the road was recrowned, fill was hauled in to bring low spots up to grade, and the roads were graded following most rain events. About 500 yards of fill were hauled to complete this work. As a result of these efforts, road conditions improved drastically on roughly 8 miles. In fact, Briar Hall was passable with a 4x2 all through hunting season - a first! It will take at least another 3-4 years of work to bring this "core" of roads up to reasonable condition. Virtually all program areas will benefit from this effort.

Problems developed with four aluminum water control structures (each with 48" diameter culverts and 58" diameter flash board risers) during the year. As it turned out, these structures were installed without a bottom (i.e., the 1' invert of the riser below the pipe did not have a solid bottom). Obviously, any water head pressure would cause undercutting beneath the riser, which in fact developed during August. Two of the structures undercut so badly that the risers simply fell in and the roads crossing the structures were endangered. With the assistance of Santee's excavator, all four of the structures were laboriously dug out, solid bottoms welded to the inverts concrete poured into the inverts, and around their bases, the structures reset, and new concrete bulkheading at the intake ends installed. Total cost of materials for this effort was slightly over \$8.0 K, not to mention the three weeks of staff time and loss of water management capability. All who take the time to read this - beware - do it right the first time or pay for it later. In defense of the staff here when these structures were installed - these were designed by the SCS!



*Structural design problem in 4 wcs's resulted in major repair efforts -
digging them out.....*

8/91 BWS



....to replacing bulkheading around inlet end.

8/91 BWS

3. Major Maintenance

Many maintenance items were accomplished during the year - most will not be mentioned here for brevity's sake. Noteworthy items included construction and installation of 20 new cable gates, repair of 15 others, and 4 pipe gates installed. Most refuge gates, other than those on the Farm Unit, were in terrible shape and really didn't even serve as a deterrent to entry. The new gates constructed included welding deadmen to the posts, erecting 4" diameter metal posts, placing roughly one yard of concrete around each post, stringing new cable, welding all cable clamps and eye bolts, and placing white PVC on the cables. It is our intention to eventually replace all cable gates, refuge-wide, as time/budgets allow.

The bone yard south of the maintenance building was completely moved. Years of accumulated junk was discarded, and numerous property items obtained from various sources were excessed. The new bone yard site is off Milltail Road further south. Although this doesn't sound like a noteworthy item, it took the collective efforts of virtually the entire staff eight days to complete this project.

Repair of refuge heavy equipment seemed to have been a never-ending job throughout the year. Not only was it frustrating to have breakdowns occurring every 2-3 hours of actual work, but repair and maintenance of this "old junk" literally ate the limited budget. Of all the refuges I've been on or worked on, this station has perhaps the worst "fleet" of heavy equipment and vehicles - a direct result of being a new station that never received any start-up funds. With a tremendous development work load facing the staff, repair of equipment will continue to take most of the available discretionary funds and lots of staff time. For example, the 20 year old D-6 broke down no fewer than 8 times while completing the road work detailed above in I.2. above - the last time in early December virtually blocking Milltail Road to all traffic (and during hunting season, of course) for 5 days while pads, master link, and pins could be obtained to fix a broken track. Other repairs to the D-6 ran from rather minor items to major engine problems such as a warped head due to being run hot the year before. The refuge D-3, only 12 years old, was in the shop 4 times, 3 of these

for major engine problems. The crew advises they probably could tear this machine down blind-folded! The 15-year-old dump truck lost a motor; one was taken out of another junker only to have it blow 3 months later. The 22-year-old farm tractor also required constant repair - the hydraulic pump just quit working as this was being written.

Vehicle woes also plagued everyone as many of the units were way past trade-in minimums with no hope in sight for reasonable replacement. The staff will persevere, however, and get to the many tasks needing to be done - most of which require use of heavy equipment.

4. Equipment Utilization and Replacement

Intense efforts were made to begin upgrading refuge vehicles and equipment - by any means possible! New equipment ordered and received during the year included: (1) a Cat 200 ELB trackhoe with digging and ditching buckets; (2) 2 disc fireplow; (3) 15' folding wing mower; and (4) 200 gallon slip on pumper unit. Equipment ordered but not received included: (1) Cat D-6H LGP (fire and winch equipped); (2) Terrevah IOT soft track crawler (Nodwell or Go-track type of machine); and (3) two new 4x4 vehicles. Equipment received (ordered prior year) included: (1) two 4x4 Broncos; (2) a 4x4 crew cab; and (3) a 2 1/2 ton stake body truck. Useable equipment obtained from surplus property sources included: (1) Brigadar truck/tractor; (2) Ford truck/tractor and 25 ton lowboy; (3) Pettibone 4x4, all terrain fork lift; (4) 10 ton cable crane; (5) John Deere 350 wide track crawler; and (6) two Jeep Cherokees (provided substitute vehicles to stations that had reported these as trade-ins). Many, many items of capitalized property were disposed of - most by destruction - after approvals were received.

Equipment borrowed at various times during the year included Mattamuskeet NWR's dump bed trailer and boom-axe, Pocosin Lake NWR's tandem axle dump truck and a farm tractor, and Santee NWR's trackhoe. Many thanks to these stations for their assistance without which, I might add, much of the work completed would not have been possible. Equipment loaned to other stations was limited - nothing really useable here! The refuge's Bucyrus dragline was taken to Ace

Basin in September and remained there for the rest of the year. Portable pump units and small boats were loaned to Pocosin Lakes during the Triangle Fire.



Refuge's only new piece of heavy equipment provided many dividends to maintenance program. 8/91 J CJ

J. OTHER ITEMS

1. Cooperative Programs

USDA gypsy moth traps were monitored on the refuge once again by APHIS out of Elizabeth City, NC.

An SUP was issued to Dare County to provide drainage of county farm land (located adjacent to the refuge farm fields).

One SUP was issued to operate beehives on the refuge.
An SUP was issued to USCOE and Dare County to use the original disposal site for deposition of dredged material resulting from deepening of the Stumpy Point navigation canal.

3. Items of Interest

Mr. Chris Mann, staffer for Congressman Walter Jones of the House Merchant Marine and Fisheries Committee, visited Alligator River on August 5.

Ms. Jennifer Salsberry, Acting Assistant Deputy Secretary of the Interior, visited Pea Island NWR on September 27.

Associate Manager Bill Grabill and his assistant, Ms. Karen Cartlidge, conducted an operational inspection October 5 - 9.

Mr. Tom Page, Property Utilization Specialist (CGS, RO), conducted a property audit during July.

Ms. Elaine McFarland conducted a safety inspection of both stations during July.

AM Grabill and DARD Phil Morgan visited on December 16 to look at storm damage on Pea Island.

ARD Benson, Regional Forester Reeves, Assistant Regional Forester Smith and refuge staff attended a meeting with Air Force personnel concerning fire responsibilities in Dare County in August.

4. Credit

The Narrative Report was a joint effort by the entire staff. Special credit goes to RR Strawser for editing and CT Lane for typing.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

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 has 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 explain 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.

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A. HIGHLIGHTS

Fall storms plummeted the coast....(See Section B.)



The Halloween storm deposited 4-5 feet of sand on NC 12.....11/91 BWS



...leaving virtually no dune line to the east in many areas. 11/91 BWS

North Pond Trail got a new look. (See Section H.4.)

Terminal groin completed. (See Section D.4.)

Innovative technique increasing loggerhead hatchling survival. (See Section G.2.)

B. CLIMATIC CONDITIONS
(See Alligator River Narrative)

C. LAND ACQUISITION

1. Fee Title

In early winter of 1988, the Coast Guard (USCG) vacated its facility at North Oregon Inlet due to severe erosion. Though the fate of the actual USCG fee title land (approximately 10 acres) is unknown at this time, the easement for use of FWS land (also approximately 10 acres) will terminate when the final survey of USCG buildings is completed and the station is officially abandoned.

At this writing, 3 years and numerous meetings later, the refuge has no official word as to the disposition of the 10 acre parcel. As for the real property that has been built on FWS land, the North Carolina Wildlife Resources Commission has shown interest in converting the old boat ramp into a public access point into Pamlico Sound and Oregon Inlet. For this reason, the refuge has requested the dock and ramp remain. All other "improvements" must be removed and the area returned to its natural condition upon termination of the easement.

D. PLANNING

4. Compliance with Environmental and Cultural Resource Mandates

On March 15, the North Carolina Department of Transportation (NCDOT) announced the completion of the terminal groin at the north end of the refuge. A right-of-way permit had been issued by the Service to the NCDOT in early 1989 to construct the 3,200 foot long groin and

revetment on the north end of the refuge to stabilize the south approach of the Bonner Bridge. The permit had been issued only after NCDOT had agreed to mitigate for any erosion losses which occurred as a result of the groin. After numerous meetings with officials from the NCDOT, USCOE, and Hardaway Construction Company, final clean-up was accomplished in mid-April.

In October of 1990, a permit was issued to NCDOT for construction of a ferry dock and road access on the north end of Pea Island. These structures were constructed when the Herbert Bonner Bridge over Oregon Inlet had become impassible as a result of a dredge colliding with the bridge. The NCDOT requested permission to leave these structures in place for use during future emergencies. After several meetings, the Service issued NCDOT a permit to do so.

Throughout the year, RM Johnson, ROS Windley, and RB Noffsinger attended meetings with USCOE and dredging companies to discuss plans for beach nourishment projects on the eroding Pea Island beaches. The USCOE proposed to dredge and pump approximately 600,000 cubic yards of sand from Oregon Inlet during 1991 and deposit the material over a distance of 15,000 feet, beginning at the north end of the island and working southward.

In January, the Service issued a permit to implement the nourishment project. Although the dredging companies experienced various problems during the project, approximately 400,000 cubic yards of material was deposited along the beaches, building them up significantly in certain areas.

The long standing USCOE plan to construct jetties in Oregon Inlet "heated" up again during 1991. This issue has been around since the early 1970's and has plagued every refuge manager at Pea Island since then. The Service has vigorously opposed this project since it's authorization due to the unavoidable, massive impacts to Pea Island Refuge. In late October of 1990 (an election year), the Secretary of Interior developed a task force of coastal engineers, oceanographers, fisheries scientists, etc. to study the USCOE plan, meet with USCOE engineers, and attempt to "resolve differences". This group, chaired by

Dr. Robert Dolan, met with USCOE at least monthly throughout 1991. Beginning in September, Raleigh FWE personnel, refuge personnel (primarily Johnson and Noffsinger), task force members, and USCOE staff met biweekly to develop mitigation plans for possible construction scenarios. Two reports were presented to the Secretary from all these meetings: (1) A joint USCOE/Interior report describing the project, project modifications agreed to during the meetings and impacts; and (2) An Interior report describing, in detail, possible impacts, etc. As of this writing, the Secretary's office has not issued a decision as to whether Interior will issue a permit authorizing jetty construction.

In March, ROS Lanier and ROS Windley met with Cape Hatteras Electric Membership Corporation officials to discuss the installation of a proposed series capacitor station. The purpose of the station was to improve the electrical service quality to the homes and businesses on Hatteras Island. A right-of-way permit was issued by the Service after obtaining the necessary plans and proposals. Refuge staff completed an EA, Section 7, and FONSI for this work.

5. Research and Investigation

In July, Robert Klips, a graduate student in biology from Ohio State University, pollinated rose mallows (*Hibiscus moscheutos*) at Pea Island to study self pollination and cross pollination.

In October, Jay Lavine, a student in veterinarian school from N.C. State University, collected ticks from Pea Island to study Lyme Disease.

Throughout the year, Joe Fucella, a graduate student from the University of Virginia, analyzed sand samples and mole crab data collected on Pea Island to determine impacts associated with renourishment projects. Dr. Robert Dolan, University of Virginia, is the principle investigator for this project being conducted under a contract issued by the Service (utilizing USCOE transfer funds).

Dr. Dolan also served as the Service's representative on the groin monitoring team, under contract with NCDOT. This team, including Dr.

Dolan and Dr. John Fisher (N.C. State University Civil Engineering Dept.), established a downdrift, pre-groin erosion rate and, following completion of construction, determines quarterly erosion rates for six miles of Pea Island south of the structure. The NCDOT is required to initiate beach nourishment if, for two quarters: (1) Erosion over any given mile exceeds 250,000 cu.yds. above historic rates, or (2) Erosion over any given 3 miles exceeds 350,000 cu.yds. above historic rates. To date, the erosion rates identified have not been sufficient to trigger nourishment. However, the USCOE deposited 400,000 yds. of material on these beaches in 1991 which probably was the only thing that prevented the trigger criteria from being met.

6. Other

Pea Island once again participated in the Atlantic Flyway Canada Goose Study. Efforts were made to observe and record as many neck collars as possible. A quota has been assigned again for the 91-92 season.

E. ADMINISTRATION

1. Personnel

Since Pea Island NWR is a satellite of AR NWR, it has no official staff. During 1991, ROS Jonathan Windley and RT Angela Elmore were permanently assigned to Pea Island. Other staff members worked on Pea Island on an as needed/as assigned basis. (See Section E.1. of the AR NWR Narrative.)

2. Youth Programs

See Section E.2. of the AR NWR Narrative.

4. Volunteer Programs

During 1991, volunteerism at Pea Island again formed the hub both in spirit and in numbers for the entire Volunteer Program. The Host/Hostess Program began in May and continued through October. During 1991, some Saturdays and Sundays were covered, but not all. The

Visitor Contact Station (VCS) was covered all weekdays during that time period.

The turtle patrol was also a popular program during 1991. Turtle patrollers participated in an 8 hour training program, then conducted the patrol one day each week from mid-May through the end of August. In the middle of the 1990 season, a Turtle Watch Program had been initiated to provide better opportunities for hatchlings to successfully reach the water. During 1991, the Turtle Watch Program was continued. (See Section G.2. for details.) Herb Lewis, a long-standing volunteer, received a NC TPIA Award for his involvement in these programs.

Summer and fall bird walks and summer Children's Wildlife Discovery Programs were conducted by volunteers. Special programs requested by schools and other groups were also conducted by volunteers.



The annual Beach Sweep - 13 miles of beach and 26 miles of road shoulder were cleaned.

9/91 BWS

The September "Big Sweep" occurred again in 1991. This activity continued to be the single event that involves the most volunteers during the year. At the 1991 Pea Island "Big Sweep", 102 volunteers participated and succeeded in cleaning the entire 13 miles of refuge beach. Since the people were ready and willing to work, each group was directed to walk up the beach, then back on NC 12. Consequently, during the "Big Sweep", all the beaches and road shoulders on the refuge were cleaned.

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

7. Technical Assistance

During July, refuge staff and volunteers assisted John Weske of the Smithsonian Institute in brown pelican and tern banding on islands located just off of the refuge. The group banded approximately 842 brown pelicans, 2,529 royal terns, and 81 sandwich terns.

Throughout the year, ROS Windley and RT Elmore participated in a mole crab and sand sampling study to monitor beach nourishment by the USCOE. Samples and field data were submitted to Dr. Robert Dolan and graduate student Joe Fucello from the University of Virginia.

F. HABITAT MANAGEMENT

1. General

Pea Island, a coastal barrier island, consists of seven basic habitat types. The most recent survey revealed 456 acres of ocean beach; 518 acres of barrier dunes; 630 acres of sand ridge, brush, and grassland; 3,024 acres of irregularly flooded salt marshes; 328 acres of salt flats; and 3 brackish water impoundments totaling 940 acres. Beach and dune acreages change from year to year. Hurricanes, combined with intense northeast storms, caused severe erosion along the beach and dunes during 1991.

2. Wetlands

In the spring of 1991, the refuge staff attempted to de-water North Pond. It was hoped that the drawdown, combined with disking, would encourage the production of emergent waterfowl foods and curb the growth of Muskgrass (*Chara sp.*) which had become the dominant submergent. After disking, Japanese millet was seeded along the impoundment fringe and responded favorably, providing excellent food for early migrating birds. Portions of the impoundment that remained dry throughout the summer produced some beneficial emergent plant species, such as water hyssop (*Bacopa sp.*) and spikerush (*Eleocharis sp.*).

Because of substantial amounts of rainfall throughout the summer, the North Pond water control structure gates were kept open. It was hoped that keeping the water low would maximize light penetration through the water present, which was more turbid than usual after drawdown and disking, thus allowing adequate amounts of sunlight to promote the growth of desired submergents such as widgeon grass (*Ruppis maritima*) and sago pondweed (*Potamogeton pectintus*). The impoundment drawdown provided excellent foraging and brooding habitat for most of the shorebirds. Black-necked stilts, yellowlegs, and a variety of plovers and sandpipers could be found throughout the summer and fall. North Pond was also visited by the rare curlew sandpiper.

Water levels in South Pond were kept at target levels throughout the year, mostly by rainfall, thus minimizing operation of South Pond pump. Species such as muskgrass and sago pondweed flourished in the impoundment (See Table 1.). In the fall, South Pond suffered severe overwash of salt water caused by northeast storms coupled with 15 foot waves from Hurricane Grace (See Section F.6.). Salinated levels reached 24. Widgeon grass appeared to survive; sago and chara did not. Water levels in the impoundment were beyond full pool levels, and water control structures were opened to lower water and salinity levels. Despite the intrusion of salt water, waterfowl continued to feed extensively on the submergents produced in South Pond.

New Field impoundment continued to produce valuable submergents during 1991. Water levels in the impoundment also remained at target levels throughout the year, minimizing the operation of the New Field pump. Species such as muskgrass and sago pondweed continued to flourish in the impoundment (See Table 1).

Table 1.
Summary of Vegetative Transect Line Sampling,
Pea Island NWR, 1991

Line	Feet Sampled	Sample Stops	Sampling Points	Percent Vegetated	Percent Bare	Plants per Pt.Sampled
South Pond	1,740 ft.	58	290	98%	2%	1.16
North Pond	1,590 ft.	53	265	63%	37%	0.70
New Field	1,770 ft.	59	295	91%	9%	1.23
Totals	5,100 ft.	170	850	----	----	3.09
Averages	----	----	----	84%	16%	1.03

Combined Food Values (% of Total)

Good-- 20.6 (28.7)
Fair-- 46.6 (29.4)
Non-- 32.7 (41.7)

1990 figures shown in ()

Major Plants (% Occurrence)

South Pond- Chara 75% (0%)
 Sago 20% (37%)
New Field- Patens 36% -dry- (26%)
 Sago 21% -wet- (4%)
 Chara 18% (13%)
North Pond- Chara 47% (61%)
 Sago 14% (0%)

New Field also suffered from severe salt water intrusion from northeast storms during the fall (See Section F.6.). Gates remained open to lower water and salinities to target levels. Despite salt water intrusion, waterfowl used New Field extensively during 1991. Shovelers, pintail, gadwall, and snow geese fed heavily on the emergents found along the edge of the impoundment adjacent to the planted field. Diving ducks fed on the sago pondweed beds in deeper portions.

Wetlands in the Salt Flats are flooded and dewatered by natural ebb and flow of wind/tides and by rainfall/runoff. Vegetation has remained relatively unchanged for many years in this area. The predominant vegetation is glasswort (*Salicornia sp.*), while almost one-half of the area is bare.

The two small mitigation ponds created by NCDOT were monitored for vegetation production and waterfowl use. Widgeon grass production was excellent during 1991. The pond fringes also continued to produce stands of *Bacopa sp.*, *Scirpus sp.*, and *Cyperus sp.* Waterfowl use remained low in and continued to be limited to the days when the adjacent sound waters were rough.

4. Croplands

The farming regime for Pea Island saw few changes from 1990. AR NWR's cooperative farmer, Ernie Wynne, plowed and planted 25 acres of wheat in New Field. The field was initially plowed using vebra shank cultivators in an attempt to avoid over-competition by quick growing native species. In the fall, this wheat was totally lost to overwash from the northeast storm of October 31 (See Section F.6.). New Field was replanted in late November with wheat but failed to produce, probably due to high salinity levels in the soil from the salt water intrusion. Almost half of the field was lost to future agricultural use due to sand, up to 3' deep, deposited by overwash. As a result of the failed crop, use by snow and Canada geese was infrequent.

South Field, a small, 10 acre field located south of the refuge headquarters, was planted with wheat. Growth in South Field was also

marginal. Waterfowl use in South Field decreased during 1991, probably as a result of the marginal growth.

G. WILDLIFE

1. Wildlife Diversity

Pea Island has a natural diversity of habitat types. Habitat management practices, such as prescribed burning, moist soil management, disking, brush removal, and green browse planting, serve to enhance habitat and wildlife diversity. Pea Island provided habitat for a wide variety of mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans during 1991. This diversity was especially evident in birds; more than 315 species of birds have been identified in the area.

2. Endangered and Threatened Species

a. Federally listed and Endangered Species

American Bald Eagle (Endangered): Bald eagles, *Haliaeetus leucocephalus*, often pass over Pea Island. The number of sightings this year was lower than last year's record of six adults and two immature birds. Refuge staff reported one adult and one immature during the mid-winter eagle survey conducted January 3-17. Though the number of sightings was down from last year, it is believed that the overall number of eagles using the refuge is increasing.

Peregrine Falcon (Threatened): The Arctic Peregrine, *Falco peregrinus tundrius*, is the subspecies of peregrines most often seen at Pea Island. NINE peregrine sightings were made by the refuge staff during the year. These included one in February hunting the New Field dike, three in April hunting New Field and South Pond, one in May hunting over Salt Flats, one in June flying by the headquarters site, one in October flying low over New Field dike, and two in November hunting and diving on ducks.

The Carolina Raptor Center applied for a special use permit to count and band peregrines on Pea Island during 1991. They were granted the

permit but never re-constructed their banding station. They did, however, release a rehabilitated peregrine falcon on August 10. The bird had been received by the Raptor Center October 16, 1990 in an ematiated condition with broken left wing and swollen right foot. After initial treatment, it was kept and flown by licensed falconer Bob Pendergrass. By his own admission, he had intentionally tamed the bird in order to be able to "fly" it. A day or so after it's release, the peregrine was spotted in Buxton eating a seagull it had killed. Park rangers were able to walk up to the bird, pick it up, and read the band number. When released, the bird jumped back down to its seagull and proceeded to finish its meal in the midst of a crowd of onlookers. Is this what rehabilitation is all about?

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. This threatened species occurs all along the coast of North Carolina. Refuge staff conducted weekly shorebird counts from May to September and conducted a special survey on January 25 to watch for piping plovers. Employees also participated in the 1991 International Piping Plover Breeding Census during the first week of June. Fifteen piping plovers, including one family group, were seen from the Virginia state line to the south boundry of Pea Island NWR. No piping plovers were sighted on the refuge this year.

Atlantic Loggerhead Sea Turtle (Threatened): The sea turtle season of 1991 on Pea Island NWR continued under the same management plan as last year. Since dune and beach erosion and ocean overwash continued to be major problems, only one small stretch of beach was designated "safe" for relocation purposes. Thus, instead of relocating nests to sites up and down the beach, all 16 nests from Pea Island and 10 from NPS were relocated to the same "safe" area. Beach erosion and high tides were not a problem on the selected area, so hatch rates increased this year. The biggest problem during 1991 was ghost crab predation - these crabs were the number one enemy of hatchlings. 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.

After realizing the scope of the losses, once again the Turtle Watch Program was implemented. It entailed digging a 10" deep by 10" wide trench from each nest to the ocean. Volunteers started watching the nest at day 55. They arrived just before dusk and swept the trench smooth; wire cones were placed around the nest with a "sliding board" emptying into the crab free trench. Waiting was the hardest part, however. But once they began to emerge, it was well worth the wait! Turtles followed flashlights (which volunteers leap frogged) to the end of the trench and arrived safely at the ocean. Monitoring the nests took an intensive effort; however, it played a vital role in greatly increasing the percentage survival of the hatchlings from the nest to the ocean.



Trenching provided the protection these tiny turtles needed to successfully reach the ocean.

8/91 AJE

At the season's end, it appeared that the decision to relocate all the nests was a good one. The decision was made only after input from other biologists and much deliberation. Most, if not all, of the nests would have been lost to salt water inundation from high tides and storm surges. The Turtle Watch also greatly increased the number of hatchlings reaching the ocean. Observations indicated that, on some nights, as many as 75% of hatchlings were lost to ghost crabs prior to trenching. Survival rates to the ocean after trenching approached 100%. If the same narrow beach is evident next year, a similar program will again be implemented.

On September 15, writer Suzanne Tate and artist James Melvin visited Pea Island to observe loggerheads hatching to prepare for their upcoming book on sea turtles. Melvin drew many of his illustrations for TAMMY TURTLE - A Tale of Saving Sea Turtles from photos taken during a Pea Island Turtle Watch, as HELPFUL HUMANS escorted the hatchlings from the nest to the ocean and protected them from hungry ghost crabs.



Tammy Turtle writer Suzanne Tate and illustrator James Melvin autograph books at the Volunteer Awards Banquet. 12/91 BSW

Suzanne Tate adopted one hatchling, named it TAMMY and actually lived out the story she had created. By the end of the year, TAMMY TURTLE (see informational packet in back) was published. The Coastal Wildlife Refuge Society (CWRS) sponsored the educational book to promote environmental awareness, conservation of earth's resources, and protection of endangered species.

b. State Listed Endangered and /or Threatened Species

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

Osprey (Special Concern): The number of adult ospreys observed on Pea Island increased during 1991. Total recorded production was 8 young. Of these, 4 young (2 separate nests) were produced from nests on artificial platforms erected during 1990. At least 3 additional attempts were made without success. Osprey sightings are numerous and on the rise.

Least Tern (Special Concern): For many years, least terns have nested at a specific area of the refuge beach; however, no least terns nested on the eroded beach in 1991. In July, 46 were observed feeding on the North Pond drawdown area. Least terns were documented on 10 weekly shorebird counts. The average number seen was 15 birds (8 above last year's average). Most of the beach sightings were in the area just south of the groin where a shallow pool of water was surrounded by large stretches of flat sand. The dredge spoil islands just north of the refuge in Oregon Inlet have proven to be suitable nesting sites in the past. These islands were encroached upon by campers and boaters who often disturbed the colonies, killing the chicks and destroying the eggs in the recent past. No documented nesting occurred there during 1991.

3. Waterfowl

Overall waterfowl use on Pea Island NWR was up by 10% from the

preceding wintering year and second highest of the past 5 years, but fifth lowest of the past 26 years. Peak waterfowl numbers were similar to the previous year but 13,200 birds below the previous 25-year refuge average waterfowl peak (See Table 2.).

Tundra swan use was down more than half from the previous year's second highest swan use in the past 26 years. This was 37% lower than the past 12 year refuge average but was still 7.4% over the past 25 year average swan use. Their peak was the second lowest of the past 13 years.

Canada goose use increased by 25% over that recorded in 1990, but was still the third lowest of the past 26 years and 81% below the previous 25 year refuge average. The peak of 750 was the lowest recorded on Pea Island in the past 26 years, breaking the previous low peak of 1,050 set in 1987-88.



Green up immediately after burn.....

12/91 JSW



.....*Snow geese reap the benefits.* 12/91 JSW

Greater snow goose use also increased by nearly 25%, but peak use fell to the second lowest of the past 26 years. Use-days were fourth lowest of the past 26 years and 66% lower than the previous 25 year refuge average.

Duck use increased by over 33% (nearly 400,000 use days) from the previous year and was second highest in the past eight years. This was 12% higher than the past 10 years and only 6% below the previous 25 year refuge average. The duck peak of 16,000 was 6,000 over last year and the highest of the past 5 years while 3,200 under the previous 25 year average (See Table 3.).

Coot use dropped nearly two-thirds from the previous year's 10 year high and was 65% lower than the previous 25 year refuge coot use average. The peak of 1,100 was the third lowest of the past 26 years.

Table 2.
Wintering Waterfowl Occurrence,
Pea Island NWR,
1990-1991

Group	Percent	Number of Use-days	% Difference 1989-1990	Peak Number	Peak Period
Tundra Swans	5.7	102,634	-59.5	1,300	Nov. 17-23
Canada Geese	3.3	58,765	+26.0	750	Mar. 14-20
Snow/Blue Geese	9.3	167,160	+23.1	2,450	Nov. 24-30
Ducks	78.1	1,401,799	+36.6	16,000	Oct. 27-Nov.2
Coots	3.6	65,370	-60.7	1,100	Nov. 17-23
All Waterfowl	100.0	1,795,370	+10.0	18,900	Oct. 27-Nov.2

Table 3.
Composition of Wintering Ducks,
Pea Island NWR, 1990-1991

Species	Percent	Number of Use-days	% Difference 1989-1990	Peak Number	Peak Period
GW Teal	23.8	333,186	+157.3	4,450	Dec. 7-13
Pintail	23.0	322,833	+55.5	8,000	Oct.27-Nov.2
Wigeon	20.3	285,089	-12.9	5,700	Oct.27-Nov.2
Gadwall	9.0	126,588	+41.0	1,760	Feb.14-20
Black Duck	7.7	107,499	+26.2	1,160	Feb. 14-20
Shoveler	6.2	86,471	+115.8	1,125	Feb. 14-20
Bufflehead	2.7	38,423	+96.1	1,650	Feb. 14-20
Scaups	1.6	22,183	+35.4	250	Nov. 24-30
Ruddy Duck	1.6	21,903	-25.1	500	Nov. 24-30
Mergansers	1.5	21,245	-16.4	825	Feb. 14-20
Unid.Ducks	1.2	17,479	-4.7	325	Sept.21-27
BW Teal	0.5	7,651	-43.4	400	Sept.14-20
Mallard	0.4	5,607	-7.2	125	Oct.27-Nov.2
Ring-necked Duck	0.3	4,361	-65.6	100	Feb.14-20
Redhead	0.1	1,169	-76.3	50	Nov.24-30
Canvasback	Trace	77	-98.1	5	Nov.24-30
Wood Duck	Trace	35	+100.0	4	Nov.17-23
Scoters	0.0	0	-100.0	0	-----
All Ducks	99	1,401,799	+36.6	16,000	Oct.27-Nov-2

Green-winged teal jumped from third place the preceding year to the most important duck species on the refuge for only the fourth time in the past 26 years. This was their highest use on Pea Island in 12 years. The peak was also the highest in 12 years.

Pintails, usually the most numerous duck on Pea Island, remained in second place with a 122,000 increase in use-days from 1989-90 and a 4,700 increase in peak to their highest refuge peak in the past 5 years.

Wigeon fell from first place last year to third this year with a 13% drop in use despite an increase in peak numbers to their highest refuge peak in 7 years.

Gadwall and black ducks remained in fourth and fifth places respectively as both experienced nominal increases in use and peaks. Gadwalls had their second highest use on the refuge in the past 26 years and their highest peak in the same period breaking the old high of 1,550 set in 1978-79. Black ducks rebounded from the previous year's 24 year low use but were still considerably below their long term average use and peak.

Canvasbacks fell to their lowest use and peak in the past 26 years as combined duck use rose by 36.6% over the previous year since all major use species except wigeon had increased use.

Brood counts were conducted on Pea Island again this year. A total of 9 counts were made, 2 of which were aerial counts. Aerial counts proved to be the only practical way to census sound broods. A total of 217 broods were counted during the surveys (See Table 4.). Again, the majority were black duck broods. Brood numbers were up for New Field. Canada goose counts were up to 16 broods this year compared to three broods in 1990.

Table 4. Brood Count Totals, Pea Island NWR, 1991						
Species	South Pond	New Field	North Pond	Sound	Species Total	Species % of Total
American Black Duck	8	66	60	1	135	62%
Gadwall	10	28	26	1	65	30%
Mallard	1	0	0	0	1	0.5%
Canada Goose	0	2	14	0	16	7.5%
Area Total	19	96	100	2	-----	-----
Area %	9%	44%	46%	1%	-----	-----

4 . Marsh and Waterbirds

Refuge beaches, marshes, and impoundments were heavily utilized by many species of marsh and waterbirds for both nesting and feeding. Although no active management occurred exclusively for these species, an upward trend in use days has been observed in recent years. Habitat management practices for waterfowl and other species have had a positive influence on marsh and water bird use of the refuge. For example, there was evidence of small heron rookeries on several nesting islands in both North and South Ponds during 1991.

This year, marsh and water bird counts were extended into September and October instead of ending at the end of August. Therefore, a shift was seen in the peak month from July to September. Peaks were recorded for a variety of marsh and waterbird species found in the impoundments at Pea Island. These included double-crested cormorant - 257; white ibis - 165; glossy ibis - 29; great blue heron - 20; common egret - 246; snowy egret - 159; cattle egret - 39; tri-colored heron - 152; little blue heron - 62; yellow-crowned night heron - 20; black-crowned night heron - 11; green heron - 4; common moorhen - 4; and pied-billed grebe - 103.

The trend toward an increased use of the refuge may have also been due to the dramatic loss of habitat along the Outer Banks. Increased human disturbance continually forced birds to smaller and smaller areas, many times utilizing habitat that was less than optimal.

Brown pelican numbers have increased steadily over the past few years as the species has expanded northward into coastal North Carolina and Virginia. These birds were once considered a threatened species in this state and were rarely sighted. They have since been de-listed in North Carolina and are quite common. During 1991, they utilized the spoil islands in and around Oregon Inlet extensively. 842 brown pelicans were banded on the Oregon Inlet islands.

5. Shorebirds, Gulls, Terns, and Allied Species

Shorebird surveys were conducted from April until October. The peak population occurred in late May when 12,526 gulls, terns, and shorebirds were recorded. This peak was higher than last year's peak of 9,878 birds. It is possible that increased public use and access to National Park Service beaches north and south of the refuge have made Pea Island's beaches more attractive to the shorebirds. The dredge spoil islands in Oregon Inlet have provided excellent nesting habitat for the birds; however, even these islands have begun to suffer from human encroachment. Terns and other colonial nesting waterbirds continued to nest on the islands in spite of the disturbance. This year, on July 8 and 9, a group of refuge staff, YCCers, and volunteers assisted John Weske in banding 2,529 royal and 81 sandwich terns.



Shorebirds are always a treat for summer visitors.

Staff

The drawdown of North Pond not only encouraged emergent growth, but also attracted an unusual sighting (along with thousands of our regular shorebirds). On July 17, 1991 a curlew sandpiper was observed along the edge of a finger island. On April 23, RT Elmore found an oyster-catcher nest with 3 eggs at the pump house area of South pond. In addition, two nests were found in early May. None of the nests survived to produce young; however, several successful families were viewed on the beach and in North Pond and New Field during spring and early summer. Numerous black necked stilts young were observed in the 3 impoundments and Salt Flats.

6. Raptors

The Carolina Raptor Center (CRC) again requested permission to census and band raptors on Pea Island this year. After careful consideration, an

SUP was issued to them to do so. The CRC never attempted to implement the program for unknown reasons.

