

REVIEW AND APPROVAL

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE
PEA ISLAND NATIONAL WILDLIFE REFUGE

MANTEO, NORTH CAROLINA

ANNUAL NARRATIVE REPORT

Calendar Year 2003

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5/11/04
Date

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6/16/04
Date

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Manteo, North Carolina

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

INTRODUCTION

Alligator River National Wildlife Refuge is approximately 152,000 acres in size and lies at the eastern end of a broad, flat, and swampy peninsula in northeastern North Carolina. Most of the Refuge is located in the mainland portion of Dare County, with some land reaching southward into Hyde County. The Refuge is part of a five-county region bounded on the north by the Albemarle Sound, on the east by Croatan and Pamlico Sounds, and on the south by Pamlico Sound and Pamlico River. The Refuge supports 145 species of birds, 48 fishes, 40 mammals, and 48 reptiles and amphibians.

Alligator River National Wildlife Refuge was established with a 118,000-acre land donation from Prudential Life Insurance Company in Dare and Tyrrell Counties on March 14, 1984. Eventually, the Tyrrell County land was transferred to Pocosin Lakes National Wildlife Refuge and additional land was acquired, some to the south in Hyde County. The addition of 5,100 acres of farmland in 1988 substantially increased opportunities for waterfowl management. Today, the farm units attract numerous tundra swans, pintails, mallards, wigeons, and a variety of other species. In combination with the 46,000-acre Dare County Bombing Range located near its center, this area represents approximately 200,000 acres of relatively undisturbed wetland habitat.

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

The Red Wolf Recovery Program is centered on Alligator River NWR. The wild population of red wolves is currently consists of approximately 100 wolves in 20 packs, distributed across 1.7 million acres in five eastern North Carolina Counties.

The Refuge offers a wide variety of programs and activities for public recreation ranging from hunting and fishing to paddling and wildlife observation and photography. The number of environmental education and interpretive programs is increasing each year, as Americans "discover" this treasure in eastern North Carolina.

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A. HIGHLIGHTS

- On January 23rd, an unusual winter storm dumped 10-12 inches of snow on the Outer Banks. Section B.
- September 18th, Hurricane Isabel slammed the Outer Banks near Ocracoke with sustained winds in excess of 100 mph. Section B.
- Alligator River/Pea Island's first full time Refuge Law Enforcement Officer, Jeremy Bucher, arrived on duty in March. Section E.1.
- Refuge Manager Mike Bryant received several awards this year including a DOI Environmental Achievement Award. Section E.1.
- Refuge Biologist Dennis Stewart was presented with the very distinguished Boy Scouts of America Silver Beaver Award for his work with scouts. Section E.1.
- WIS Bonnie Strawser received the American Recreation Coalition's "Legends Award" for 2003. Section E. 1.
- A total of 30,590 hours of volunteer service was contributed by 365 volunteers during 2003. Section E.4.
- In relation to fire management, calendar year 2003 was one of the wettest years in Refuge history. Section F. 9.
- In spite of a wet spring fire season, the Refuge experienced portions of the "First Fire", the largest wildfire (2,300 acres) in past 10 years. Section F.9.
- Eight adjacent, private landowners signed a Memorandum of Understanding to allow the Refuge to conduct prescribed burns on their property. Section F.9.
- In November, the Regional Fire Management Coordinator made a decision to relocate the fire helicopter to central Florida. Section F.9.
- Damage from Hurricane Isabel ranges from moderate to extensive in red-cockaded woodpecker clusters. Section G.2.
- Fiscal year 2003 represents the 16th consecutive year of successful red wolf management in eastern North Carolina. By Spring 2003, the wild population had produced a total of at least 332 wild pups, with 41 born in 2003 alone. Section G.2.
- A graduate student study to estimate the Refuge population of black bears is underway and a management plan will be drafted in 2004 or 2005. Section G.8.

- To commemorate the 100th Anniversary of the NWRS, a time capsule was buried at the Outer Banks Welcome Center on Roanoke Island. Section H.
- In 2003, the Coastal Wildlife Refuge Society spent \$82,000 on Refuge projects. Section H.18.
- The Navy Shell and Milltail Bridge replacement projects were completed this year and 23 miles of Refuge roads were repaired using Federal Highway Administration monies. Section I.2.
- The South Twiford dikes reconstruction project was initiated this year. Section I.2.



Black bears are a fairly common sight on Alligator River National Wildlife Refuge. This mother has her paws full with three cubs to corral.

Larry Wade

B. CLIMATIC CONDITIONS

The Outer Banks of North Carolina typically has warm, humid summers and cool, damp winters with an average annual precipitation of 51.30 inches. It is not uncommon to have 20-30 mph winds. The table below summarizes the past year:

2003 ALLIGATOR RIVER NWR WEATHER DATA

Month	Maximum Temperature	Minimum Temperature	Total Rainfall
January	74	10	1.75
February	77	27	6.19
March	78	33	5.25
April	82	31	7.74
May	90	43	5.27
June	94	51	3.47
July	96	66	8.28
August	98	58	7.85
September	93	54	6.41
October	81	39	3.84
November	85	30	2.00
December	70	24	5.99
Total			64.04 inches

On January 23rd, an unusual winter storm dumped 10-12 inches of snow on the Outer Banks. Near blizzard-like conditions existed for several hours with several white-outs. This was the heaviest snowfall in the area since 1988.

September 18th, Category 2 Hurricane Isabel slammed the Outer Banks with landfall centering near Ocracoke Island. Although not a particularly wet storm (avg. 2-3 inches of rain) Isabel brought sustained winds in excess of 100 mph to much of the area. Structural and resource damage reports totaled approximately \$5 million for Alligator River and Pea Island NWR's. From the air, it appeared that numerous microbursts within the storm resulted in scattered severe damage. Resource damage to thousands of trees was sustained at ARNWR and sand dunes at PINWR were overwashed across NC Highway 12, some into Refuge impoundments, to create 181 acres of sand flats. Chainsaw crews from several southeast NWR's were instrumental in removing trees from roads and trails – 235 trees were blown across the ½ mile Sandy Ridge Trail alone. The red wolf captive facility was completely destroyed and one red wolf was killed inside the facility when it exited the kennel at a very inopportune time.

Hurricane Isabel Damage



Creef Cut Trail was cluttered with trees following Hurricane Isabel.

KLW



The Red Wolf Facility storage shed was demolished by a large pine tree.

KLW

The Red Wolf Facility storage shed was demolished by a large pine tree.

KLW



Thousands of trees fell across primary and secondary access roads at Alligator River NWR.

KLW

C. LAND ACQUISITION

1. Fee Title

Taylor Tract

A total of 324.46 acres of the 660 acre Taylor Tract was purchased this year from The Conservation Fund (TCF) who acquired the land from Edmund P. Taylor in February 2002 for \$695,000. The tract has significant potential as high quality, diverse habitat for the endangered red wolf, priority avian species, black bear, and Atlantic white cedar and cypress-gum habitat. The remaining acreage will likely be purchased in 2004.

2. Easements

A 10-foot wide easement through Refuge property in the Mashoes area (Henson Island Properties) was found to be valid and the developer ran an underground electric cable across the Refuge for 0.75 miles to a private tract of land on the Croatan Sound. The landowner

plans to rebuild a house that burned many years ago. The Realty office in Atlanta revised the ROW language in the deed to allow the cable to be put underground and prohibit burning as a method of maintenance by the ROW holder.

After acquiring the Taylor Tract, a review of the deed referenced an access easement. Since Refuge staff was unable to find any details regarding the easement, the matter was sent to the Regional Division of Realty for further study. No additional details were brought forth and a decision was made to proceed with the purchase.

During late 2003, representatives from Dare County and a private consulting firm approached the Refuge for input and requirements for a utility easement. The purpose of the easement would be to construct sewage collection lines across Refuge land for a wastewater treatment plant to be built on the Dare County Bombing Range to serve the community of Stumpy Point. They were advised of the processes involved for the Fish & Wildlife Service to issue a right-of-way permit, including NEPA, compatibility, Section 7, and the actual right-of-way permit. This project will continue into 2004 or longer.

After Hurricane Isabel and during the cleanup questions arose regarding the rights-of-way for U. S. Highway 64, U. S. Highway 264, and Tideland Electric Membership Corporation. These issues and questions were not resolved and continued into 2004.

The Red Wolf Recovery Program is partner to conservation and access agreements with different owners of private land comprising approximately 15,500 acres. For 2003, these included:

Red Wolf Program Partners – 2003				
Name	Acres	Location	Type	Status
Holbert	1,000	Hyde Co., east of New Lake	Partner's Agreement \$200/yr	1999-2003
Mattamuskeet Ventures	14,445	Hyde Co., north Lake Mattamuskeet	Partner's Agreement \$2,000/yr	1999-2003

3. Other

Silver Tract

The Silver Tract in the Mashoes area was purchased this year for \$31,000. The Realty Office lists the tract at 65.44 acres. Dare County tax records show the tract being 85 acres as opposed to 65. The previous owners, Winky and Nancy Silver, indicate they sold FWS 85 acres. A survey was requested to locate boundary lines and corners, but to date one has not been ordered by the Regional Office.

White Columns Tract

Efforts were made to locate funding to purchase a 5,010 acre tract located in Hyde County adjacent to Refuge lands. Acquisition of this parcel would basically complete the south end of the Refuge. The land is currently owned by White Columns Land and Timber Company, Inc. and is on the market for sale at \$495/acre (\$2.48 million). So far, no acquisition monies have been located. The area appears to have wildlife value for numerous species of neotropical migratory birds including hooded, prothonotary, black-throated green, and Swainson's warblers. The red-cockaded woodpecker is known to inhabit the property along the northern boundary. Red wolves likely also use the area as do black bears, white-tailed deer, and a host of other mammals, reptiles, and amphibians.

Additional Tracts

Other tracts that have been identified for possible acquisition include: Arey Tract (100 acres, appraisal pending); Fran Harris Tract (63.5 acres); Pingleton Point (3,400 acres); Haulover Point (75 acres); Griffith Tract (110 acres); and Skinner Tract (112 acres). No funding sources have been identified for these tracts at this time.

D. PLANNING

1. Master Plan

The Refuge staff and planning staff wrote introduction and affected environment sections for the Comprehensive Conservation Plan for Pea Island NWR. In 2004, they will analyze alternatives for Pea Island and complete the writing of the draft plan for internal and public review.

5. Research and Investigations

Fish

A survey to determine presence, diversity, and distribution of fish and aquatic species began during 2001 and the fieldwork was completed during 2002. Data analysis and report preparation were expected in 2003. Due to personnel changes and reassignments, the data analysis and report preparation were not completed during 2003. However, a fisheries species list was developed and included in the Comprehensive Conservation Plan draft. Refuge staff used GIS software to digitize and compile the acreage of watersheds wherein fisheries surveys were conducted.

Black Bear

A challenge cost share project designed to estimate the Refuge black bear population and monitor gene flow/genetic dispersal of bears in the ecosystem began. More information is provided in the wildlife section.

Fire

The two National Fire Plan studies, water quality after burning and the characterization of down dead woody material and fuel loads through remote sensing, have been on-going throughout the year. Environmental conditions prevented the burning of the prescribed burn

plot during the winter, so researchers continued to collect baseline water quality data at two-week intervals. On May 30, Ge Sun, Steve McNulty, and Robert Mickler gave a presentation on the progress of the studies. All vegetation in the control and burn plots have been classified using aerial photographs and preliminary characterizations have been done on pre-burn water quality and vegetation data. Hurricane Isabel and the temporary halt on joint jurisdictional burns (part of the burn plot is on Dare Bombing Range) thwarted any attempts for a fall burn. Robert Mickler changed jobs in November, so Michael Gavazzi with the US Forest Service is now the field supervisor for the studies. Plans are to complete a post-Hurricane Isabel resample of the vegetation plots in early January 2004 and then do the prescribed burn before the spring fire season.

Effects of Sea Level Rise

Duke University research student Ben Poulter conducted vegetation sampling in November in conjunction with his study regarding the effects of rising sea-level rise on pocosin wetlands and estuarine marsh.

Geological History

The Department of Geology at East Carolina University has collected some data from the Refuge for the purpose of learning more about the geological history of the area and using data to develop predictive models of landscape changes as sea level rises.

6. Other

GIS

Development of the Geographical Information System (GIS) for Alligator River began in the mid-1990's. Since that time, the Refuge has acquired and created data for all Refuge programs and all of the nine Refuges in eastern North Carolina. The Refuge maintains approximately 3,000 GIS files and 4 sets of aerial photography. We maintain a data sharing agreement with Dare County. Currently there is one staff member using GIS on a regular basis and three that use it occasionally. The majority of the GIS work is completed by Forestry Technician Brian VanDruten.

Program highlights and accomplishments for 2003 include: continued work on the vegetation/cover type map (see Section F.3. for more information), completed mapping of all Refuge bear hair traps, updated near-Refuge bear mortalities data layer, modifications to burn units data layer, display of Refuge fire management compartments and prescribed burn unit map in the Southeast Regional Office and on the Southeast Region GIS webpage, mapped US Navy/USFWS joint jurisdictional burn units, produced maps for 12 prescribed burn prescriptions, updated firebreak data layer, produced maps for firebreak and culvert installation contracts, participated on Southeast Region GIS committee, and produced maps for a Level 1 Pre-acquisition Contaminants Survey.

E. ADMINISTRATION

1. Personnel



L to R:

Front Row: Kathy Whaley, Jeremy Bucher, Eric Craddock, Dennis Stewart, Brian Van Druten, Leslie Schutte.