7. Other Migratory Birds

The diversity of bird life on Pea Island is so great that it is sometimes referred to as a "birder's paradise". This is especially true when considering the passerines. 115 different species of song birds migrate through Pea Island.

8. Game Mammals

Rabbits are the only game mammal that occur in any numbers on Pea Island. Cottontail and marsh rabbit numbers have declined in recent years.

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

Evidence has been found to indicate an influx of foxes and opossums. The immigration of foxes and the presence of feral house cats may be one of the causes for the decline in rabbit and pheasant populations.

Two deer have been observed on Pea Island. Tracks have been found on several occasions in the Salt Flats area. There have been several reports of deer in Rodanthe, which borders the refuge on the south. In October, a doe was struck and killed by an automobile just south of the Pea Island HQ.

10. Other Resident Wildlife

Ring-necked pheasants were occasionally observed in the salt marsh, brushland, the browse area in New Field, and in the dunes in years past. Sightings of pheasants have dropped drastically in recent years. Occasionally, one or two have been observed feeding in New Field (both male). No females were observed during 1991. Only one pheasant was

documented on the Christmas Bird Count. The exact status of the pheasant population is unknown.

11. Fisheries Resources

This year for the first time in Pea Island history, North Pond was opened to commercial mullet fishing. With the drawdown of North Pond (See Section F.2.), it was anticipated that a fish kill would result from the low dissolved oxygen levels associated with the lower water levels. North Pond contained thousands of striped mullet in the 7-15 pound range. Joseph Farron, from Buxton, was awarded an SUP to harvest the mullet after outbidding other fishermen with a bid of \$600. Mr. Farrow harvested approximately 7,500 pounds of mullet with the largest tipping the scales at just over 15 pounds.

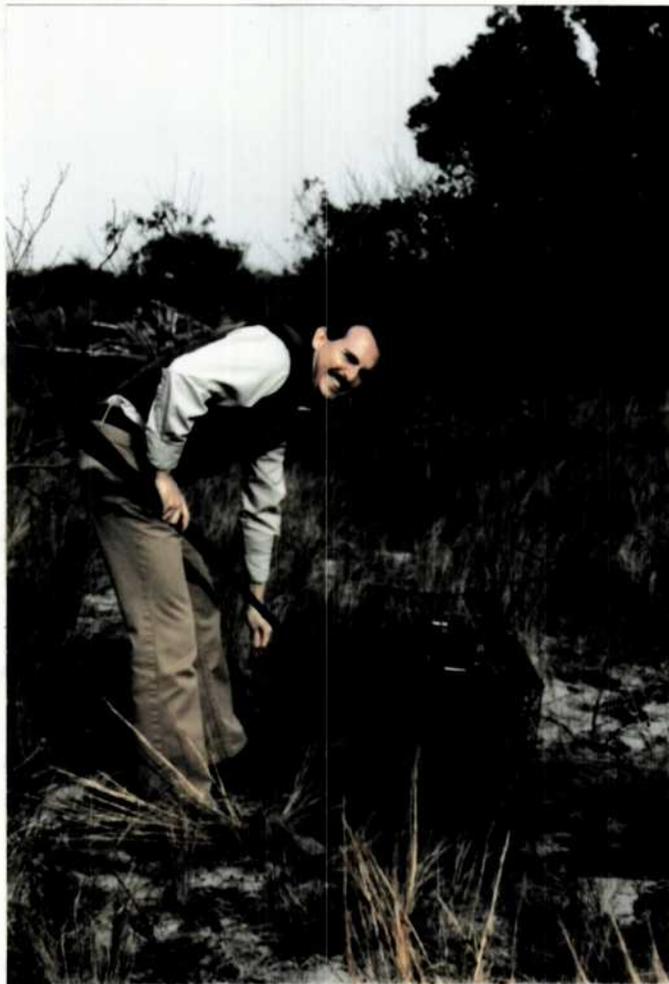
15. Animal Control

Feral cats continued to be a problem with nesting birds, waterfowl, turtles, etc. Cat tracks were found from the beach to the sound. Four cats were trapped during 1991. Three were male, and one was a lactating female. Several cats were killed by cars on the highway (Buffy and Puffy). Observations reported by the public increased dramatically this year. Trapping efforts will continue during 1992.

16. Marking and Banding

After the second consecutive year of no waterfowl banding on Pea Island, the refuge was directed to band and neck collar Canada geese as a part of the Atlantic Flyway Canada Goose Study during the 1990-91 season. A quota of 100 geese was assigned. Rocket net trapping was plagued by frustrations which ranged from technical problems to "tourists" scaring geese off net sites. The first net shot occurred on January 25 and resulted in 14 geese being caught. Two other shots increased the yearly total to 28.

The Gypsy Moth Pheromone Trapping Program continued on Pea Island during 1991. Ten traps were set near heavy traffic areas and checked periodically. The final result was a capture and verification of two



Feral cat patrol - relocation to that habitat in the sky. 9/91 AJE

gypsy moths. The USDA responded that trapping a few moths does not necessarily indicate that there is an infestation. A single catch could be the result of a visitor from an infested area to the north inadvertently transporting an egg mass onto the refuge. Artificial introductions do not always develop into infestations but are reason for increased attention.

H. PUBLIC USE

1. General

Based on the National Park Service vehicle counter at Bodie Island, estimated visitation to Pea Island during 1991 was 1,778,109. The Host/Hostess program continued to provide visitor information and

operate the Coastal Wildlife Refuge Society's sales unit at the Visitor Contact Station from April-October.

YCCers, volunteers, and the fire crew provided manpower for a revamping of the sign program, minor trail maintenance, general clean-up in visitor areas, and routine maintenance of the structures associated with public use.

Because of the groin construction on the north end, the area was closed to public use during the first part of the year. In late spring, the groin was completed, the parking lot reburbed and the area re-opened to the public. This again provided easy access to the catwalks on the Bonner Bridge for fishermen.

The new entrance signs received at the end of 1990 were installed with a western red cedar bases. The locations of the signs were changed due to development on the south boundary and high activity levels around the Bonner Bridge. The new signs are an improvement; however, the need for much larger, sand blasted entrance signs for Pea Island is evident. The staff plans to move in this direction as funding allows.

Since the 1989 vacating of the Oregon Inlet USCG Station, little has happened in relation to its deposition. Misinformation and rumor abounded in local communities about newly found heirs to a portion of the land, political actions to give the property to Dare County, etc. To date, no definite, official information has been received by this office concerning its deposition. Realty (RO) has been advised that the refuge has no interest in any of the structures except the boat ramp and dock facility. The NCWRC has expressed an interest in operating the area as a public boat access area. Moving in this direction will require an MOA placing the responsibility for maintenance, repairs, enforcement, and litter pick-up solely on the NCWRC. Until the final accounting and listing has been accomplished by the USCG, the entire issue remains in limbo.

As in the past, public demand for beach access has increased and the amount of undeveloped beach frontage property locally has decreased.



New entrance sign erected with DOT assistance. 7/91 BWS

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

2. Outdoor Classrooms - Students

The emphasis on non-staff conducted activities continued during 1991. School groups, scouts, etc. were encouraged in the independent use of the refuge for educational activities. Marsh investigation equipment (seines, mud sieves, etc.) was available for loan from the VCS.

Since no registration was required for the use of outdoor classrooms, there was no record of the actual number of such uses that occurred. The N.C. Aquarium utilized Pea Island marshes for a number of conducted salt marsh studies, as well. On the whole, this type of use is increasing on Pea Island.

4. Interpretive Foot Trails

The CWRS continued to assume primary responsibility for maintenance on the North Pond Trail. During 1991, some additional trail grooming was done by the YCC enrollee and the Alligator River fire crew. The North Pond Trail Upgrade and Renovation Project, postponed by the collapse of the Bonner Bridge during 1990, was continued with full force this year. Phase I (expansion of the existing platform and addition of ramps) was begun early in the year and mostly completed (erecting ramp stringers and decking remains). Two of the seven weather- and vandal-proof binocular spotting scopes, purchased for the trail, were installed during Phase I.

A 1991 Challenge Grant (\$9,100) was received to complete Phase IV (multi-level observation tower). The matching goods/services were provided by the CWRS. This phase was completed during 1991. The CWRS contracted with a local builder to do the actual construction; materials were purchased with Challenge Grant money. Two scopes were installed on the top level of the tower. An additional scope (handicapped accessible) is on-hand and will be installed on the first level which has a wheelchair ramp. Four interpretive plaques (fiberglass embedment) were ordered for the tower at year's end.

At present, engineering of the plans for Phases II and III is underway. As soon as these plans are approved, the CWRS will let contracts for the construction of these structures.

Approximately 146,688 visitors (293,380 AH) utilized the interpretive foot trail (self guided). Another 1,063 visitors (1,595 AH) participated in conducted trail walks.



The long-awaited observation tower for North Pond Trail... 8/91 BWS



...took only 3 weeks for construction. 9/91 BWS

6. Interpretive Exhibits/Demonstrations

The two interpretive kiosks and the exhibits displayed in the VCS continued to be popular with refuge visitors. The kiosks provided basic visitor information 24 hours a day, 7 days a week. The VCS (at the headquarters building) provided a few minor exhibits but was open only from 9-4 seasonally.

At Pea Island, there continued to be a need to provide a place for visitor contact and limited interpretive exhibits. Hopefully, a Public Use Review (scheduled for 1992) will address this need.

During 1991, 80,010 visits (19,997 AH) and 6,800 visits (1,700 AH) were spent at the kiosk and VCS, respectively.

7. Other Interpretive Programs

All regularly scheduled (summer and fall) interpretive programs during 1991 were conducted at Pea Island by refuge volunteers.

Four bird walks and three Children's Wildlife Discovery Programs were scheduled each week during June, July, and August. Participation during the 1991 summer was as follows: Bird Walk - 53 programs and 610 participants; Children's Wildlife Discovery - 28 programs and 840 participants. Nine fall bird walks were conducted on Saturdays during October, November, and December for a total of 78 participants. Besides these regularly scheduled programs, approximately 18 special bird walks were conducted into the South Pond or other refuge areas for 270 people.

In addition to the above programs, refuge staff and volunteers conducted 11 special programs ranging from marsh walks to talks about small mammals for 300 people, including school groups, civic organizations, museum groups, and environmental clubs.

9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island during 1991. Bluefish, spot, pompano, croakers, and trout were the major fish caught. A total of 1,139,149 AH (288,539 visits) were spent fishing.

11. Wildlife Observation

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

Due to the location of the road (NC Highway 12) through Pea Island, it is difficult for a traveler to pass without observing wildlife. On most days of the year, the quality of wildlife 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 species. Various species of raptors utilize the dunes, power line poles, and sign posts for resting and hunting. An estimated 1,329,191 visitors spent time in association with vehicular wildlife observation during 1991.

The number of birders requesting special permission to bird in the closed areas of the refuge dropped drastically during 1991, as was expected. During 1990, South Pond was drawn down for management purposes, creating excellent wading and shorebird habitat. Several rare species, including curlew sandpipers, white-winged terns, and others attracted "life listers" from all over the country. During 1991, North Pond, which is already completely open to the public, was drawn down. Having a very different bottom configuration, the North Pond drawdown did not create the quality of excellent wading and shorebird habitat that was produced during the South Pond drawdown. Birders requested access to South Pond a time or two until the word dispersed that there was no real reason to go there. A lesson was learned -

though some folks want access to a closed area just because it's a closed area, most folks are honorable in their intentions and trusting of FWS evaluations (maybe?) of their need for access.

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. Refuge visitors spent approximately 438,682 AH (294,205 visits) participating in wildlife/wildlands observation (on foot) on Pea Island during 1991.

12. Other Wildlife Oriented Recreation

In the past, a few well placed photo-blinds have provided limited numbers of refuge visitors with a unique opportunity to photograph wildlife. Several years ago, Hurricane Gloria destroyed the few blinds available. Since then, several special requests have been sent to RO for funding when opportunities were offered. It is hoped that, eventually, photo/observation blinds may be reconstructed.

It is obvious, however, that the best photographs at Pea Island have resulted from being in the right place at the right time - with a camera in hand. During 1991, approximately 23,127 AH (5,779 visits) were spent with wildlife/wildlands photography.

15. Off-Road Vehicling

The use of ORV's on Pea Island was restricted to North Carolina Highway 12. Illegal ORV traffic continued to plague the refuge; however, probably due to rapid erosion of the beach and repeated ocean overwash of NC 12, 1991 was a year for fewer ORV violations. As long as there is a physical way for vehicles to reach the beach, there will always be a problem with ORV traffic on this refuge.

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. It appears, from weekly surveys conducted at Pea Island and along other beaches in Dare county including Cape Hatteras National Seashore, that increasing human activity on beaches is adversely affecting bird use of this important habitat. The birds are simply avoiding areas of heavy to moderate human use and are concentrating on beaches where public access is limited and the numbers of swimmers, sunbathers, surfers, and fishermen are low.

16. Other Non-Wildlife Oriented Recreation

Because Pea Island is associated with the "beach scene", non-wildlife related recreational activities will always occur on the refuge. Swimming, surfing, and sunbathing are major summer activities. Approximately 1,136,447 AH (332,851 visits) were spent in non-wildlife oriented recreation during 1991.

17. Law Enforcement

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

There is still an obvious need for more LE presence on Pea Island. It is hoped that this need can be met during 1992. Again in 1991, the most common problems were car clouting, illegal parking, vandalism to NPS restrooms, public nudity, littering, and dogs off a leash. Pea Island's beach is a desolate place and has had drugs wash in from vessels whose cargo has been dumped at sea. In these cases, there have been people onshore searching for the drugs as well as Coast Guard and other officials.

There are minor poaching problems at Pea Island; occasionally cars will stop and shots will be fired at waterfowl from the road. Poachers sometimes slip in from Pamlico Sound to quickly shoot as many waterfowl as they can and then speed away. Some illegal hunting may

take place within the refuge boundaries in the Pamlico Sound. These types of violations are difficult to detect, and the violators are difficult to apprehend.

During 1991, the following violations were cited:

Possession of firearm	2
General trespass	2

18. Cooperating Associations

Though the CWRS is officially the Cooperating Association for Alligator River NWR, most of its activity for 1991 was associated with Pea Island.

The Sales Unit at the VCS was upgraded and new inventory added. During 1991, Pea Island patches and pins, duck stamp pins and key chains, insect repellent, wildlife note cards, 7 styles of T-shirts, and 23 titles of wildlife-related books were on the sales list.

The CWRS received permission from Cape Hatteras National Seashore to reprint their new bird list Birds of the Outer Banks and donated 5,000 copies to Pea Island. At year's end, the North Pond Trail Upgrade and Renovation was 75% complete. (See Section H.1. of this report for details of this project and See Section H.18. of AR NWR Narrative for more details about the CWRS.)

I. EQUIPMENT AND FACILITIES

1. New Construction

In mid-March, the NCDOT completed construction of the terminal groin at the north end of Pea Island (See Section D.4.).

On April 23, a new flag pole was installed at Pea Island Headquarters. The flag pole later became the victim of a run away NPS blazer when a ranger was attempting to save a brown pelican.

New entrance signs were erected on Pea Island in early September with help from the NCDOT.

In late summer, a multi-level observation platform was completed on North Pond Wildlife Trail (See Section H.11.).

2. Rehabilitation

In June, deck replacement was completed on an existing observation platform on North Pond Trail by the CWRS.

3. Major Maintenance

After many years of disrepair, eaves, fascia boards, and gutters were replaced on the Pea Island Headquarters, storage buildings, and residence. Roofs and ceilings remain in disrepair.

The interior of the refuge headquarters was repainted in the fall.

Two refuge kiosks were repainted during the summer.

4. Equipment Utilization and Replacement

As a result of the coastal environment at Pea Island and limited storage, equipment continued to be stored at AR NWR and brought over on an as-needed basis.

J. OTHER ITEMS

1. Cooperative Programs

An SUP was issued to the Carolina Raptor Center to census and band raptors at Pea Island (See Section G.6.).

An SUP was issued to the USCOE to permit the discharge of dredged sand along Pea Island beach (See Section D.4.).

An SUP was issued to Robert Klips, a graduate student in biology, from Ohio State University for the purpose of studying self pollination and cross pollination in rose mallow (*Hibiscus mascheutos*) (See Section D.5.).

An SUP was issued to Joseph Farrow to allow the commercial harvest of mullet in North Pond waterfowl impoundment (See Section G.11.).



run with the

RED WOLF

ON ROANOKE ISLAND
NORTH CAROLINA

Projected Costs

Actual Building Construction- <i>projected 12 - 12.5 K sq. ft.</i>	1,500,000
Site Work, Parking Lots/Entrance Road Paving, Landscaping, etc. <i>100 automobile, 12 over-sized</i> <i>vehicles, and 24 staff spaces; bus</i> <i>drop-off area, walkways, etc.</i>	500,000
Utilities Hook-up, Construction Change Orders, Contingencies, etc.	350,000
Layout, Design, Fabrication, and Installation of Interior Exhibits	750,000
Live Red Wolf Display and Mini- Visitor Center- <i>including exhibits</i>	1,000,000
Wildlife Trail- <i>including exterior</i> <i>exhibits</i>	500,000
<i>Total Cost</i>	4,600,000



Run with the Red Wolf...

Make an unparalleled investment.

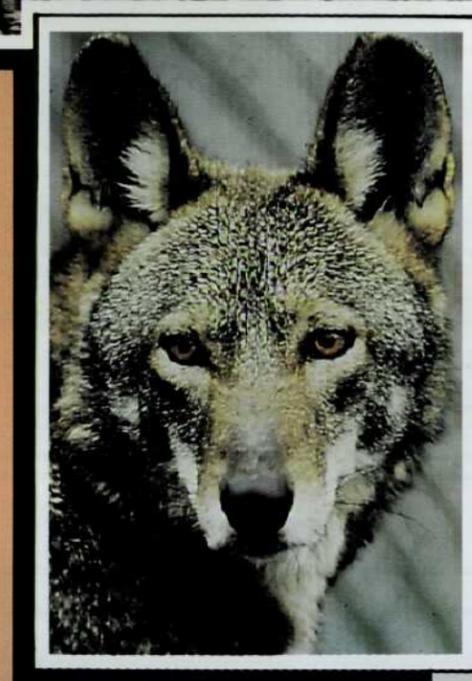
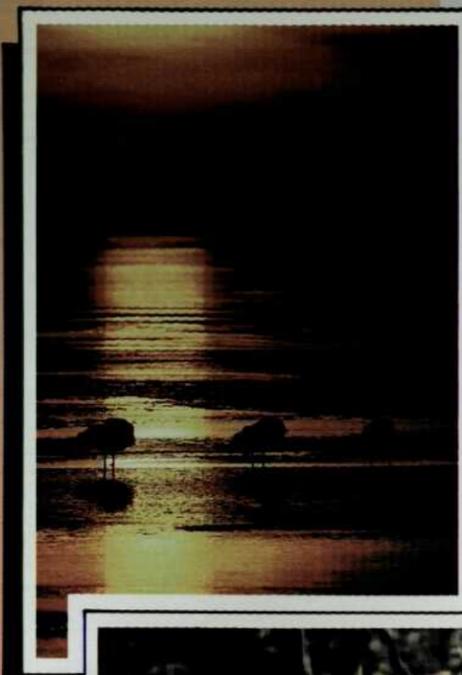
The "Run with the Red Wolf" project proposes a facility superior to others of its type. It will house the administrative functions for both Alligator River and Pea Island National Wildlife Refuges while educating the public about the nature and value of our wildlife resources.

The Visitor Center and associated facilities will allow residents of and visitors to the Outer Banks, citizens of North Carolina, other states, and from abroad to experience the red wolf's race for survival.

The Alligator River National Wildlife Refuge Visitor Center, featuring a live red wolf exhibit, wildlife trail, indoor exhibits on wildlife conservation and management, educational classrooms, and auditorium with on-going programs will provide an opportunity to teach an already interested public about more wide-ranging environmental problems, helping to instill a new conservation ethic. The ultimate goal is to teach the knowledge and understanding needed to make wise decisions and choices concerning our natural resources and their inherent value. Visitors will be able to walk to the very edge of civilization and peek into the life of a wild wolf. How better to understand the plight of a wolf than to meet him, face to face. The red wolf project has often been described as a "flagship for conservation". In fact, red wolves are running for the benefit of many wildlife species and for wildlife conservation, as a whole.

The Alligator River Visitor Center has all the hallmarks of an opportunity that can't be matched. The high visibility and goodwill of the red wolf recovery program offers outstanding public relations value.

In the infrared satellite photo to the right, the remaining forested wetlands of eastern North Carolina show as red. Note the location of Alligator River National Wildlife Refuge. The star shows the location of the site on Roanoke Island that has been purchased by the U.S. Fish and Wildlife Service for the Refuge Visitor Center/Administrative Complex.



Run with the Red Wolf... See the big picture.

Over the past few centuries, wildlife habitat has been destroyed, altered, and/or fragmented to the extent that population levels of many plant and animal species have become critically low. However, the negative impacts of these changes are not limited to specific plants and animals. They effect the basic health and function of our entire world. For natural cycles to work and support dynamic, self-sustaining communities, there must be large undeveloped areas set aside.

Fortunately, Alligator River National Wildlife Refuge has been saved. Over 150,000 acres has been protected from fragmentation and development. The refuge is a rich mosaic of habitats, including salt and freshwater marshes, cranberry bogs, assorted pocosins and swamps, a 5,100 acre waterfowl management area, and even majestic Atlantic white cedar stands.

The refuge's large size, remoteness, and isolation provide the primary needs for many native species, including black bear, which cannot survive on small, isolated tracts of land. Several endangered and threatened species, including the red cockaded woodpecker, the American alligator, and now, the red wolf, call this area home.

Run with the Red Wolf... Team up with an international star.

In the early seventies, the red wolf was not a hero. It was a sad story of little hope. The U.S. Fish and Wildlife Service realized that red wolf numbers had dropped dangerously low. The only hope for survival of the species lay in establishing a captive program to maintain the critically small gene pool until a better plan could be formulated. The "better plan", of course, would attempt to locate a suitable place and re-establish red wolves into the wild.

Red wolves became the focus of national attention in the early to mid-eighties when serious efforts to re-establish the species became publicized. Today, thanks to the efforts of the Fish and Wildlife Service, the support of the American public, and the strength of the species itself, the red wolf once again roams free within its historic range. Through programs implemented, including the re-establishment program here, red wolf numbers have increased to 131 in captivity and 29 in the wild. Alligator River has witnessed eight successful wild-born litters, including one litter born in the wild to a wild-born wolf! Second generation wild-born puppies are a real measure of success for a project such as this. The entire world watches this struggle for survival. Not surprisingly, the story has captivated literally millions. When you team up with this star, you will benefit from the international exposure it receives. America recognizes that the red wolf is running for all of us.

See what we have planned...



Front Elevation

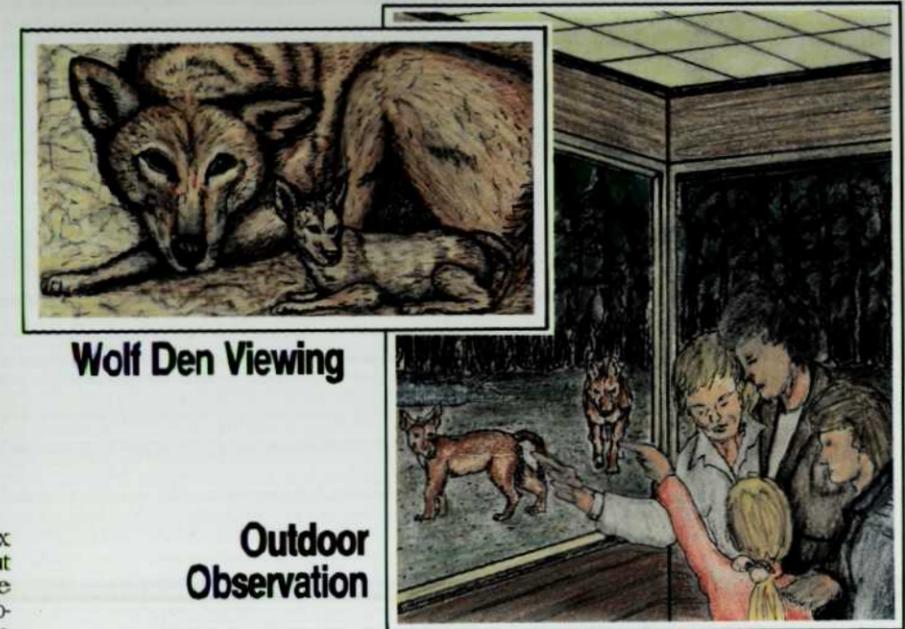
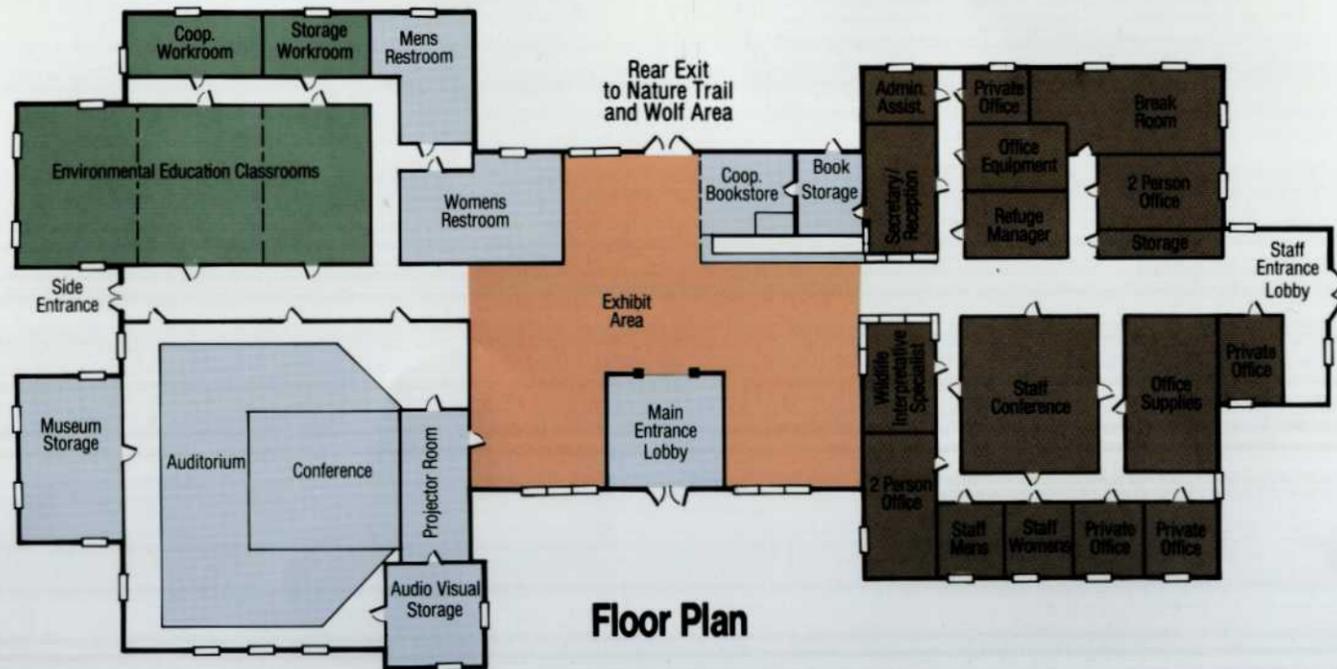
Run with the Red Wolf...

Help teach a conservation ethic.

This modern, hi-tech facility will provide state-of-the-art environmental education classrooms and equipment, as well as life-like and entertaining wildlife interpretive exhibits. Visitors will begin their experience with an unforgettable introduction to wildlife and habitat of the southeast, gradually focusing until the emphasis naturally becomes one of a local significance. They will explore, through audio, video, and other interactive technologies, the intricacies of life in the mysterious pocosin. Fresh and salt water marshes will exhibit their bounty. The cypress swamp with endangered American alligators and other reptiles will mesmerize old and young alike. The intricate maze of lakes, rivers, streams, sloughs, and sounds and the wildlife dependent upon them for survival will come alive for even the casual observer.

Visitors will learn of the endangered red cockaded woodpecker's fight for survival. Management for waterfowl populations will become real, as opposed to a fantasy to be read about. Environmental education classrooms will provide space and programs to reach the people who can have a far reaching impact — the stewards of tomorrow.

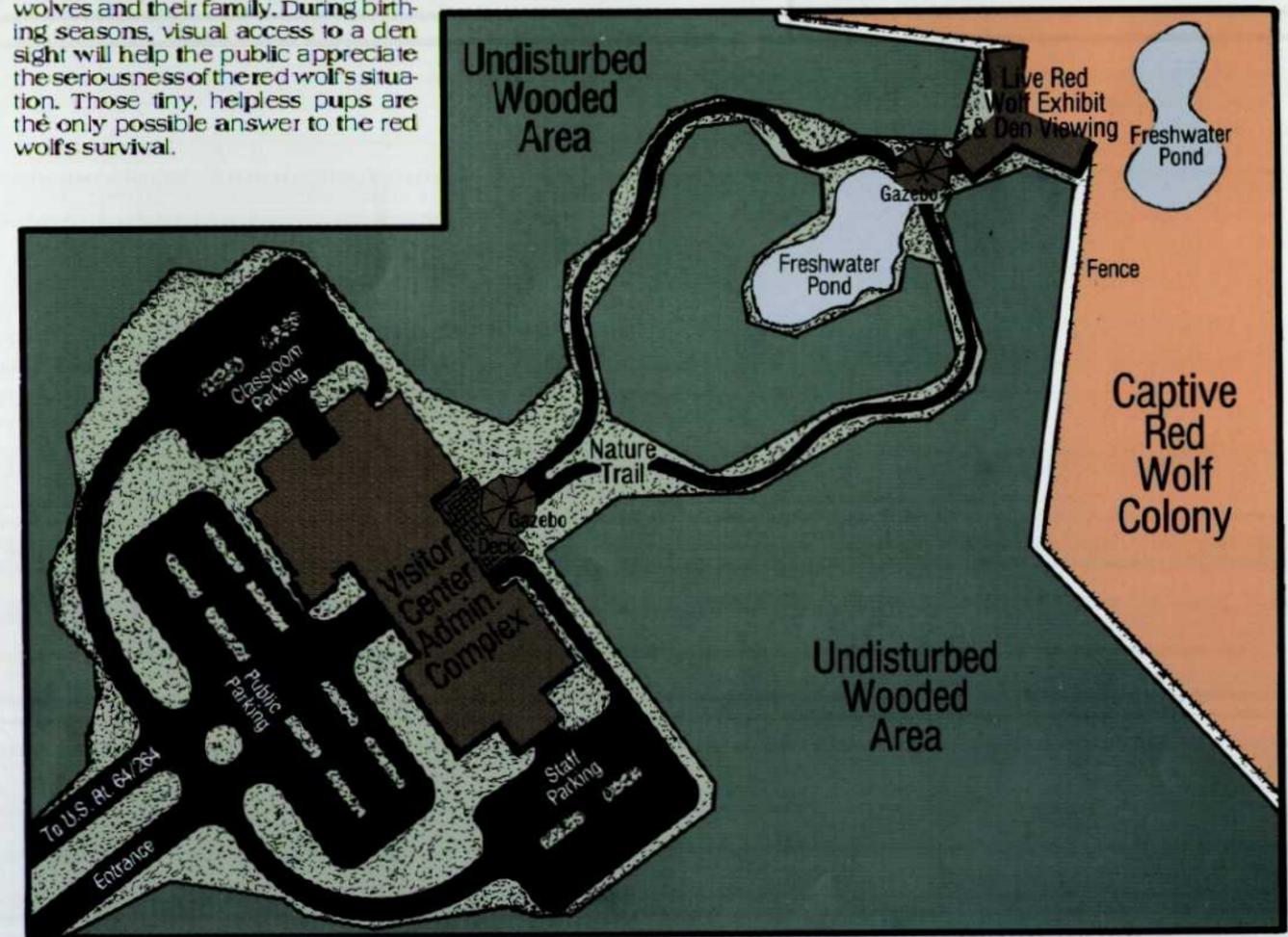
Full scale administrative facilities, on-site, will allow public access to the people who actually implement the planning, management, and maintenance programs on the refuge. A wildlife trail with associated habitats including maritime forest, fresh/brackish water marsh, and others will give visitors a first-hand experience in the outdoors.



Wolf Den Viewing

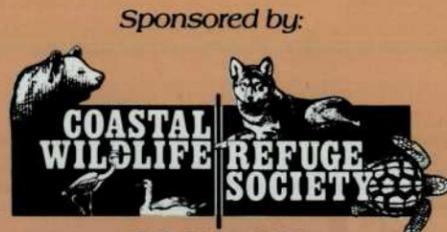
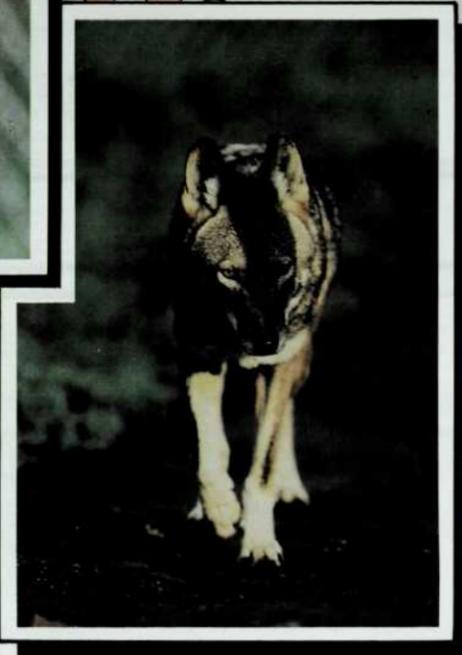
Outdoor Observation

A live red wolf exhibit will climax their visit. In addition to learning about the plight of the red wolf and the success of the re-establishment program, visitors will actually look into the habitat of at least one pair of wolves and their family. During birthing seasons, visual access to a den sight will help the public appreciate the seriousness of the red wolf's situation. Those tiny, helpless pups are the only possible answer to the red wolf's survival.



Site Plan

The Red Wolf is racing for survival...



Sponsored by:

P.O. Box 1808
Manteo, North Carolina 27954



The "Run with the Red Wolf" project is being implemented under the auspices of a "MEMORANDUM OF AN AGREEMENT" between the Coastal Wildlife Refuge Society and the U.S. Fish & Wildlife Service.

run with the

RED WOLF

ON ROANOKE ISLAND
NORTH CAROLINA

Run with the Red Wolf... Lead the way.

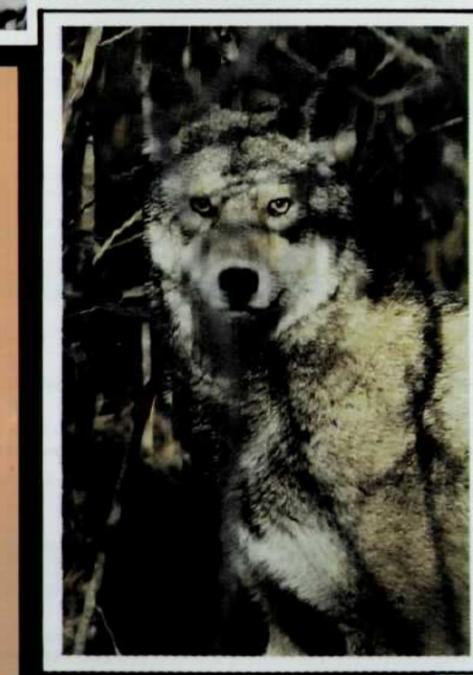
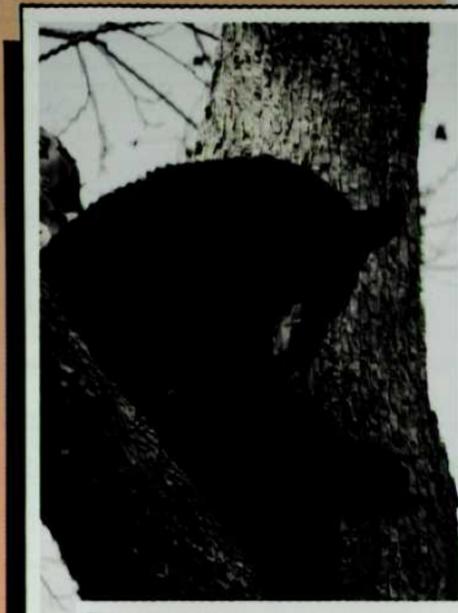
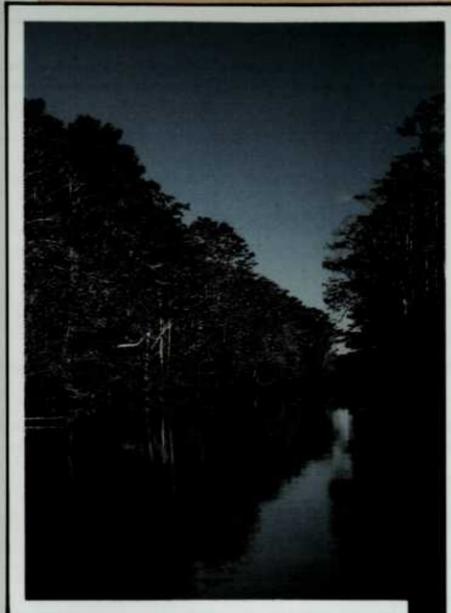
The Coastal Wildlife Refuge Society is offering you an opportunity to participate in a project on the Alligator River National Wildlife Refuge...a race... worthy of your involvement. It's a project that will promote a public facility where people can meet the red wolf face-to-face. You might ask "why?". The answer can be understood more readily if you view the battle for survival of this magnificent animal in light of the world in which we currently live.

As you read this, many scientists are saying that environmental problems have grown so great that the whole fabric of Nature may be coming apart. And, it's clear that man's survival depends upon keeping it together. We need to save what's left. Even better, we need to restore whatever we can. The need is to set the stage for improved environmental health through proper stewardship, commitment, and education of future generations. We're in a race that simply cannot be lost.

But we can't win this race without good leaders. Many businesses, like yours, are coming to the rescue. They're taking the lead. They're providing the strength, the courage, and the support needed to start fixing things...They're making the effort to put a stop to the downward spiral of environmental quality.

Far from the halls of corporate America, a wolf is also leading. Deep in the woods of Alligator River National Wildlife Refuge, located in eastern North Carolina, the red wolf is living in the wild after an absence of over a hundred years. Saved from extinction only through captive breeding programs in the nation's zoos, red wolves are making a comeback. But, it's not easy; it's a race for survival. There are still many problems to solve and many wolves to be born and survive in the wild before their continued existence is assured.

The red wolf project at Alligator River Refuge and the associated educational efforts can help pave the way for other restoration projects, not just for the wolf, but for other species on the brink of extinction. Man played a major role in pushing the red wolf to the brink. Misunderstanding and fear resulted in indiscriminate killing; habitat loss due to land use changes virtually sealed its doom. Management techniques perfected through the current re-establishment program, coupled with appropriate facilities to help change public attitudes and beliefs, certainly will provide the basic tools for other recovery projects, both with red wolves and with other species in critical condition. In a sense, the red wolf runs for all species, including man himself. You are invited to join this exciting race; the starting line is a 35 acre parcel of land on the north end of Roanoke Island, near Manteo, North Carolina. The area known for the first English settlement and the first flight will also become the first to offer a second chance for red wolves. It's really a second chance for all of us.



Run with the Red Wolf... Show your good stewardship.

You have an opportunity to set the pace for others. You can show others what stewardship is all about. "Run with the Red Wolf" provides corporate sponsors the opportunity to set the stage for private support of the wise use and management of these public resources. For generations, each of us has feasted from the earth's banquet table. This is a unique opportunity to help us teach the stewards of tomorrow how to nurture and care for the resources that have supported us for so long. And, you can certainly claim the credit you richly deserve. Others claim they care; you show you care...

Run with the Red Wolf... Seize the moment: step out and lead.

Yes, the red wolf is running...It was alone for many years. But, the race for survival is like any other race: the more members on the team, the shorter the distance for each runner. Join the team... The red wolf is approaching you now. It needs your help. You'll be making the decision to keep the red wolf running strong.

As people learn, through your support, more will join in the effort for wildlife conservation. More will be running with the red wolf. More will be carrying the banner for conservation of our wildlife resources. And that's what it will take to make it work.

The Red Wolf Returns

When the wind told Chief Seattle that the last red wolf died it was correct, but only to a degree. The last red wolves in the wild did die, but fortunately a few red wolves did survive at a **captive breeding facility** operated by the **U.S. Fish and Wildlife Service**.

Cooper's encounter with the spirit of Chief Seattle made a big impression on him, and he decided to become a wildlife biologist in order to help animals like the red wolf. In college, he learned that red wolves were once common across North Carolina and the rest of the southeastern United States. However, since the days that settlers came over to America, man waged a war to **exterminate** the red wolf. To the settlers, wolves and other **predators** symbolized evil and posed a threat to their livestock and poultry.

By the 1930s, the last wolf disappeared from North Carolina, and by the 1960s, all of the remaining red wolves left in the world were living in a little patch of swampland in Texas and Louisiana. Because the red wolves were facing extinction, the Fish and Wildlife Service captured the remaining red wolves and began a captive breeding program. The reason for the program was to

produce enough wolves so that someday they could somewhere be released back into the wild.

Fortunately, that someday is today, and that somewhere is the Alligator River National Wildlife Refuge in Dare County, North Carolina. In 1986, the Fish and Wildlife Service began a program to restore the red wolf to its rightful place in the wild. It's taken a long time, but people are now realizing that wolves and other predators serve a real need in an **ecosystem**. Without natural predators, prey animals such as deer can become **overpopulated**. When this happens, animals often starve to death or get diseases. They can also become a nuisance to man, as they raid farms for food. Despite what you might have heard about wolves attacking people, stories like "Little Red Riding Hood" are myths and not reality. Red wolves do not attack people.

By the time Cooper got his biology degree from college, there were enough red wolves in captivity (about 85) for the Fish and Wildlife Service to consider releasing some. Cooper's hard work paid off and they hired him to work on this program. The decision to release red wolves was made only after careful thought. The Fish and Wildlife Service wasn't sure if it was possible to restore a

population of red wolves since such a project had never been carried out in the history of the United States. The Fish and Wildlife Service placed a great deal of faith in Cooper when they hired him to work on this historic project. Cooper always wondered if Chief Seattle somehow helped him get the job.

The evening of May 21, 1988 was cold and Cooper's hands grew numb as he drove the jeep down an old logging road on the Alligator River National Wildlife Refuge. The wolves had been on the refuge for about eight months. Cooper stopped the jeep when he was near the middle of female 196's and male 211's **home range**. Each wolf had an assigned number so that Cooper could keep track of the different animals. Cooper reached to the back seat and grabbed his **radio tracking** equipment. Both wolves wore collars that contained transmitters that produced electronic signals that allowed Cooper to locate 211 and 196.

Cooper turned his equipment on and walked down the road. Immediately he began to hear the "beep, beep, beep" made by the wolves' transmitters. Over the last six months of radio tracking, Cooper had learned much about the wolves' behavior. Cooper was excited because over the past couple of months he

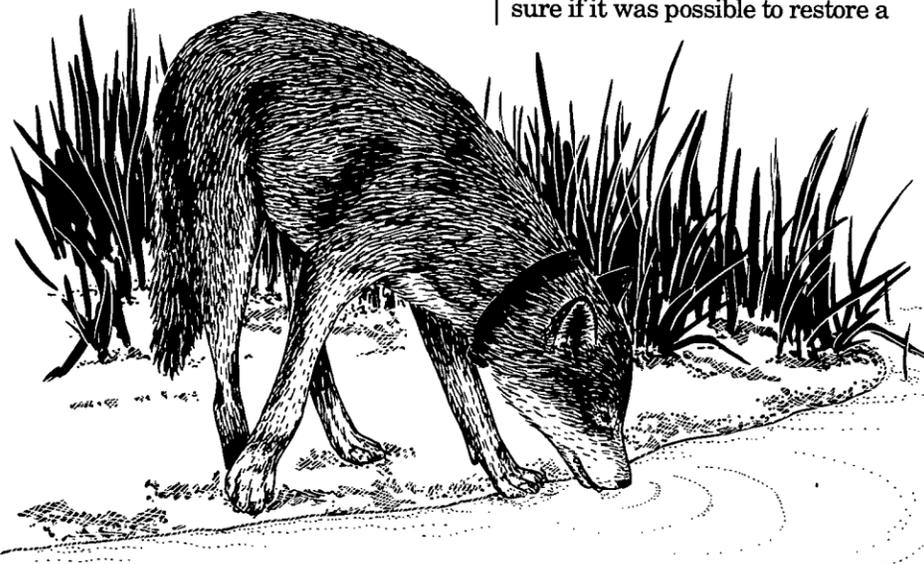
had noticed **changes** in female 196's behavior. When 211 went hunting, 196 stayed by herself, and Cooper had noticed she was starting to look fatter. Cooper wasn't sure what these changes meant but he hoped 196 was pregnant.

As the signals kept getting stronger, it soon became apparent that the wolves were traveling toward him. As they approached, Cooper sat very still because he knew the wolves would leave the area if they knew he was there. Suddenly 211 and 196 popped into sight. He watched as they trotted toward him, stopping every few feet to sniff the side of the road. Then, to his surprise, Cooper saw an animal much smaller than the other three. A puppy!

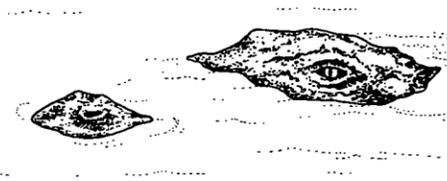
Suddenly the wolves lifted their noses in the air and sniffed. They smelled Cooper. In a flash, all three disappeared into the woods.

Cooper sat still and marvelled at what he had seen. He knew that the puppy was evidence that it was possible to save the red wolf from extinction. He also knew that if red wolves could be saved from extinction, many other endangered species could

be saved as well. As he walked back to the jeep, the memory of Chief Seattle flashed in his mind. Cooper drew in a deep breath of crisp air as he thought about the wise old Indian. Suddenly the stars were a little brighter and the creek beside the road was louder. Cooper knew why these things happened and he knew Chief Seattle would be proud.



Red wolves face many dangers in the wild. Some have died of disease or have been hit accidentally by cars. On South Carolina's Bulls Island, two red wolves have been killed by alligators. Despite these deaths, the fact that red wolves are successfully breeding and raising young in the wild proves that red wolf restoration can work.



The red wolf restoration project at the Alligator River National Wildlife Refuge is very important because biologists are learning a lot from this effort that can later be used to restore other endangered animals to the wild. In addition to the wolves at Alligator River, red wolves are also roaming several coastal islands in South Carolina, Florida and Mississippi. Although these islands aren't large enough to support large red wolf populations, they are used to get the wolves accustomed to living in the wild. Because they are on islands, the wolves can learn to hunt and raise young away from human interference. Once they are familiar with living in the wild, they can be transferred to their new home at the larger Alligator River National Wildlife Refuge in North Carolina.

Size Comparison

Gray (Timber) Wolf	
Red Wolf	
Coyote	
Red Fox	

3 Foot Scale

Resources and References

Fact or Fiction?

While Cooper and the spirit of Chief Seattle are fictional characters, everything else in the story is true. It's sad, but the red wolf and many other animals are almost extinct. Fortunately, they can be saved, but they need your help. Learn more about the red wolf and its problems and support work to save endangered animals in the wild.

Definitions

Captive Breeding Facility — a center where animals are held so that they can breed and reproduce to increase their numbers.

U.S. Fish and Wildlife Service — the federal agency responsible for protecting and helping endangered species. They also manage populations of migratory birds like ducks and geese.

Predators — animals that kill and eat other animals.

Prey — animals that are killed and eaten by predators.

Exterminate — to kill or eliminate all of something.

Extinction — the process where a species ceases to exist.

Ecosystem — a community of organisms interacting with their environment.

Overpopulated — this occurs when there are too many animals for the amount of food and cover available in an ecosystem.

Home Range — an area where wild animals spend most of their time.

Radio Tracking — the process of using signals produced by radio transmitters to locate an animal.

References

Wildlife in North Carolina magazine — "Born in the Wild" by Mike Phillips, September 1989. (Account of U.S. Fish and Wildlife Service's red wolf management techniques in North Carolina.)

Wildlife in North Carolina magazine — "Return of the Red Wolf" by Vic Venters, September 1989. (General account of red wolf reintroduction to North Carolina.)

Wolves of the World by Fred Harrington and Paul Paquet. Noyes Press, 1982.

The Kingdom of Wolves by Barry Scott. Putnam's Sons, 1979 (For elementary students).

Wolves and Humans—Competition and Conflict, Teachers Material Packet, The Science Museum of Minnesota, 30 E. 10th Street, St. Paul, MN 55101 (\$12).

The Wolf by David Mech. Natural History Press, 1970.

Of Wolves And Men by Barry Lopez. Scribners, 1979.

Zoobooks: Wolves, Wildlife Education Ltd.

Wolf Recovery in Northern Rocky Mountains, National Wildlife Federation, 240 N. Higgins, Missoula MT 59802 (\$4.00)

For a more comprehensive list of wolf resource and reference materials, write us and we'll send you a free copy.

Activities

The following activities are from the Aquatic WILD and Project WILD activity guides.

— *And The Wolf Wore Shoes* teaches students to distinguish between animals based on "real life" and those based on "make believe."

— *Saturday Morning Wildlife Watch* teaches students to discriminate between realistic and unrealistic portrayals of animals.

— *Quick Frozen Critters* examines predator/prey relationships and animal adaptations.

— *Muskox Maneuvers* examines adaptations in predator/prey relationships.

— *Here Today, Gone Tomorrow* examines the cause for extinction of animals.

Education Summit

The National Wildlife Federation will be conducting an "Educator's Summit" at Black Mountain, N.C. from July 7 to 13 focusing on advanced training in environmental education for teachers and youth educators. For more information, contact Steve Law, NWF Conservation Summit, 8925 Leesburg Pike, Vienna, VA 22184 or call (703) 790-4534.

Predator Workshop

If you have already attended a Project WILD workshop and would like to learn more, you may be interested in an advanced WILD workshop we will be offering late this summer. It will focus on predators and will feature the red wolf and other predators found in North Carolina. Write us for an application and for specific dates and locations. However, you must have attended both the original and aquatic Project WILD workshops in order to attend the advanced workshops.

WILD Australia

If you're an educator interested in learning about Project WILD in beautiful Australia, and earning graduate education credit for it as well, Outback Adventures is offering a 17-day study safari to Queensland, Australia. For more information, contact Outback Adventures Inc., 15706 SE 45th St., Bellevue, WA 98006.

Project WILD is...

Your responses to our N.C. WILD survey have been very positive. Thanks for your help. In a few cases, however, we noticed a little confusion about North Carolina WILD and *North Carolina WILD Notebook*. North Carolina WILD is the name of our environmental education program. Educators may attend workshops where they receive activity guides for use in all subject areas, K through 12 grades. Activities from these guide books are often referred to in *North Carolina WILD Notebook*, our educational newsletter. For more information about Project WILD, write the N.C. Wildlife Resources Commission at the address below.

North Carolina WILD Notebook

North Carolina WILD Notebook is produced eight times each year and is designed to help educate young people about the need to conserve our natural resources. Free subscriptions are available to educators/teachers by writing the Division of Conservation Education, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188

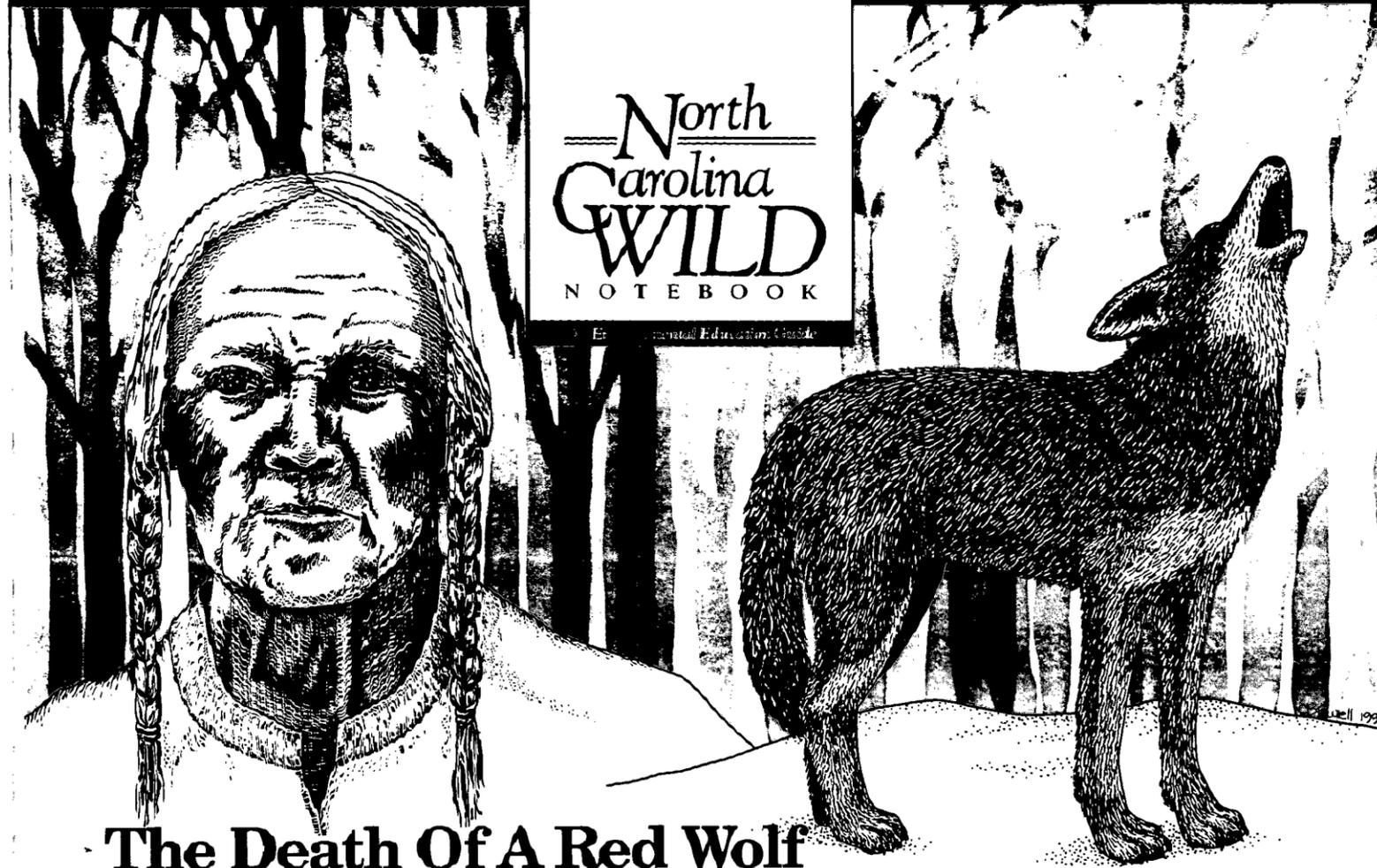
Are You Moving?

If you are moving or no longer wish to receive North Carolina WILD Notebook, please let us know. Send an old address label and your new address label to *North Carolina WILD Notebook*, N.C. Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188.

Contributors

Articles in this issue of *North Carolina WILD Notebook* were written by Mike Phillips, the U.S. Fish and Wildlife Service biologist working with the red wolf restoration project at North Carolina's Alligator River National Wildlife Refuge. This issue was edited by Vic Venters and designed by Nancy Gorgas and Donna Kanna of the Division of Conservation Education. Illustrations were provided by Consie Powell.

14,200 copies of this public document were printed at a cost of \$1,263 or \$.089 per copy.



The Death Of A Red Wolf

Although Cooper was a strong hiker he had suddenly grown very tired. As he rested on a large boulder, the stars that had shone brightly in the night sky suddenly grew dim and the creek that had flowed loudly grew quiet. As Cooper wondered about these strange happenings he heard something on the trail. He fixed his attention on the direction of the sound and began to worry that a bear might be approaching, for he had seen fresh tracks on the trail. As he strained to get a better view, his foot slipped and he fell. When he opened his eyes he saw an old man with copper-colored skin, dark brown eyes, and long silver hair standing over him. As the man helped him to his feet, Cooper noticed that he was dressed in moccasins and deerskins. The old man spoke first: "I am Chief Seattle of the Suquamish. Are you all right, Cooper?"

"How did you know my name?"

Cooper responded.

"The bear told me," said the chief.

The chief helped Cooper to the

boulder and they both sat down. Cooper looked around and noticed that the night had grown even darker and the creek quieter. Confused, he asked the chief, "Why are the stars so dim and the creek so quiet?" The chief responded in a tired voice, "The stars are dim because they draw light from the wolf. The creek runs quiet because it draws water from the wolf. And today the wolf died."

The chief drew a deep breath and continued, "Moments ago, the wind told me that the last wild red wolf was killed. My tribe believes that all things are connected. When the last wild wolf died, so did a part of each star, each creek, and each person, even a part of you and me. That is why the night is dark and quiet, and why we are a little weaker."

"Many years ago when I was a boy, all stars were bright and all creeks flowed loudly with rushing water. But since then, many animals have become extinct. The passenger pigeon, the Carolina parakeet, and the eastern cougar are all gone. With

the passing of each, the stars grew dimmer, the creeks ran quieter and I grew weaker."

The chief looked at the ground. Although the night was dark and strands of his silver hair partly hid his face, Cooper saw a tear run down his cheek. The chief continued.

"If men don't change their ways, soon all stars will disappear, all creeks will run dry and people will die from a great loneliness of spirit. For whatever happens to the beasts, soon happens to us. All things on this planet are connected."

"Don't worry about finding your way home, the spirit of the wolf will guide you," the chief continued. "But before you leave, I must warn you that there is very little time left to correct the mistakes of the past. You must work to restore animals like the wolf or the world will die."

This frightened Cooper and he turned his eyes to the ground. A cool breeze rustled through the trees and prompted Cooper to look back to the chief. But he was gone.

(duplicate for classroom use)

101 Things You Can Do To Help Save Animals and Animal Habitats — cont.

- Don't pick flowers or collect wild creatures for pets...leave animals and plants where you find them.
- Don't buy souvenirs made from wild animals.
- Watch out for wildlife. Give consideration to all living things you see crossing the road.

In your car...

- Drive sensibly. Don't waste gas.
- Keep your car tuned up.
- Carpool.
- Use public transit.
- Ride your bike or walk instead of driving.
- Buy a more gas efficient car.
- Recycle your engine oil.
- Keep your tires properly inflated to save gas.
- Recycle your old tires.
- Keep your wheels in alignment to save your tires.
- Don't litter.

At your school or business...

- Start a recycling program for office and computer paper, cardboard, etc.
- Use scrap paper for informal notes to yourself and others.
- Print things on recycled paper.
- Print or copy on both sides of the paper.
- Use smaller paper for smaller memos.
- Re-use manila envelopes and file folders.
- Hide the throw-away cups and train people to bring their mugs to meetings.
- Route things around the office or post non-urgent communications rather than making multiple copies.
- Use the stairs instead of the elevator.
- Office building landscape doesn't have to be sterile lawns and bedding plants. Plant trees and shrubs the birds will like.
- Put a bird feeder outside your office window. It's a great conversation piece.

When you're shopping...

- Don't buy food or household products in plastic or styrofoam containers if there's an alternative (milk and egg cartons, vegetable oils, butter tubs, etc.) They can't be recycled and they don't break down in the environment.
- Don't buy "disposable" anything. Paper plates and towels, styrofoam cups, etc. are extravagant wastes of the world's resources.
- If you must buy disposables, buy paper products rather than plastics or plastic foam. The manufacture of plastic foam depletes the ozone layer.

- Buy durable products and keep them a little longer. Cheap furniture, clothes and appliances often have short life spans.
- Check the energy rating on major appliances you buy.
- Read labels and buy the least toxic product available for cleaning, pest control and other jobs.
- Put your parcels into one big sack instead of collecting several small ones.
- Don't buy things with excess packaging (individually wrapped cheese slices, apples on a paper tray wrapped with cellophane, etc.)
- Buy in bulk: reduce pollution that comes from the manufacture and disposal of many small packages.
- Ask questions. Don't buy products that are hazardous to the environment or that were manufactured at the expense of important animal habitat.
- Buy locally grown food and locally made products when possible.
- Don't buy products that come from endangered animals.
- Don't keep "exotic pets."

Personal efforts...

- Take advantage of the Nongame Wildlife checkoff on your North Carolina tax form.
- Join a conservation organization.
- Volunteer your time to conservation projects.
- Give money to worthy conservation/environmental causes.
- Check your lifestyle. Think about the effects of your daily actions on the environment.
- Vote for candidates that share your sentiments.
- Read books and articles on wildlife and environmental issues.
- Watch nature programs on TV.
- Subscribe to conservation or environmental publications. Purchase them as gifts to others.

Spread the word...

- Convert by example. Encourage other people to save resources too.
- Tease, cajole, or persuade your family, friends and neighbors to recycle, be energy conscious, etc.
- Write your legislators when you have an opinion about pending legislation on environmental, land use and other issues.
- Teach children to respect nature and the environment. Take them on a hike, help them plant a tree or build a bird house, buy them a nature book or subscription to a wildlife magazine.

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101 Things You Can Do To Help Save Animals and Animal Habitats

None of us set out to place wild animals on a fast track headed for extinction. In fact, we would save them if we could. Wouldn't we?

We can. At least we can try by reducing our demand for and waste of electricity, petroleum products, metals, land, paper and wood and by becoming aware that when we discard toxic, non-biodegradable wastes, we're only creating pollution that comes back to haunt people and animals alike.

You can help while there's still time to make a difference. Here's a list of things we can do. Ask your students how many of the things listed they can do. Divide your class into teams. See which team can think of the most responsible actions not listed here.

In your home...

- Recycle everything you can: newspapers, cans, glass, aluminum foil and pans, motor oil, scrap metal, etc.
- Investigate local recycling centers that take items like scrap paper, plastics, appliances, etc.
- Save your kitchen scraps for the compost pile.
- Use phosphate-free laundry and dish soaps.
- Avoid the use of household pesticides. Flyswatters work very well.
- Clean your windows with vinegar and water instead of chemical products.
- Use cold water in the washer unless it's necessary to use warm or hot.
- Use washable rags, not paper towels, for cleaning up spills and doing other household chores.
- Use crumpled-up newspapers to wash windows.
- Use cloth diapers. The plastic in disposable diapers doesn't break down.
- Use cloth, instead of paper, napkins.
- Don't put hazardous substances down your drain or in your trash (paint thinner, furniture polish, etc.) Dispose of them properly.
- Don't use electrical appliances for things you can easily do by hand.
- Re-use brown paper bags to line your trash can instead of plastic liners. Re-use bread bags, butter tubs, etc.
- Use re-usable containers to store foods instead of plastic wraps and foil.
- Write to companies that send unwanted junk mail. Ask them to take you off their list.
- Save your coat hangers and return them to the cleaners.
- Take unwanted, re-usable items to a charitable organization or thrift shop.
- Don't leave water running needlessly.
- Install a water saving shower head.
- Set your water heater at 130 degrees.
- Insulate your water heater. Contact your utility company to see what they have available.

- Turn the heat down and wear a sweater.
- Lower your house temperature by one degree per hour for every hour you'll be away or asleep.
- Turn the lights off when you're out of the room. Do the same with the TV.
- Get a free energy audit from your utility company.
- Burn only seasoned wood in your woodstove or fireplace.
- Mend and repair, rather than discard and replace.

In your yard...

- Start a compost pile.
- Plant shrubs and trees in your backyard that provide food and shelter for birds and other creatures.
- Feed the birds.
- Put up bird houses and baths.
- Pull weeds instead of using herbicides.
- Use natural insect controls as alternatives to pesticides.
- Landscape with plants that aren't prone to insect and fungus problems.
- Ignore caterpillars and most native leaf chewing insects. Let birds and insect predators take care of them.
- Use beer traps for slugs instead of baiting with poisons.
- Start a vegetable garden.
- Use organic fertilizers. Manure helps condition your soil and fertilizes at the same time.
- If you use pesticides, herbicides or fungicides, don't throw leftovers in the trash, down your drain or into a storm sewer. Dispose of them properly.
- Compost your leaves and yard debris or take them to a yard debris recycler. Burning them creates air pollution and putting them out with the trash is a waste of landfill space.
- Use mulch to conserve water in your garden.
- Plant things that don't require so much water.
- Take extra plastic and rubber pots back to the nursery.
- Large expanses of lawn are not good habitat for other creatures, plus they usually must be maintained with chemicals and extensive watering. Dig up some of your grass and plant native shrubs or trees instead.
- Plant short, dense shrubs close to your home's foundation to help insulate against cold.

On vacation...

- Turn the heat down and turn off the water heater before you go.
- Carry re-usable cups, dishes and flatware.
- Make sure your plastic trash doesn't end up in the ocean.

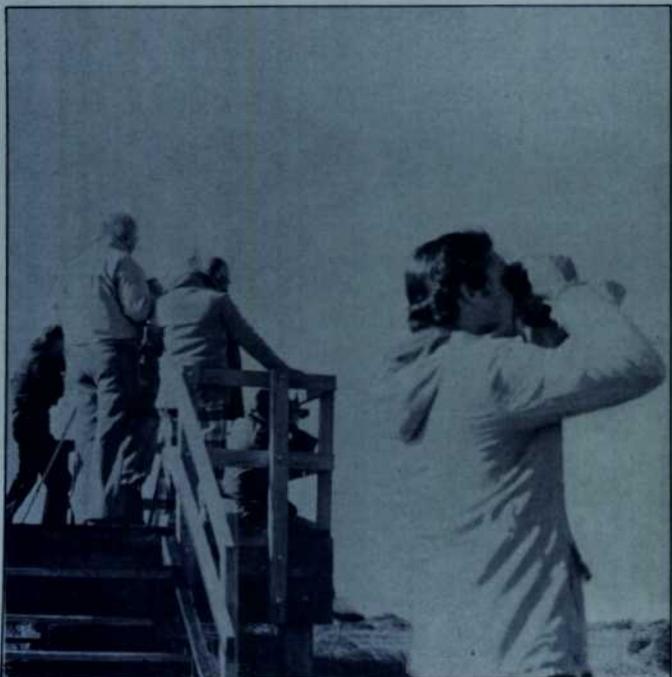
Pea Island National Wildlife Refuge is administered by the Fish and Wildlife Service on Cape Hatteras National Seashore. Pea Island is composed of 5,915 acres of coastal barrier island extending over 12 miles along North Carolina's "Outer Banks" from Oregon Inlet southward to the village of Rodanthe.

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

WILDLIFE

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

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



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

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

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

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

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

MANAGEMENT

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

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

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

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

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

RECREATIONAL OPPORTUNITIES

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

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

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

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

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

REGULATIONS

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

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

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

Fishing is allowed on the beach, not in the ponds.

Camping is prohibited. Check NPS camping areas on Bodie Island.

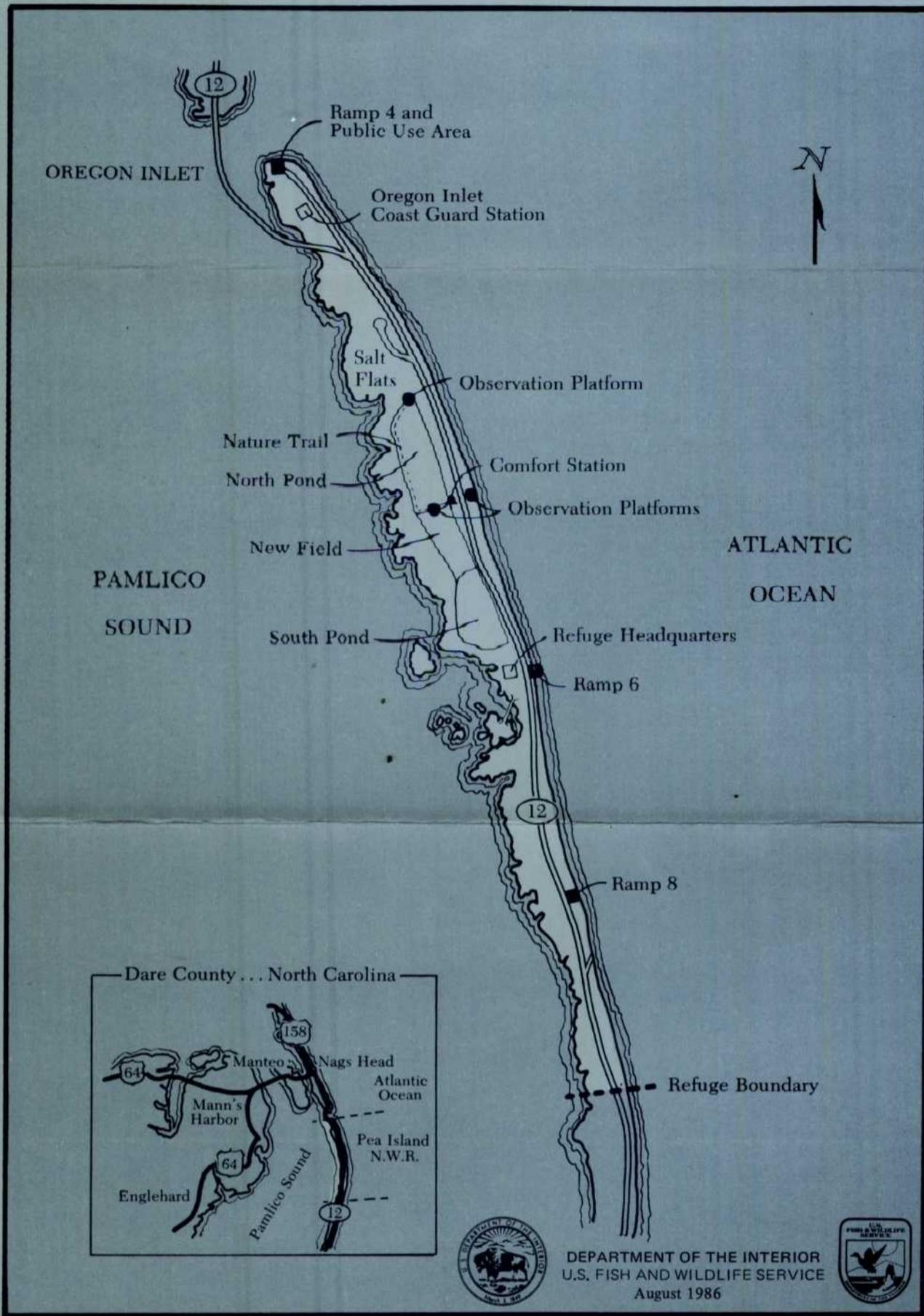
Fires are prohibited.