Middle Row: Mike Morse, Anthony Ralph, Jenny Howard, Sara Kruger (RS Staffing), Bonnie Strawser, Kathy Whidbee, Bernice Kitts, Jim Wigginton

Back Row: Bruce Creef, Bobby Govan, Janice Lane, Mike Bryant, Kris Fair, Alan Emery, Bud Fazio



Alligator River NWR Fire Staff: L to R –Tom Crews, Cory Waters, Jim Beasley, Amy Midgett, Eric Meekins, Kelly Van Druten, Donnie Harris, and Jeff Swain.
KLW

Alligator River NWR Staff – 2003

NAME	POSITION	STATUS	EOD
1. Jim Beasley	Forestry Tech. (Fire) GS-0462-07	PFT	05/26/85
2. Art Beyer*	Wildlife Biologist, GS-0486-09	PFT	12/02/90
3. Mike Bryant	Refuge Manager, GS-0485-14	PFT	04/14/96
4. Jeremy Bucher	Park Ranger (LE), GS-0025-09	PFT	03/09/03
5. Jerry Campbell	Maintenance Worker, WG-4749-05	1040	06/30/03
6. Eric Craddock	Eng. Equip. Operator, WG-5716-08	PFT	02/21/93
7. Bruce Creef	Eng. Equip. Op. Supv., WS-5716-07	PFT	04/21/71
8. Tom Crews	Fire Mgmt. Officer, GS-0460-12	PFT	01/22/95
9. Alan Emery	Automotive Worker, WG-5823-08	PFT	05/22/88
10. Kris Fair	Bio. Science Tech., GS-0404-07	PFT	05/02/96
11. Buddy Fazio	Wildlife Biologist, GS-0486-13	PFT	04/22/01
12. Bobby Govan	Eng. Equip. Op., WG-5716-08	PFT	09/03/93
13. Donnie Harris	Forestry Tech., (Fire) GS-0462-08	PFT	01/11/96
14. Jenny Howard	Park Ranger (Interp.), GS-0025-05	NTE 1 Yr	04/07/03
15. Bernice Kitts	Office Assistant, GS-0303-07	PPT	04/02/95
16. Janice Lane	Administrative Officer, GS-0341-09	PFT	03/25/90

17. Chris Lucash*	Wildlife Biologist, GS-0486-11	PFT	12/02/98
18. Anicia Martinez	Secretary, GS-0318-05	TERM	08/15/99
19. Jenny Marzluf	Bio. Science Tech., GS-0404-05, temp appt. terminated 11/02/03	NTE 1 Yr	11/04/01
20. Charles Mathis	Student Intern, GS-0499-04, reassigned Pocosin Lakes NWR 09/21/03	SCEP	08/13/00
21. Scott McLellan*	Bio. Science Tech., GS-0404-07	PFT	12/29/98
22. Eric Meekins	Eng. Equip. Op., (Fire) WG-5716-08	PFT	10/25/93
23. Amy Midgett	Forestry Tech., (Fire) GS-0462-06	PFT	05/14/93
24. Victor Miller	Maintenance Worker, WG-4749-05, terminated 05/18/03	NTE 1 Yr	06/03/01
25. Mike Morse*	Wildlife Biologist, GS-0486-09	PFT	04/09/89
26. Jonathan Powers	Eng. Equip. Op., WG-5716-08	PFT	04/24/88
27. Anthony Ralph	Maintenance Worker, WG-4749-05	TERM	07/30/00
28. Ann Marie Salewski	Park Ranger (Interp.), GS-0025/09	PFT	12/01/02
29. Craig Scheibel	Forestry Tech. (Fire), GS-0462-06 Transferred to NFS 04/06/03	PFT	03/03/96
30. Leslie Schutte*	Wildlife Biologist, GS-0486-07	TERM	12/05/02
31. Daniel Sprague	Laborer, WG-3502-03	1040	07/28/03
32. Dennis Stewart	Wildlife Biologist, GS-0486-12	PFT	12/27/91
33. Bonnie Straswer	Park Ranger (Interp.), GS-0025-12	PFT	12/31/80
34. Jeffrey Swain	Eng. Equip. Op., (Fire) WG-5716-08	PFT	02/10/02
35. Brian VanDruen	Forestry Tech., GS-0462-07	PFT	01/15/99
36. Kelley VanDruen	Fire Mgmt. Officer (WUI), GS-0401-11	PFT	02/16/01
37. Cory Waters	Forestry Tech. (Fire), GS-0462-06	PFT	11/30/03
37. Kathy Whaley	Refuge Manager, GS-0485-12/13	PFT	12/28/02
38. Kathy Whidbee*	Office Assistant, GS-0303-07	TERM	06/03/01
39. Jim Wigginton	Refuge Manager, GS-0485-12	PFT	03/28/99

* Red Wolf Program employee

Jerry Campbell was selected to fill a 30-day emergency hire vacancy as a Maintenance Worker WG-4749-05 effective 01/27. This appointment was extended for an additional 30 days on 02/26 and terminated 03/28.

On 02/23/03 Brian VanDruen received a career ladder promotion from a Forestry Technician, GS-0462-06 to a GS-0462-07.

Our new Refuge Law Enforcement Officer, GS-0025-09, Jeremy Bucher arrived on duty 03/09/03. Jeremy transferred to Alligator River NWR from the U.S. Department of Justice, Border Patrol in Ajo, Arizona. On 03/24 Jeremy started a 13 ½ week Refuge Pre-Basic Orientation and National Resource Police Training at the Federal Law Enforcement Training Center (FLETC) in Brunswick, Georgia. He completed this training on June 26. July 7, he had to attend one week of USFWS Refuge Officer Basic Training at the National Training Center in West Virginia. On July 21 he left again to complete a mandatory 10 week LE field training detail at Piedmont and Savannah NWRs. Jeremy was called back to Alligator River NWR on September 24 to assist with Hurricane Isabel recovery efforts. His training officer

from Piedmont NWR came to Alligator River NWR with him and completed Jeremy's training detail. On 10/01 he assumed his normal law enforcement duties for Alligator River and Pea Island NWR's.

Forestry Technician (firefighter) Craig Schiebel transferred to the National Forest Service, Klamath National Forest, Goosenest Ranger District in MacDoe, California 04/06.

Jenny Howard reported to duty on 04/07 as a temporary, NTE 1 year Park Ranger, GS-0025-05 for Pea Island NWR.

Contracts of employment for R.S. Staffing employees Shauna Baron (Outreach – Red Wolf Program), and Mike Martin (Park Ranger – Pea Island NWR) ended on 04/11.

Temporary Maintenance Worker Victor Miller's appointment was terminated effective 05/18.

Jerry Campbell was selected from the Open Continuous Announcement as a temporary (1040), Maintenance Worker, WG-4749-05. He arrived on duty 06/30.

Daniel Sprague was selected from the Open Continuous Announcement as a temporary (1040) Laborer, WG-3502-03. He reported to duty on 07/28.

Term employee Anthony Ralph's appointment was extended for an additional year on 07/30. This will be the fourth year of Anthony's term appointment as a Maintenance worker, WG-4749-05.

Student Intern Charles Mathis was reassigned to Pocosin Lakes NWR on 09/21. He will complete the requirements of the SCEP at Pocosin Lakes NWR.

On August 12 and 13, staff within 10 years of eligibility for retirement attended a Pre-Retirement Seminar in Edenton, North Carolina.

Desk audits were completed for all wage grade employees' positions the week of August 18. As of the end of 2003 no word has been received from our Regional Office on the results of these audits.

Effective October 15 by issue of Director's Order #155, Refuge Manager Mike Bryant relinquished his law enforcement authority.

Jennifer Morton completed her second year of a temporary appointment as a Biological Technician, GS-0404-05 and her appointment was terminated 11/03.

Cory Waters was selected to fill our vacant Forestry Technician (firefighter), GS-0462-06 position (VICE Schiebel) and EOD 11/30.

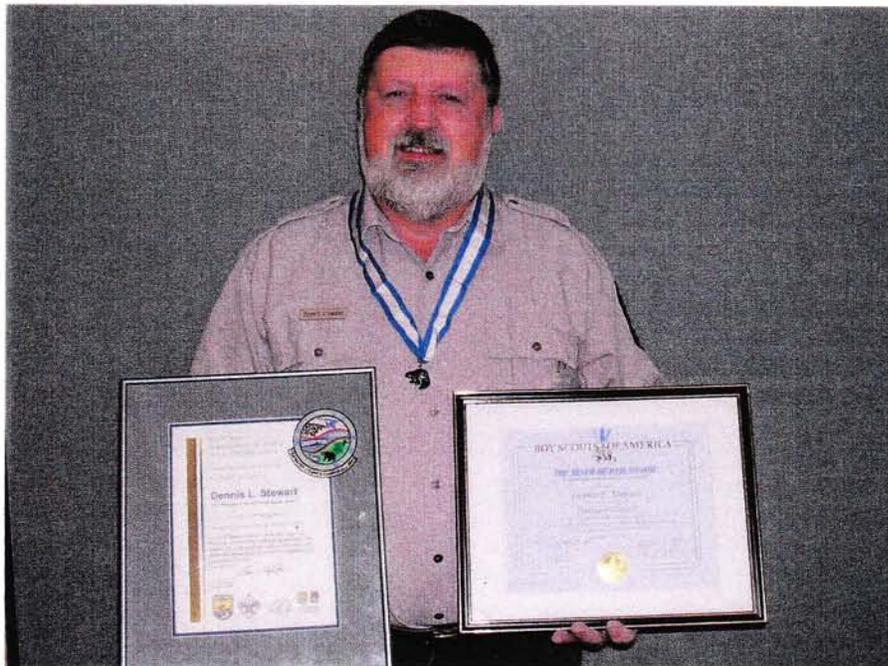
Deputy Project Leader Kathy Whaley received a career ladder promotion (GS-12/2 to GS-13/1) effective 12/28.

Sarah Krueger was hired as a contract employee through R.S. Staffing on 12/30. Sarah is working in outreach for the red wolf program until this position can be filled with a permanent employee. The recruitment package for this position was submitted to Human Resources 12/02.

The following employees received awards in 2003:

RM Bryant received several awards including a DOI Office of Environmental Policy and Compliance Environmental Achievement Award for his work with multiple agencies on NCDOT's Bonner Bridge Replacement Project. He also received the 2003 Resource Enhancement Award from the Soil and Water conservation Society's Hugh Hammond Bennett Chapter.

Refuge Biologist Dennis Stewart received the very distinguished Boy Scouts of America Silver Beaver Award for his work as a Boy Scout Troop Leader in the Tidewater District.



Refuge Biologist Dennis Stewart received the Silver Beaver Award from the Boy Scouts of America. (KLW)

WIS Strawser received the American Recreation Coalition's "Legends Award" for the USFWS this year. Her efforts were recognized for her work developing and managing the annual Wings Over Water Festival that was in its 7th year in 2003.

STAR Awards

Eric Craddock, Janice Lane, Bernice Kitts, Jim Wigginton, Dennis Stewart, Jennifer Howard, Amy Midgett, Donnie Harris, Jeff Swain, Eric Meekins, Alan Emery, Jonathan Powers, Bobby Govan

Quality Step Increase

Anicia Martinez, Mike Bryant, Tom Crews, Kelley Van Druten, Donnie Harris, Ann Marie Salewski

4. Volunteer Program

In 2003, 30,590 hours of service were contributed by 365 volunteers in the following areas: maintenance, 4,731; resource support, 14,205; and public use and outreach, 11,654. The hours were compiled from volunteers at both Alligator River and Pea Island National Wildlife Refuges; both Refuges are therefore reflected in this section. Interns, workampers, local Refuge volunteers, and organized work groups are the four active groups which form the Refuge volunteer program.



The Buffalo City cabin provides housing for up to five interns at one time in a rural, pleasant setting. KLW

College students and graduates seeking to gain experience in wildlife management, research, and public use served as interns again this year. They are required to contribute a minimum of three months of volunteer service 40 hours/week, during which they received \$90 per week (\$18 per work day) food stipend and were furnished free Refuge housing. Interns for

2003 included: Sarah Krueger, Alex Metler, Janess Vartanian, Kyle Krzywicki, Chris Crow, Carrie Pomfrey, Robert Longsinger, Brad Nichols, Valerie Mitchell, Adrienne Paoletta, Tim Jessen, Lisa Tomkosky, Aaron Klosterman, Anna Scesny, Jennifer Weiskittle, Katheryn Wilkinson, Kiel McAdams, Leah Elrod, Oscar Gonsales, Mary Davis, Sara Felgel, and Mark Hayworth.

Workampers, who are also scheduled in 3-month blocks, were provided a pad for their RV at Pea Island and supplied with electricity, sewage disposal, and propane gas. During 2003, most workampers were couples and both members of the team worked on both Refuges. In every case, the workampers certainly surpassed the 24-hour per week per person required minimum.

2003 Workampers

<u>Workamper</u>	<u>Award/Hr. pins</u>	<u>Work Area</u>	<u>Service Period</u>
Robert Dagnall	500 pin, 1000 pin	Maintenance	Oct 02 - February
Mary Dagnall	500 pin	Public Use	Oct 02 - February
John Fairbank	Certificate, 250 Pin	Maintenance	February - April
Joyce Fairbank	Certificate, 250 Pin	Public Use	February - April
Muriel Smith	1500, 2000 Pin	Public Use	February - June
Jimmy Smith	1500 Pin	Maint/Public Use	February - June
Gene Goerke	Certificate, 250 Pin	Maintenance	June - August
Louise Goerke	Certificate, 250 Pin	Public Use	June - August
Clarence Quinlog	Certificate	Maintenance	August - November
Midge Quinlog	Certificate	Maint/Public Use	August - November
Julie Hazlett	Certificate	Public Use	December - Feb 04

Plans are being made to construct a two pad work camper site at Alligator River NWR. A small cabin with a common area, shower, kitchen, and laundry facilities will be placed on the site. Coastal Wildlife Refuge Society provided \$51,000 for this project which should cover all expenses.

Several outside groups volunteered during 2003. A handful of "green thumbs" from East Carolina University focused a weekend of attention on the native plant garden at Pea Island. Local Scout groups assisted with water level management, maintenance, and beach cleanup. Multiple bird banding projects drew 40 people out to assist. The Sierra Club work group returned to Alligator River and Pea Island for a week in October. For the 4th year in a row, NC State University students (rallied by a summer intern) in the Leopold Wildlife Club assisted with the FWS booth at the NC State Fair in October. Other projects involving volunteer support included the 2003 Camporall (a regional Boy Scout event), several wildlife and related festivals, science fairs, and post-hurricane cleanup activities.

Cumulative hours tallied through September 30, 2003 yielded awards which were presented at the annual Volunteer Awards Banquet in November. Awards were presented to interns

and workcampers during the course of the year, since most are unavailable during the time of the banquet. Usually, interns reach the 500 hour "milestone" and receive a certificate (100 hours), a volunteer pin (250 hour) and a volunteer pin with a 500 hour rocker. Workcamper awards vary. In addition, the following volunteers were presented "milestone" awards:

Certificate (100+ hours) – John Gilson, Laura Gilson, Linda Ackiss, Mary Lou Batcho,
Tom White

250 Hour Pin – Dee Hardham, Dru Ferrence, Ron Marchand

1000 Hour Pin – Dick Fryklund, John Weske, Stew Whittle, Susan Davis

Outstanding Sales – Ruth Polnisch

The Outstanding Volunteer for 2003 was Stew Whittle. Stew has a cumulative total of 1,088 hours and is so devoted to his weekly day at the Pea Island Visitor Center that he's often referred to as the "Friday Man." Stew's name was added to the permanent plaque in the office, and he received an individual plaque and an embroidered "volunteer-of-the-year" jacket.

Support from the management staff continues to be unwavering and beneficial. The disappointment of last year's withdrawal of the promised Volunteer Coordinator position still remains, but hopes are high as the volunteer program (and therefore, the need for this position) continues to grow.

Neither Alligator River nor Pea Island could sustain the current high-quality level of interpretive programs, visitor support, or threatened sea turtle monitoring without the consistent dedication of local Refuge volunteers. These volunteers continue to be the behind-the-scenes strength of not only the volunteer program, but the operation of the Refuges, especially Pea Island. During 2003, this devoted group provided more than 15,000 hours.

5. Funding

Refuge funding for FY 03 was as follows:

<u>FUND</u>	<u>NAME OF FUND</u>	<u>FY00</u>	<u>FY01</u>	<u>FY02</u>	<u>FY03</u>
1113	Red Wolf	684.4	914.1**	896.5	906.0
1230	Migratory Birds	1.5	0	0	0
1261	Operations	879.8	1125.3***	1161.0	1211.1
1262	Maintenance	204.2	337.4	267.6	653.8
29..	Storm Damage *	453.6	1747.9	1555.4	953.7
8555	Federal Roads	0	45.0	0	4.0
8550	Pest (So.Pine Btl.)	70.0	80.0	0	0
9251	Fire Operations	403.3	541.2	592.0	690.0
9263	Rx Burns	188.3	150.0	370.0	106.1
9264	WUI	0	216.6	80.0	166.4
TOTAL		2885.1	5237.5	4922.5	4691.1

1261 funding was almost \$100,000 short of meeting salaries this year.

*Storm damage money carries over, so the amounts include carryover from previous year.

**Asheville Field Office position moved to Alligator River; additional funding is for salary and red wolf breeding facility in Tacoma, WA.

***Increase of 233.0 is due to addition of CCP office to Alligator River funding code.

Note that ½ of the salary for both Park Rangers Salewski and Howard is paid by the Coastal Wildlife Refuge Society.

6. Safety

Monthly safety meetings were held following staff meetings. Topics varied from month to month as did presenters. Safety continued to be a top priority for all staff members.

7. Technical Assistance

RM Bryant and Biologist Stewart worked with Mr. Robert Fisher of RESOLVE, a non-profit consensus building and dispute resolution organization, as part of a NPS/USACOE/FWS planning project. The purpose is to develop an EIS for the issuance of a 5-7 year Special Use Permit or MOA to maintain the Oregon Inlet navigation channel.

Refuge Biologist Stewart and DRM Whaley worked with Dare County officials and consulting firm Wooten and Associates to discuss a proposed sewer treatment facility for the Stumpy Point community. Currently, more than 60 homes have straight pipe discharge of sewer into a canal adjacent to Refuge lands that eventually dumps into Stumpy Point Bay. Several options are being considered that would involve various levels of cooperation from the Refuge ranging from an easement for a pipe to a potential land swap with the county.

In April, WUI Specialist Van Druen participated in a peer review of project proposals for the Joint Fire Science Program, an interagency program to fund scientific research about wildland fire on federal lands or in conjunction with a federal partner. The interagency panel met at the FWS Regional Office in Atlanta.

DRM Whaley assisted with the review of the revised National Recreation Policies. She was also a team member for the Wheeler NWR Public Use Review completed in preparation for their CCP initiation.

8. Other

Administrative offices for Alligator River and Pea Island National Wildlife Refuges remained on Roanoke Island in space rented by GSA. The Migratory Bird Field Office and Red Wolf Recovery Program offices are also located within the GSA leased property. A tract of land totaling 35 acres has been purchased on the north end of Roanoke Island, just

across from the National Park Service Headquarters on Highway 64. Future plans include the development of a Visitor Center/Office. At this time, we are tentatively scheduled to receive funding for this project in 2008.

F. HABITAT MANAGEMENT

1. General

Six categories of natural, vegetated habitat are found on ARNWR: brackish marsh, pocosin, mixed-hardwood pine forest, non-alluvial hardwood forest, cypress-gum forest, and white cedar forest. Pocosin can be further divided into low shrub pocosin, high shrub pocosin, pond pine/shrub pocosin, and pond pine cane pocosin. These are classified as wetlands based on vegetation present, soil type, and hydro-period. ARNWR contains some of the last remaining large tracts of pocosin-type habitat along the east coast. Although much of the Refuge is relatively unaltered by humans, large portions have undergone changes in vegetation composition and hydrology caused by ditching and canal dredging for access and logging purposes. However, none of the wetlands have been drained by gravity to the extent that they would be classified as non-wetland. In more recent years, forested areas have been further fragmented with firebreaks to meet smoke management guidelines when conducting prescribed burns. The purchase of the Prudential farmlands in March of 1988 added agricultural land to the list of habitats.

2. Wetlands

Many areas on the Refuge have been impounded due to road construction for logging practices prior to the area becoming a Refuge. Problems associated with the artificially extended hydroperiod have been partially resolved through installation of water control structures (WCS) to facilitate water movement on both sides of the road. As usual, efforts were limited due to equipment and inclement weather. Some attention will be diverted to maintenance of existing structures.

This year approximately 1,800 acres of moist soil were produced in prior converted farmland within the farm unit. Because of much wetter than normal conditions during all of 2003, it was not possible to disc, burn, or plant anything in the moist soil units. However, past experience has shown that fire and disking are the most efficient management tools for controlling undesirable vegetation and that planting some of the moist soil unit acreage with agricultural crops results in much higher waterfowl use. Also, it appears that intensive management practices are necessary on an annual basis to maintain the moist soil units in the most productive state.

With the wet conditions throughout the year, production of desirable plants (wild millet, smartweed, fall panicum, switchgrass, foxtail, etc.) was much better than would have been predicted. The negative side of not being able to burn and disc is that weed stubble in the fields resulted in areas that waterfowl tended to avoid.

3. Forests

The table below shows habitat types and approximate acreages for Alligator River National Wildlife Refuge, Dare and Hyde Counties, North Carolina:

Habitat Type	%	Approximate acreage		Total
		Dare County	Hyde County	
Freshwater pools, ponds, & lakes	0.8	754	398	1,152
Brackish marsh	16.5	22,162	3,100	25,262
Managed wetlands	1.2	1,800	0	1,800
Cropland	2.0	3,000	0	3,000
Cypress-gum forest	1.0	1,477	0	1,477
Atlantic white cedar forest	5.6	6,932	1,568	8,500
Mixed pine/hardwood forest	7.5	11,418	0	11,418
Non-alluvial hardwood forest	8.0	12,236	0	12,268
Pond pine shrub pocosin	25.3	33,154	5,512	38,666
Pond pine cane pocosin	20.0	28,300	2,100	30,400
High shrub pocosin	4.1	5,030	1,320	6,350
Low shrub pocosin	8.0	12,292	0	12,292
TOTAL	100%	138,197	13,998	152,585

An intern volunteered to monitor the approximate 100 acres of bottomland hardwoods restored on mineral soils on the Refuge. A previous owner had converted these sites to loblolly pine plantations killed by the Southern pine beetle. A contractor K-G bladed and drum chopped the site in late 2001. Although the initial site preparation was to be followed with prescribed fire, the area was not burned. Approximately 55,000 mixed hardwood seedlings were planted in late March and early April of 2002. Species planted included cherrybark oak, swamp chestnut oak, overcup oak, white oak, laurel oak, water oak, willow oak, persimmon, bald cypress, blackgum, yellow poplar, and dogwood. Because 2003 was an unusually wet year, many of these seedlings, especially those planted in low areas where standing water occurred during much of the year, did not survive. The good news is that 50-60% survived and, by planting at a rate of 681 trees/acre, there are enough survivors to produce a high quality hardwood forest.

Hurricane Isabel resulted in thousands of trees being blown down throughout the forest. RCW trees were impacted, fuel loading has increased dramatically, and long-term habitat changes will result in numerous, hard-hit areas.



Microbursts within Hurricane Isabel resulted in scattered, severe damage to forest resources throughout the Refuge. KLW

The on-going forest cover type mapping project for Alligator River made substantial progress in 2003. Ninety-five percent of the delineation phase of the project was completed. During this phase, Geographic Information System software was used to perform on-screen digitizing of polygons. These polygons represent the different forest stands that could be discerned from 1998 and 1999 aerial photographs. The remaining five percent will have to be completed after field visits are made to determine where the stand breaks will have to be drawn. Ground truthing continued and 77,000 acres were classified by the end of 2003. In addition, data produced during cover type mapping is being used to develop a fuels map. This has resulted in 82,000 acres being classified by fuel model.

4. Croplands

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

In 2003, cooperative farmers included Ernie Wynne, Thomas Holmes, and George Holmes. No crops were produced this year. The farmers indicated that conditions were too wet, however near-by farmlands were able to produce crops. Because of the involvement in the

USDA filter strip program, each farmer received payments for their farming acres that were converted to filter strips. The farmer payments from this program are fairly substantial and total \$140,000 annually.

Changes in the program for 2004 are being discussed at this time. The method of "payment" for the farmers will change to a percent based share as is done throughout the southeast region for FWS croplands. More specific oversight and direction on crops to plant at specific locations will be provided in 2004.

9. Fire Management

Wildfire Preparedness:

Calendar year 2003 was one of the wettest years in Refuge history. There were only a few days where staffing for high fire danger was needed, and only one fire to report during the normally critical spring fire season.

Wildfires:

In spite of the extremely wet spring fire season, Dare County experienced the largest fire in the past ten years – the "First Fire". An off-target bomb on the Dare County Bombing Range (USAF side) started a wildfire in May that burned 2,300 acres of wildlands and spread onto the Alligator River NWR. The fire burned across four miles of very boggy terrain and spotted as far out as one mile in advance of the main fire. This urban interface fire threatened the North Carolina Forest Service (NCFS) maintenance shop and outlying homes and businesses of the Stumpy Point Community clustered along U.S. Highway 264. Fire personnel and resources from all NC NWR's responded to assist the NCFS and Dare County Fire Marshall with suppression efforts. The NCFS was the lead agency and brought in their Type II Incident Management Team to lead the effort. FWS fire tractors were plagued by equipment problems all through this event. This included both ARNWR and Pocosin Lakes NWR equipment. To the contrast, NCFS flextracked fire tractors performed flawlessly and completed the bulk of the work. FWS fire plows were a primary part of the problem; however, the aging, poorly suited FWS flextracks were unable to keep going in the toughest areas.



An off-target bomb in May started the 2,300 acre "First Fire" that spread onto Alligator River NWR.

TC

Prescribed Burning:

A very wet winter and spring prescribed burning season followed the 2002 summer fire season, bringing quite a bit of rain and even a deep snow with blizzard conditions. Early January saw very wet conditions in the woodlands, so burning efforts centered on the large marsh portion of the Roanoke Marshes Fire Compartment that has exhibited major wildfire problems in the past. We struggled to burn the farm fields on the Refuge due to the wet conditions caused by heavy rains and water being impounded for the biological program until very late in the Spring.

A series of test burns had to be made in October to see if the exposed organic soils in the "blow-downs" caused by Hurricane Isabel would cause groundfire in the prescribed burn units. The South Koehring Unit was burned in October. An attempt was made in early November to burn Quadrangle Unit 5, but it was too wet at the time and the burn had to be scrubbed. A 3,000 acre burn was planned for the South Boundary of Long Shoal River in late November, but had to be called off due to deteriorating weather conditions. All the prescribed burns completed at the Refuge are shown in the table below.

CY-2003 Rx Burn Projects - Alligator River NWR

Unit Name	Unit Number	Total Acres	Acres Burned	Dates	Fire #
Spencer's Ck	2.2.1	2,477	1,178	1/13/03	D042
Roanoke Marshes 7a	2.2.7a	90	90	1/11/03	D039
Roanoke Marshes 7b	2.2.7b	970	970	1/12/03	D040
Roanoke Marshes 5a	2.2.5a	2,828	2,828	1/12/03	D041
Creef Ag. Fields	3.3	500	260	3/20/03	D222
Twiford Ag. Fields	3.2	1,000	760	4/30/03	D318
South Koehring	4.2.8	769	769	10/25/03	D535
Quadrangle Unit 1	2.1.1	594	594	12/05/03	D609
Quadrangle Unit 2	2.1.2	928	464	12/06/03	D610
Total Acres RX Burned in CY-03			7,913		



A successful prescribed fire burns up to Hwy. 264 on Alligator River NWR. Smoke management is an issue that stays in the forefront for all prescribed burns. TC

In addition to prescribed burn activities completed on ARNWR in 2003, the Alligator River Fire Crew assisted with prescribed burns at Pea Island, Pocosin Lakes, Mackay Island, Cedar Island and Mattamuskeet NWR's.

Cooperative Relations:

In conjunction with the US Marine Corp Air Station at Cherry Point, NC, a cooperative, joint-jurisdictional prescribed burn was conducted at Cedar Island NWR and Atlantic Field

Outlying Field. The burn was conducted to protect critical values in the Atlantic Community and the multi-million dollar military emitter sites.

Refuge staff from ARNWR attended the Dare County Bombing Range prescribed burning meeting. Proposals for burning were discussed - both USAF lands and joint jurisdictional areas with ARNWR. Contract issues between the (NCFS) and the USAF Seymour Johnson AFB surfaced during the meeting, highlighting the need to address the issue of responsibility and contingency funding for wildfires prior to initiating any prescribed burning activities. As of this date, not all these issues have been resolved, which places the prescribed research burns planned for the Little Fields area on hold since these are joint jurisdictional burns.