Pets on a leash are allowed on the beach. Pets are not allowed around the ponds.

Hunting is prohibited.

Weapons are prohibited.

Vehicles are allowed only in parking areas and on Highway 12.



Pea Island National Wildlife Refuge



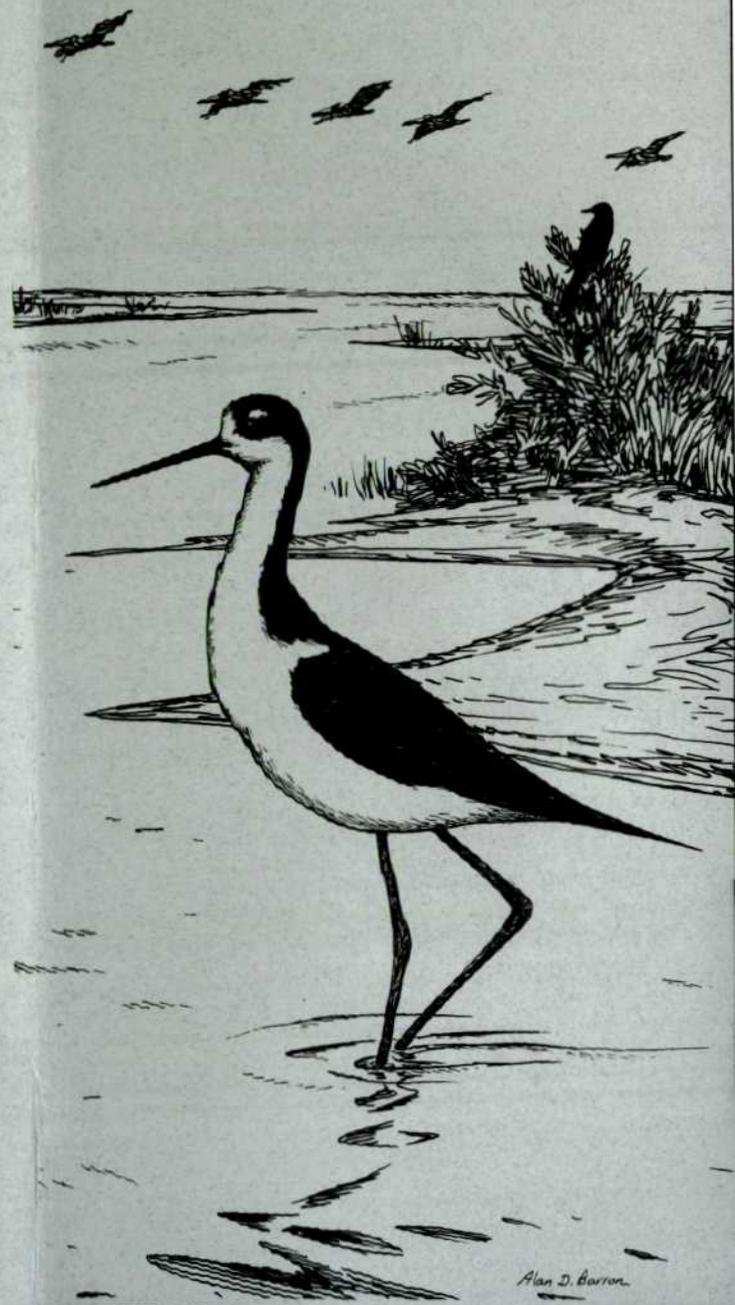
ACCIDENTAL SPECIES

Pacific Loon	Whip-poor-will*
Western Grebe	Olive-sided Flycatcher
Herald Petrel	Alder Flycatcher*
Red-billed Tropicbird	Willow Flycatcher*
Anhinga	Vermilion Flycatcher
"Great White Heron"	White-breasted Nuthatch
Reddish Egret	Brown-headed Nuthatch
Roseate Spoonbill	Bewick's Wren
Wood Stork	Northern Wheatear
Mute Swan	Eastern Bluebird
Black Vulture	Sage Thrasher
Mississippi Kite	Sprague's Pipit
Swainson's Hawk	Northern Shrike
Golden Eagle	Cerulean Warbler
Purple Gallinule	Louisiana Waterthrush*
Sandhill Crane	Kentucky Warbler
Spotted Redshank	Mourning Warbler
"Eurasian Whimbrel"	Western Tanager
Black-tailed Godwit	Bachman's Sparrow
Bar-tailed Godwit	American Tree Sparrow
Little Stint	Lark Bunting
Franklin's Gull	Le Conte's Sparrow
Common/Mew Gull	Western Meadowlark
Thayer's Gull	Brewer's Blackbird
Thick-billed Murre	Red Crossbill
White-winged Dove	Common Redpoll
Snowy Owl	Flamingo sp. †
Burrowing Owl	Barnacle Goose †

* assumed--no records for Seashore
† species of questionable origin

FIELD NOTES

Birds of the Outer Banks



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- 1990 -

Compiled by: John Fussell, III
& Marcia Lyons

Illustrations by: Alan D. Barron



PRINTED ON RECYCLED PAPER

Alan D. Barron

BIRDS OF THE OUTER BANKS

Nearly 400 species of birds have been sighted within Cape Hatteras National Seashore and its surrounding waters. This impressive number is due to several factors: a location on the Eastern Flyway, varied habitats, and strong winds and storms that often bring exhausted vagrants to our shores.

This checklist presents each bird's usual status throughout the year. The abundance categories are based on chances of the bird being seen under good conditions and in optimum habitat. Some species may be very localized. A list of accidental species is included. Always remember that birds are highly mobile and can often occur out of range or season.

WHEN AND WHERE

Birding is always exciting on the Outer Banks though the greatest variety of species occurs during spring and fall migrations. For those seeking out migratory shorebirds, the various inlet tidal flats, the ponds at Pea Island and Bodie Island, and the salt ponds at the Cape Hatteras Point offer the greatest concentrations.

Landbird migration in the fall can be good but spotty, with best observations occurring in the shrub thickets along the dikes at Pea Island and in the maritime woods on lower Hatteras and Ocracoke Islands. Most resident landbirds can be found in Buxton Woods.

Hérons, egrets, terns, skimmers, and other birds that breed locally are best seen in the warmer months. These birds frequent both salt and freshwater areas. Winter ducks and geese concentrate in the large ponds on Pea Island and Bodie Island.

Sightings of pelagic birds usually requires a boat trip of 15 miles or more offshore. However, one may have success in spotting some of these birds from the Cape Hatteras Point, especially after storms.

Please report any unusual sightings at one of our Visitor Centers or in the log book outside the Hatteras Island Ranger Office.

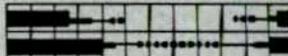
ABUNDANCE DESIGNATIONS

- COMMON:** Easily seen in the proper habitat.
- FAIRLY COMMON:** Seen most of the time in the proper habitat.
- UNCOMMON:** Usually present, but not certain to be seen.
- OCCASIONAL:** Seen only a few times during a year.
- RARE:** Not seen every year.

LOONS

- Red-throated Loon
— Common Loon

J F M A M J J A S O N D



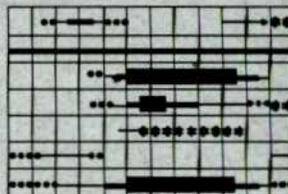
GREBES

- Pied-billed Grebe
— Horned Grebe
— Red-necked Grebe
— Eared Grebe



SHEARWATERS

- Northern Fulmar
— Black Capped Petrel
— Cory's Shearwater
— Greater Shearwater
— Sooty Shearwater
— Manx Shearwater
— Audubon's Shearwater



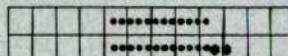
STORM-PETRELS

- Wilson's Storm-Petrel
— White-faced Storm-Petrel
— Leach's Storm-Petrel
— Band-rumped Storm-Petrel



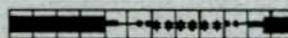
TROPICBIRDS

- White-tailed Tropicbird
— Masked Booby



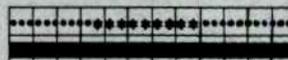
GANNETS

- Northern Gannet



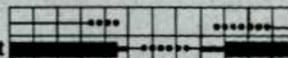
PELICANS

- American White Pelican
— Brown Pelican



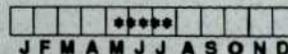
CORMORANTS

- Great Cormorant
— Double-crested Cormorant



FRIGATE BIRDS

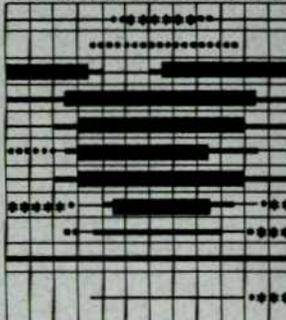
- Magnificent Frigate Bird



BITTERNS & HERONS

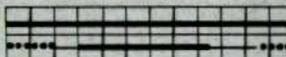
- American Bittern
— Least Bittern
— Great Blue Heron
— Great Egret
— Snowy Egret
— Little Blue Heron
— Tricolored Heron
— Cattle Egret
— Green-backed Heron
— Black-crowned Night Heron
— Yellow-crowned Night Heron

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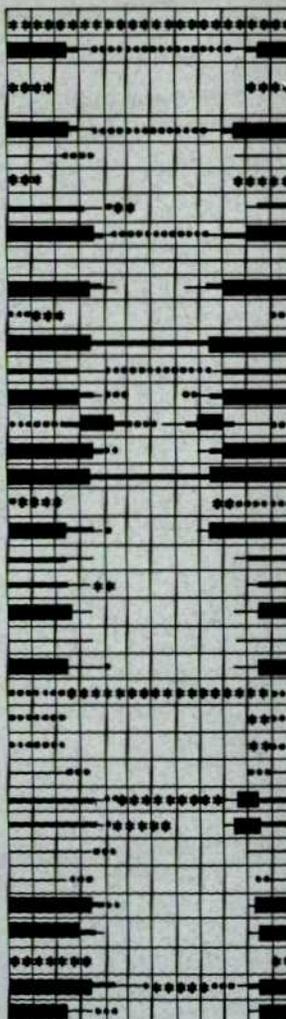
IBISES

- White Ibis
— Glossy Ibis



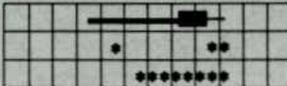
GEESE & DUCKS

- Fulvous Whistling Duck
— Tundra Swan
— Greater White-fronted Goose
— Snow Goose
— Blue Goose
— Ross Goose
— Brant
— Canada Goose
— Wood Duck
— Green-winged Teal
— Eurasian Teal
— American Black Duck
— Mallard
— Northern Pintail
— Blue-winged Teal
— Northern Shoveler
— Gadwall
— Eurasian Wigeon
— American Wigeon
— Canvasback
— Redhead
— Ring-necked Duck
— Greater Scaup
— Lesser Scaup
— Common Eider
— King Eider
— Harlequin Duck
— Oldsquaw
— Black Scoter
— Surf Scoter
— White-winged Scoter
— Common Goldeneye
— Bufflehead
— Hooded Merganser
— Common Merganser
— Red-breasted Merganser
— Ruddy Duck



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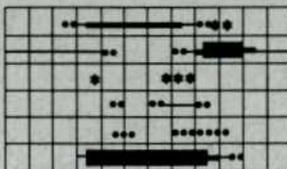
LARKS

- ___ Horned Lark



SWALLOWS

- ___ Purple Martin
- ___ Tree Swallow
- ___ No. Rough-winged Swallow
- ___ Bank Swallow
- ___ Cliff Swallow
- ___ Barn Swallow



JAYS AND CROWS

- ___ Blue Jay
- ___ American Crow
- ___ Fish Crow



TITMICE

- ___ Carolina Chickadee
- ___ Tufted Titmouse



NUTHATCHES

- ___ Red-breasted Nuthatch



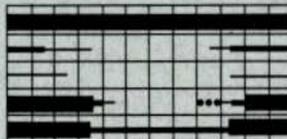
CREEPERS

- ___ Brown Creeper



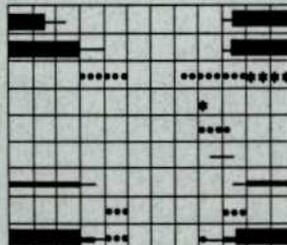
WRENS

- ___ Carolina Wren
- ___ House Wren
- ___ Winter Wren
- ___ Sedge Wren
- ___ Marsh Wren



THRUSHES AND ALLIES

- ___ Golden-crowned Kinglet
- ___ Ruby-crowned Kinglet
- ___ Blue-gray Gnatcatcher
- ___ Veery
- ___ Gray-cheeked Thrush
- ___ Swainson's Thrush
- ___ Hermit Thrush
- ___ Wood Thrush
- ___ American Robin



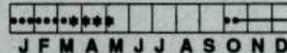
MIMICS

- ___ Gray Catbird
- ___ Northern Mockingbird
- ___ Brown Thrasher



PIPITS

- ___ Water Pipit

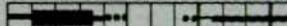


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WAXWINGS

- ___ Cedar waxwing

J F M A M J J A S O N D



SHRIKES

- ___ Loggerhead Shrike



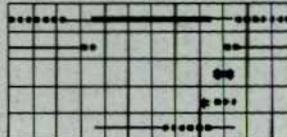
STARLINGS

- ___ European Starling



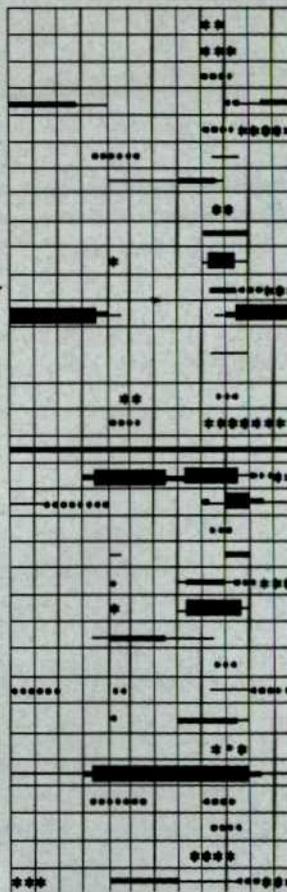
VIREOS

- ___ White-eyed Vireo
- ___ Solitary Vireo
- ___ Yellow-throated Vireo
- ___ Philadelphia Vireo
- ___ Red-eyed Vireo



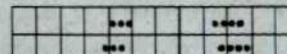
WOOD WARBLERS

- ___ Blue-winged Warbler
- ___ Golden-winged Warbler
- ___ Tennessee Warbler
- ___ Orange-crowned Warbler
- ___ Nashville Warbler
- ___ Northern Parula
- ___ Yellow Warbler
- ___ Chestnut-sided Warbler
- ___ Magnolia Warbler
- ___ Cape May Warbler
- ___ Black-throated Blue Warbler
- ___ Yellow-rumped Warbler
- ___ Black-throated Green Warbler
- ___ Blackburnian Warbler
- ___ Yellow-throated Warbler
- ___ Pine Warbler
- ___ Prairie Warbler
- ___ Palm Warbler
- ___ Bay-breasted Warbler
- ___ Blackpoll Warbler
- ___ Black & White Warbler
- ___ American Redstart
- ___ Prothonotary Warbler
- ___ Worm-eating Warbler
- ___ Ovenbird
- ___ Northern Waterthrush
- ___ Connecticut Warbler
- ___ Common Yellowthroat
- ___ Hooded Warbler
- ___ Wilson's Warbler
- ___ Canada Warbler
- ___ Yellow-breasted Chat



TANAGERS

- ___ Summer Tanager
- ___ Scarlet Tanager

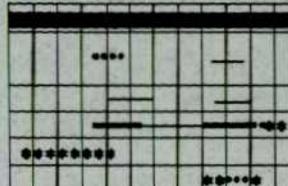


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CARDINALS & ALLIES

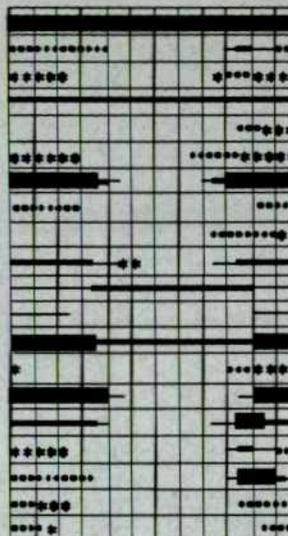
- ___ Northern Cardinal
- ___ Rose-breasted Grosbeak
- ___ Blue Grosbeak
- ___ Indigo Bunting
- ___ Painted Bunting
- ___ Dickcissel

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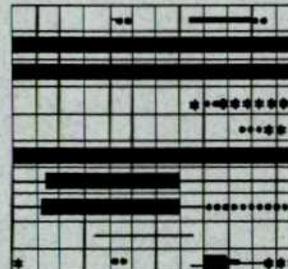
NEW WORLD SPARROWS & ALLIES

- ___ Rufous-sided Towhee
- ___ Chipping Sparrow
- ___ Clay-colored Sparrow
- ___ Field Sparrow
- ___ Vesper Sparrow
- ___ Lark Sparrow
- ___ Savannah Sparrow
- ___ "Ipswich Sparrow"
- ___ Grasshopper Sparrow
- ___ Sharp-tailed Sparrow
- ___ Seaside Sparrow
- ___ Fox Sparrow
- ___ Song Sparrow
- ___ Lincoln's Sparrow
- ___ Swamp Sparrow
- ___ White-throated Sparrow
- ___ White Crowned Sparrow
- ___ Dark-eyed Junco
- ___ Lapland Longspur
- ___ Snow Bunting



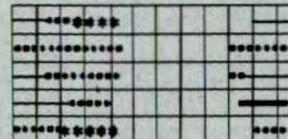
BLACKBIRDS & ORIOLES

- ___ Bobolink
- ___ Red-winged Blackbird
- ___ Eastern Meadowlark
- ___ Yellow-headed Blackbird
- ___ Rusty Blackbird
- ___ Boat-tailed Grackle
- ___ Common Grackle
- ___ Brown-headed Cowbird
- ___ Orchard Oriole
- ___ Northern Oriole



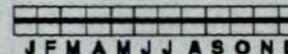
FINCHES

- ___ Purple Finch
- ___ House Finch
- ___ Pine Siskin
- ___ American Goldfinch
- ___ Evening Grosbeak



OLD WORLD SPARROWS

- ___ House Sparrow



J F M A M J J A S O N D

The Refuges...

Alligator River National Wildlife Refuge, established in 1985, is a relatively young refuge that has quickly become a focal point of activity and interest. Encompassing over 141,600 acres of diverse habitat types ranging from the unique pocosins to fresh water marshes, Alligator River provides a home for many wildlife species. Some threatened and endangered species, such as the American alligator and red-cockaded woodpecker, live and reproduce here. Others, like the bald eagle and peregrine falcon, utilize the refuge during parts of the year. Many biologists have described the refuge as one of the last strongholds in the southeast for the black bear. A 5,100 acre tract of agricultural/moist soil units rounds out Alligator River's potential with a large waterfowl management program.

Alligator River is the site of the first attempt to restore a species that was extinct in the wild. The red wolf re-establishment program began in 1986 and has made wildlife management history. The program is successful thus far; a number of free-roaming red wolves live on the refuge. Red wolves have been born and successfully reared in the wild on the refuge.

Most of the refuge is open for public use; however, access is limited by the remoteness of the area and environmental conditions.

Alligator River also administers both Pea Island and Currituck National Wildlife Refuges. Both refuges were established primarily as wintering areas for waterfowl. Pea Island lies on the northern 13 miles of Hatteras Island and has long been recognized as a "Birder's Paradise." Established in 1938, Pea Island is one of the nation's oldest refuges. It comprises 5,915 acres of beach, dune, high and low marsh, and fresh and brackish water ponds. The refuge bird list boasts an impressive 312 species (including several "accidentals"). Trails and overlooks are open for public use year round. Summer and fall bird walks are regularly scheduled, and summer children's programs are also popular.



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

The Society...

The Coastal Wildlife Refuge Society is a non-profit organization established and incorporated in 1989 by a group of local citizens. The purposes of the Society are twofold: 1) to generate funds to support refuge programs and activities, particularly relating to public education, interpretation, recreation, and information, and 2) to assist in the recruitment of refuge volunteers. The generation of funds by the Society will be through membership fees and donations. Society projects may include the purchase of bird lists, general refuge leaflets, or other informational or educational handouts, support for the volunteer program, the production of refuge or wildlife related videos or slide programs, the purchase of A-V or photographic equipment, or other projects that would enhance the public's enjoyment and appreciation of the refuges and their resources.

A major Society project, at present, is the upgrading and renovation of the North Pond Trail on Pea Island National Wildlife Refuge. The plan includes the construction of four observation structures. Except for the upper levels of the observation tower, all structures will be fully handicap accessible. Three of the structures will feature permanently mounted, vandal- and weather-proof binocular spotting scopes. Thus far, funds for this project have been received through Federal Matching Grants, Community Grants, and private donations.

Some members of the Society may wish to become refuge volunteers; however, volunteerism is not a requirement.

The annual membership meeting for the Society is held in September.

Your interest and support is appreciated.

Coastal Wildlife Refuge Society Board of Directors

Ken Dyar, President

Warren Davis, Vice President

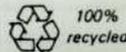
V. J. Kristoffersen, Secretary

Fitzhugh Streshley, Treasurer

Dick Denton

Hilda Bayliss

Bonnie Strawser, Refuge Liaison
Office number (919) 987-2394



Coastal Wildlife Refuge Society, Inc.

Name _____

Address _____

Phone (H) _____

(O) _____

Please check membership—

- Regular \$10.00
 Wildlife \$50.00
 Donor \$200.00
 Corporate \$500.00
 Other Donation \$ _____

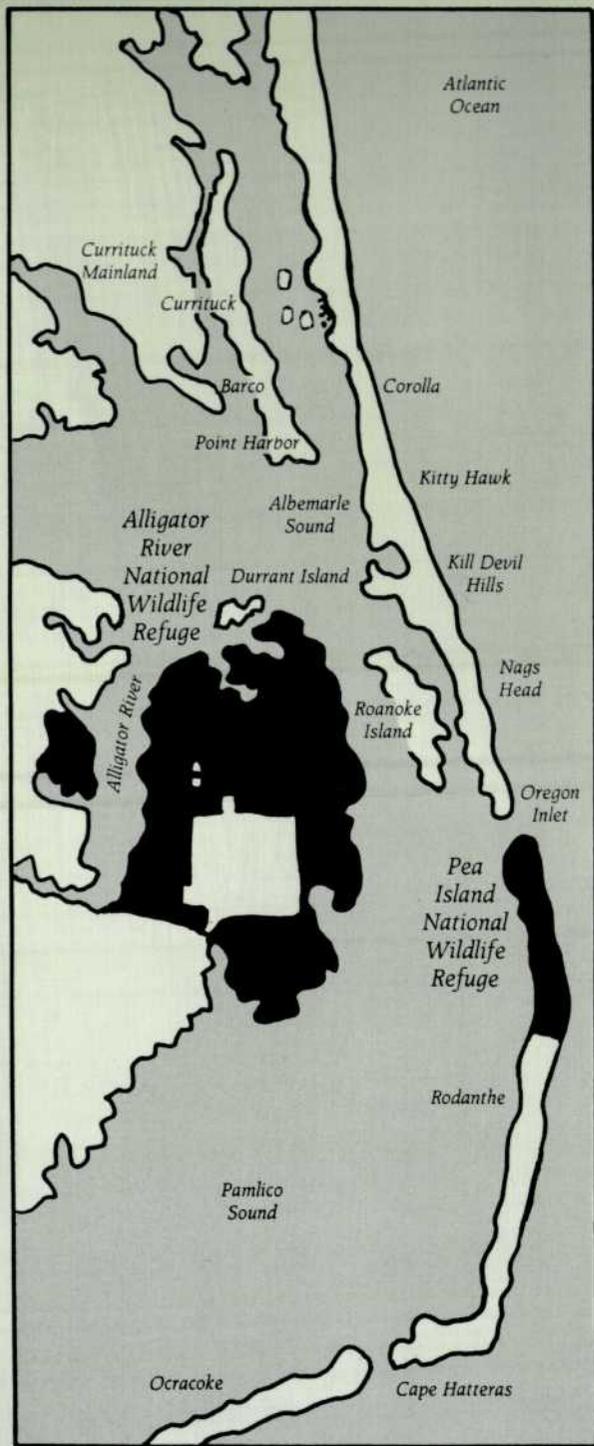
Can you help out?

- Host/Hostess
 Naturalist
 Art/Photography
 Carpentry
 Fundraising
 Secretarial
 Biological
 Maintenance
 Litter Pick-up

Mail with check to:

Coastal Wildlife Refuge Society
P.O. Box 1808
Manteo, North Carolina 27954

clip and mail



P.O. Box 1808
Manteo, North Carolina 27954



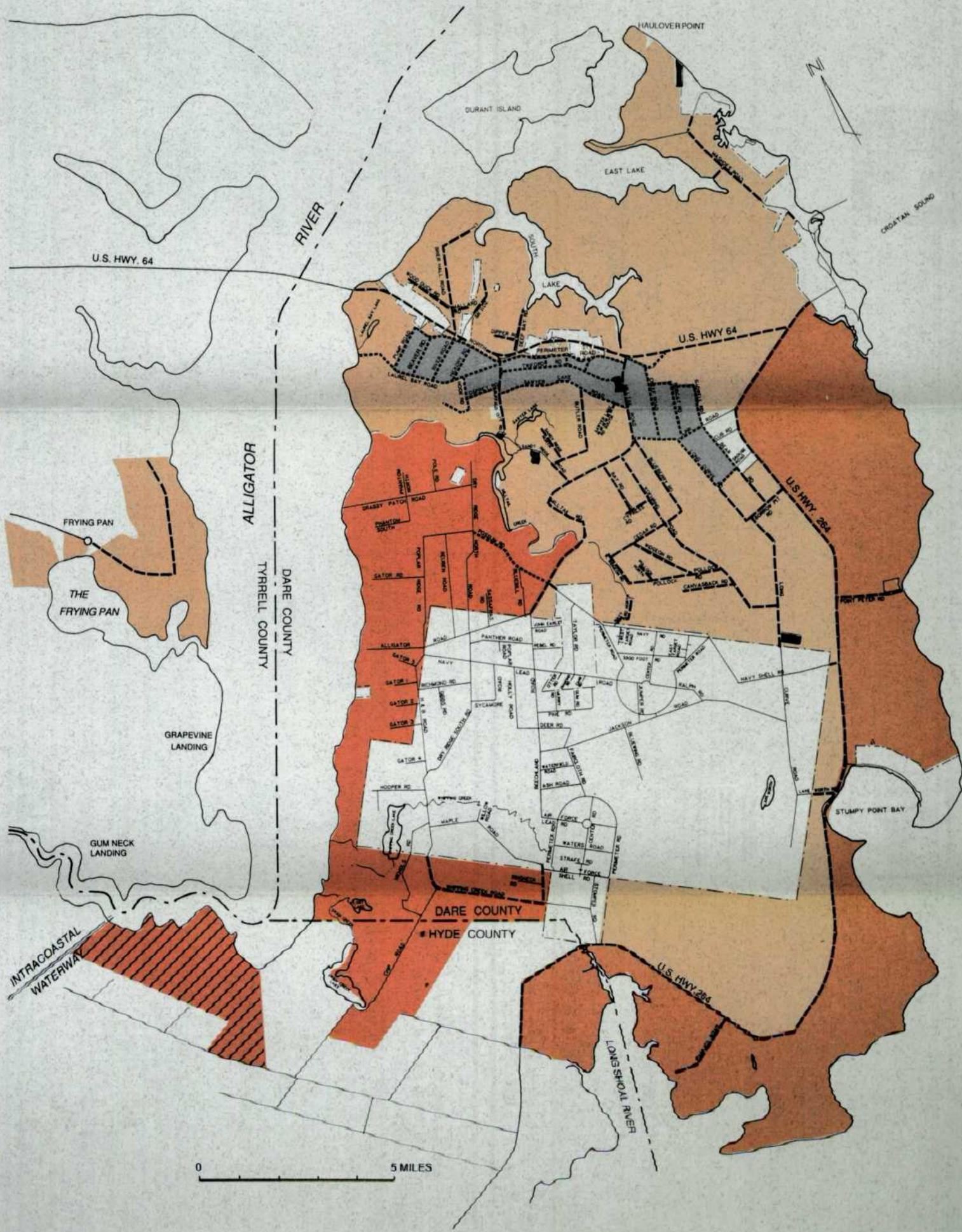
An Invitation...



*...for people who cherish the wildlife
and wildlands of*

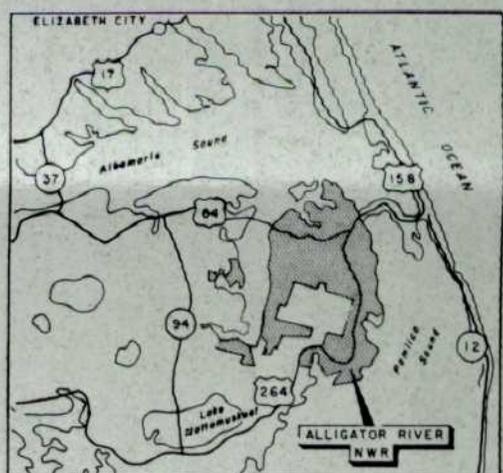
**Alligator River
Pea Island
Currituck
National Wildlife Refuges**

*to join the
Coastal Wildlife Refuge Society.*



- Gum Swamp Unit - Hunting allowed; dogs prohibited.
- Hunting allowed; the use of dogs is restricted to bird hunting with retrieving dogs.
- Hunting with dogs allowed.
- Farming Area-Open September 1-October 31 (dogs allowed); other times CLOSED TO ALL ENTRY. Closed year round to water fowl hunting.
- No Hunting - Safety/Resource Management Zone.
- Roads leading into this section are private and closed to the general public. Public access is by water only.
- Roads open to motorized vehicles.
- Roads open seasonally to motorized vehicles.

All REFUGE ROADS ARE CLOSED TO MOTORIZED VEHICLES UNLESS DESIGNATED AS OPEN; WATERWAYS IN THE GUM SWAMP UNIT ARE CLOSED TO MOTORBOATS.



VICINITY MAP
SCALE 0 10 20 30 MILES

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

Alligator River National Wildlife Refuge Regulations

- The refuge is open daylight hours only. Hunter access is allowed from one hour before until one hour after legal shooting hours.
- Firearms are prohibited on the refuge unless they are unloaded and dismantled or encased. When participating in a hunting activity firearms are permitted but must be unloaded while being transported by a vehicle or boat under power.
- The taking or possessing of bear, or any part thereof, is prohibited, except when transporting same along a state road.
- The use of artificial lights (including car headlights) to locate, observe, or take wildlife is prohibited.
- The use of dogs is restricted to designated areas.
- Vehicular access is restricted to designated areas.
- Camping is prohibited.
- Wood gathering is by permit only.
- No commercial guiding is permitted.
- The construction and use of permanent blinds, platforms and ladders is prohibited. Blinds and tree stands must be removed from the refuge after each day's hunt.
- The training of dogs is permitted only during the corresponding hunting seasons.
- When unarmed, hunters may walk on closed roads in the farming area to retrieve their stray hunting dogs.
- Hunters utilizing the refuge are subject to inspections of licenses, hunting equipment, bag limits, vehicles and their contents during compliance checks by Refuge or State officers.
- Youth hunters (ages 15 and under) must have successfully passed a state-approved hunter

education course and must carry proof of certification. Youth hunters must be directly supervised by an adult (21 or over). For small game hunts, an adult may supervise up to two youth hunters; for big game, an adult may supervise only one youth hunter.

Only the following may be hunted:

- | | |
|------------------|-------------|
| • mourning doves | • squirrels |
| • geese | • rabbits |
| • swans | • quail |
| • ducks | • raccoons |
| • snipe | • opossums |
| • woodcock | • deer |

The farming area is closed to waterfowl hunting year round.

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

If you have any question as to the advisability or legality of any activity, consult the refuge manager before participating in that activity.

See map for information on the use of dogs and vehicles.

Hunting and fishing opportunities for disabled individuals are available on Alligator River National Wildlife Refuge. Disabled persons may contact the refuge office prior to their arrival if special arrangements are needed.

Take pride in America's wildlife resources. To report wildlife violations, call 1-800-662-7137. For additional information, write or call:

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

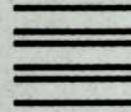
Department of the Interior
U.S. Fish and Wildlife Service
4-RF-41630-July, 1991



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INT423



U.S. Fish and Wildlife Service
Alligator River National Wildlife Refuge
P.O. Box 1969
Manteo, North Carolina



Official business
Penalty for Private Use: \$300

To:



Hunting
Regulations
1991-92

Alligator River
National Wildlife Refuge



Alligator River & Pea Island National Wildlife Refuges



"A Publication of
The Coastal Wildlife
Refuge Society."

United States Department of the Interior Fish and Wildlife Service

Refuge Phone:
919-473-1131
Refuge Address:
P.O. Box 1969
Manteo, N.C. 27954

"Wildlife Places"



Take Pride in America Public Lands Belong To All of Us!!

In their Take Pride in America song, the Oak Ridge Boys said it best:

When was the last time you saw an eagle on the flight?
Just look around you, we are that eagle in the sky.
Up here where God shines his light,
America never looked so bright!

Take pride in America, take pride in the USA.
Take pride in America; America, don't turn away!
Come on, it's our duty to preserve our country's beauty.
Take pride in America, take pride in the USA.

We've come a long way, There's still a lot of work to do:
Rivers to clean up, forests and parks we can renew.
More land for wildlife to roam, volunteers to clean up our home.

Take pride in America, take pride in the USA.
Take pride in America, America is on parade.
So join hands, tow the line; together we can make her shine.
Take pride in America, take pride in the USA.

When was the last time you had a chance to help this land?
To make a difference, to face a task and take a stand?
This land can't last forever; the sooner we begin, the better.

Take pride in America, take pride in the USA,
Take pride in America, America is on display.
We won't stop until we're done; the eagle's flight has just begun.
Take pride in America, take pride in the USA.

Public lands do belong to all of us. Each time we visit a national wildlife refuge, national or state park, forest, or other parcel of public land, it's important to remember that we're really "home". Does that mean we can act as we please? Does it mean that the

resources there are ours to exploit if we see fit? Does it mean that the laws don't apply to us?

Certainly, the American public knows better. Because public lands belong to all of us, we have a tremendous responsibility to take

good care of them and use them wisely. We have a responsibility to be good stewards of the lands and waters that have been left in our trust. To future generations, we owe public lands that are as good, or better, than the ones our forefathers passed on to us.

How can we be good stewards?? How can we assure that these resources are used wisely and managed effectively? How can we give guarantees to an unborn generation?

Practicing humility is a great way to start. If we always keep in mind that we are a small part of a giant picture.... If we always remember that our wants and our needs are very different and try to distinguish between them.... If we try to realize that even our genuine needs, as individuals, are insignificant compared to the consequences of meeting those needs without due precautions.... Then, and only then, can we begin to see the real world as it is today....

Be informed. Keep up with environmental issues. Spend lots of time in the great outdoors, and get to know the public lands in your area. Learn about management policies on these lands. Ask questions when you don't understand something. Look into ways you can help the "public servants" who are responsible for the lands.

Since we live in a democracy, we each have a voice — an equal voice — in government. Granted, each of us is not heard on a daily basis. One

way to practice good environmental stewardship is to make our views known. Nothing in America has as much of an effect on a politician as voters. Write and call your congressmen! Pat them on the back when they perform well on environmental issues; chastise them when they don't. Encourage them to learn more about environmental issues. Send them information about issues that concern you.

We can teach more by example than we can by any other method known to man. If we each behave in an environmentally responsible way, what an impact it will have on everyone we meet! If we recycle, others will recycle. If we pick up trash on the beach, others will do the same. If we appreciate birds and flowers and a slow moving creek in the wilderness, folks around us will begin to appreciate the same things. If we volunteer to lead a bird walk, someone, somewhere will be affected by our involvement.

Children are the most important people in the world today, for the fate of the world, in fact, lies in their hands. For generations, we have squandered our resources, dirtied our air, poisoned our water, and abused our precious environment in every way possible. If we cannot begin to right the wrongs of the past today, there will be no hope for tomorrow.

Near Manteo, North Carolina, two vastly different national wildlife refuges have been set aside for wild-

life and public enjoyment. These are your refuges. You have a right to enjoy them You have an obligation to "handle with care". If, as you learn about Alligator River and Pea Island National Wildlife Refuges, you want become more involved, give us a call. If you have time to volunteer, we can use you. If you just want to comment, we'd love to hear from you. If you wish to make a donation of equipment, materials of any sort, or money, it's as easy a phone call or letter.

These refuges are precious gifts. In a sense, we have inherited them from our parents. In an even greater sense, we have merely borrowed them from our children.

Remember that rights and responsibilities always go hand in hand. Exercise your rights. Live up to your responsibilities. Take pride in America's wildlife resources. And remember, "The eagle's flight has just begun!"



REMEMBER TO RECYCLE!

The three R's of conservation are:

- Reduce waste
- Re-use
- Recycle

Recycling makes a difference!

Take Pride in America's Natural Resources....



Recreational Opportunities at Alligator River

Alligator River National Wildlife Refuge isn't your typical "let's ride over and look at the refuge" refuge! Though it's literally teeming with wildlife, most of the refuge is inaccessible and its vastness makes wildlife observation a "hit or miss" activity. When visitors to the Outer Banks call to ask where they should go to "see the refuge," it's a very difficult question to answer.

The entire refuge is traversed by over 200 miles of old logging roads.

Most of these roads (all except the ones in the Gum Swamp Unit and around or near the farm fields) are open to the public year round. That statement may be terribly misleading for someone who isn't familiar with the refuge or its roads.

Visitor accessibility can change drastically from one day to the next. A hard rain or a long wet spell can make the roads impossible to drive on, even for specially equipped four-wheel drive vehicles. Even when



weather would otherwise allow access, staff time and money restraints prohibit the refuge from maintaining most of the roads most of the time.

Many of the things people want to see — a stand of Atlantic white cedar, red wolves, alligators, bears, etc. —

aren't easily within the realm of possibility. They're certainly possible, but require a real investment of time and effort on the part of the visitor and a lot of good old fashioned luck.

There are several state roads that run through the refuge. These roads, of course, are maintained year round. US 264 and 64 roughly divide the refuge into thirds. Buffalo City Road, just outside the community of East Lake, provides easy access to Milltail Creek, several units of the farm fields, and the remains of "Buffalo City" — a historic old logging town. No "trails" exist; however, there are several old roads that depart from Buffalo City Road and can be walked semi-comfortably for a short distance.

Milltail Creek is open for boating — both motorized and nonmotorized. Prothonotary warblers, other passerines, a variety of raptors, and several other species of birds have been observed in this area. Alligators and a variety of snakes (including the poisonous cottonmouth water moccasin) live in Milltail Creek but shy away from visitors if they hear them coming. (During most of the year, it's advisable to watch carefully for snakes wherever you are on the refuge!) Whitetail deer, black bear, and other smaller mammals are possibilities, as well. Unfortunately for visitors (but fortunately for wildlife), because of the vastness of the refuge, most exciting observations are infrequent and are made by only the very persistent refuge visitors.

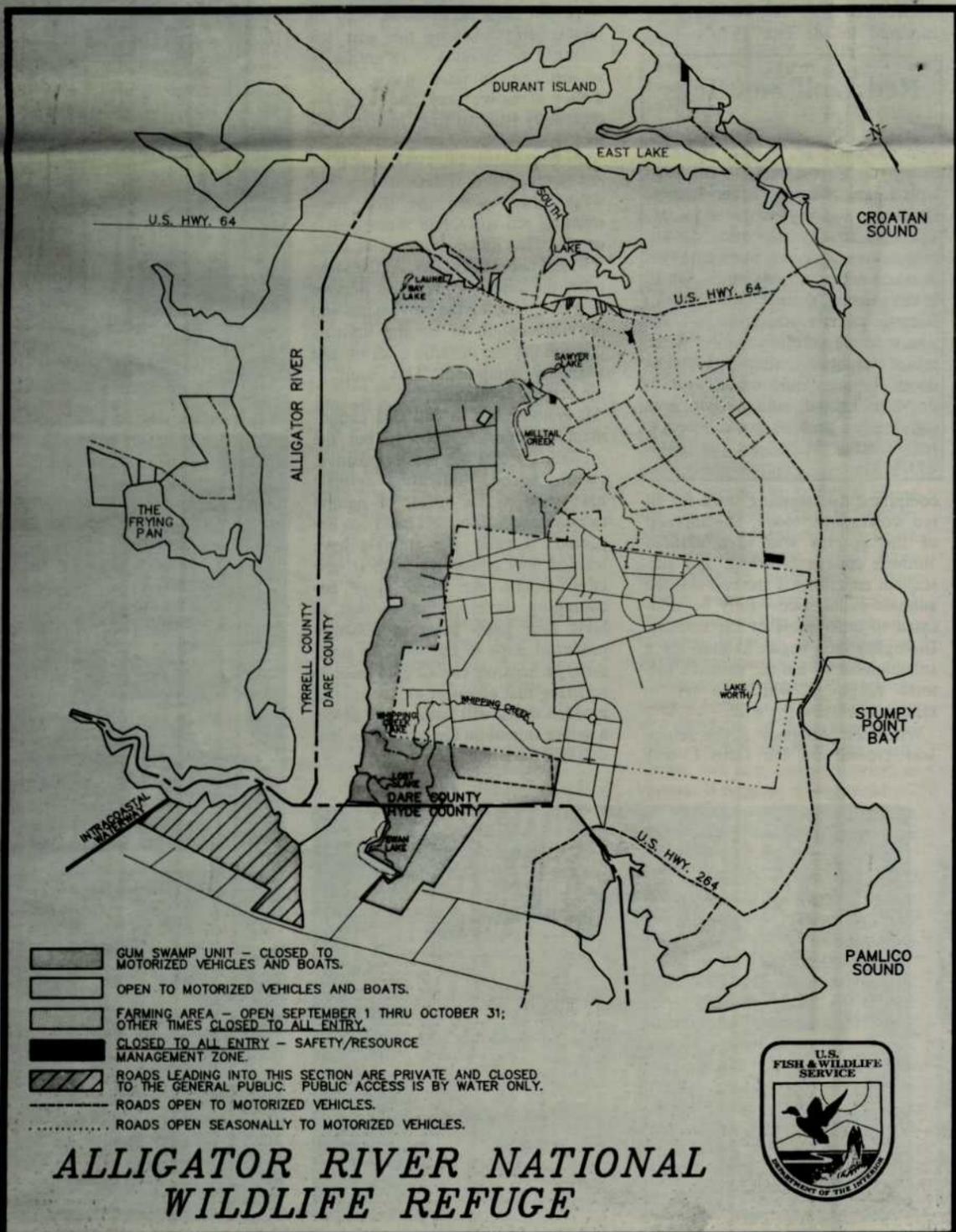
Alligator River is open to hunting and fishing during the regular State seasons. Hunters should contact the refuge for specific hunting informa-

tion prior to participating in a hunt on the refuge. Fishermen are reminded that the creeks, canals, and lakes of the refuge are classified as freshwater; State regulations apply.

The vast majority of the refuge is open to the public year round. Visitors are advised to utilize information contained on the refuge map in this publication to determine whether or not they may visit a particular area of the refuge. Contact the refuge office for clarification or questions.

For visitors who merely want to lose themselves in the quiet wildness of the place, paddle through a swamp creek, or just get away from the hurry of life, the opportunities are limited only by physical access. Since this limited access for people provides a reduced stress environment for wildlife, there are no current plans for public access development on the refuge.

The process has begun to acquire land and build an office and Visitor Center for Alligator River National Wildlife Refuge on Roanoke Island. Since the refuge itself is a difficult one to visit, this Center will allow Outer Banks visitors a first hand look at refuge habitats, wildlife, and activities. Besides having "state-of-the-art" exhibits inside, the Center plans to offer an interpreted nature trail and an exhibit with live red wolves. This project is a "first" in several ways. Besides the idea of a live exhibit, the proposal for this facility involves building it with private funds obtained through a national fundraising campaign. If you know of a corporation or individual who might be interested in helping us achieve this ambitious project, please contact the refuge office.





Red Wolf ...



Many visitors to the Outer Banks don't realize that only a few miles away from their beach vacationing activities, wild wolves are roaming free — right here in Dare County! But that fact is not nearly as fearsome as some might think. Only a small number of these shy and elusive creatures are involved, and they are the subject of a carefully-controlled scientific project to see whether a nearly extinct species of canid (dog-like mammal) can successfully be reintroduced into the wild. The experiment, the first of its kind in the world, offers hope of averting the otherwise certain disappearance of this native American species, and it is a source of pride to many Dare County residents, as well as to wildlife specialists around the world.



The red wolf (*Canis rufus*) is one of three wild canids native to the United States, the others being the gray (timber) wolf and the coyote. Smaller and lankier than the gray wolf but larger than the coyote, the red wolf is usually cinnamon to gray in color. Adults may weigh from 42 to 80 pounds.

Like all canids, the red wolf is a predator and usually feeds on a wide range of wild animals and birds (although its diet may include carrion and vegetation as well). Usually these feeding activities pose no threat to man or domestic animals.

The red wolf once roamed throughout the southeastern and south-central portions of the United States, but as the human population of these regions expanded over the last two or three centuries, habitat suitable for the animal disappeared and the numbers of red wolves dwindled. By the

1960s, only a handful of animals were left and their range had shrunk to a few counties along the Texas-Louisiana border. Concern grew that the species would soon be lost altogether because of disease and interbreeding with coyotes. Biologists decided to capture as many genetically-pure red wolves as possible and preserve them in captivity.

Seventeen pure red wolves were captured in the late 1970's; they

Red Wolf Sightings

Because they are extremely shy animals that shun contact with humans, you are not likely to see a red wolf in the Alligator River Refuge. But major highways cross the refuge, and occasionally motorists do encounter one on or near the road. (This is most likely to occur at night, which is the animals' normal hunting time.) Because of this possibility, we ask you to drive carefully while in the refuge (especially after dark), slow down if you should see a wolf or dog-like animal, and report such sightings as soon as possible to the refuge office in Manteo (tel. (919) 473-1131).

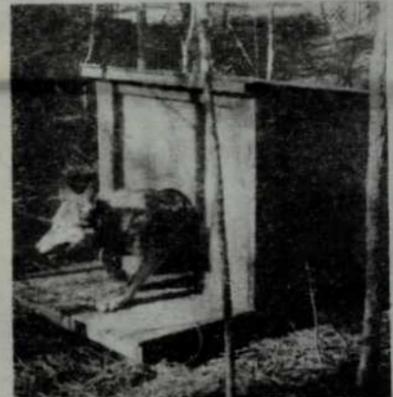
comprised the founding stock for all red wolves alive today. The survival of the species was then assured through captive breeding, and subsequent experiments showed that the animals could successfully be relocated to other parts of the country. Biologists then began looking for a suitable area within the animal's historic range in which to try to reintroduce it into the wild.

When the Alligator River refuge was created on the Dare County

mainland in 1984, the U.S. Fish and Wildlife Service began to study it as a possible red wolf reestablishment site. By 1986 the decision to go ahead was made, and a five-year experiment to rebuild a viable, self-sustaining red wolf population in the wild began. On November 14, 1986 four pairs of red wolves were delivered to the refuge, where they were put into acclimation pens in remote areas. During the next ten months, the animals were gradually weaned from commercial dog food to a diet of native prey and were increasingly isolated from human contact.

On September 14, 1987, a pair of red wolves was released into the wild. These were the first free-roaming red wolves in more than a decade. The other three pairs were released two weeks later. At the same time, the Fish and Wildlife Service began monitoring the movements and physical condition of the animals through the use of radio tracking and telemetry equipment. This monitoring activity continues.

It is too early to call this experiment a complete success, but the preliminary data are mostly positive. (While several individual animals have died as the result of natural causes or accidents, this had been expected.) Clearly the animals have learned how to survive in their new environment. An even more encouraging development is that at least four pairs have successfully produced pups in the wild. In time, then, perhaps we can all take pride in realizing that an event all too rare in modern times will have taken place: a native animal on the edge of extinction will have been saved.





American Alligator

Imagine paddling through the thick swamps of northeastern North Carolina and you will not likely picture an alligator as part of the scenery. But, as the name suggests, the Alligator River National Wildlife Refuge is home to a population of these threatened species. Excellent habitat and ample area for the alligators is found in the refuge but the population remains delicately balanced against the occasional harshness of the local climate. As a cold-blooded animal, they are susceptible to extreme freezing temperatures and occur no farther north than the coastal plain of NC.

Youth in Action Hope for the Future

It was a motley looking crew that stopped down the muddy road toward the wolf pens. Several of the red wolf biological team were there; however, the assistants were the surprising part of the group. A fifteen-year-old rising sophomore from Manteo High School walked along carrying a snatch pole. Two other high school sophomores carried shovels and the medical kit. Two sixteen-year-olds chatted with the others about what to expect. These two were returning for their second experience with the red wolves. Someone asked why we needed shovels. Mike Phillips, the red wolf biologist, explained, "They dig dens that run up under the roots of trees. Sometimes the puppies can be 10-15 feet back from the entrance and, we can't reach them. In that case, we have to dig them out. It's imperative that the pups be inoculated and given a health check at this point. Whatever we must do to accomplish that, we'll do."

Other than the wide-eyed amazement on their faces and their obvious youthfulness, these teens appeared no different than others working in the pen. Bits and pieces of conversation told part of the story: "We need to keep the adult wolves out of the box. Hold this net over the door" "Get a muzzle on that snout, and do it fast!" "Can you read the scale? We need an accurate weight." "Hold him tightly; the rope is slipping!" "Can you pinch the sides of his mouth so I can get the medication between his teeth?"

The project for the day was the processing of four ten-week old captive red wolf puppies on Alligator River National Wildlife Refuge. The main "processors" were the biological team hired by the USFWS to plan and implement the reestablishment program. The assistants for the day were members of the Youth Conservation Corps (YCC).

YCC began as a pilot program almost two decades ago. The two primary program objectives are 1) to provide a meaningful work and learning experience for high school aged youth and 2) to accomplish needed conservation work on public lands. Alligator River's program usually involves from 4-10 enrollees, depending on funding, staffing, the availability of vehicles, and the importance of the scheduled projects.

Many YCC projects are labor in-

ensive, requiring many long, hot, sweaty hours of hard work under not-so-comfortable circumstances. Clearing the understory from a red cockaded woodpecker colony might sound like a "glamorous" wildlife job until you start to work! First, the work can't begin until the chicks have fledged. That means YCC have to save this project for the hottest part of the summer. Couple the heat with the humidity and the biting flies and mosquitoes. Then add the fact that OSHA allows minors to utilize hand tools ONLY. What you have is a long, hard project! Fortunately, most YCC enrollees realize the value to this endangered species and try to keep their complaining to a minimum!

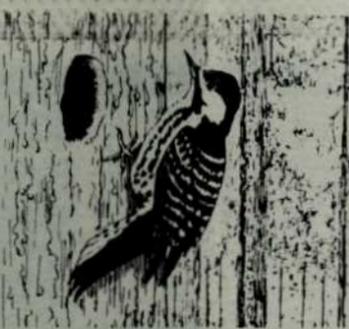
YCC provide manpower and energy to band brown pelicans and a variety of shorebirds. In one recent trip, over 1300 pre-flight pelicans were banded. On another day, almost 2,000 royal and sandwich terns received similar shiny bracelets!

Not all the YCC jobs are as fun to do or write about as the ones already mentioned. Mentioning soil samples around the work area of the refuge causes enrollees to hide behind their lunch boxes. Talk about spreading hay to mulch the dikes and the groans become audible. Point to a sandbag and the expression on their faces turn to horror!

But through it all, they get the job done. They get a few blisters, and they get dirtier than they ever thought possible, but they go home each night with a sense of accomplishment.

And there's more. After spending a day or two picking up roadside trash, you can bet these young people won't absentmindedly toss trash out the car window. After cleaning black paint from a red wolf crossing sign, I'd feel sorry for the poor soul who admitted to one of these kids that they spray painted the signs!! Work like this helps folks see both sides of issues! In the YCC program, there's an awfully lot of growing up accomplished in a short eight to ten week period.

Ask them what they think....Well it depends on when you ask them! Many enrollees would like to return for a second summer. Of course, that's not possible for most. But, they leave the summer with a little better appreciation for the refuge and for wildlife and for hard work. Their lives will never be the same.



Red Cockaded Woodpecker

Did you know that in addition to the red wolf, another wild creature on the brink of extinction is living here in Dare County? No, we're not talking about native Outer Bankers of the human kind, but rather about a bold little (about 8 inches long) member of the woodpecker family called the red-cockaded woodpecker. (RCW).

This mostly black and white bird (the male's red tufts just behind the eye are very hard to see) was once common in the southeast. As have many other species, it has come upon hard times lately, mainly because of habitat loss. The red-cockaded is quite fussy about where it will nest; only a tall living pine afflicted with heartwood disease will do. There are few areas where such trees exist in large enough numbers to support colonies of these birds. But one area where the birds can live in safety is right here in the Alligator River National Wildlife Refuge.

Four colonies of red-cockaded have been reported as nesting within the boundaries of the refuge, but a couple of these reports predated the creation of the refuge. Within the last two years, only two colonies have been positively identified there. This does not mean that other colonies do not exist, however. It does indicate that we don't have a good handle on how many colonies there are because of the difficulty of surveying the entire 150,000 acres of the refuge.

Ground surveys are impractical on this particular refuge because the understory (brush and vegetation from 3 to 10 feet high) is so thick that walking in the woods without cutting a trail is impossible. Even if trails were cut, visibility from such a trail would be sharply limited. Surveys by helicopter may fill the bill, and these, of course, are quite expensive.

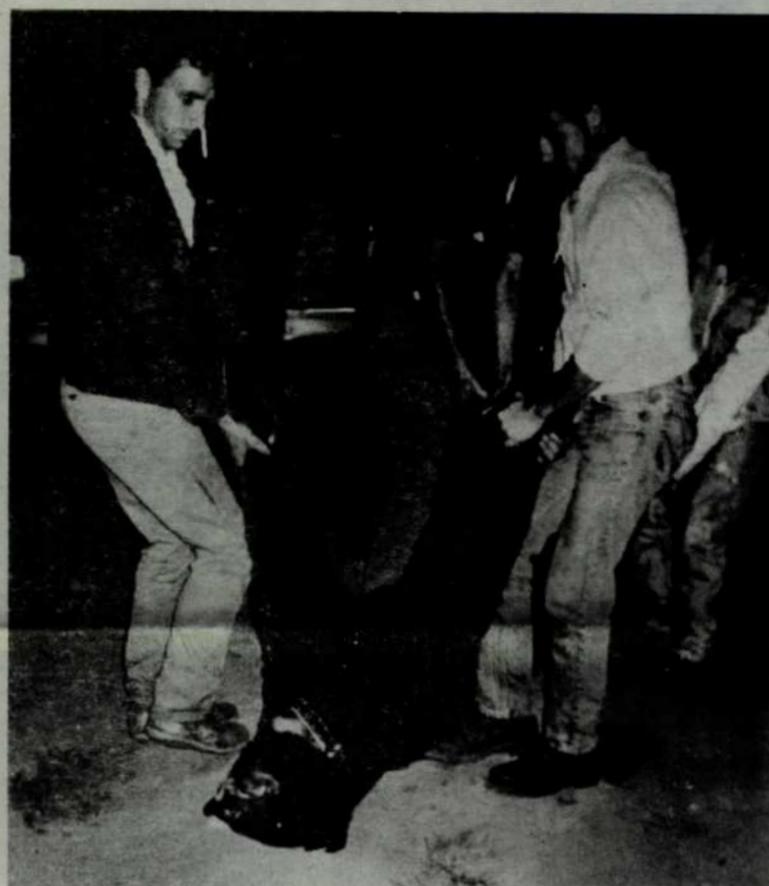
Thus far in the refuge's young life, the Fish and Wildlife Service, assisted by youngsters of the Youth Conservation Corps (YCC) have been able to clear away many young-to-mature hardwood trees in the vicinity of one of the colonies, thereby helping perpetuate it. RCWs are known to abandon sites if hardwood understories reach the level of their cavities. This clearing also needs to be done around the other known colonies, as well. Again, this is a costly proposition because it requires a long, hard effort on the part of many individuals (about 1400 work hours for the one site cleared so far). An alternative clearing method — a limited and carefully controlled burning operation around each colony nesting area — is feasible, but this, too, would be costly. Prescribed burning in peat soils certainly is not without risks.

Clearly, further work and investigation needs to be (and will be) done to find the best and most practical way to help the red-cockaded woodpecker survive. And many of us who care about wildlife will be cheered by the knowledge that some of that work is going on right here on our own doorstep in the Alligator River refuge.

Six Point Buck



Sedated Bear is Transported



Black Bears

Alligator River National Wildlife Refuge is one of the few refuges in the history of the U.S. Fish and Wildlife Service to have as one of its primary objectives the protection and management of a resident game species. Fortunately, biologists and managers realized the value of the remnant population of black bear for which the refuge provided critical habitat.

Black Bear in eastern North Carolina have been the topic of great concern in recent years. In 1988, the U.S. Fish and Wildlife Service, in cooperation with the Department of Defence, began a study to learn more about black bears in eastern North Carolina. Specifically, the study is designed to determine more about black bear movements and habitat in Dare County.

Five bears were outfitted with telemetric collars similar to those used in the red wolf project. Movements of those bears are monitored on a regular basis. Though it is too early to form definite conclusions as a result of this work, several statements can be made concerning the bears.

First, the bears tend to frequently be located in areas characterized by thick vegetation and relatively isolated from both paved and unpaved roads. Second, the bears did not hibernate during 1989.

Significant controversy surrounds black bear populations in the southeastern Atlantic Coastal Plain, including Dare County. Habitat modification resulting from peat mining, forestry, and agriculture has effectively fragmented bear habitat throughout the region. Mainland Dare County is an excellent example. Here, tracts of pocosins and associated coastal plains habitats are surrounded by extensive acreage of cleared lands. Dare County black bears effectively live on an island of suitable habitat surrounded by inhospitable environs.

The potential of the un hunted population in Dare County to act as a reservoir for black bear reproduction and dispersal in the Atlantic Coastal Plain is unknown. However, research done at the Great Dismal Swamp National Wildlife Refuge indicates the refuge there does function in that manner. In recent years, development of land in and around Dare County has accelerated. This, along with the initiation of a bear season in both Hyde and Tyrrell Counties, makes Dare County a vital sanctuary for bears. The U. S. Fish and Wildlife Service will maintain the prohibition on bear hunting on the refuge until data are available to design a harvest strategy that ensures the continued existence of the population.

Pea Island National Wildlife Refuge Beginnings

Located on the northernmost thirteen miles of Hatteras Island on the Outer Banks of North Carolina, Pea Island National Wildlife Refuge is one of over 400 refuges nationwide administered by the U. S. Fish and Wildlife Service. Though it falls within the boundaries of Cape Hatteras National Seashore, the refuge is not managed as a part of the National Seashore. By a Memorandum of Understanding, National Park Service rangers patrol Pea Island to assist in enforcing regulations. Refuge, Seashore, State, and local regulations apply on Pea Island.

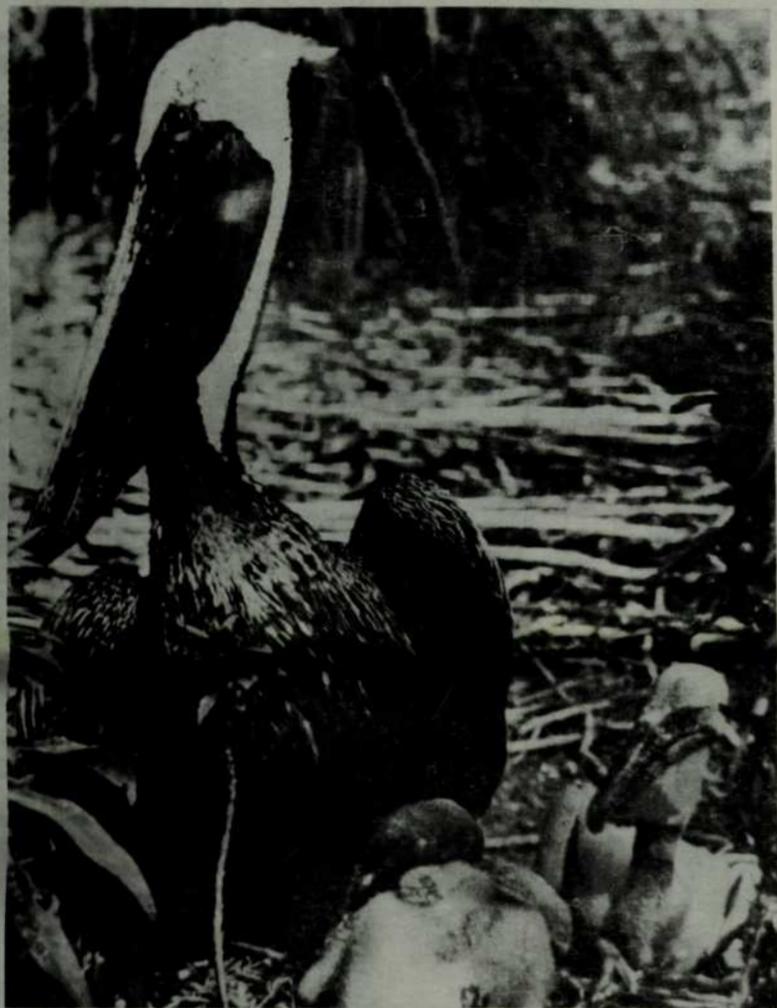
This 5,915 acre refuge and an adjacent 25,700 acres of Pamlico Sound waters on its western boundary were established in 1937 by Congressional Act and Presidential Proclamation. The island was named for the dune

peas which grow there and was set aside to provide safe wintering habitat for greater snow geese and other migratory waterfowl.

Shortly after the establishment of the refuge, Civilian Conservation Corps (CCC) workers, in an effort to "improve" the low sandy island, constructed barrier dunes to protect the inland portions from storms. Over the years, other dunes were constructed by the U. S. Army Corps of Engineers and the Interior Department, as well. The last "dune building" was completed in the late '50s.

The CCCs also built dikes creating impoundments for waterfowl and fields to grow wildlife foods. Though methods and technology have changed over the years, Pea Island's basic mission is the same today: providing a quality environment for wildlife.

"It's For The Birds"



Ask any birder to identify the "birders paradise" of the East Coast; Pea Island will be one of the first places to come to mind. Since this refuge lies midway on the Atlantic Flyway, thousands of waterfowl winter on or migrate through Pea Island each year. Species include snow and Canada geese, tundra swans, and 25 species of ducks. During spring and especially fall migrations, the diversity of bird life is phenomenal. The refuge bird list boasts an impressive 314 species.

During the spring and summer months, many species of wading and shorebirds nest on the refuge. Least terns, willets, black skimmers, and oystercatchers raise their young primarily in the beach and dune zone. Ibises, egrets, herons, black ducks, gadwall, and some songbirds often find safety and suitable nesting cover in the impoundment or marsh areas on the sound side of the refuge.

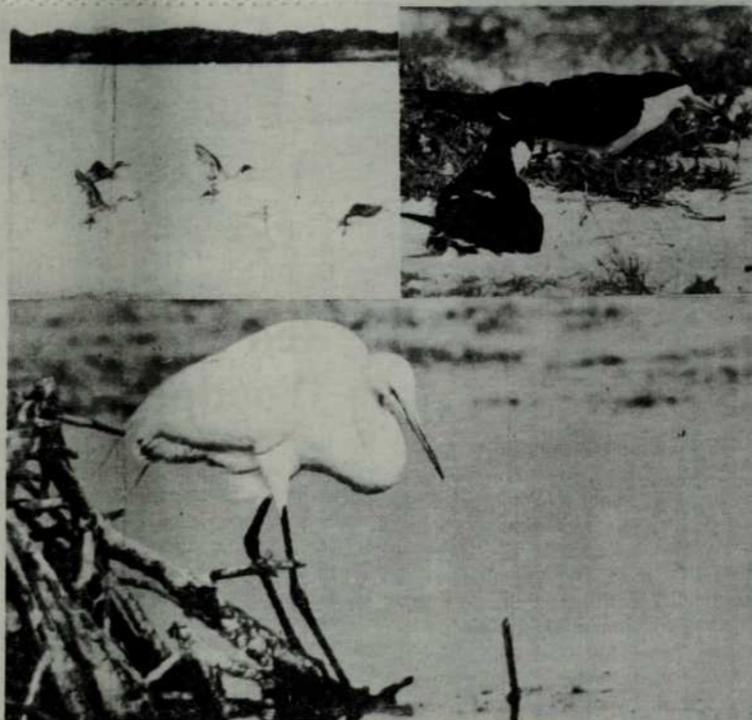
Suitable habitat for several threatened species is found on the barrier islands. Peregrine falcons are frequently observed as they move along the flyway on their north and south migrations. Endangered bald eagles occasionally visit the refuge, usually during the warmer months. Pipit, plovers inhabit the refuge beach and dune areas. And the threatened loggerhead sea turtles lumber ashore on

dark summer nights to lay their eggs on the refuge beaches.

Resident river otters create paths or slides between the impoundments and the salt marsh. Muskrats and nutria build their grass mound homes in the marshy areas. Raccoons, opossums, minks, and both cottontail and marsh rabbits find that the refuge meets all their needs. Colorful ring-necked pheasants can occasionally be seen feeding along the dikes or highway.

Many species of aquatic wildlife live in the marshes, tidal flats, and tidal creeks along the edge of the Pamlico Sound. Speckled trout (weakfish), croaker, spot, menhaden, and flounder all spawn and spend their early stages of life in the protected soundside of the barrier islands. Blue crabs, oysters, and clams also find this area ideal.

Besides the loggerhead sea turtle, reptiles such as diamondback terrapins, yellow bellied sliders, common snapping turtles, black racers, and banded water snakes make their homes on the refuge. Though no poisonous snakes have ever been documented on the refuge, cottonmouth moccasins are common further south on Hatteras Island, and the refuge offers prime habitat for them. Few amphibians can tolerate the harsh salt environment.



Safety in Numbers

In the summer, many species of wading and shore birds nest in large groups on the barrier islands, on small spoil islands in the sounds, or on the fringe areas of the mainland. Royal, sandwich, common, and least terns; black skimmers; a variety of herons, egrets, and ibises; and brown pelicans are among the most common of these colony nesters.

Terns and skimmers prefer bare to almost bare sand for their nesting sites. Nests are merely a "scrape" in the sand. The eggs blend in easily with the broken shells and natural beach litter. Because the nests are essentially "invisible", it's entirely possible for an unsuspecting visitor to wander through a colony and even step on the nests, while totally unaware of the damage that results. For this reason, every effort is made to sign nest areas appropriately so they are protected from unintentional, as well as intentional, disturbance.

Many visitors fail to realize that exposure of the nests to even ten or fifteen minutes of summer sun can literally cook the eggs. Adult birds protect their nests from this intense heat by providing shade. A careless beachcomber or free-roaming pooch who keeps the parents from returning to their nest can do immeasurable damage without ever even knowing....

Wading birds tend to nest in clusters in trees or shrubs. Usually, many species nest together, but for some, a single species rookery is the norm.