MOU's

During the fall, eight private landowners signed a Memorandum of Understanding to allow the Refuge to conduct prescribed burns on their property in conjunction with burning Refuge lands. These agreements will allow the Refuge to tie burn units into already existing firebreaks, such as roads or canals, located on private property. These agreements will allow for prescribed burns in the Mashoes and Long Shoal River Fire Management Compartments. A final Memorandum of Understanding is in process with the North Carolina Department of Transportation to burn a portion of their property abutting Mashoes Unit 4.



A 2,800 acre landscape-scale marsh burn at Alligator River NWR.

TC

Off-Station Dispatches:

Refuge staff from ARNWR were dispatched to Florida to assist with prescribed burning, to the Space Shuttle Columbia Recovery Effort in Texas, and to wildfires in Montana, Idaho, Utah, Nevada, California, and other states. A total of 141 staff days was contributed to off-

station assignments during CY-2003. Positions filled were DIVS, HCWN, HECM, ENGB, EDSP, FFT1, SEC2, and FFT2.

Fire Related Training:

- FMS Van Druten, FT Van Druten, FFEO Meekins, and FF Scheibel attended Prescribed Fire Planning and Implementation Training in Tallahassee in January.
- FMS Van Druten attended S-205 Fire Operations in the Urban Interface in February and Fire Prevention Education Team Training in March.
- FMO Crews attended RX-410 Smoke Management in April.
- FMO Crews facilitated and attended a week long S-317 Helicopter Manager Training course in June. Also attending were FCO Donnie Harris, FFEO Eric Meekins, FF Amy Midgette, and FF Craig Scheibel. In June, FMS Van Druten attended a Firewise Facilitator Workshop sponsored by the NCFS and NFPA.
- All qualified firefighters and many of our support personnel attended Annual Firefighter Refresher Training in March. In addition to basic firefighter safety, sessions on fire behavior, tractor and plow safety, tactics, fire weather, orienteering, etc. were taught during the two-day session. FMS Van Druten and FCO Harris facilitated a make-up Refresher. FMS Van Druten also prepared and sent an email outlining steps for those still needing the refresher on how to do a self- study.
- FMO Crews completed his task book as DIVS. FFEO Meekins completed his task book as HCWN.

Fire-related Outreach:

FMS Kelley Van Druten revised the Fire Exhibit used at the 2002 Wings Over Water Wildfest for use as an exhibit at the National Wildlife Refuge System Centennial Celebration at Pelican Island NWR on March 14. The exhibit was well received at the celebration for highlighting a management practice done on Refuges. WIS Bonnie Strawser manned the booth during the Centennial Celebration.

On April 16 and 17, FMS Van Druten participated in the Cape Hatteras Elementary School Science Fest. A 25-minute presentation on prescribed burning, including a computer simulation of a prescribed fire, was given to approximately 300 children in K-5th grade over two days. Tattoos to promote the Refuge System Centennial were passed out to participants.

The Fire Exhibit was successfully used again on May 17 during the Engelhard Seafood Festival, where it was one of several exhibits under the large FWS tent. The exhibit was also slated for use on October 11 as part of the FWS sponsored Conservation Trail during the Boy Scout Camporall. Weather prohibited putting up the entire Fire Exhibit. FMS Van Druten had the scouts do a practice fire shelter drill to earn a stamp on their Conservation Trail Passport. Successful collection of all stamps, earned by completing an activity at each booth along the trail, earned a scout a patch.



A display featuring prescribed burning was created for special events.

KVD

The Region provided \$8,000 for a 9264 WUI project to develop an educational fire display focusing on wildland-urban interface issues and the Firewise program. FMS Van Druten worked on the project over the summer to supplement panels on the current Fire Exhibit. Two fire factsheets were developed to handout at events to explain wildland fire in greater detail than can be shown in the exhibit. The factsheets were entitled "Prescribed Fire: Benefits of Fire as a Management Tool" and "Burning in Pocosins: Fire as a Management Tool on National Wildlife Refuges." Magnets and stickers sporting the slogan "Defensible Space Helps Your Place" were also made for handouts.

The ARNWR Fire Crew participated in the NPS First Flight Centennial kickoff activities, starting in January 2003 featuring our helicopter 206RW. They also participated in the main Centennial Celebration from December 12-17 with the entire fire crew and other Refuge staff participating in the displays and activities. The primo machine was demonstrated to approximately 30,000 persons over the duration of the six day celebration with explanations on how and why the FWS conducts prescribed burns as a part of its Refuge management mission. A poster composed of photographs showing helicopters in action on fires in Region 4 was prepared and placed inside the FWS helicopter for viewing.



Forestry Technician Amy Midgett provides information to visitors at the NPS First Flight Centennial Celebration. KLW

Equipment

Following a “close-call” in which one of the ARNWR tractors almost fell off the small “drop-neck” lowboy trailer, it became apparent that the Refuge is in dire need of a new low-boy suitable for loading and unloading fire equipment – and one that can be dedicated to fire management. The trailer of concern is a “drop-neck” model designed for loading from the front. Fire tractors with plows will not fit onto this lowboy unless loaded from the back. The operator has to pull the tractor up over a large wood and metal “hump” built up over the rear wheels and axle. This causes the tractor to tip and lurch dangerously. The fact that the tracks on our flextracked tractors overlap this lowboy trailer by 12-18 inches on both sides also factors into the difficulty experienced in using this lowboy.

The Refuge fire plows are being dismantled and rebuilt to NCFS design standards for pocosin plows. The need for re-building or replacing the two primary fire plows was highlighted during the First Fire.

No progress was made in getting the FWS gyro-trac brush cutter repaired under warranty following the devastating equipment fire the previous summer (2002). When year-end funding became available, the decision was made to write-off the loss of the old gyro-trac and purchase a new machine from a different company. A new flextracked brush cutter tractor was purchased from Geo-Boy and will be delivered to the Refuge in early 2004. The burned gyro-trac will be transferred to Savannah NWR to use for spare parts for other gyro-tracs in the region.

206 RW

The FWS Region 4 helicopter had a busy year and the new fuel truck and trailer went with it. Following prescribed burns in the winter, it flew to east Texas to participate in the Space Shuttle Recovery efforts for most of the spring. It assisted Florida, Mississippi and South Carolina in a number of prescribed burns. It returned in time to participate in the First Fire, flew Phragmites spraying projects, and flew to western Idaho where it was heavily used with the MKIII Primo machine in burnout operations. It returned to North Carolina and assisted in Hurricane Isabel recovery efforts for both FWS and NPS. During the later part of the fall, it assisted in more prescribed burning projects on the Refuge and in the First Flight Centennial Celebration at the Wright Brothers National Memorial.

In November, the Regional Fire Management Coordinator made the decision to relocate the fire-funded helicopter to central Florida. Regional Aviation Manager Glenn Cullingford will be moved there to fly it. The Refuges in North Carolina will be dependent on ARA's for Rx and wildfire suppression in the future.

Fire Research:

A smoke management meeting was held in July with the North Carolina Forest Service. A proposal was created to perform operational evaluation burns to evaluate V-smoke and other smoke modeling processes to be used in place of the current North Carolina Smoke Management Guidelines, with the intent of completely overhauling the current Guidelines. The FWS is taking a lead role in this cooperative research project.

The two National Fire Plan studies, water quality after burning and the characterization of down dead woody material and fuel loads through remote sensing, have been on-going throughout the year. Environmental conditions prevented the burning of the prescribed burn plot during the winter, so researchers continued to collect baseline water quality data at two week intervals. On May 30, Ge Sun, Steve McNulty, and Robert Mickler gave a presentation on the progress of the studies. All vegetation in the control and burn plots has been classified using aerial photographs and preliminary characterizations have been done on pre-burn water quality and vegetation data. Hurricane Isabel and the temporary halt on joint jurisdictional burns (part of the burn plot is on Dare Bombing Range) thwarted any attempts for a fall burn. Plans are to complete a post-Isabel resampling of the vegetation plots in early January 2004 and then do the prescribed burn before the spring fire season.

FMO Crews met with Jim Reardon and Rick Stratton from the Missoula Fire Lab and looked at their Research Burn Unit at the Dare County Bombing Range. Hurricane Isabel has laid waste all the data collections and compilation from this block due to the amount of disturbance the storm created in the area.

In the spring, the Refuge learned that a FY2003 research proposal submitted to the Joint Fire Science Program (JFSP) was not approved. FY2004 JFSP proposals were due in December, and the Refuge worked with a set of investigators to refine the research project and submit a new proposal. The purpose of the research is to evaluate a number of smoke management questions, starting with fuels availability and consumption rates and ending with plume modeling and assessment of potential impacts to public values and fire effects. If approved, research will be conducted on the Alligator River National Wildlife Refuge and Dare County Bombing Range. Robert Mickler with ManTech Environmental Technology Inc. is the principal investigator on the project and Regional Fire Ecologist Dave Brownlie is the project's Federal Cooperator.

DFMO Crews, ADFMO Vince Carver, and FMS Van Druten gave Region 4 Deputy Chief of Fire, Bob Eaton, the grand tour of eastern North Carolina Refuges during June 16-20. Eaton was introduced to pocosin fuels, wildland/urban interface issues, equipment needs, research needs, and personnel limitations for the fire program in this district.

Former FWS FMO Ray Fairinetti traveled to the Refuge as an AD on several occasions to assist prescribed burn implementation and planning.

Fire-related Contracting Highlights:

- The Firebreak Contract for 8.8 miles of 30 foot wide firebreaks in the Parched Corn Bay Compartment was completed for \$171,160 by Garcia Forestry using an amphibious tractor (Wilco Marshbuggy) with cutter head
- An Aviation Management Review with FWS, OAS, and NPS was completed for Alligator River National Wildlife Refuge in January. As of year's end, we have not received the results.
- A contract for Firebreak Access with Six Culvert Crossings was awarded this year, but the contract had to be terminated in December because the contractor could not reasonably assure the Government of his financial solvency.
- The 264 Culvert Crossing contract went overbid and no contract was awarded.
- The Deems-Curry dispute which revolved around flagging the contractor said he had to do in order to create the Stumpy Point Firebreaks was settled out of court. The suit was filed to recover about \$100,000, and the settlement totaled \$67,000.

10. Pest Control

Pest Plants

Generally, cooperative farmers use herbicides and insecticides for pest control on croplands. Pesticide Use Proposals and Chemical Use Reports are submitted on an annual basis in accordance with Service policy and guidelines. Because they could not plant due to wet conditions, there was very little chemical use on the Refuge by cooperative farmers. Some herbicide application did occur as field preparation for burning so that winter wheat could be planted. Because of an administrative decision, the prepared fields were not burned. Extra efforts are required to control Phragmites communis in farm fields, moist soil units and along roadsides. These efforts include herbicides, burning, and disking where possible.

During 2003, approximately 25 acres of Phragmites in the farm field areas were treated by force account through aerial application by helicopter.

Southern Pine Beetle

Trapping of southern pine beetles was done at three locations on the Refuge from April through May. This is a cooperative effort with the North Carolina Division of Forest Resources with the Refuge's contribution being allocating time and staff to set and check the traps. Trap results are unknown due to collecting and reporting problems.

G. WILDLIFE

1. Wildlife Diversity

The vast expanse of swamp forest and wetlands on the Refuge contains many important wildlife and ecological resources. Since much of the Pamlico/Albemarle peninsula was developed by clear-cutting, peat mining, and agricultural conversion, this area remains one of the most remote and diverse swamps in eastern North Carolina.

Alligator River NWR and its surrounding waters support many species of resident and migratory fish and wildlife. Preparation of species lists for the Comprehensive Conservation Plan revealed that, of the diverse assemblage of resident and transient wildlife, approximately 64 species are fish, 264 species are birds, 62 species are reptiles and amphibians, and 41 species are mammals. The Refuge supports wildlife species important from both a regional and a national standpoint. Its large size and dense vegetation make the Refuge a haven for species such as the black bear. Also, the Refuge harbors many species adapted to living in forested habitat as opposed to disturbed areas such as field edges. The Refuge also provides habitat for the endangered red-cockaded woodpecker and migrating bald eagle and peregrine falcon. Alligator River NWR is at or near the northern limit of ranges for several vertebrate species, most notably, the American alligator.

2. Endangered and/or Threatened Species

Four endangered species have been documented on the Refuge. Management programs are in place for the red wolf and red-cockaded woodpecker. An inventory program, although inactive, is in place for the American alligator, which is considered threatened by similarity of appearance to the crocodile in North Carolina. There are no plans to manage specifically for or inventory the bald eagle at the current funding and staffing level. As opportunities present themselves, aerial nesting surveys will be conducted.

a. Federally Listed Endangered and Threatened Species

American alligator (TSA): American alligators reach the northern extent of their range on the Refuge and probably were never very numerous in the area. Although delisted, the alligator remains classified as threatened by similarity of appearance in North Carolina. The highest density alligator population is consistently found on Whipping Creek Lake. A few

have been seen each year in the marshes, ponds, streams, and canals. Sightings of alligators throughout open areas of the Refuge seem to be increasing. Alligator surveys were not conducted in 2003 due to insufficient funding and staffing.

Bald eagle (Threatened): During the course of the year immature and adult eagles can be observed on the Refuge. Although eagle sightings are becoming more common, only two eagle nests have been confirmed on the Refuge as of this writing. Nesting did not occur in either of these nests during 2003.

Red-cockaded woodpecker (Endangered): Prior to Hurricane Isabel, trails were cut to previously tagged cavity trees south of Whipping Creek Road. Trails to cavity trees north of U. S. Highway 264 were cleaned up and made passable. Of the three known clusters on the Refuge, one produced a fledgling. None of the U. S. Highway 264 clusters were active during the nesting season.

Damage from Hurricane Isabel ranges from moderate to extensive in red-cockaded clusters. Although damage assessments remain incomplete due to inability to access some areas due to downed trees, it appears that 50% or more of the cavity trees were blown down or broken off. Some progress is being made as time allows to clear trails through pocosin to gain access to remaining clusters. This process is further complicated due to the fact that there is no funding or staffing allocated for such biological work on the Refuge.

Red wolf (Endangered):

Red Wolf Wild Population

The Red Wolf Recovery Program of the U.S. Fish and Wildlife Service, located in northeastern North Carolina, manages the world's only wild red wolf (*Canis rufus*) population. Fiscal Year 2003 represents the 16th consecutive year of successful management. By spring 2003, the wild population had produced at least 332 wild pups, with at least 41 pups born in the wild in Fiscal Year 2003. The wild population of red wolves is currently composed of approximately 100 wolves comprising 20 packs distributed across 1.7 million acres in five North Carolina counties.



A red wolf pup gets attention from "Dad."

Greg Koch

Red Wolf Adaptive Management Plan

The Red Wolf Adaptive Management Plan began in 1999 and is implemented by the Red Wolf Recovery Program field team headquartered at Alligator River NWR. An independent panel of scientists known as the Red Wolf Recovery Implementation Team meets twice per year to review pertinent field data, discuss red wolf and coyote management, and make recommendations to the Service regarding adaptive management and red wolf recovery. Reviews by the Implementation Team show the Plan is effective in restoring the wild red wolf population and managing competitors (eastern coyotes). In 2003, the number of red wolf breeding pairs (packs or family groups) and red wolf litters trends upward while the number of breeding coyotes or hybrid litters trends downward. By the end of calendar year 2003, one third of the 1.7 million acre experimental population area has numerous red wolves and is managed as free of coyotes, while another third of the area has many wolves and is almost free of coyotes. This means the red wolf experimental population area is nearly two-thirds full of red wolves. The remaining third shows good progress in restoring red wolves and managing coyotes.

Red Wolf Captive Breeding Program

As part of the Red Wolf Recovery Program, the Red Wolf Captive Breeding Program is effectively implemented by almost 40 captive facilities across the United States. The effort is overseen by the Red Wolf Recovery Program Team Leader located at the Alligator River National Wildlife Refuge (currently Bud Fazio), and is coordinated by the Red Wolf Species Survival Plan Leader, Will Waddell, located at the Point Defiance Zoo and Aquarium in Tacoma, Washington. In 2003, approximately 153 red wolves were held in captivity for cooperative breeding, reproduction research, and conservation genetics work. This breeding program maintains genetic diversity among red wolves and prepares a small number of red

wolves for possible release into the wild. This program leverages approximately \$400,000 of in-kind services contributed by the various partner facilities located across North America.

Red Wolf Island Programs

The Red Wolf Recovery Program and Red Wolf Captive Breeding Program partner with two U.S. Fish and Wildlife Service National Wildlife Refuges to raise red wolves in wild settings on islands. Young wolves growing up on these islands learn survival skills that prepare them for release into the wild red wolf population in North Carolina in the vicinity of the Alligator River National Wildlife Refuge. The Cape Romain National Wildlife Refuge in South Carolina maintains ten or more red wolves, including a red wolf family group (two to five) on Bull Island that produces pups for eventual release in North Carolina. The Cape Romain Refuge educates approximately 200,000 people per year about red wolves. The St. Vincent Island National Wildlife Refuge in Florida maintains a pair of red wolves, also for breeding in the wild. These island programs play vital roles in the red wolf captive breeding program via education and producing wild-born red wolf pups for release.



The captive red wolf facility at Alligator River NWR sustained \$180,000 in damage from Hurricane Isabel. One wolf was killed. K LW

Red Wolf Landowner Agreements

The Red Wolf Recovery Program is partner to conservation and access agreements with two different owners of private land comprising 15,445 acres (see Section C.2). These tracts of land are strategically selected to maximize monitoring of red wolves and other canids in the northeastern North Carolina five county experimental population area.

Red Wolf Genetic ID Project (including M.S. & Ph.D)

The Red Wolf Recovery Program is working with wildlife genetics researchers to identify gene loci in red wolves and coyotes. This information allows biologists to more easily distinguish and manage red wolves versus other dog-like animals such as coyotes. This information also assists managers in deciding how best to ensure long-term survival of the red wolf species. Both Master's degree and continuing Ph.D work at the University of Idaho have identified 18 gene loci in red wolves to date, making it easier to distinguish between red wolves and eastern coyotes.

Modeling the Wild Red Wolf Population

The Red Wolf Recovery Program is partnering with two Universities to model the North Carolina wild population of red wolves. Researchers from the University of Arizona are modeling coyote/red wolf gene introgression in one model and pathogen resistance in another model. A researcher at Trent University in Canada is modeling survival and demographics of the red wolf population. Both the introgression model and the population demographic model show that the wild red wolf population will survive successfully with assistance from biologists in managing problem coyotes.

Red Wolf Captive Research Facility at North Carolina State University

In a joint effort between North Carolina State University and the Red Wolf Recovery Program, the first two holding pens of a six pen facility have been constructed to allow important research on captive red wolves. Research is being conducted on such topics as disease detection, physiological processes, food habits and behavior characteristics. Ultimately, information learned at the North Carolina facility will be very helpful in both the captive breeding effort and wild population management effort of the Red Wolf Recovery Program. Veterinary school faculty member Dr. Michael Stoskopf is also lead facilitator of the Red Wolf Recovery Implementation Team.

b. State Listed Endangered and/or Threatened Species

Of other species occurring on the Refuge and not federally listed, the State of North Carolina lists some as endangered, threatened, of special concern, or significantly rare. Although the Refuge is not managed for all of these species, present practices do provide benefits for many of them. Species occurring on the state list and Refuge are:

Least tern (Special Concern); **Common tern** (Special Concern); **Gull-billed tern** (Threatened); **Black skimmer** (Special Concern). These species are not likely to be seen on most of the Refuge. They may be observed flying over the waters of Pamlico Sound, Croatan Sound, Albemarle Sound, Alligator River, and creeks and lakes within the Refuge. There are no sites suitable for nesting on the Refuge.

Little blue heron (Special Concern); **Snowy egret** (Special Concern); **Tri-colored heron** (Special Concern). These species are found around canals and on creeks throughout the Refuge. Very little is known about numbers of birds on the Refuge. Nesting has not been documented on the Refuge.

Glossy ibis (Special Concern): The glossy ibis can be found in fields within the farm units. Very little is known about numbers of birds on the Refuge. Nesting has not been documented on the Refuge.

Peregrine falcon (Endangered): The Arctic peregrine, *Falco peregrinus tundrius* can be observed on the Refuge with some regularity. Nesting does not occur on the Refuge.

Timber rattlesnake (Special Concern): The timber rattlesnake is found throughout the Refuge and is common relative to other snakes. Little is known about the life history of this species on the Refuge.

Pygmy rattlesnake (Special Concern): The pygmy rattlesnake has not been documented on the Refuge, but has been found in Hyde County. Since the Refuge extends into Hyde County on the southern end, it is conceivable that the species could occur on Refuge land.

Carolina water snake (Special Concern): The Carolina water snake is found throughout the Refuge in canals, marsh, creeks, and other water bodies where there is an adequate food supply. Little is known about the life history of this species on the Refuge.

Diamondback terrapin (Special Concern): The diamondback terrapin is found along the estuarine borders of the Refuge. Little is known about the life history of this species on the Refuge.

3. Waterfowl

Historically, large numbers of waterfowl did not use ARNWR because of the forested character, but the Refuge supports a substantial year-round population of wood ducks using the numerous ditches, canals, creeks, lakes, natural openings, and swamps. A large number of waterfowl species can be found on the Alligator River and the associated sounds during winter months. The addition of the 5,100 acres of farmland in 1988 substantially increased opportunities for waterfowl management on the Refuge. This management has been achieved primarily by converting farm fields, classified as prior converted wetlands, to moist soil management units.



Several thousand waterfowl used the South Twiford Unit A impoundment for feeding during December and January. KLW

Results of this year's surveys are given in the table below. Except for wigeon and coot, all species showed a substantial increase in use during the 2002-2003 survey period in comparison to the 2000-2001 survey period. Most species continue to show lower use in comparison to the 5-year and long-term averages.

Composition of Wintering Waterfowl, Alligator River NWR
2002-2003

SPECIES	PEAK PERIOD	SURVEY PEAK #	# USE DAYS 2002-03	% TOTAL USE DAYS 2002-03	USEDAYS % diff from 2001-02 avg	USEDAYS % diff from long-term avg
Tundra Swan	Dec	1,480	70,145	14.5	+51	+48
Snow goose	N/A	0	0	0	0	0
Canada goose	N/A	0	0	0	0	0
Mallard	Feb	465	21,660	4.5	+85	-54
Black	Dec	202	8,801	1.8	+621	-61
Gadwall	Feb	68	2,489	0.5	+2317	-75
Wigeon	Jan	163	7,071	1.5	-16	-49
Pintail	Feb	4,298	185,489	38.3	+1267	-19

Cont.			1			
GWT	Feb	4,568	69,822	35.0	+1754	-11
BWT	Mar	8	193	0.01	N/A	-74
Shoveler	Feb	179	4,796	1.0	+56	+91
Wood	Dec	142	2,716	0.6	+661	-85
Ringneck	Jan	361	9,459	2.0	+1111	-85
Redhead	N/A	1	1	0	N/A	0
Canvasback	N/A	0	0	0	N/A	0
Scaup	Mar	2	40	0	N/A	0
Unknown	Jan	41	1,389	0.3	+322	-94
Bufflehead	N/A	0	0	0	N/A	0
Ruddy	N/A	0	0	0	N/A	0
Merganser	Feb	4	113	0.01	+126	+31
Coot	Mar	3	90	0.01	-12	-99

Food production in the moist soil units was good to excellent as most units contained a frequency of occurrence of good to fair waterfowl plant species within an overall range of 67%. This frequency correlates well with the portions of farm fields that can be effectively managed for moist soil vegetation. Shaping of the farm fields for surface drainage results in about 1/3 of each field being too high and dry for cost-effective moist soil management.

The table below shows the frequency of occurrence for moist soil unit plant production during the growing season at Alligator River National Wildlife Refuge.

Alligator River National Wildlife Refuge				
Moist Soil Waterfowl Food Production				
Moist Soil Unit	Frequency of occurrence (%)			
	Good	Fair	Non	Other
South Twiford Unit A	17.4	43.6	37.5	1.6
South Twiford Unit B	38.4	36.0	25.2	0.4
South Twiford Unit C	16.5	34.4	47.9	1.2
South Twiford Unit D	35.0	36.2	28.8	0
South Twiford Unit E	21.5	37.9	34.6	6.0

<u>Cont.</u>				
North Twiford Unit A	12.3	42.2	39.5	6.0
North Twiford Unit B	36.0	32.8	30.5	0.64
North Twiford Unit C	42.2	25.4	32.2	0.20
North Twiford Unit D	24.0	17.8	55.1	3.1
Creef A-1 North	29.8	39.8	16.1	14.4
Creef A-1 South	56.0	6.5	28.3	9.1
Creef A-2	41.9	31.2	12.8	14.1
Average =	29.7	37.3	25.2	7.8
Overall food production	67.0		33.0	

With regards to moist soil management, only 30%-50% of each unit can be flooded by gravity flow. Since there are no pump stations capable of pumping water into the units, the remaining increases in water level are due to rain. As the wintering period progresses it is interesting to note that the higher elevation moist soil units gradually become flooded and waterfowl use shifts to these units. However, these units have considerably lower use overall when averaged over the season. Since habitat conditions were good to excellent throughout the wintering period, it is not likely that food sources were limiting use.



Several Refuge staff members attended an invertebrate identification workshop held at Pea Island NWR. FWS

Incorporation of filter strips on each side of each farm field during the 2000 growing season has been very beneficial for grassland birds and other wildlife. An unpredictable consequence of these filter strips (75 feet wide on each side of the field) is the effect they had on field use by tundra swans. These filter strips effectively reduced field width to half of the original 150 ft. width. Annual and perennial weeds growing in these filter strips attain heights that "enclose" the fields, making them too narrow for use by swans. Future management of these filter strips for shorter, grassland communities should solve this problem.

The Wood Duck Nest Box Program was inactive. Since use of nest boxes has always been consistently low, checking the boxes is not a high priority. Traditionally, less than 2% of the nest boxes have ever shown any signs of wood duck use. However, nest boxes are used by other species such as other birds and bees. At the last count, 39 boxes still remain throughout the Refuge.

4. Marsh and Waterbirds

Although management of moist soil units is focused on waterfowl, numerous other marsh and waterbird species can be observed in these units. Herons, egrets, woodcock, snipe, and rails, appear to be most numerous. Killdeer and yellow legs are common. Kingfishers are often seen adjacent to canals with deeper, more permanent water. The anhinga has been observed on the Refuge on rare occasions. Although not documented for several years, anhinga nesting has been observed on at least one occasion within the southern portions of the Refuge. At the present time, there are no formal surveys for these species. They are counted while conducting winter waterfowl surveys.

6. Raptors

Many raptor species can be observed on the Refuge. Among the most common are the red-tailed hawk, red-shouldered hawk, and northern harrier (marsh hawk). The kestrel and merlin are also common species. Owl species include great-horned owl, barred owl, short-eared owl, and screech owl. Peregrine falcons are known to move through the general area during migration. A few reports of peregrine falcons occurred during 2003. During late 2003 some preliminary effort went into establishing grassland bird and raptor surveys in the farm fields. An attempt will be made to finalize routes and protocols during 2004.

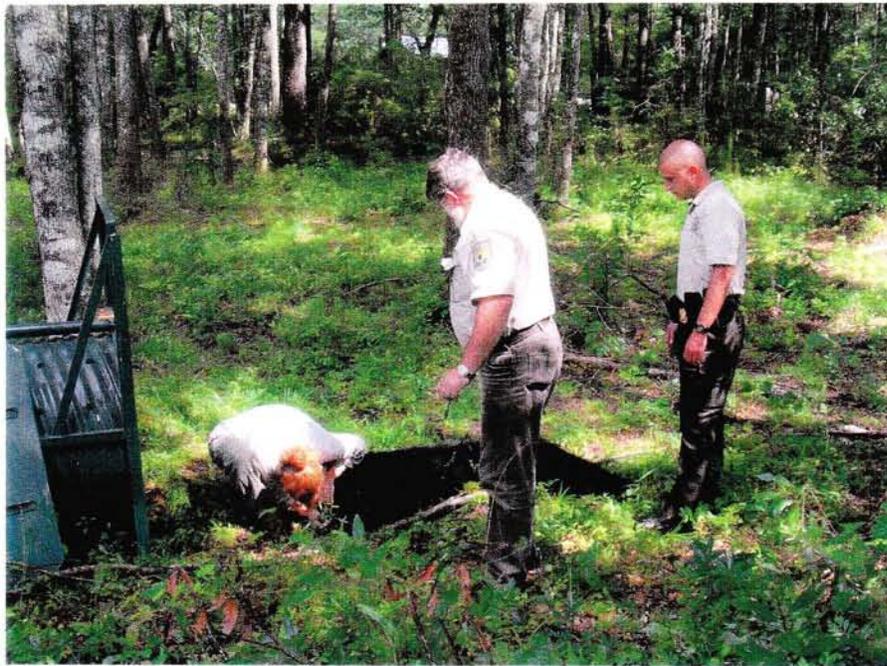
7. Other Migratory Birds

The Refuge is host for migratory species such as the mourning dove. Several species of rails are found in the moist soil units, and woodcock may be found throughout. In addition, the vast expanse of forested habitat on the Refuge provides for a wide range of neotropical migrant birds. There are plans to begin neotropical migrant bird surveys as soon as budgets and staffing permit.