Brown pelicans, one of the "happy ever after" stories of this century, have made a great come back on the

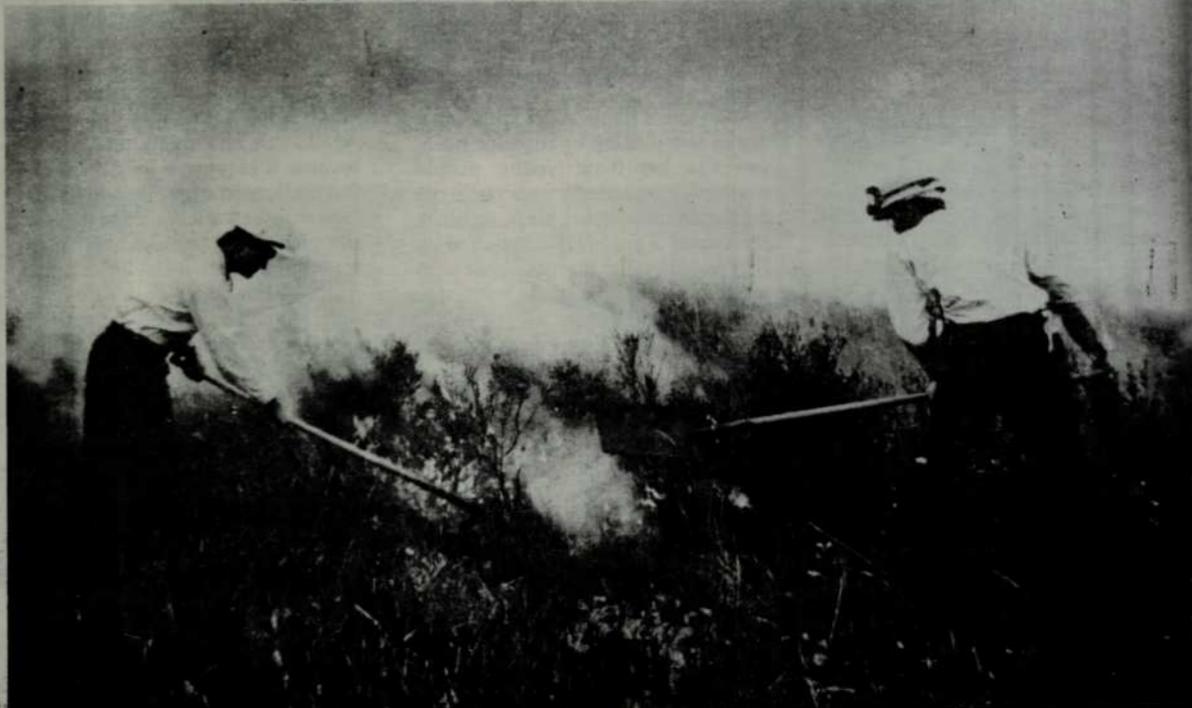
Outer Banks. Being at the top of the same food chain as eagles and osprey, pelicans were almost lost as a species due to the use of the pesticide DDT. Though DDT caused no noticeable physical problems for the adult birds, it caused insurmountable problems with reproduction. Eggs from these birds had paper-thin shells. When the parent bird attempted to set the eggs, they were destroyed by her weight.

Less than a decade ago, a small group of "pilgrim" pelicans built a colony of three nests on a spoil island near Oregon Inlet. The following year, there were 90 nests. From there, the numbers have grown and grown, until they now reach four digits! Pelicans nest on the ground, on small clumps of vegetation, in low shrubs, or in trees.

All these colonial nesting birds need areas of absolute isolation because the nests are extremely vulnerable. Things that seem harmless can be catastrophic — setting up a camera on a tripod to photograph the young birds, allowing your dog to exercise for 20 minutes on the beach while "no one's looking," going behind a "closed area" sign because you don't see any reason for the area to be closed....

Please be aware. And, spread the word. Spaces for these colonial nesters are fewer and fewer each year. The destruction of a single colony can have a tremendous effect on the entire population. Remember, they were here first, and this is their home. We're the guests, so use your best "company" manners.

Periodic Controlled Burn



"Management Is The Key"

On Pea Island Refuge, the harmonious blending of man's technical know-how and nature's processes is sought to provide natural cover and foods for wildlife. The barrier dunes, once constructed to "preserve" the fragile ecosystems of the island, are no longer rebuilt to prevent overwash. Instead, potential overwash areas are identified and plans are made to provide drainage. Grain crops are not planted, but small fields are planted with perennial grasses which will replenish themselves with minimal need for additional management.

The fresh/brackish water ponds are manipulated, supplementing precipitation with timely operation of 30 inch pumps that transfer water from the Pamlico Sound into the ponds. During the spring and early summer, some of the ponds are drawn down to allow emergent plant growth. In the fall, the areas are flooded to provide easy access for waterfowl to feed on both these emergents and the submergents that grow naturally in the more permanently flooded areas. Both vegetative types are important for waterfowl that utilize the refuge for a migration stop-over or wintering area.

Controlled burning is utilized on portions of the refuge and is usually accomplished on a three-year rotation. High marsh areas that have grown into shrub thickets are burned to encourage grasses, which are preferred by most wildlife species. Some areas of the refuge are left untouched to provide diversity of habitat for all refuge wildlife species.



The Coastal Wildlife Refuge Society

The Coastal Wildlife Refuge Society, a non-profit corporation, was established by a group of concerned citizens early in 1989 to fund educational and recreational programs on the Alligator River and Pea Island National Wildlife Refuges. The Society's objectives are to assist in recruiting refuge volunteers and to provide support for refuge interpretive, educational, and recreational programs.

Functioning through a Memorandum of Understanding with the US Fish and Wildlife Service, the Society works closely with Refuge staff to supplement and assist approved public use activities. Since the Society is a non-profit organization, it can serve as a receiving agent for monetary contributions intended to benefit the refuges. The major Society project, at present, is the upgrading and renovation of the North Pond Trail on Pea Island National Wildlife Refuge. This plan includes the construction of four observation

structures. Except for the upper levels of one tower, all structures will be fully handicap accessible. Three of the structures will feature permanently mounted, vandal — and weather — proof binocular spotting scopes.

An upcoming project is the design and construction of two observation/photo blinds for Pea Island Refuge. These blinds will be free for the public to use. The Society provides brochures, spotting scopes for bird walks, and other educational equipment or materials as the refuge requests and funds are available.

Thus far, funds for these projects have been received through Federal Matching Grants, Community Grants, private donations, and sales. T-shirts, note cards, and an assortment of wildlife-oriented books are available from the office at Pea Island. Proceeds from these sales assist with Refuge projects. Individuals or groups interested in helping with these or other projects should contact the refuge office or the Society.

Volunteers Make a Difference

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE VOLUNTEERS TAKE PRIDE IN AMERICA That would be an appropriate headline in any newspaper around. What an incredible group of people! "Pride in America" is behind it all, but look at all the "symptoms" of this "disease." They take pride in our wildlife resources; they take pride in our environmental heritage. They teach folks of all ages what our environment is all about and how to take care of it. They show how to take care of our environment. They're proud of themselves, and they're proud of the job they do for the U.S. Fish and Wildlife Service. And, we're awfully proud of them, too! That's what Pride in America is all about, isn't it? That's what volunteerism is all about.

Alligator River's volunteer program officially began fewer than 10 years ago. We never dreamed the program would grow to be so valuable to refuge operations. Since our meager beginnings so few years ago, the refuge volunteer program has grown in number of volunteers, in hours contributed, and, more importantly, in value to the refuge and the resource. It hasn't just grown; it has literally exploded. There's almost no facet of refuge work that is not enhanced by our superior volunteer program.

Though there are several special publicized projects each year (beach sweeps, tern banding trips, etc.) that draw one-time volunteers (over 200, in all), most of the refuge volunteer program involves fewer than 50 "regulars." These folks are from all walks of life. Some are retired; some are students. Some folks prefer to volunteer in their own area of expertise; others choose to branch off and start something entirely different, just for the fun of it, and just to help out in any way they can.

Some volunteers donate 40 to 60 hours a week; others come in 4 hours a week. Some come in only once or twice a year. There is no minimum requirement in the overall program; however, several of the projects for which we utilize volunteers require a specific time commitment. For example, folks who man the Pea Island National Wildlife Refuge Information Desk commit to a day or half day each week for the entire summer. They answer the telephone, relay messages on the radio, give out refuge information to visitors, and answer questions. Similarly, volunteers who participate in the "turtle patrol" commit to one morning each week all summer. These folks ride a 4-wheeler the entire 13 miles of refuge beach in search of nests of the threatened loggerhead sea turtle. Since Pea Island National Wildlife Refuge is on the edge of the range for this species, these nests are very important for their survival. It's an important job; volunteers have never let us down on it.

The red wolf project has received international acclaim. At Alligator River, volunteers deserve much of the credit for the success of the program to date. Student interns (volunteers) literally live on the refuge with these endangered wolves, providing security in the pen area and constant data as to their habits. Volunteers follow the movements of the free roaming wolves, helping to establish a base of information about these animals for which so little is known.

Several refuge volunteers are trained and available to go into local classrooms to provide wildlife programs. Programs on birds, mammals, invertebrates, fish, reptiles, amphibians, red wolves, and migration are offered, each including a slide presentation, question and answer session, and a hands-on activity. These volunteers are dedicated to teaching tomorrow's leaders to take care of America.

Refuge volunteers lead bird walks, band ducks, build wolf traps, pick up trash, write newspaper columns, install signs, and run errands. They teach children, and they vacuum floors. The list goes on, and on, and

on.... Whatever the refuge needs, there's a volunteer somewhere in the program who is eager to give his/her best effort to provide for it.

A newsletter provides a list of needs; our faithful volunteers have never failed to respond to those needs. For short-notice projects, a few phone calls is all it takes. There's a place in the program for anyone who wants to become involved. Volunteer involvement is limited only by the energy and abilities of the volunteers themselves. Most of our recent recruitment has been by current volunteers, eager to share their experiences with others.

Why do they do it? Sometimes, I think they must be crazy to give, give, and continue to give. They aren't interested in recognition, even though they richly deserve it. One of our volunteers summed it up concisely. "We want to give something back. Life's been good to us. Now we have time and energy to return." Where else but America? The Alligator River National Wildlife Refuge volunteers demonstrate Pride in America with each hour they give. They are deeply dedicated to the refuges and to the resources they protect. They are committed to do their part to ensure that America's wildlife heritage continues to be filled with richness and diversity for generations to come.

Yearly, Alligator River and Pea Island National Wildlife Refuges benefit from over 14,000 donated hours of volunteer service. For this service to America, the refuge volunteer program has been named as a National Winner in the "Take Pride in America Awards Program" for several consecutive years. In salaries alone, the program has saved over \$250,000. That's your tax money being saved!!

If you visit one or both of the refuges, you may have an opportunity to chat with one of our many dedicated refuge volunteers. If you do, be sure to let them know how much you appreciate what they do.

If you're interested in joining in on the fun and satisfaction of being a refuge volunteer, contact the refuge office.

Important Events to Remember

- March — Arbor Day
 - April — National Wildlife Week, Volunteer Week, Earth Day, Red Wolf Howling Safaris
 - May — Take Pride in America Month
 - June — National Fishing Week, Pea Island Bird Walks
 - Summer — Children's Wildlife Discovery Program
 - September — Big Sweep, National Hunting & Fishing Day, Coast Week, Public Lands Day/Federal Lands Cleanup Day
 - Fall — Saturday Pea Island Bird Walks
 - December — Christmas Bird Counts
- *Local Activities Usually Planned
**Special Refuge Programs — Contact the refuge for details.

COASTAL WILDLIFE REFUGE SOCIETY, Inc.

Name _____

Address _____

Phone (H) _____

(O) _____

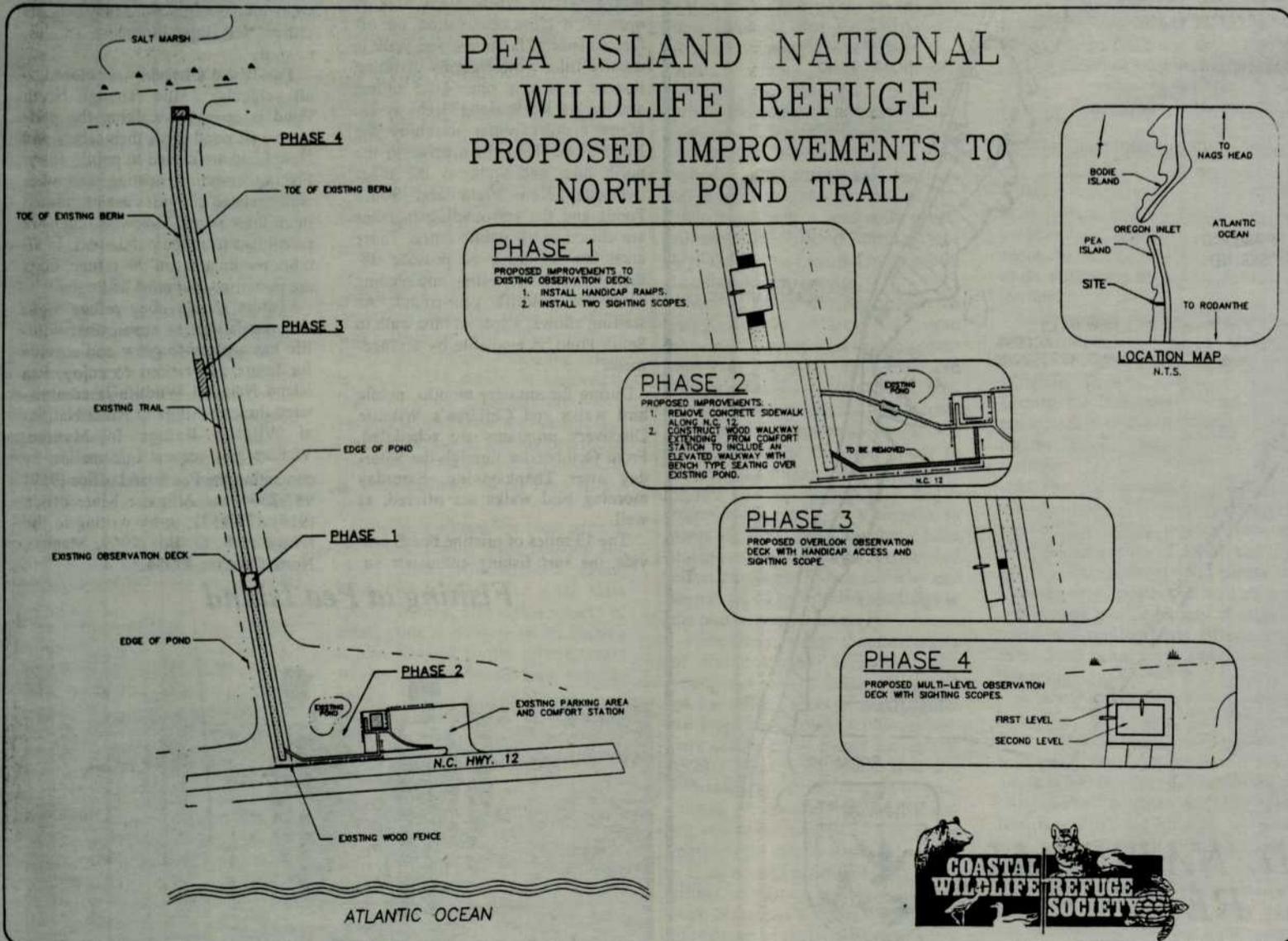
Mail with check to:
Coastal Wildlife Refuge Society
P.O. Box 1808
Manteo, North Carolina 27954

Can You Help Out?

<input type="checkbox"/> Host/Hostess	<input type="checkbox"/> Fundraising
<input type="checkbox"/> Naturalist	<input type="checkbox"/> Secretarial
<input type="checkbox"/> Art/Photography	<input type="checkbox"/> Biological
<input type="checkbox"/> Carpentry	<input type="checkbox"/> Maintenance
<input type="checkbox"/> Bird books	<input type="checkbox"/> Litter Pick-up
<input type="checkbox"/> T-shirts	12.00 Adult XL-L-M-S
	10.00 Children L-M-S
<input type="checkbox"/> Notecards	2.50 4.50
<input type="checkbox"/> Lapel pins	3.00

Please check membership:

<input type="checkbox"/> Regular	\$10.00
<input type="checkbox"/> Wildlife	\$50.00
<input type="checkbox"/> Donor	\$200.00
<input type="checkbox"/> Corporate	\$500.00
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THANK YOU

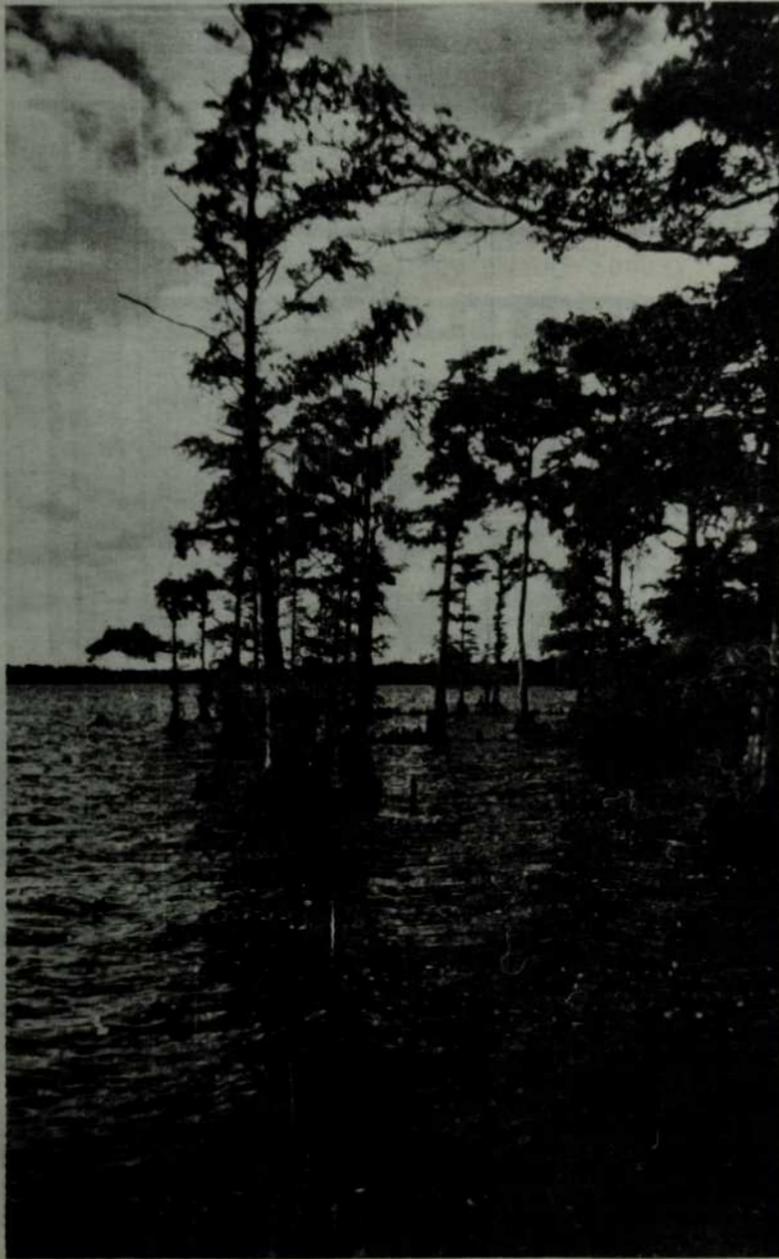
We'd like to thank the following supporters of the North Pond Trail and Renovation Project:

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Michael and Debbie Martin  
Outer Banks Community Foundation  
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Trimpi, Thompson, & Nash  
Waterway Survey and Engineering



## Cypress Trees Flourish



## Alligator River - Swamp on a Hill

This large (approximately 150,000 acres), young (established in 1984) refuge of marshland, pine and hardwood forest, and swamp is located on the eastern North Carolina mainland just west of the Outer Banks. It was set aside to protect the region's unique pocosin habitat — "pocosin" is an Indian word that literally means 'swamp on a hill' — and to manage and preserve the wildlife found in this habitat.

Alligator River's wildlife populations are quite diverse and include many species of birds, mammals, reptiles, and amphibians. Endangered and threatened species found here include the American bald eagle, peregrine falcon, red cockaded woodpecker, and American alligator. What is believed to be one of the largest and last remaining concentrations of black bear along the mid-Atlantic coast is also located on the refuge. And within the last three years, the refuge has gained fame as the locale of a bold new experiment to reintroduce an extinct-in-the-wild native American mammal, the red wolf, into the wild. (The project has been quite successful to date — see separate article.)

An important Fish and Wildlife Service objective in managing the Alligator River refuge is to restore natural water conditions by plugging the man-made drainage ditches and canals that crisscross the area. By so doing, the original wetland character of the area will be largely replicated, and it will once again support larger populations of wood ducks, barred owls, red shouldered hawks, marsh rabbits, otters, and other wetland species. (See separate article.)

Another goal is to re-establish the stands of Atlantic white cedar trees that once dominated the area. This

commercially very desirable species was heavily harvested by timber companies to the point that few viable groves now remain standing. (See separate article.)

Another important activity involves cooperative management with local farmers of some 3,800 acres of croplands within the refuge. Under this arrangement, the farmers plant and harvest some of the land, while portions of some crops they plant are left to benefit wildlife.

Until it became a National Wildlife Refuge, the area was exploited mostly by logging companies, farmers, and hunters. No public-use development has occurred since the refuge was established, and little is planned for the near future. While the refuge is open to the public for birdwatching, wildlife photography, etc., visitors should know that most refuge roads are unpaved, old logging roads, and use of a four-wheel drive vehicle is recommended during most of the year.

Hunting is allowed on most parts of the refuge during State seasons and in accordance with all State regulations. (White-tailed deer is the main species hunted, although a variety of small game is taken as well.) Fishing is also allowed on the refuge, again strictly in accord with State requirements. Before getting involved in these activities, interested persons should consult the information boards located near all entrances to the refuge, or call or write to the refuge office in Manteo (Alligator River National Wildlife Refuge, P.O. Box 1969, Manteo, NC 27954, tel. (919) 473-1131).



## Tranquil Afternoon



## Atlantic White Cedar

One of the features of the Alligator River National Wildlife Refuge that makes it so special is the diversity of natural habitats it contains. Among these, a habitat we regard as especially impressive and significant consists of those areas where stands of the Atlantic white cedar tree now predominate or have flourished in the past.

The white cedar is indeed a very useful tree. Stands of this species are highly beneficial to wildlife, a factor which of course is an important consideration in creating wildlife refuges. The habitat in which these cedars grow provides excellent cover (that is, shelter and protection) for many animal and bird species. Shrubs associated with the habitat provide berries as a food supply for the black bear as well as many other animals and birds.

And then there is the sheer beauty of the habitat itself. Try some sky gazing by standing at the base of a large white cedar and looking upward along its trunk through the dark green arched crown high above you. It can be a truly inspirational experience, and it is little wonder that many who visit a cedar grove for the first time comment that they feel as if they are standing in a natural cathedral.

Finally, the white cedar is highly prized commercially. It is used extensively in boat building and home construction. It is one of the few trees valuable enough in the business sense to cover the high costs of logging it in the wet peat soils of the Albemarle-Pamlico peninsula. This high dollar value has led to its depletion throughout its range.

Most of the white cedar lands in the refuge consist of areas that were clearcut in commercial logging operations a few years ago. Fish and Wildlife Service personnel are now seeking ways to salvage these areas and, hopefully, regenerate new stands of young trees that can grow to maturity. Preliminary observation has shown that the cedars have begun regenerating nicely, on their own, in some of these areas, but have been doing less well in others. A concerted effort has begun to find out why and then to try to apply this knowledge in the poor-regeneration areas.

Fortunately, a few thousand acres of living cedars, including both young and mature trees, still remain on the refuge; all commercial leases for logging operations within its borders ceased on or before the end of 1990. At this point, refuge staff and volunteers are in the process of conducting an inventory of the remaining cedar stands. This, as well as the regeneration efforts described above, will represent important first steps in efforts to nurture and hopefully restore the refuge's valuable and beautiful stands of the magnificent Atlantic white cedar.

## Education a Plus . . .



## Wetlands Management

Until quite recently, many of us assumed that our wetlands — marshes, swamps, pocosins and the like — were just about the least valuable pieces of property that exist, and the only way to make such lands useful was to drain them. Now, due to declining fish and game populations, increasing water pollution, and other problems, we are learning to our sorrow that we were wrong, and wetlands should be up there at the top of the list of land types we should have been protecting all these years.

At the Alligator River National Wildlife Refuge, work is now under way to try to restore the original wetland character of some of the area. If the experiment is expanded, it will require a lengthy and complex effort, but the potential payoff could be quite large.

Much of eastern North Carolina used to consist of vast tracts of marshy and forested wetlands. The extensive pine, cypress, and white cedar forests of the region became more and more attractive as a burgeoning American population developed a growing appetite for timber and wood products. Small wonder, then, that roads and canals were increasingly built throughout the area

to give logging companies access to its rich stands of trees.

But the hitch, although no one realized it at the time, was that by building these roads and canals and removing its forests, the basic character of the land and its ability to support wildlife were changed for the worse. While the land remained wet, surface water could no longer be retained as long as it used to, meaning that water levels and many of the nutrients and foodstuffs needed for survival of and successful reproduction by many wildlife species were no longer there. The water run-off from these areas into nearby rivers and sounds became more severe. The changes may also have made it more difficult to regenerate the more valuable species of trees that had been harvested.

With the establishment of the Alligator National Wildlife Refuge in 1984, the Fish and Wildlife Service began to think about ways to try to undo some of the effects, and active efforts to this end got under way in 1989. And so, in the summer of 1989, Fish and Wildlife Service technicians succeeded in raising water levels in one area (approximately 8,000 acres) by placing a water flow control device in a canal and plugging 14 smaller ditches.

It is much too early to see any measurable results of this work, but water levels appear to be rising slowly. We are cautiously optimistic that this represents a small step in the right direction. Proposals have been made to expand the effort. In years to come and as we continue expanding the project, we may just be lucky enough to find that something approaching the original character of the wetlands in this area will have been successfully restored. And if that can happen here, why not in other areas as well?



## Waterfowl Management

We have all been hearing a lot lately about the decline in the number of ducks and other waterfowl throughout North America, due primarily to the rapid loss of wetlands and other suitable habitat for these once-abundant birds. This has become a matter of increasing concern to wildlife enthusiasts and sportsmen alike, and many efforts — from creating artificial ponds along major flyways, to advertising the federal duck stamp program, to producing TV specials about the problem — are under way to do something about it before it is too late.

An important part of the battle to stop the drop in waterfowl populations is being waged by the Fish and Wildlife Service. Here in Dare County, the front lines of that battle are located on the Pea Island and Alligator River National Wildlife Refuges.

At Pea Island, efforts to enhance waterfowl habitat are centered on (1) maintaining proper water levels in three large fresh-water ponds, and (2) growing the kinds of food plants in and near those ponds that will attract and nurture a wide variety of ducks, geese, and wading birds. Efforts like these have been going on there for this refuge's entire 50+ year history.

A newer and more ambitious effort is being undertaken at Alligator River. Here the work to help waterfowl really began in the late 1990s, and it is focused on a 4,800 acre tract of cropland. The previous landowner had modified this natural wetland area by building a perimeter dike around it, digging drainage ditches and installing pumps that can remove up to 250,000 gallons of water per minute from the area. Such pumping was necessary to make the area dry

enough for farming.

In 1988, Fish and Wildlife Service personnel were able to make a start in restoring wetland conditions in the tract by flooding 1,100 acres of farm fields. In the two following years, a system of dikes and ditches was refined that permitted greater fine-tuning of water levels throughout the flooded area. The payoff from this engineering work has already been gratifying. The duck population in the area rose from essentially zero ducks to a high of 5,000 in the winter of 1988 to more than 30,000 a year later. Species present included ring-necked, green and blue-winged teal, wood ducks, mallards, black ducks, and pintails.

The next objective of the wetlands restoration project at Alligator River will be to create a checkerboard of moist soil impoundments, forested wetlands, agricultural fields, and permanent ponds throughout the area. Progress toward this goal will be slow and costly because of the resources that will have to be brought to bear. But the progress made already is a good indication of the tremendous potential this area has for helping reverse the decline in our local waterfowl populations. Waterfowl wintering here find abundant food and little disturbance, a good combination that sends them back to their breeding grounds in excellent condition for reproduction.

Our children and grandchildren may never again see the sky blackened by the flight of untold tens of thousands of migrating ducks, but at least we are now doing what we can to make it possible for some — and hopefully many — of these birds to survive.

## Loggerhead Sea Turtles

Every morning from late May to early September, volunteers join the rising sun on the beaches from Oregon Inlet to the Rodanthe Pier. They spend the early hours searching for the characteristic tracks that indicate a female sea turtle has crawled from the waves' edge to the base of the dunes to lay her eggs. North Carolina beaches lie on the northern edge of the nesting range for loggerhead sea turtles. Loggerheads are a threatened species, now requiring special assistance to avoid extinction.

Locating a turtle nest begins the process by volunteers and staff of Pea Island Refuge that will offer each egg its best chance of survival. When a crawl is found, a trained professional comes out to "probe" to determine if, in fact, a nest was actually laid. Some crawls are "false," and no eggs are deposited. Once eggs are found, the quantity is recorded,

and the nest is evaluated for relocation. If it is in an area of high erosion, overwash or excessive public use, it is carefully transplanted to a safer area of the beach.

Intense monitoring of the nest begins about 55 days later in expectation of hatching. There are many obstacles for the turtles to surmount on their journey to the Gulf Stream. Some don't survive the strenuous "dig" to get to the surface from the underground nest. Others fail to survive the dash across the beach to get into the water. The ghost crabs are vicious fighters and voracious eaters of baby turtles. Once in the ocean, turtles have to contend with another set of predators, including fish and sharks.

An average loggerhead nest will have 60-155 eggs. Pea Island usually has 10-20 nests each year. Most biologists consider a nest successful

if one tiny hatchling survives to produce offspring. Mathematically speaking, that means Pea Island, at best, provides 10-20 turtles for the breeding population each year. Compare that to many southern beaches where hundreds of nests are laid each night for weeks at the time. Why do we put so much time and energy into producing only 10-20 turtles?

A special factor in the biology of sea turtles makes the North Carolina turtle nests particularly important; the temperature of the environment around each egg determines whether a male or female turtle will emerge. As the northernmost and therefore coolest range for nesting loggerheads, it has been hypothesized that an unusually high percentage of males may hatch from the North Carolina nests. Since a single male sea turtle may service many females, Pea Island's nests could be the major source of males for the entire population. Since turtles normally have a low percentage of survival from a nest due to natural hazards, the increased mortality caused by man-made hazards has pushed the species towards extinction. Carelessly tossed baggies, abandoned pieces of gill net, and improperly managed trawling operations are all dangerous to sea turtles.

This makes our efforts that much more critical and each turtle that makes it from nest to ocean that much more special. In your visit to the Outer Banks, be respectful of areas marked for wildlife protection. Don't litter; obey refuge, State, and local laws; and report people who violate!

## Hunting at Alligator River



## "Refuges Are For Adventurous People"

### Pea Island

#### Summary of Regulations:

- Fishing is permitted in the ocean and sound. Fishing is prohibited in the ponds.
- Pets are prohibited in the pond areas. In all other public areas, pets are permitted if they are leashed.
- Camping is prohibited.
- Fires are prohibited.
- Hunting is prohibited.
- Guns are prohibited.
- Driving on the beach is prohibited. Vehicles are allowed only on public roads and in designated parking areas.
- Littering is prohibited.

Birding, fishing, nature study, and photography are the most popular wildlife related public uses of the refuge and its bountiful resources. Since it lies in the middle of Cape Hatteras National Seashore and is bisected by NC 12 (the only road to Hatteras/Ocracoke), Pea Island National Wildlife Refuge is impacted by more than 2 million visitors each year who at least "pass through." Many of these folks never realize they are on a national wildlife refuge; others take a quick look as they drive through, but never stop for further involvement.

In the fall and winter, driving along Highway 12 can offer a memorable wildlife viewing experience. Snow and Canada geese graze in fields which have been planted in cool season grasses. In the pond areas, also near the road, tundra swans, many species of ducks, and an assortment of wading and shorebirds can usually be seen.

Currently, two observation platforms are located on the north and south dikes of North Pond. The North Pond Trail, a half mile trail located on the south dike of the pond, is currently being upgraded and renovated. More serious birders (or folks who want more of a "walk on the wild side") may continue past the half mile trail and walk the entire perimeter of the North Pond on refuge service roads. This area is open for wildlife observation, but offers no special facilities. The walk is usually filled with swarms of biting insects, is a long one (4-4.5 miles) and the last leg is along Highway 12. Many visitors prefer to enjoy the North Pond Trail, then drive to the north dike and walk to the other overlook. New Field and South Ponds and the surrounding marshes are closed to all public entry. These areas are set aside to provide undisturbed resting, nesting and feeding areas for wildlife year-round. As staffing allows, a special bird walk in South Pond, is available by arrangement.

During the summer months, public bird walks and Children's Wildlife Discovery programs are scheduled. From October 1st through the Saturday after Thanksgiving, Saturday morning bird walks are offered, as well.

The 13 miles of pristine beach provide the surf fishing enthusiast an

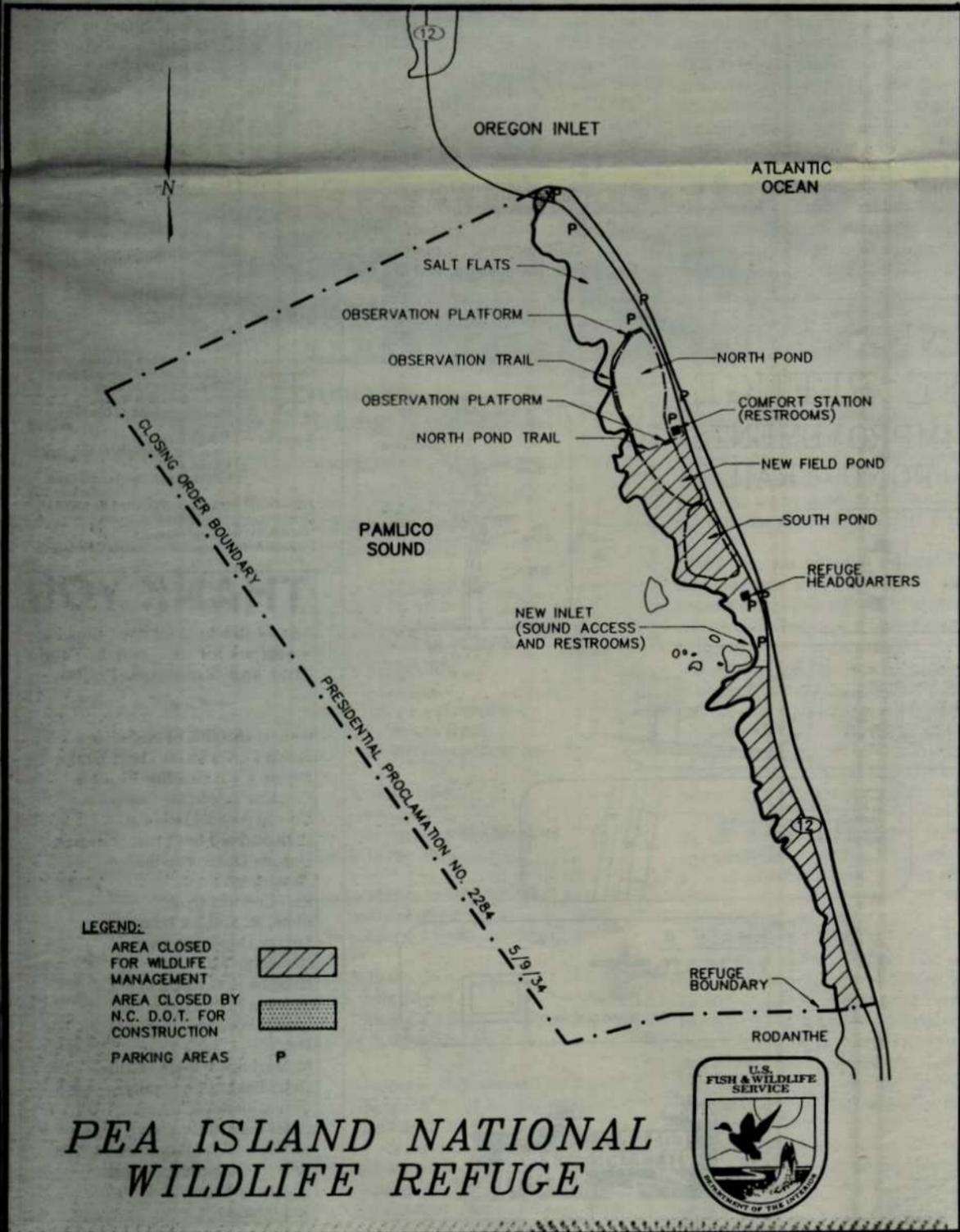
excellent opportunity to take home a good catch. Speckled and gray trout, spot, flounder, blue fish, red drum, and striped bass are some of the more sought after species. A walk on the beach also offers an excellent opportunity to observe shorebirds and marine birds and mammals.

The best opportunity for crabbing is along the shore of Oregon Inlet. New Inlet, a small soundside parking area about 7 miles south of Oregon Inlet, provides an appropriate spot to launch a small, shallow draft boat or canoe. Fishing in the sound is easier by boat, but many visitors prefer to wade from New Inlet or walk to the back of the island to fish from the shore on the north end. Many schools utilize New Inlet for marsh studies, as well.

Pea Island's beaches are closed to all vehicular traffic. Though North Pond is open for walking the perimeter, all pond areas themselves and New Field are closed to public entry. Fishing, crabbing, boating, and other water-related activities are prohibited in all three ponds. Likewise, dogs are prohibited from the pond areas. In all other public areas of the refuge, dogs are permitted, but must be leashed.

Visitors should obey refuge signs and regulations to ensure that wildlife has a place to grow and survive for future generations to enjoy. Pea Island National Wildlife is administered through Alligator River National Wildlife Refuge in Manteo. Visitors may request information by contacting the Pea Island office (919) 987-2394, the Alligator River office (919) 473-1131, or by writing to the refuge at P. O. Box 1969, Manteo, North Carolina 27954.

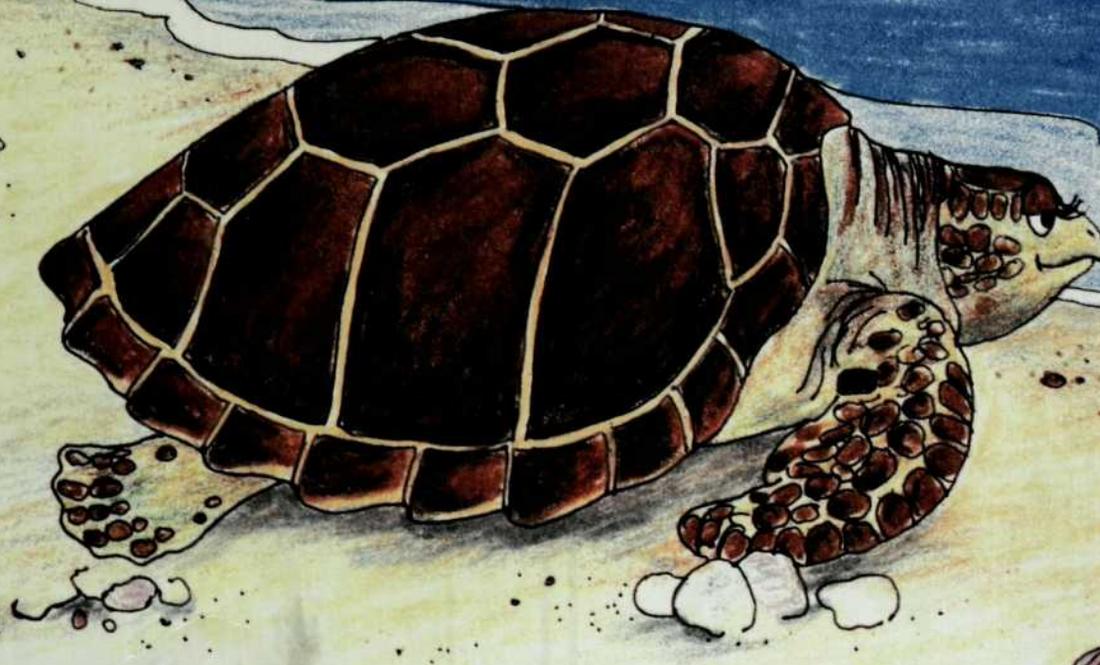
## Fishing at Pea Island



# PEA ISLAND NATIONAL WILDLIFE REFUGE

# TAMMY TURTLE

## A Tale of Saving Sea Turtles



Suzanne Tate  
Illustrated by James Melvin

**Tammy Turtle** was published in cooperation with the Coastal Wildlife Refuge Society, the non-profit support group for Alligator River and Pea Island National Wildlife Refuges in North Carolina.

Tammy is a loggerhead sea turtle (*Caretta caretta*). Loggerheads are among the six species of Atlantic sea turtles. All six are classified as **endangered** or **threatened**.

A mature loggerhead turtle produces two to four nests of 75 to 150 eggs each in a nesting season occurring every 2-3 years. Adult sea turtles have almost no natural enemies. However, young sea turtles fall prey to many things. Fewer than 1 in 100 turtle hatchlings survive to reach adulthood. In the United States, loss of nesting habitat and predation of eggs are among the major threats to the species.

In **Tammy Turtle**, plastic litter is the symbol for humans' negative effects on turtles. Litter was chosen because children can relate to litter and can do something about it.

We have purposely represented HELPFUL HUMANS as employees and volunteers for conservation agencies. Since all sea turtles are protected by the Endangered Species Act, only "official" humans may work with them.

Many sea turtle programs would not survive without the dedicated efforts of volunteers. These volunteers work long hours without pay, day and night, in all kinds of weather, to help sea turtles survive.

Located in Dare County, North Carolina, Pea Island National Wildlife Refuge lies in the northern part of the nesting range for loggerhead sea turtles.



P.O. Box 1808 Manteo, NC 27954

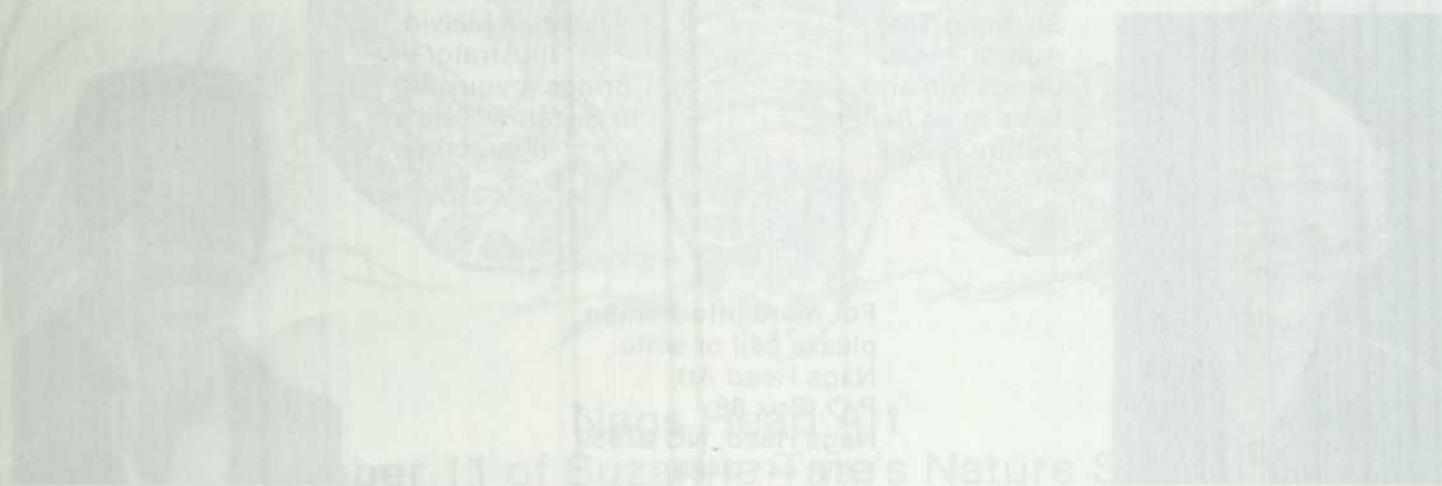
# Tammy Turtle

A Tale of Saving Sea Turtles

Suzanne Tate

Illustrated by James Melvin

## Tammy Turtle



For more information  
please call or write  
Nags Head Art  
PO Box 200  
Nags Head, NC 28596

Number 11 of Suzanne Tate's Nature Series

Tammy Turtle was published in cooperation with the Coastal Wildlife Refuge Society, the non-profit support group for Alligator River and Pungu Island National Wildlife Refuges in North Carolina.

Tammy is a loggerhead sea turtle (*Caretta caretta*). Loggerheads are among the six species of Atlantic pine turtles. All six are classified as endangered or threatened.

A mature loggerhead turtle produces only two sets of 75 to 150 eggs each in a nesting season occurring every 2-3 years. Adult sea turtles have almost no natural enemies. However, young sea turtles fall prey to many things. Fewer than 1 in 100 white hatchlings survive to reach adulthood in the United States. Loss of nesting habitat and predation of eggs are among the major threats to the species.

In Tammy Turtle, plastic litter is the symbol of man's negative effects on turtles. Litter was chosen because crabs eat it, fish eat it, and even sea turtles do it.

We have personally represented HILLTOP, Inc. as employees and volunteers for conservation agencies. Since all sea turtles are protected by the Endangered Species Act, only "official" humans can work with them.

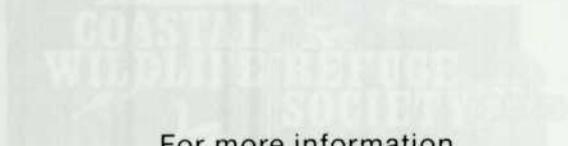
Many sea turtle projects depend on the efforts of volunteers. These volunteers are needed in all kinds of weather. It helps sea turtles.

Located in Dare County, North Carolina, the world's National Wildlife Refuge lies in the northern part of the nesting range of loggerhead sea turtles.



Suzanne Tate,  
Author—  
brings fun and  
facts to us in her  
Nature Series.

James Melvin,  
Illustrator—  
brings joyous life  
to Suzanne Tate's  
characters.



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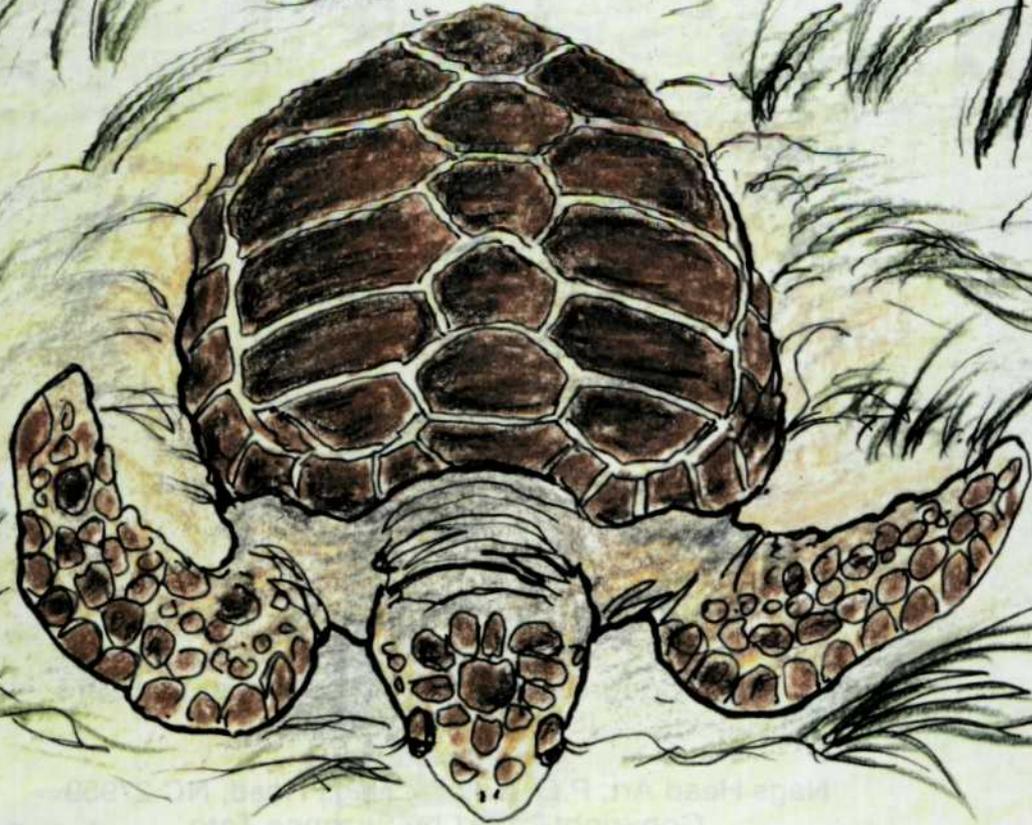
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# Tammy Turtle

A Tale of Saving Sea Turtles

Suzanne Tate

Illustrated by James Melvin



Nags Head Art

Number 11 of Suzanne Tate's Nature Series

Tammy Turtle  
A Tale of Saving Sea Turtles

To Conservation Volunteers

Everywhere

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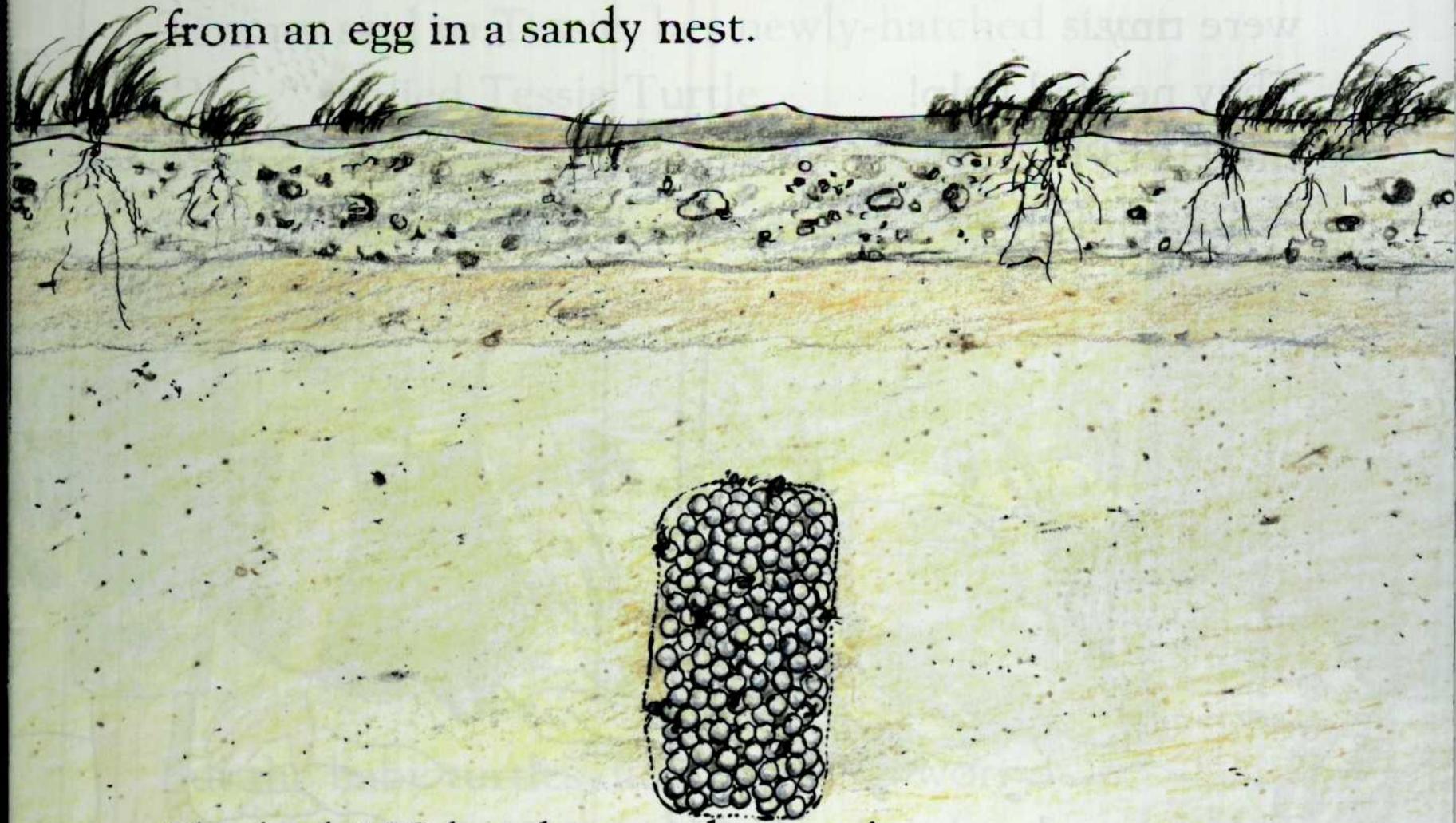
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First Edition

One dark night, Tammy Turtle hatched  
from an egg in a sandy nest.

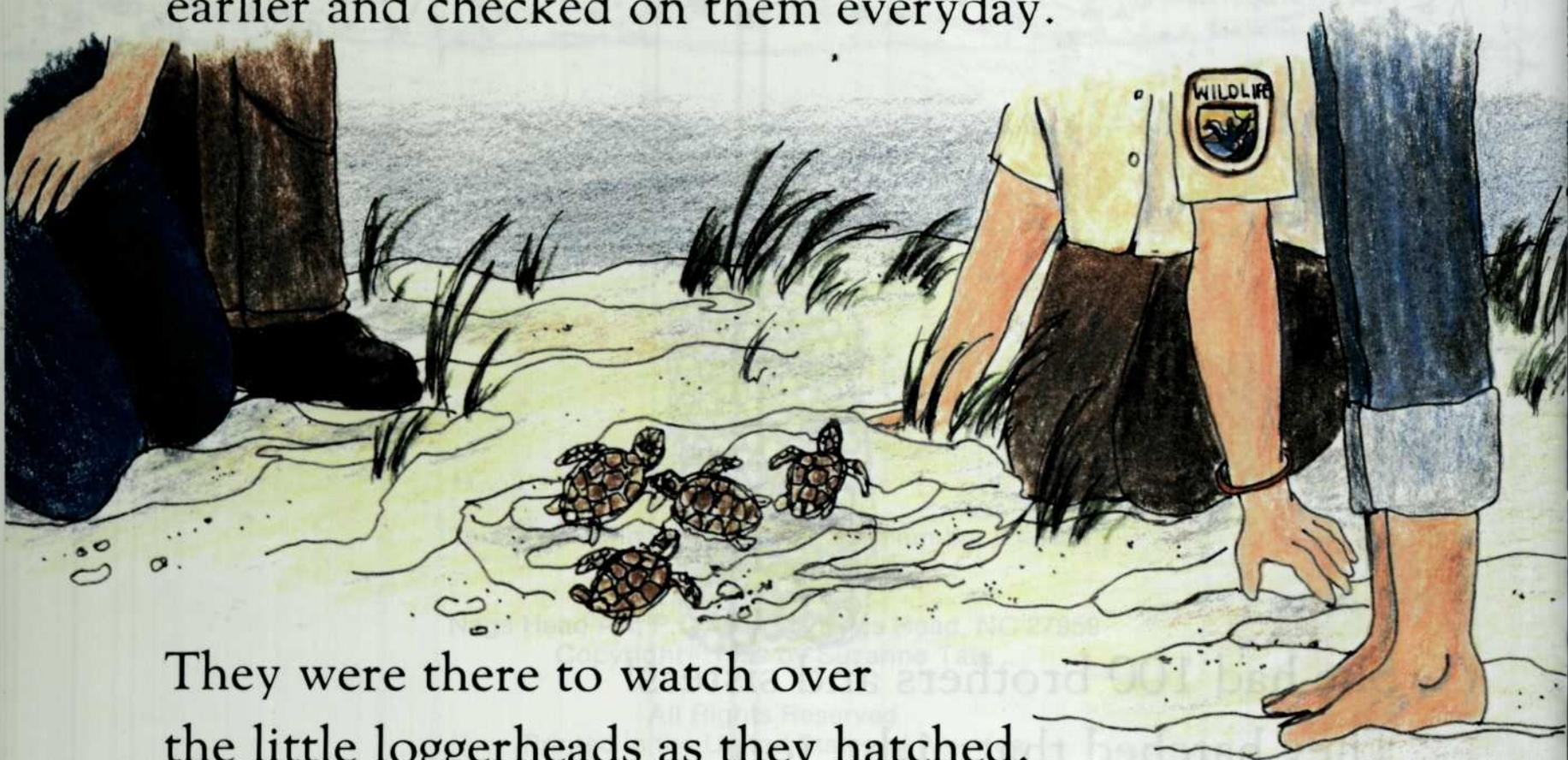


She had 100 brothers and sisters!  
They hatched that night, too.

Tammy and the other turtle hatchlings  
were tiny.

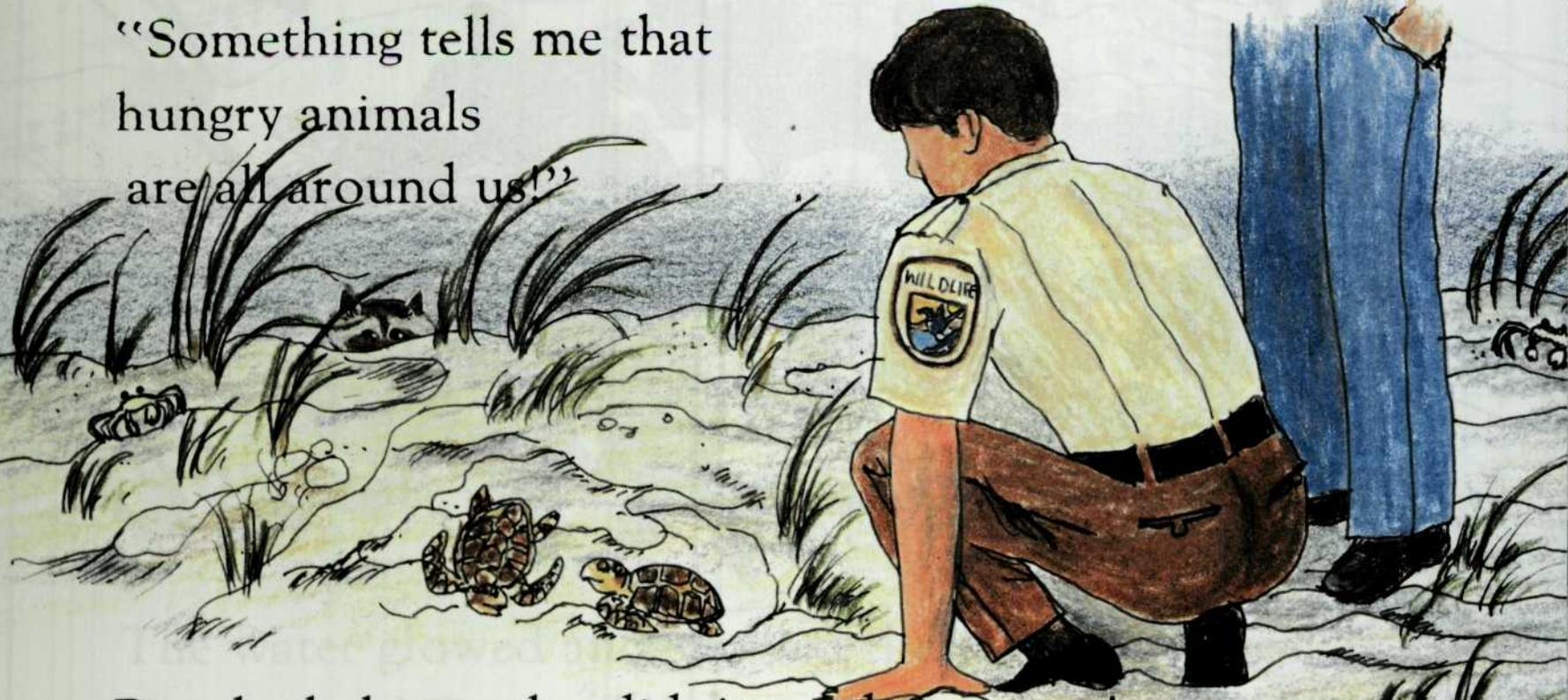
They needed help!

But HELPFUL HUMANS had found the eggs 55 days  
earlier and checked on them everyday.

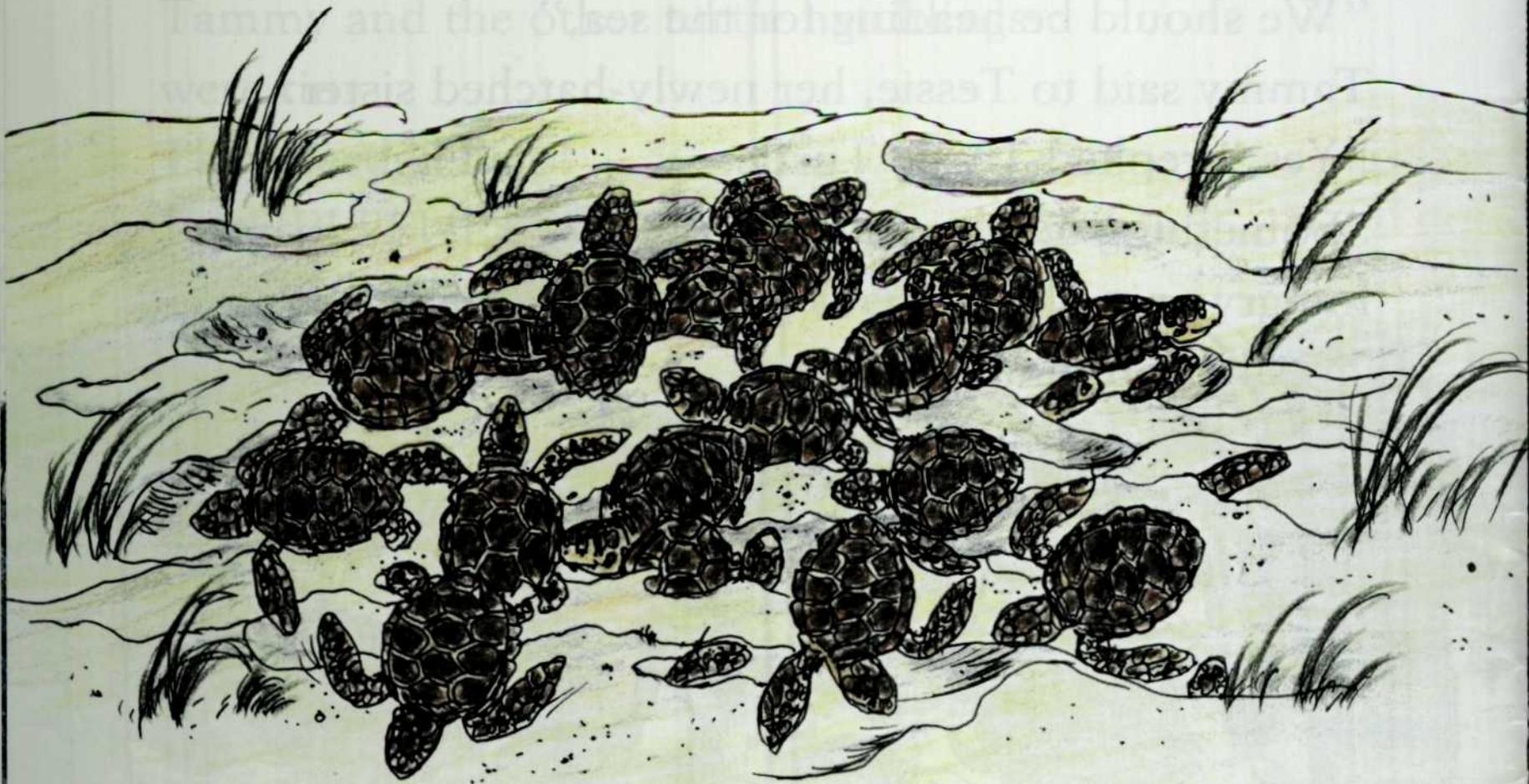


They were there to watch over  
the little loggerheads as they hatched.

“We should be heading for the sea,”  
Tammy said to Tessie, her newly-hatched sister.  
“Yes,” replied Tessie Turtle.  
“Something tells me that  
hungry animals  
are all around us!”



But the baby turtles didn't need to worry!  
The HELPFUL HUMANS guarded them.  
They kept them safe from raccoons and ghost crabs.



Suddenly, the nest began to boil!  
It boiled over with dozens of tiny turtles  
as they sprang into action.



The water glowed and showed them where to go. Tammy and Tessie and their brothers and sisters hurried toward it.

“Here we go!” cried Tammy as they all slid into the sea.



Waves washed over the turtles  
and turned them upside down.

The sea was a wild place!

Hungry animals were there, too.

But every tiny turtle knew that it should head for deeper water and...

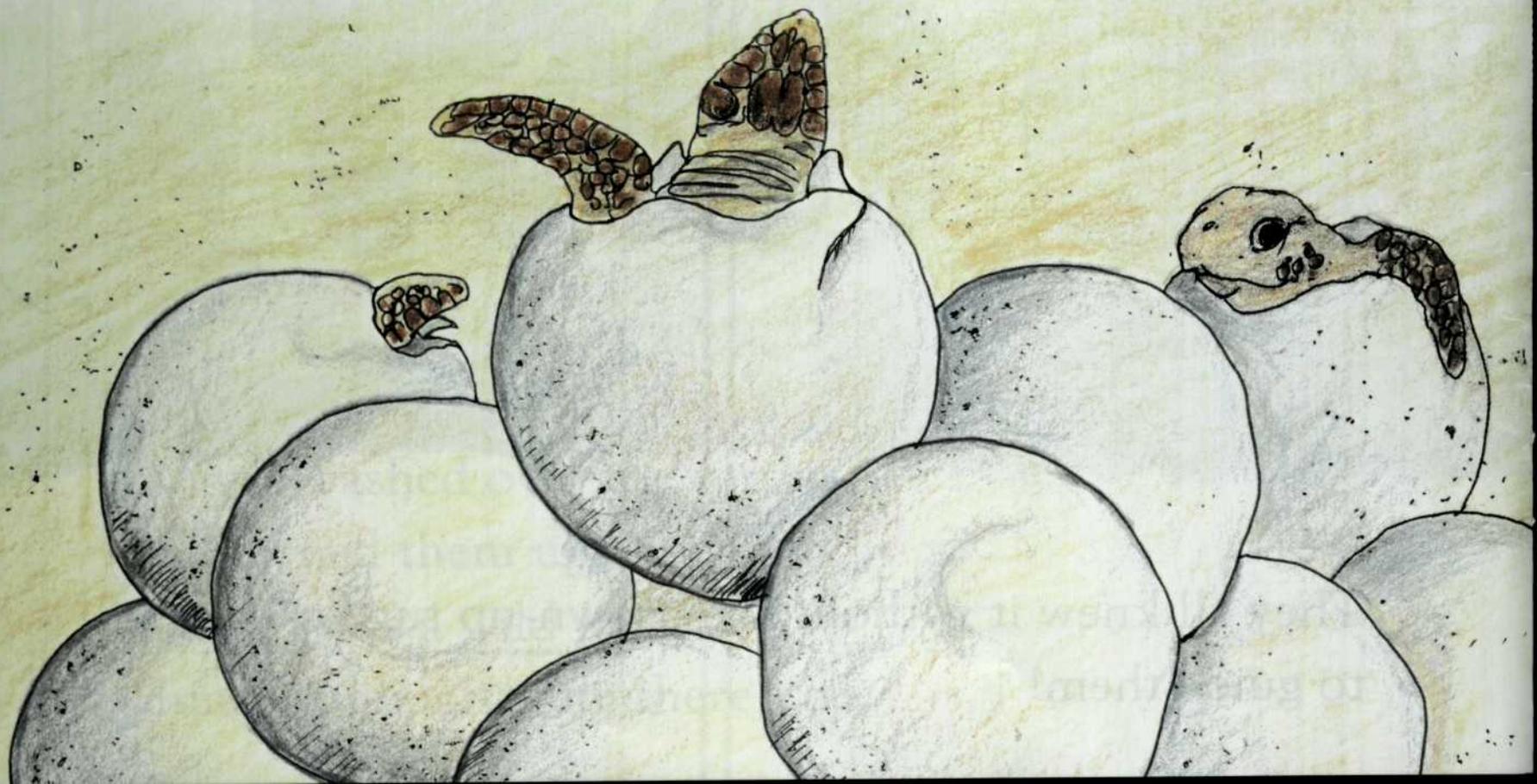
**GO FAST!**

They all knew it without any grown-up turtle to guide them!

Nature had given them a source of energy  
to escape their enemies.

For earlier, each tiny turtle  
had absorbed yolk from its egg.

It gave them enough food to last three to five days.



The tiny turtles didn't stop for anything.  
They swam as fast as they could  
until they came to the Gulf Stream.





The water was warm in the Gulf Stream  
and full of sea life.