8. Game Mammals

White-tailed deer are found on the Refuge. Although carrying capacity for pocosin habitat is considerably less than bottomland hardwoods, deer population size appears to be relatively constant and they are providing sportsmen with considerable recreational opportunity.

A study to estimate the Refuge population of black bears is underway and a management plan will be drafted in the coming year. The ecosystem bear study entered the fourth year. Hair traps were constructed in late 2002 and early 2003. During the summer of 2003, 1,479 hair samples were collected from 71 traps over a period of 8 weeks. Following the 2004 hair collection season, genetic analysis will be done during the winter of 2004-05. A report with management recommendations will follow. Dr. Mike Vaughan of Virginia Tech is the principal investigator with graduate student Catherine Treddick conducting most of the field work.



Refuge Biologist Dennis Stewart and LE Officer Jeremy Bucher observe while Virginia Tech researcher Catherine Treddick gathers data from a nuisance bear at the Buffalo City cabin. KLW

A male black bear broke into the porch of the intern housing at Buffalo City cabin and caused other exterior damage to the facility during several visits. A culvert trap borrowed from the State was successful in capturing the bear. After a complete work-up and awakening from anesthesia, the bear was shot in the behind with rubber bullets during his exit to help deter him from returning to the area and causing additional damage.

10. Other Resident Wildlife

Wild turkeys were rarely observed during the spring and summer. However, in the fall and winter, flocks of 6-20 birds were observed in various locations. Other turkeys were observed over much of the northern half of the Refuge, even along roads transecting pocosin habitat. Group size varied from 1 to 6 birds. This is the second year since the restoration project began in 1999 with the release of 16 birds that significant numbers of turkeys were observed on the Refuge.

15. Animal Control

Beaver numbers are rapidly increasing and so are all of the associated problems. Removing dams from culverts and canals is an ongoing maintenance issue. Beaver population management practices have been implemented and will most likely become a permanent component of Refuge management activities.

H. PUBLIC USE

Special Section: Celebrating the Centennial

On Saturday, March 21, 2003, a special community-oriented ceremony was held at the Outer Banks Welcome Center on Roanoke Island to commemorate the 100th Anniversary of the National Wildlife Refuge System. A Time Capsule containing a variety of items from Refuges and the local community was buried and a plaque was installed. Items in the capsule included samples of stained glass wildlife ornaments that are given to volunteers annually, refuge brochures, Murphy Peterson memorabilia, goose neck collars, bird bands, a red wolf collar, Jockey's Ridge State Park articles, Outer Banks Chamber of Commerce items, a striped bass lure, beach pea seeds, a 1950's vintage FWS LE badge, various patches and lapel pins, caps, a video of the NWRS, peat pellets, nomex apparel, NPS items, Ding Darling memorabilia, driving tour of Pea Island NWR CD, FWS employees business cards, Outer Banks postcards, and newspaper clippings. See the back panel for a complete list of items that were included.

The plan is for the capsule to be excavated in 2103 around the 200th NWRS Anniversary. If scientists are correct in their predictions, the person retrieving the time capsule may need scuba gear. Most of the Outer Banks are expected to be underwater due to an anticipated rise in sea level of up to 100cm.



Workers from Hatchell Concrete buried a Refuge Centennial Time Capsule at the Outer Banks Welcome Center in March 2003.

BS



Refuge Manager Mike Bryant unveils the Time Capsule and interpretive plaque with assistance from community volunteers.

BS

1. General

Public use trends continue to move upward in the non-consumptive areas. Local groups including the Outer Banks Paddlers Club and the North Banks Bird Club use and promote the Refuge through a variety of means. The Milltail Creek Canoe/Kayak Trail system has been especially popular.

Total visits to the Refuge in 2003 were estimated to be 42,318. Administrative offices remain in the General Services Administration (GSA) leased office space in Manteo. A few visitors continue to locate the office, but most information is disseminated through web pages, telephone, correspondence, or the news media. During 2003, the Refuge continued to focus on providing a greater number of media contacts while keeping the messages short and simple. A total of 65 news releases and 25 radio/TV spots were done.

WIS Strawser participated as a member of the Roanoke-Tar-Neuse-Cape Fear (RTNCF) Ecosystem Outreach Committee, the NC Environmental Education Association, and the Region 4 Outreach Team (R4OT). WIS Salewski also joined the RTNCF Ecosystem Outreach Committee and took on a fundraising subcommittee within the R4OT. DRW Whaley served as RTNCF Outreach Committee co-chair for 2003 along with Planner Bob Glennon.

2. Outdoor Classrooms – Students

Creef Cut Wildlife Trail and Sandy Ridge Wildlife Trail are used frequently by groups of students on the way to and from the Outer Banks from inland areas. Some of these groups contact the Refuge to request a teacher/leader to work with their groups. As staff time allows, and as volunteers are available, these requests are usually met. A growing number of schools are also making the Refuges their ultimate destination, and are requesting a variety of programs. During 2003, 53 students from four schools were taught on-site by staff and volunteers as a part of an organized educational program.

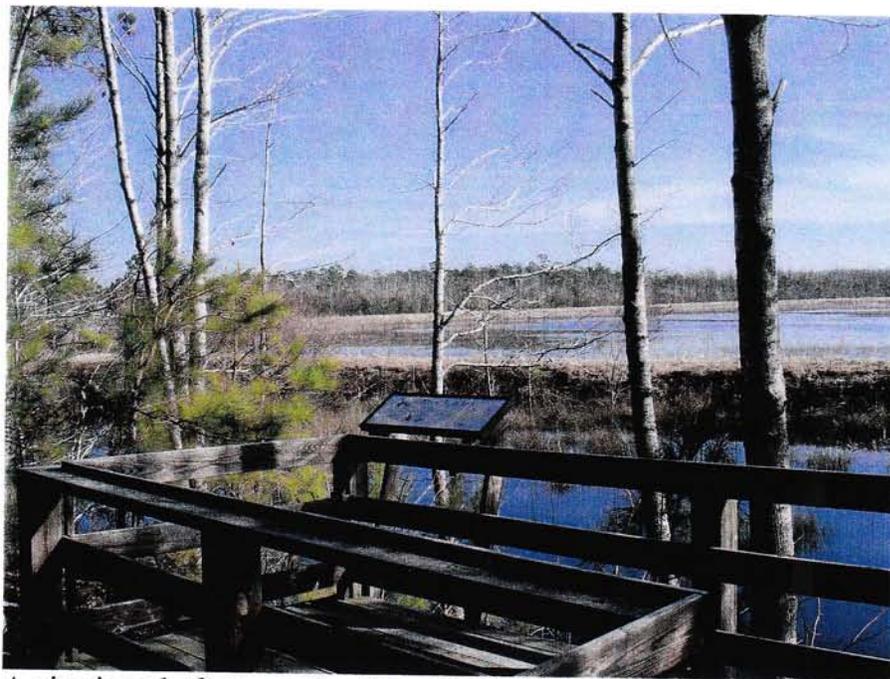
3. Outdoor Classrooms – Teachers

Since Alligator River NWR and Pea Island NWR are located in an area rich in conservation education/interpretation agencies, these Refuges do not receive the requests common on other stations that are often the sole sources available. The North Carolina Aquarium, Jockey's Ridge State Park, Nags Head Woods Ecological Preserve, and Cape Hatteras National Seashore offer environmental education and teacher training activities. For this reason, the Refuge has chosen to focus more on other educational needs rather than attempt to compete with other conservation agencies.

4. Interpretive Foot Trails

Sandy Ridge Wildlife Trail and Creef Cut Wildlife Trail continue to be used by individuals and groups. With 2,300 feet of boardwalk, Sandy Ridge Trail is one of the best kept secrets on the Refuge! Full potential for use of these trails has not been reached. Both trails, but

especially Sandy Ridge, received extensive damage during Hurricane Isabel. Sandy Ridge Trail alone had 235 trees downed over ½ mile. Trails were cleared as promptly as possible utilizing a chainsaw crew from various SE Refuges, workampers, a Sierra Club workgroup.



A viewing platform on Creef Cut Wildlife Trail provides interpretive panels on managing wildlife and neighboring jet activities. K LW

Though not a foot trail, the Milltail Creek Canoe/Kayak Trail System continues to be quite popular. On most days, there are several groups using the trail. If there was a local place to rent canoes or kayaks, use would increase dramatically. However, there is not a demand great enough to consider a concession for this purpose. Four local businesses were issued special use permits (SUP) to conduct guided canoe or kayak tours on the Milltail Creek Canoe/Kayak Trail System during 2003. Approximately 7,000 visitors participated in guided tours provided by the holders of these SUP's.

An estimated 39,900 people used Alligator River NWR foot trails during 2003. It is anticipated that Refuge trail use will increase. Approximately 7,375 visitors used the paddling trails, and 10,520 used the Wildlife Drive.

6. Interpretive Exhibit/Demonstrations

Refuge staff manned displays and exhibits at some of the usual annual events around Dare County and eastern North Carolina. Although some events were canceled following Hurricane Isabel, Interpretive Specialists were able to participate in other conservation-themed festivals, including the Pelican Island Centennial celebration, NC Aquarium's Earth Day event, NC State Fair, the Engelhard Seafood Festival, the Manteo Christmas parade, and outreach events at Manteo Elementary School and Cape Hatteras Elementary School.

This year, the Refuge coordinated and participated in a Boy Scout Camporall attended by over 4,000 boy scouts and held at the Manteo Airport. In partnership with the Frisco Native American Museum, NC Aquariums, National Park Service, 4H Conference Center, the Coastal Wildlife Refuge Society, and the Service's Fire Program, Refuge staff constructed an educational "conservation trail" where scouts participated in an interactive activity at each station and then received a commemorative Centennial patch. Over 1,200 scouts received the patch and were accompanied by an estimated 2,400 adults who also participated in the activities, coordinated by Specialist Howard.



The Blue Goose costume is a favorite at several local events annually.

BS

Refuge personnel staffed an exhibit at the week-long First Flight Centennial at the Wright Brothers National Park. Attended by approximately 150,000 visitors, the Service staffed a free-standing, custom-designed exhibit on The Role of Aviation in Wildlife Management, a float plane used in wildlife aerial surveys, and a helicopter used in prescribed fire management and fire control. WUI funds paid for the aviation exhibit, along with thousands of promotional key chains and magnets which were distributed to festival attendees. RTNCF Refuges also contributed funds toward North Carolina Refuges and Hatcheries leaflets, which were distributed to event participants. Refuge staff talked to a variety of event attendees about the many methods the Service employs using aviation.

The Refuge exhibits located at the Aycock Brown Welcome Center in Kitty Hawk were viewed by approximately 462,000 visitors during 2003.

7. Other Interpretive Programs

Regularly scheduled interpretive/educational programs for the Refuge during 2003 are shown in the table below. Fall, summer, and spring guided canoe tours were scheduled for a \$30 fee. In the summer, a weekly mammal tracking program and Refuge at night program was scheduled. These two weekly programs were not as popular as hoped, so interpretive staff will consider a change back to more popular themes for next year.

Alligator River NWR Public Use Programs

PROGRAM	#PROGRAMS	\#PARTICIPANTS
Howling Safaris	19	1,200 (est.)
Canoe Tours	25	219
Mammal Tracking	1	3
Refuge at Night		
Owl Prowls	2	10
Astronomy	1	10
Bats	0	0
Refuge at Night	2	6

Red wolf howlings have proven to be very popular programs on the Refuge. Because of overwhelming demand for howlings, a reservations system was instituted in 2003. The program continued to be free of charge. Red wolf program employees also reached 1,130 people through off-site programs at a variety of venues.

Refuge staff participated in several off-site outreach opportunities. Through an International Migratory Bird Day flyer distributed throughout elementary and middle schools on the Outer Banks, Specialist Salewski received interest from a variety of teachers and developed two new educational programs relating current science topics to bird conservation. One program (Deadly Links, from Project WILD) at Manteo Middle school reached 100 students; one program at First Flight Middle School on Biodiversity and Endangered Species reached 100

students; and a program on Bird Songs at First Flight Middle School reached 100 students. More programs of this nature will be established.

The Region provided \$8,000 in funding for a 9264 WUI project to develop an educational fire display focusing on wildland-urban interface issues and the Firewise program. Workamper Gene Goerke designed and built a foldable easel and a collapsible brochure holder for the project. Two fire fact sheets were developed by WUI Specialist Van Druten to explain wildland fire in greater detail than the exhibit offers. The fact sheets were entitled, "Prescribed Fire: Benefits of Fire as a Management Tool" and "Burning in Pocosins: Fire as a Management Tool on National Wildlife Refuges." (see packet in back) Magnets and stickers sporting the slogan, "Defensible Space Helps Your Place" were also made for distribution.

An outreach session on Southern pine beetle biology was conducted at the Cape Hatteras Elementary School Science Fest. Eighteen classes were conducted on beetle life cycles and trapping beetles. Students received a "hands-on" experience in checking beetle traps.

8. Hunting

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

With additions and deletions of land in the Refuge, the ratio of land designated for hunting with chase dogs and land designated as closed to use of chase dogs has remained relatively constant (1:1). With reviews and changes of the Master Plan, some changes in hunting areas have occurred; however, the ratios of lands open to still hunting and lands open to chase dog hunting have remained approximately the same

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

White-tail deer continue to be the most sought after game species on Refuge lands. Alligator River contains over 150,000 acres of habitat, traversed by more than 150 miles of unimproved roads. These factors make it difficult to establish effective hunter check stations. The North Carolina Wildlife Resources Commission (NCWRC) again required hunters to register hunter-killed deer with a local wildlife cooperator agent; however, they assume that an estimated 40% go unreported. In past years, the figures reported by the State have been used and extrapolated to provide more realistic estimates. Using these figures, provided by the NCWRC, it was estimated that 50 deer were taken during the 2003 hunt.