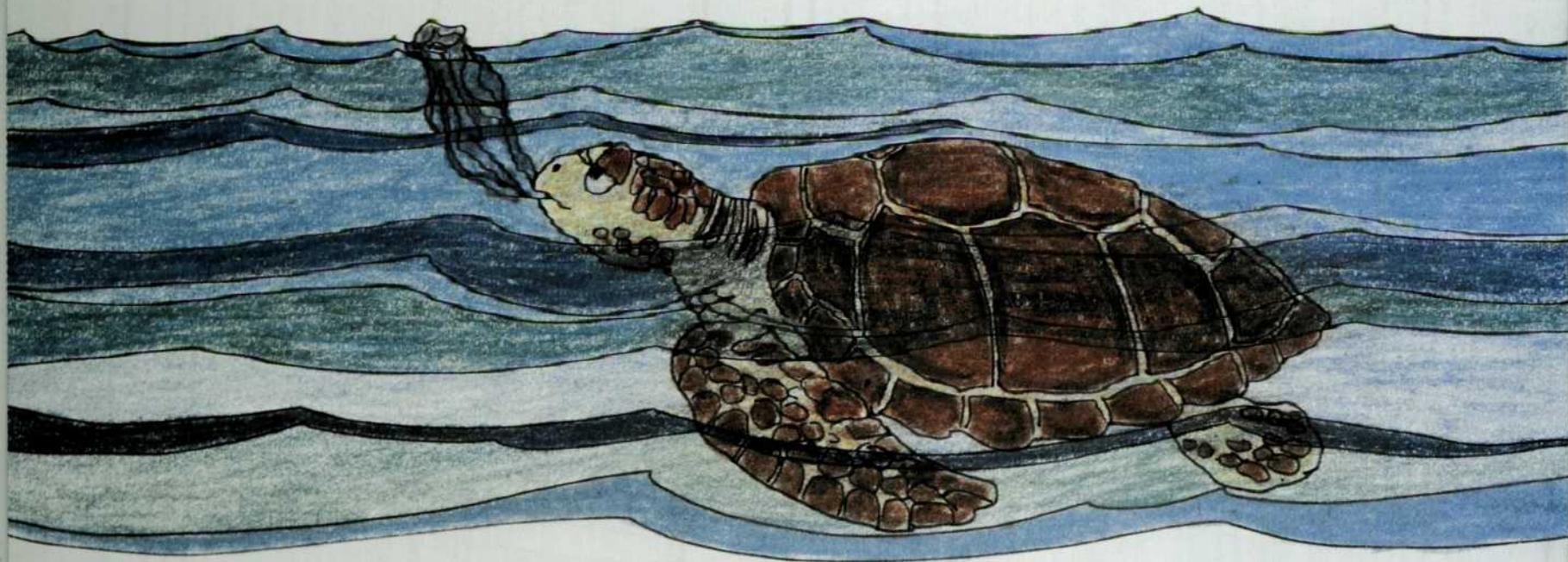
A plant called sargassum weed floated in it.

“Oh, we can hide in this seaweed,” said Tammy.

“And look for good things to eat,” added Tessie.



The little turtles did find plenty of food  
in the Gulf Stream.  
Later, they drifted apart and each one  
swam and ate and grew larger.



Several years went by, and Tammy Turtle became big and strong.

One day, Tammy was looking for food.

She saw one of her favorite foods—jellyfish.

“Oh, I will gulp that down at once,” thought Tammy.

And she grabbed it with her big beak.



But it wasn't a jellyfish!  
It was a plastic bag left by careless HUMANS.  
Tammy Turtle felt sick after eating it.

She could not even swim well!  
Waves tossed the tired turtle  
and washed her ashore.



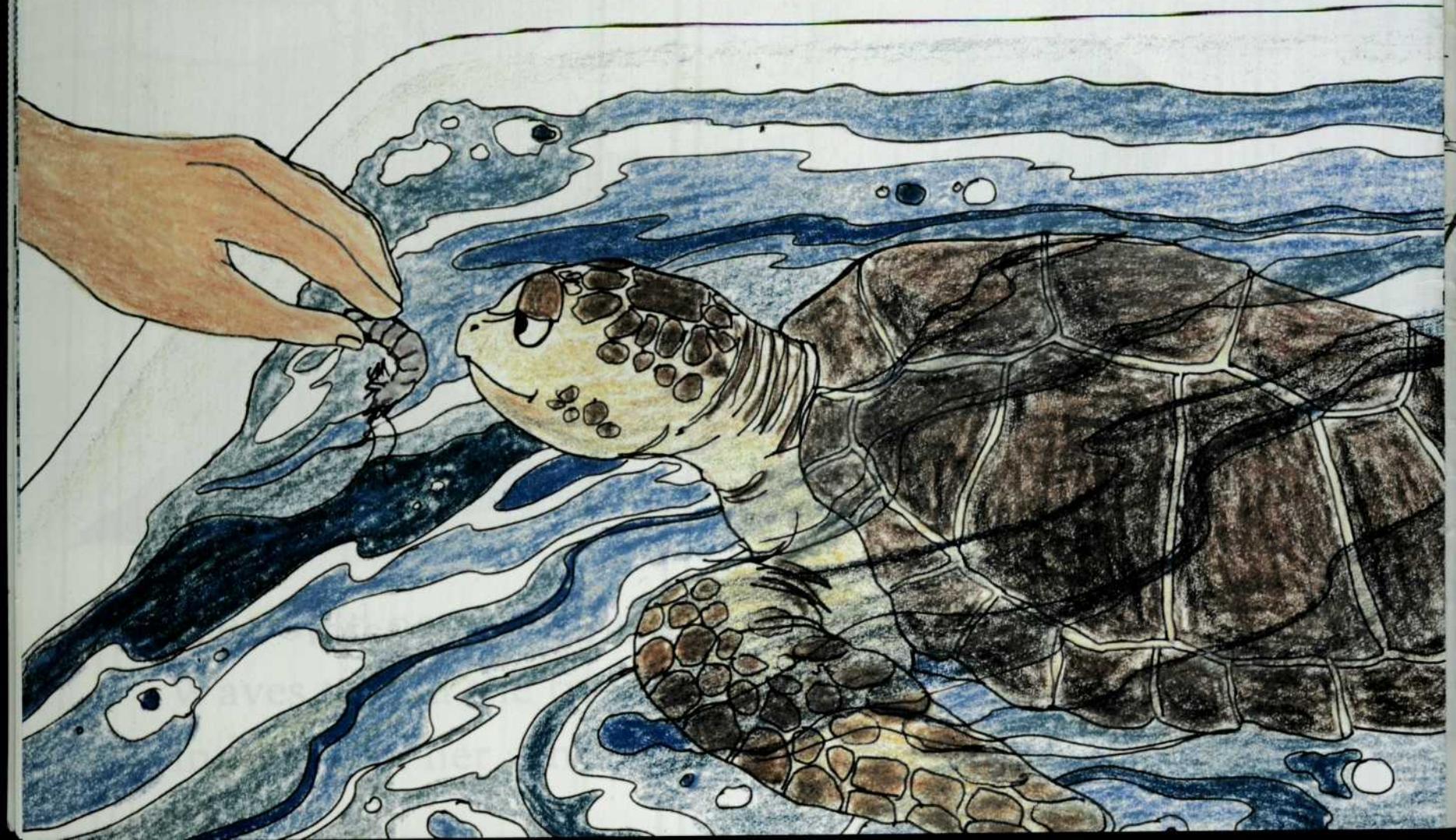


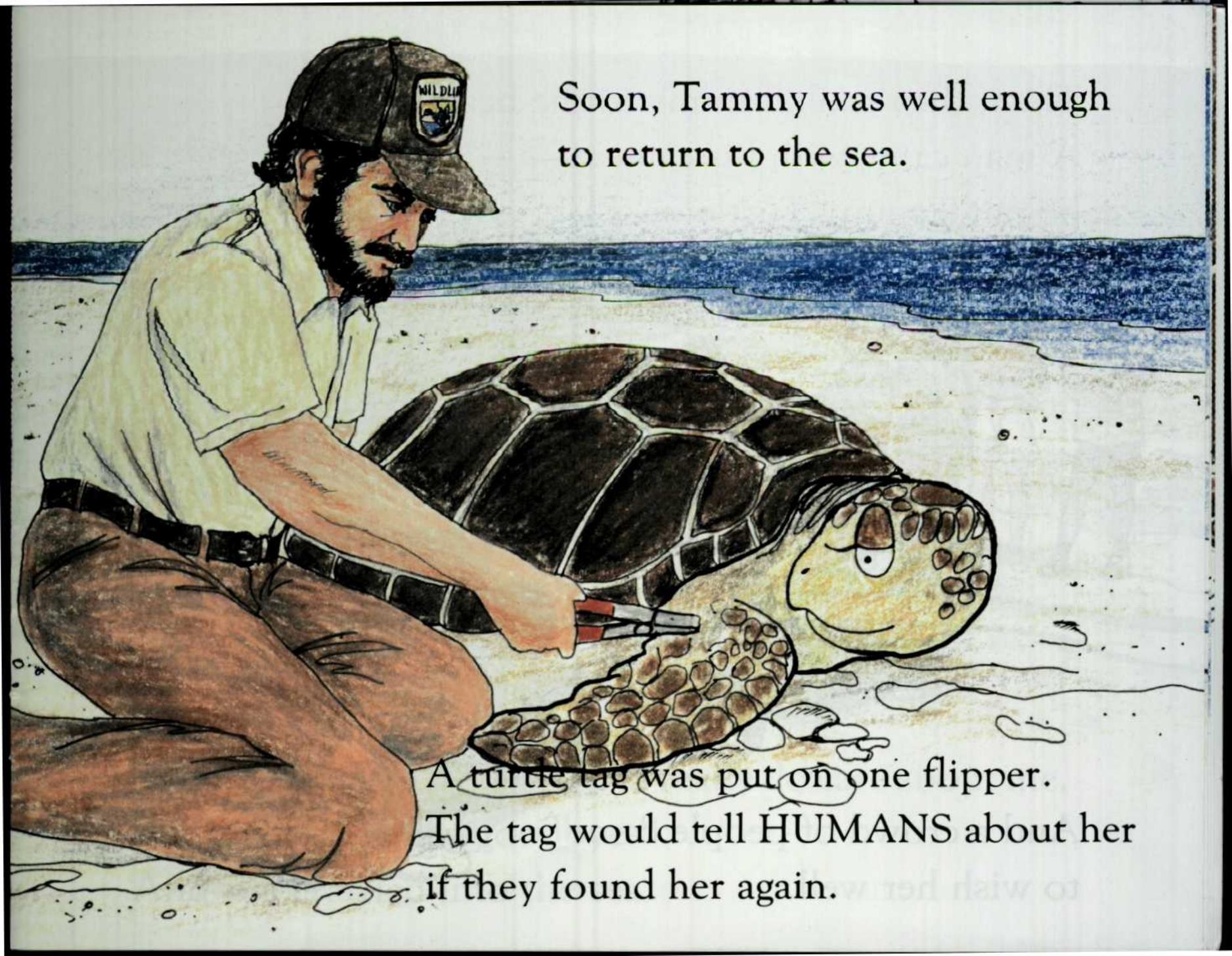
Again, HELPFUL HUMANS were there and found Tammy.

“Maybe we can save this sea turtle!” they said.

“We will take her to a place where she can rest and get well.”

So they took Tammy Turtle to a science center.  
She was put into a large tank  
and cared for everyday.

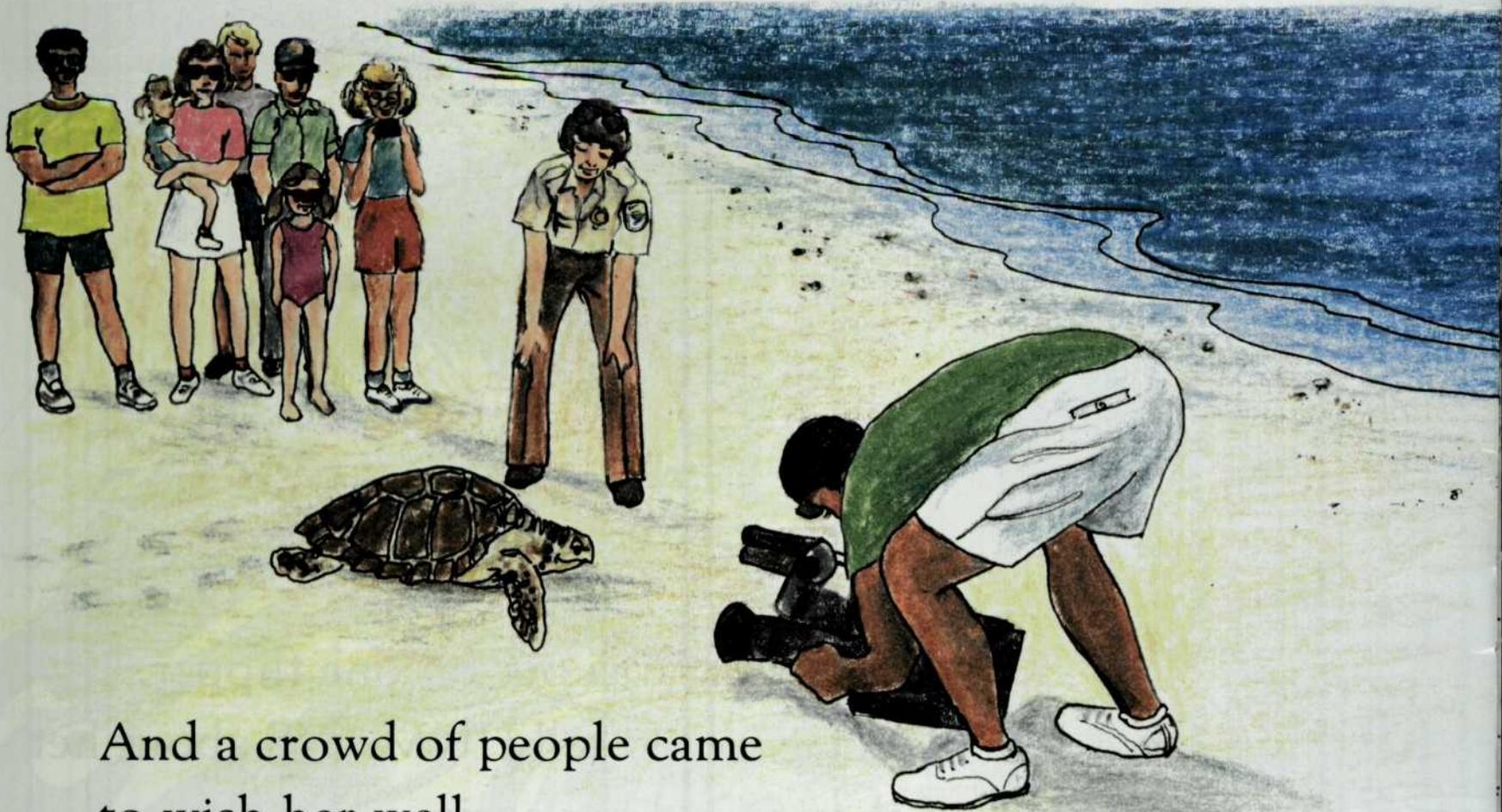


A man with a beard and a cap that says 'WILDLIFE' is kneeling on a sandy beach. He is using red-handled pliers to attach a tag to the flipper of a large sea turtle. The turtle has a friendly face with large eyes and a slight smile. The background shows the ocean waves and a clear sky.

Soon, Tammy was well enough to return to the sea.

A turtle tag was put on one flipper.  
The tag would tell HUMANS about her  
if they found her again.

Then, they took Tammy to the beach.  
A man came with his camera—  
he put Tammy Turtle on TV!

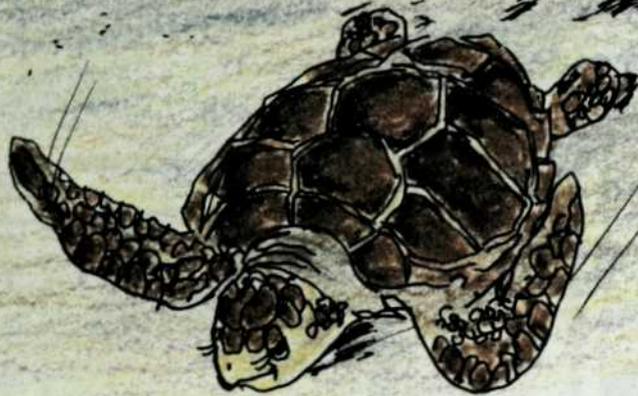


And a crowd of people came  
to wish her well.



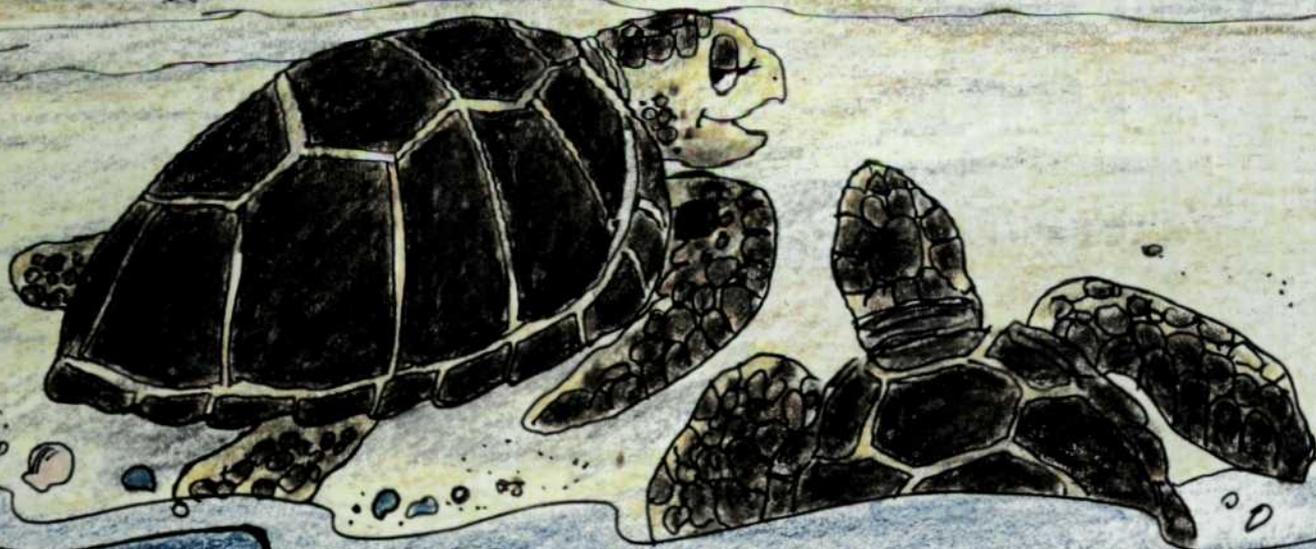
Tammy thought, "HUMANS really do care about me.  
But it's time to say goodbye."  
And she crawled into the sea.

Time passed, and Tammy became  
a fully grown mother turtle.



One dark night, she crawled ashore.  
She came up on the beach to lay her eggs  
in a sandy nest.

Soon, another turtle slowly  
dragged herself out of the water.

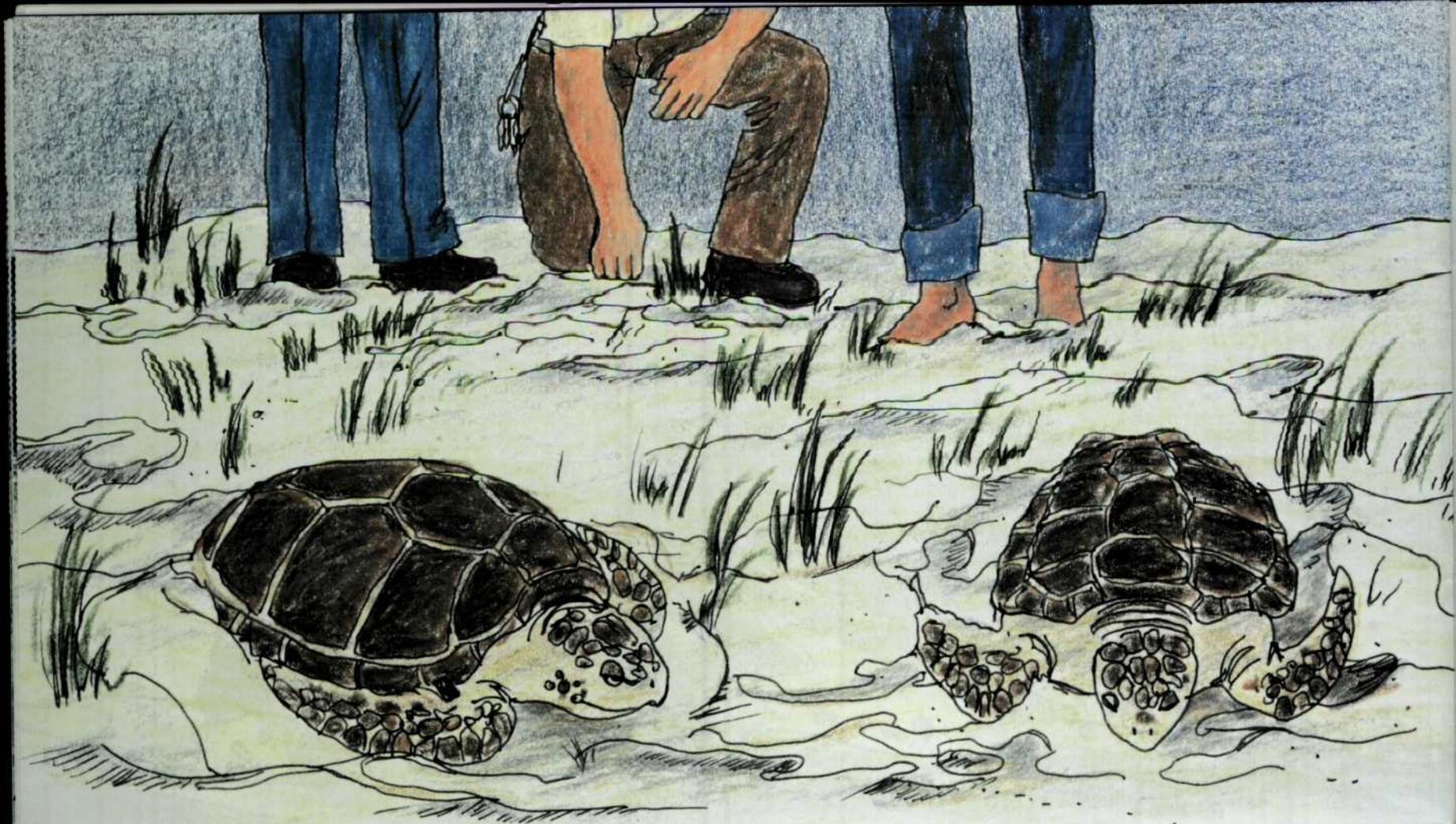


"Tessie! Is that you?" cried Tammy.

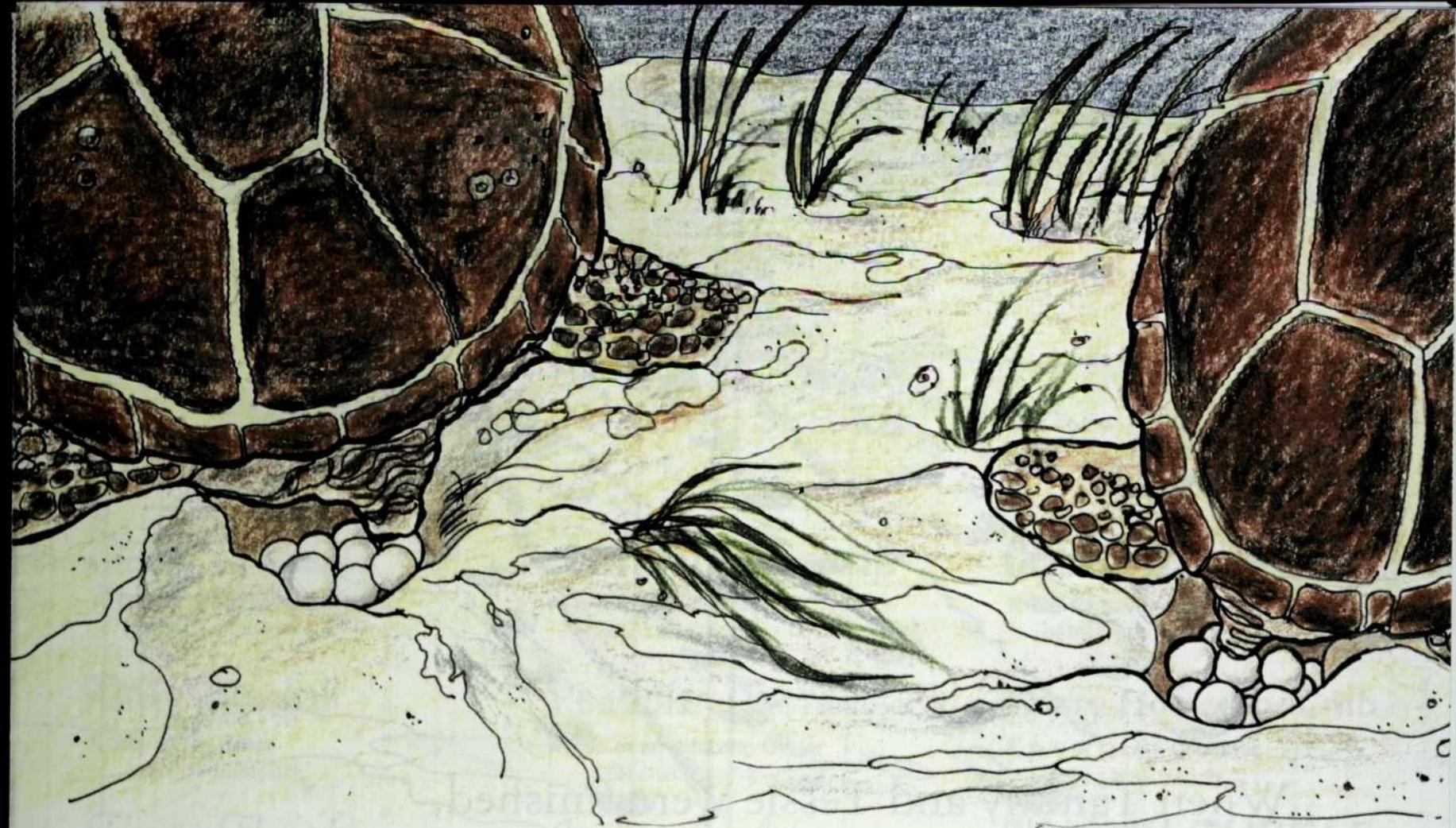
"I've come to lay my eggs, too," answered Tessie.

It was most amazing!

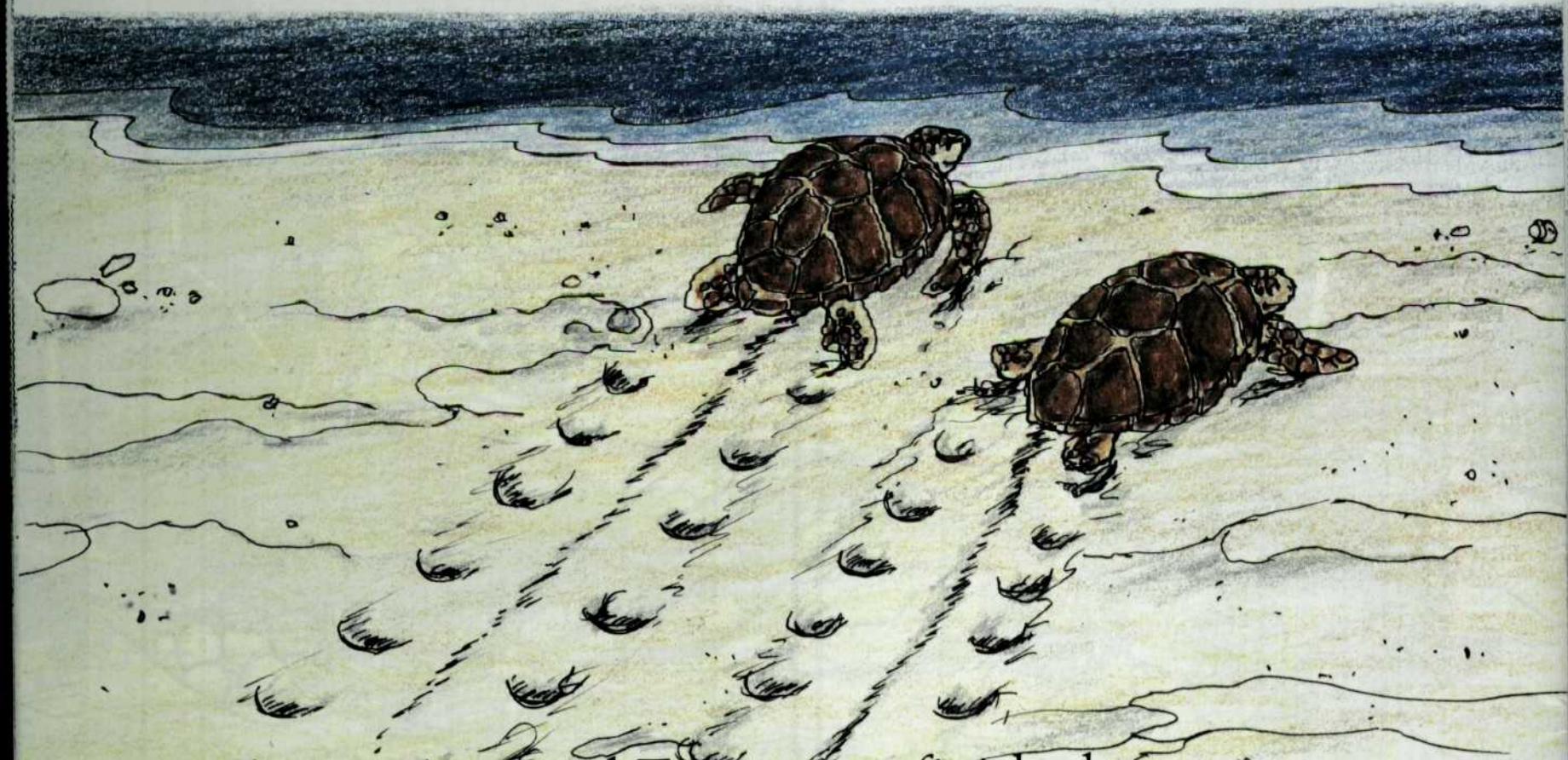
Tammy and Tessie had come back  
near the beach of their birth to lay their eggs.



HELPFUL HUMANS came again to the beach and quietly watched the mother turtles. The big loggerheads dug deep nests in the sand with their back flippers.



Tammy and Tessie acted as if they were in a daze. They didn't notice the HUMANS at all. The turtles quietly laid their eggs, and then—using their flippers—covered the eggs with sand.



When Tammy and Tessie were finished,  
they slowly crawled to the water.  
They never looked back at their nests  
and swam away in the sea—  
just like their mother had done years before!

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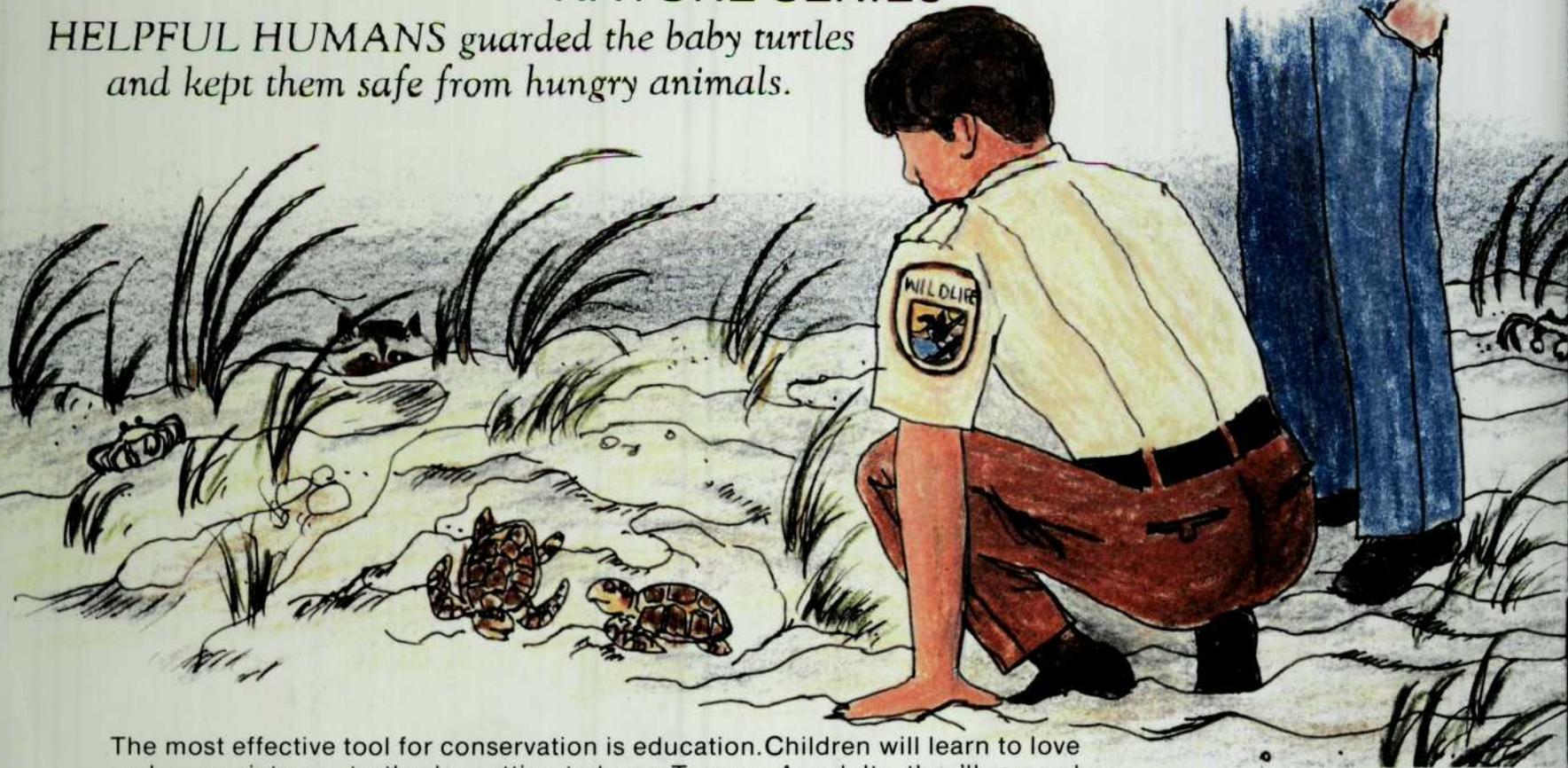
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