This year was Dare County's thirteenth annual bear season since the NCWRC and County Commissioners reinstated a bear season. Bear hunting is not allowed on the Refuge at this time. Refuge officers and biologists monitor bear hunting activities adjacent to Refuge lands. An estimated 16 bears were taken from the county owned tract of land near the landfill.

Archery season ran from September 7 to October 4, along with the usual weekend patrol assignments for Refuge Officers. Muzzle loader season lasted October 5-11. Regular gun season began October 12 through January 1st. Farm fields stayed open longer this year, until November 15, due to their temporary closure during the Hurricane Isabel clean-up. For the rest of the year (and through September, 2003), this area was closed to all public entry.

Waterfowl seasons were October 2-5, November 9-30, and December 14 – January 25. A limited amount of waterfowl hunting took place on the Refuge, but most occurred over open water in the sounds and in Milltail Creek.

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

Estimated public hunting activity appears below:

Hunting Activity	Refuge Visits
Waterfowl	360
Big game	821
Upland game	127

Unfortunately, hunting visits are, at best, an educated guess on our part. With so many different entrances to the Refuge and so few officers, about the only way to estimate hunting activity is by anecdotal information and leaflets distributed.

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

The Dare County Bombing Range is beginning to plan for a bear season on Dare Game Lands in 2005. Refuge employees have been attending meetings due to potential impacts to the Refuge from hunting a species on adjacent lands that is currently illegal to take on the Refuge.

9. Fishing

The heaviest recreational fishing effort in the vicinity on the Refuge is in the surrounding sound system from October through April. Fishing pressure on the Refuge is relatively low and is a reflection of the isolation of the area and limited access rather than of low catch per unit of effort. Angling for bluegill, crappie, chain pickerel, channel catfish, flier, largemouth bass, and yellow and white perch is considered good. During 2003, there were an estimated 38,661 fishing visits to the Refuge. Frog gigging is allowed on the Refuge by special use permit; however, no permits were issued during 2003.

10. Trapping

Since trapping is considered a commercial use of the Refuge, neither visits nor activity hours are normally recorded under public use. For the 2003 trapping season, three special use permits were issued in December for Refuge trapping. Substantial requirements are integrated into the permit due to the presence of the red wolf on Alligator River NWR.

11. Wildlife Observation

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



Kayaking and canoeing are increasing in popularity along four marked paddling trails in the Milltail Creek area.

KLW

Wildlife photographers used the Refuge to some extent for a chance at photographing black bear, red wolves, deer, or any number of birds and other animals. General habitat scenes were popular for an adventuresome few.

The following figures represent wildlife/wildlands observations during 2003:

Activity	Visits
Foot traffic	39,873
Vehicle travel	10,517
Boat use	7,373

17. Law Enforcement

RLEO Jeremy Bucher reported for duty in September after completing several months of required training. After Hurricane Isabel, Officer Thomas Payne from Piedmont and J.D. Bricken and Greg Walmsley from Pee Dee worked on Alligator River and Pea Island to provide security during hurricane recovery. Refuge collateral duty officer Kelley Van Druten conducted patrols on both Alligator River and Pea Island NWR's as her schedule allowed and situations arose.

NCWRC Officer Mark Cagle made the majority of law enforcement cases on the Alligator River NWR, including a few deer poaching cases. LEO Chris Smith from Mattamuskeet NWR assisted at Alligator River NWR during spring, clearing the Refuge of several abandoned vehicles and working at night to help reduce after-hours use.

Other Items:

- An unusual call was fielded by FMS/LEO Kelley VanDruten in May when she responded to a suspected osprey electrocution in Kill Devil Hills, NC, reported by the Dominion North Carolina Power Company.
- In late June, several excess 9mm and .40 caliber handguns leather gear were transferred to the Bureau of Indian Affairs.
- On July 15, officers from around eastern North Carolina gathered in Manteo for a Law Enforcement Deployment Workshop to meet with Regional Chief of Refuges Jon Andrews and members of a review team. The group discussed proposed changes for the LE program within the National Wildlife Refuge System.
- From August 1-16, LEO Van Druten traveled to Utah for a 14-day Security Officer assignment for the USFS Region 4 Large Fire Support aviation facility.
- A general disagreement between OLE and Refuge management regarding issuing tickets in the field on Refuges remained unsolved this year. Refuge officers are required to issue pink slips to the offender, then send the information to the Special Agent who determines whether or not an NOV will be sent. No other FWS areas in Region 4 operate in this manner. Refuge management is working to change the procedure to allow Refuge officers to issue their own tickets in the field.

18. Cooperating Associations

FY 2003 for the Coastal Wildlife Refuge Society (CWRS) noted the following accomplishments:

During the year, CWRS spent \$82,000+ on Refuge projects, including the following:

- \$22,000 to the Service to fund an Interpretive Assistant position;
- \$ 3,633 for outreach;
- \$12,295 for Centennial materials;
- \$4,000 for trail maintenance;
- \$11,000 for Visitor Center projects,
- \$861 for misc. materials and supplies for educational/interpretive programming;
- \$ 995 for staff support;
- \$27,000 for Wings Over Water support;

A total of \$50,245 granted from Ducks Unlimited to Mackay Island through CWRS was spent on a wetlands project on Mackay Island NWR.

The CWRS continued to hold \$90,000 of the original \$95,000 donation (i.e., a Right-of-Way fee from the NC Power Company) for Currituck NWR. It has also been instrumental in assisting other stations in the RTNCF Ecosystem and the Planning Office, as requested.

The Society also continued to include in their budget a line item of \$120,000 for planning of the new Visitor Center on Roanoke Island.

The Book Store/Gift Shop grossed \$137,679 in sales during 2003. Other income sources were donations - \$8,387; interest - \$4,107; canoe fees - \$13,369; Wings Over Water - \$20,000; grants - \$9,200; and reimbursements - \$8,600 (includes \$8,613 reimbursement from Refuge for intern stipends).

Society President Tom White and Board members Dru Ferrence and Bob Webster attended the National Refuge Friends Conference in January.

The Coastal Wildlife Refuge Society received a Merit Award for their work from Soil and Water Conservation Society's Hugh Hammond Bennett Chapter.

Current membership is approximately 800 members. During 2003, the Society was awarded a grant for \$5,000 from the National Fish and Wildlife Foundation to fund a membership campaign.

At the annual membership meeting in September, the by-laws for the Society were amended to allow for dues or volunteer service to "purchase" membership in the Society. Article IV Membership was changed to read as follows:

ARTICLE IV - Membership

Any individual or organization that approves the purpose of the Society, is willing to assist the Society, and qualifies by the payment of dues or the providing of volunteer service as stated herein, shall be eligible for membership. Only members in good standing shall be permitted to vote at the annual meeting. Classes of memberships and dues or volunteer hours for each class shall be as follows:

Regular Member - - - - - \$10 or one hour as a volunteer annually
 Wildlife Member - - - - - \$50 annually
 Donor Member - - - - - \$100 annually
 Life Member - - - - - \$250 or 500 cumulative volunteer hours
 Business Member - - - - - \$500 annually

I. EQUIPMENT AND FACILITIES

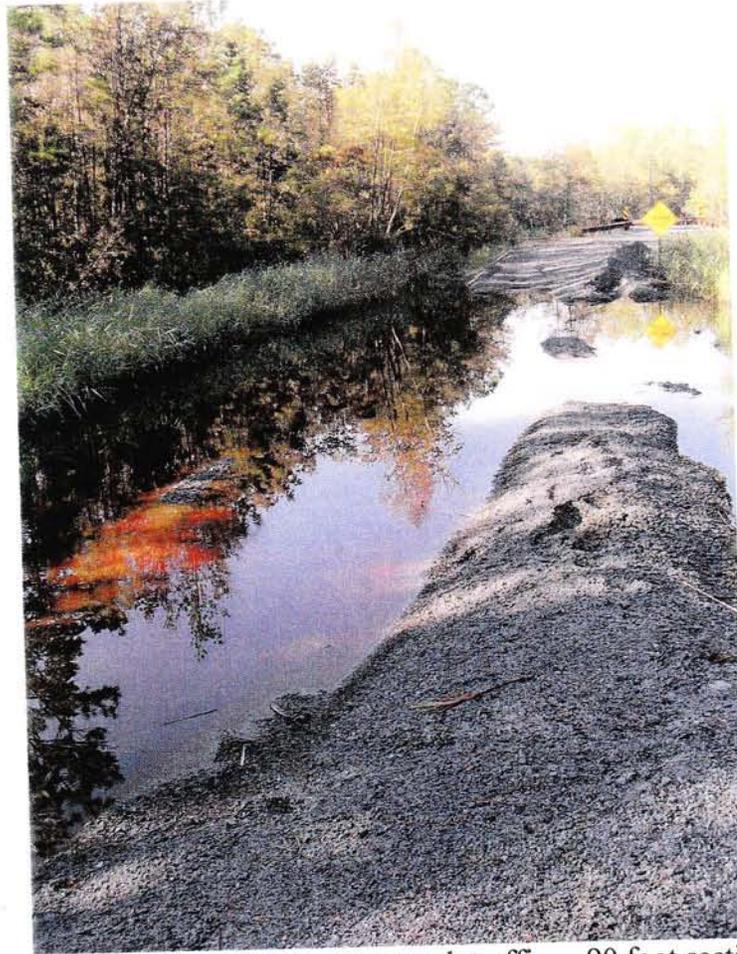
1. New Construction

A new HAZMAT building was delivered and installed behind the maintenance office in August. This is a much needed improvement over old storage facilities.

2. Rehabilitation

The Navy Shell and Milltail Creek bridge replacement projects were completed in March this year. Both bridges allow for one lane of traffic use, and were built to provide safe transportation of all Refuge vehicles and loads for all management activities. They will also provide safe access to interior portions of the Refuge for the visiting public. Requests from the USAF to provide access to Refuge roads and bridges for commercial logging trucks has so far been denied due to impacts that would result from this use.

We continued a Federal Highway Administration project for Refuge road rehabilitation from ERFO monies from 1999 storms. A total of \$3,275,000.00 was approved for repairs to primary/arterial roads and designated as Disaster NC 2000-1-FWS. The Eastern Federal Lands Highway Division completed all designs and Bid solicitations. In October 2002, funding had been reduced to \$2.3 million and a contract was awarded to Aldridge Brothers, Inc. of Robbinsville, NC. to repair 23 miles of Refuge roads. Repairs have included hauling, spreading, compacting and grading materials to elevate roads back to prior storm damage grades. The final six inch layer of compacted gravel aggregate will provide all weather use for Refuge and public use purposes. The width of applied aggregate varies from 16 – 24 ft., depending on the base width of the individual road. During the repairs of Milltail Road, a 90 foot section of the road (120 ft. NE of the new Milltail Creek bridge), collapsed and became impassable. Monies from the original contract were used to complete emergency repairs to the collapsed portion of the road. Negotiations with the Federal Highway Administration and our Regional Office resulted in funding (130K) to make the remainder of road repairs on the original contract. Two (2) miles of road remain to be repaired on the original contract. Those repairs should be complete by June 2004.



Following heavy rains and contractor truck traffic, a 90 foot section of Milltail Road collapsed. Contractors had to excavate all materials and install wooden mats due to the instability of the substrate. KLW

An on-site meeting was held in March with Jo Ann Clark (Southeast Region Road Coordinator) and Dorothy Germain (ERFO Coordinator) to evaluate the need for repairs of the additional mileage (59.5 miles) originally identified in the initial inspection.

Following Hurricane Isabel in September, additional road damage was received. As of early 2004, we are awaiting final word on the amount of funds we will receive for additional road repairs.

Began dike rehabilitation project in South Twiford impoundment units C, D, and E. Unit E was divided into two units, creating Unit F. Total linear footage of dike constructed in the four units is estimated at 33,500 feet. Excavation of dike material is complete, but remains to be shaped and seeded. The original dike remains to be reverted back to field levels.



WG Supervisor Bruce Creef provides Refuge Manager Mike Bryant with an update on the South Twiford dike project. K LW

Other Items:

- Removed and rebuilt 2 (Creef #1 & Laurel Bay #2) diesel pump engines.
- Extensive clean up after Hurricane Isabel (September 2003).

3. Major Maintenance

- Installed new chlorinator for the Operations Facility water system.
- Replaced clutch oil seal on Laurel Bay Pump engine #2.
- Removed canal culvert from intersection of Cub and Bear Roads.
- Replaced oil cooling unit on Laurel Bay pump engine #1.

4. Equipment Utilization and Replacement

The Northeast NC Refuges District Gyro-Trac brush/tree cutting machine assigned to the Refuge suffered a fire during cutting operations in July 2002 that caused major damage to the machine. The Gyro-Trac was transferred to the company's factory in Ravenel, SC where it has sat pending warranty challenges from the Government. Regional Safety Officer Brian Hardison pursued a settlement with the company. By late April of 2003, there were several private parties suing Gyro-Trac over fire-caused damages on their machines, and the Government had agreed to cooperate with their lawyer to share information regarding all parties' claims. At that time, the Government was still looking into plans of pursuing a warranty claim against the company. As the year drew to a close, the chances of the Government getting Gyro-Trac to honor their warranty faded. Based on the time and money being expended, the thought of pursuing a lawsuit against

the Canadian company in a Canadian court began to lose its appeal. Eventually, the Government decided to recoup what losses it could by using the burnt Gyro-Trac for parts for other similar Southeast Regional machines. Plans are being made to transfer the burned unit from the factory in Ravenel, SC to Savannah NWR. A similar designed machine (Geo-Boy) has been ordered to replace the Gyro-Trac and will be based at Pocosin NWR.

Other Items:

- Mowed V-ditches, disked impoundments, and managed water levels in North Twiford, South Twiford, Creef A1 (north and south), and Creef A2 management units in preparation for annual waterfowl and shorebird migrations.
- Received and put in service one red wolf, one fire, and five O&M vehicles.
- Graded approximately 250 miles of Refuge roads.
- Service, maintenance or repairs to vehicles – 51.
- Service, maintenance or repairs to equipment – 48.
- Received and put in service new Cat 320 long reach excavator.
- Pumped approximately 650 hrs. each on four pumps for farm field impoundment management.

5. Communications Systems

We continued the update of the station radio system (new mobile radios, installation of towers at Pea Island Office and Visitor Center, and Sandy Ridge Wolf cabin. Completion is expected in early 2004.

6. Computer Systems

During 2003, one hard drive had to be sent off for data recovery at the cost of \$1,706.12. A total of six computers were purchased, all with XP as the operating system. To date, all Refuge computers either have Windows 2000 or Windows XP as their operating system, and all systems meet and/or exceed the Regional standards.

The East Lake Operations Center was equipped with satellite service to improve internet connectivity for daily e-mail, operations, and SAMMS. The site also had a wireless network installed to share the internet connection for all computer workstations.

All permanent employees at Alligator River NWR have access to the internet either by dial-up using their assigned username and password or via network connections. Each permanent employee has a Lotus Notes email account. All employees have been given information to obtain an Active Directory password, and at this time are either using their former Notes password or AD to access SII pages, and other Service intranet sites.

8. Other

- Exchanged equipment use (sometimes personnel) with Mattamuskeet, Pocosin Lakes, Roanoke River, Mackay Island, Carolina Sandhills Refuges, Navy Dare Bombing Range (DOD) and the National Park Service.
- All permanent Wage Grade employee position descriptions were reviewed by a contract personnel specialist as part of the Regional audit process.
- Several staff members attended SAMMS training in preparation for implementing this new program.
- Craddock and Creef instructed in Regional MOCC training sessions.
- Creef instructed in Regional Heavy Equipment training sessions; continued duties as National Wage Grade representative on the Leadership Development Council; continued duties on Southeast Region's WG Advisory Committee; assisted (as instructor) with Basic Refuge Manager Academies and with two sessions of WLD 5100 (Workshop for Maintenance Professionals) at NCTC.
- Staff assisted in all aspects (dispatch, helo operations, prescribed burning, wildfire suppression, maintenance of vehicles and equipment) of Fire Management Program.
- Staff assisted with Wings Over Water and Sierra Club activities.
- Craddock assisted with and attended Pelican Island Centennial events.
- Staff completed annual Regional and National (RPI, MMS, RONS, Capitalized Property Management, Fleet Management, RCAR, OGM, Energy Conservation) data requests.
- Staff provided National Park Service with logistical and equipment support for the First Flight Centennial.
- Monitored Pea Island (North Pond) bulkhead project.

J. OTHER ITEMS

1. Cooperative Programs

Wildland-Urban Interface Program

Several contacts were made this year for the WUI program when FMS Van Drueten attended Fire Prevention Education Team Training in Crossnore, North Carolina. Although the training was to prepare her to go out on assignment as a team member for an interagency Fire Prevention Team, it was very beneficial for networking and generating ideas for wildland-urban interface education activities.

FMS Van Drueten attended a Firewise Communities workshop hosted by the North Carolina Forest Service (NCFS) in New Bern, North Carolina. The training was instrumental in developing partnerships with the NCFS for implementing Firewise programs and coordinating state education efforts, and for developing a better understanding of how to introduce Firewise concepts to homeowners. These two training classes have helped to cement a working relationship for fire education issues between FWS and the NCFS.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 2003

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

A. HIGHLIGHTS

- Hurricane Isabel came ashore on the Outer Banks on September 11. Section B.
- Replacement of the Bonner Bridge is nearing. Section D. 4
- A decision is made to stop planning for jetties at Oregon Inlet. Section D. 4
- USACOE dredging operations continue at Oregon Inlet. The question of sand compatibility is quickly becoming a major issue. Section D. 5.
- 1,674 acres of marsh was burned in the north PINWR burn units. Section H.9.
- Two loggerhead sea turtle nests and 6 false crawls, a record low, was attributed to much cooler than average summer water temperatures. Section G.2.
- Resident Canada geese are becoming more of a management concern. Section G. 13.
- Total sales for the Coastal Wildlife Refuge Society gift shop at Pea Island NWR totaled almost \$136,000. Section H.18.
- Posting of the 25,700 acre Proclamation Boundary was completed in February. Section I.2.
- First Flight Centennial brings special visitors to the Outer Banks. Section J.3.

B. CLIMATIC CONDITIONS

Specific climatic data is not kept for Pea Island NWR. See Alligator River National Wildlife narrative section B for local data.

Hurricane Isabel

The Hurricane Plan was activated on September 15 in preparation for Hurricane Isabel which slammed the Outer Banks as a Category 2 storm with sustained winds in excess of 100 mph on September 18. Structural damage reports totaled approximately \$5 million for Alligator River (ARNWR) and Pea Island (PINWR) NWR's. Resource damage to thousands of trees was sustained at ARNWR and sand dunes at PINWR were overwashed into Refuge impoundments to create 181 acres of overwash areas. Chainsaw crews from several SE Refuges were instrumental in removing trees from roads and trails – 235 trees were blown across the Sandy Ridge Trail alone. The red wolf captive facility was completely destroyed and one red wolf was killed inside the facility when it exited the kennel at a very inopportune time. ARNWR received damage to several facilities and had thousands of trees toppled.



Although not on the Refuge, the inlet cut by Hurricane Isabel destroyed a portion of NC Highway 12 on Hatteras Island. This type of event is very possible on Pea Island NWR.

DLS

C. LAND ACQUISITION

2. Easements

After Hurricane Isabel, Cape Hatteras Electric Cooperative realized that the electric transmission line is in eminent danger of being disrupted in two locations due to close proximity to the ocean. A request to relocate the electric line to a new right-of-way (ROW) was received in late 2003 and will be processed in 2004.



Hurricane Isabel resulted in up to six feet of sand on portions of NC Highway 12 within the Refuge. DLS

The ongoing effort to keep NC Highway 12 open for traffic continued in 2003. Although there were no changes in the right-of-way easement, much effort went into working with the N.C. Department of Transportation (NCDOT) to keep sand and water off the highway with each passing storm. Hurricane Isabel impact on NC Highway 12 is the big news item for 2003. The storm significantly impacted nearly four miles of the highway. Altogether, approximately 181 acres of Refuge land were covered with overwash sand amounting to approximately 463,000 cubic yards of sand displaced from the beach and dune line. Of the 181 acres of sand overwash approximately 70 acres occurred west of the highway, 18 acres on the highway, and 92 acres east of the highway. Much of this sand was moved by the NCDOT from the west side and across the highway to reconstruct a protective dune on the east side. The newly reconstructed dunes will be sprigged with sea oats and beach grass in late 2003 or early 2004. As of this writing, the NCDOT plans to further stabilize the dunes with sand fencing. The overwash footprints will remain as mostly bare sand over several growing seasons, but will gradually undergo succession into wetland and maritime grassland/shrub communities.

D. PLANNING

1. Master Plan

The planning staff, under the direction of lead planner Bob Glennon, continued work on CCP's for Pea Island and Alligator River NWR's in addition to several other eastern North Carolina Refuges during 2003. A Draft CCP for Pea Island was completed in December this year and we are awaiting a review copy.

3. Public Participation

Many volunteers participated in the turtle patrol and turtle watch programs. See Atlantic loggerhead sea turtle under section G. 2 for details.

4. Compliance with Environmental and Cultural Resource Mandates

Refuge staff continued providing input into the CCP by writing key sections and providing GIS data layers to the Edenton Planning Office.



Emergency actions to reopen NC Highway 12 were required by NCDOT post Hurricane Isabel. DLS

NC Highway 12

Road work completed after Hurricane Isabel was performed under emergency provisions of the National Environmental Policy Act and in compliance with the "Emergency Management Plan for the Protection of NC-12 from Whalebone Junction to Ocracoke". This plan was developed by seven Federal and State agencies. Throughout the post-storm recovery process, Refuge staff was present to work with NCDOT daily and there was frequent coordination with regulatory

agencies such as the U. S. Army Corps of Engineers and the North Carolina Division of Coastal Management. Post-storm color aerial photography taken the day after Hurricane Isabel passed proved to be a very valuable tool in quantifying the extent of overwash and volume of sand moved by NCDOT.

Bonner Bridge

Refuge staff attended numerous meetings during the year with NCDOT to discuss the Bonner Bridge Replacement Project. A merger team was formed to work with the NCDOT with regards to National Environmental Policy Act (NEPA) documentation and alternative selection. The following information summarizes Bonner Bridge activity for the year and the USFWS perspective on this project:

REPLACEMENT OF THE HERBERT C. BONNER BRIDGE – Briefing Paper

ISSUE: Depending on the selected alignment, replacement of the Bonner Bridge could result in negative long-term impacts to Pea Island National Wildlife Refuge.

BACKGROUND: In 2006, North Carolina Department of Transportation (NCDOT) proposes to start construction of a replacement bridge for the North Carolina Highway 12 (NC Highway 12) Bonner Bridge over Oregon Inlet that makes landfall on Pea Island National Wildlife Refuge and lies within Cape Hatteras National Seashore. The current bridge is in very poor condition. NCDOT wants a new bridge completed by 2010. The Refuge Manager is working with NCDOT and many other agencies on a NEPA Merger Team to develop a long-term solution that will meet the needs of the community and protect the Refuge.

More than 40 years ago, NC Highway 12 and the Bonner Bridge were constructed through and onto the Refuge. Constant beach erosion, severe weather, and a high volume of traffic continually force NCDOT to protect the integrity of the road system. Over \$27 million was spent between 1988 and 1998 to repair and protect the Bridge and NC Highway 12 from the ocean. The ocean is moving 10-15 feet closer to the road annually, requiring NCDOT to create temporary dunes, remove sand, and relocate sections of the highway in a number of “hotspots” south of the Bridge; three “hotspots” are on Pea Island Refuge.

In 1989, NCDOT requested permission from USFWS to install a terminal rock groin on the northern extremity of the Refuge to help protect the Bridge. A permit was issued with a stipulation that the groin must be removed if it was no longer required to serve its original purpose – to protect the Herbert C. Bonner Bridge.

Initially, NCDOT proposed building a new bridge a few hundred feet west of and parallel to the existing Bridge. This proposal was not likely to be found compatible and would not solve the problem of NC Highway 12 “hotspots.” NCDOT had another problem: building a short bridge that could last 75 years to a highway that may not last 20 years. Subsequently, NCDOT presented four additional alternatives, which were narrowed to two alternatives in February 2003. Additional environmental analysis is currently being completed within these two potential corridors. Currently, the NEPA Merger team, including NCDOT, supports doing detailed studies on Alternative/Corridor 4 – the long bridge alternative.

Major opposition to the long bridge has come from Dare County Commissioners over concerns about future access to Pea Island Refuge and the fate of the groin and an old abandoned Coast Guard Station. NCDOT, the Refuge Manager, and the Regional Chief of Refuges have met with the county to hear their concerns, answer their questions, and assure them we have been working with NCDOT and others to plan for access to Pea Island if the long bridge is built. They assured Dare County that NCDOT can retain the current NC Highway 12 ROW and that anyone can apply for a new permit for the groin and it would be evaluated.

Alternative/Corridor 1 would result in the shortest bridge construction – 6.2 miles in length: \$138 million. The bridge in this location would have the greatest impact on migratory bird habitat by crossing 1.2 miles of Refuge land. The “hotspots” would not be by-passed. Expensive maintenance on NC Highway 12 within the Refuge south of the bridge would still be required. Numerous times in the past, but prior to the 1997 NWRS Improvement Act, sections of NC Highway 12 were relocated on the Refuge. It is a certainty that in the future NCDOT will request a new ROW to relocate a section of NC Highway 12 and it may be difficult to find it compatible under the requirements of the 1997 Act.

Alternative/Corridor 4 proposes the longest bridge and would result in a bridge making landfall south of the Refuge – 17 miles in length: \$260 million. This alternative would bypass all three Refuge “hotspots” and would have the least impact on submerged aquatic vegetation (SAV) beds. With an elevated road on pilings deep into the Palimco Sound, this structure would eliminate all maintenance of NC Highway 12 within the Refuge with an annual savings of at least \$300,000 to NCDOT; a single storm can cost a million or more dollars in highway repairs.

USFWS PERSPECTIVE: The USFWS is committed to maintaining the biological integrity of Pea Island NWR and ensuring long-term public access. While Alternative 1 would be the less expensive of the two alternatives initially, it has greater impact on migratory bird habitat and may materially detract from or interfere with the “wildlife first” mission of Pea Island NWR. A bridge in Corridor 1 would not address the major issue of maintaining NC Highway 12 through the Refuge long-term. It is not likely that this alternative would be found compatible with our mission, therefore making it unlikely that a permit would be issued.

Alternative 4 would reduce long-term maintenance costs, improve safety and reliability, and cause less environmental impact. While a bridge in Corridor 4 would initially cost more than a bridge in Corridor 1, this scenario would effectively eliminate the need for expensive maintenance on NC Highway 12 through the Refuge at a large cost savings to NCDOT over the long term. A bridge in Corridor 4 is the better long-term solution for the Refuge and the public.

The U.S. Fish and Wildlife Service supports a safe, long-term, reliable transportation corridor that would have the least impact on Refuge land. The NEPA Merger Team allows the Refuge Manager to be actively involved in the selection process. The U. S. Fish and Wildlife Service is committed to working with others to ensure access to the Refuge and to evaluate permit applications for the groin.



Refuge Manager Mike Bryant has spent hundreds of hours working on the Herbert C. Bonner Bridge replacement project. KLW

Several pages of text could easily be written summarizing the activities/actions associated with Oregon Inlet Jetties, replacement of Bonner Bridge, dredged material disposal on the Refuge beach, dune reconstruction, and maintenance of NC Highway 12. Refuge staff participated in numerous meetings with USCOE, NCDOT, ES, other state agencies, and local officials over the course of the year.

Jetties Project

During early 2003, The Oregon Inlet Jetty Project authorized by Congress 30 years ago and planned by the USACOE was dealt a serious blow when the President's Council on Environmental Quality announced that they, along with the Department's of Army, Commerce, and Interior agreed to stop planning for jetties as a means of stabilizing and managing the navigation channel in Oregon Inlet.

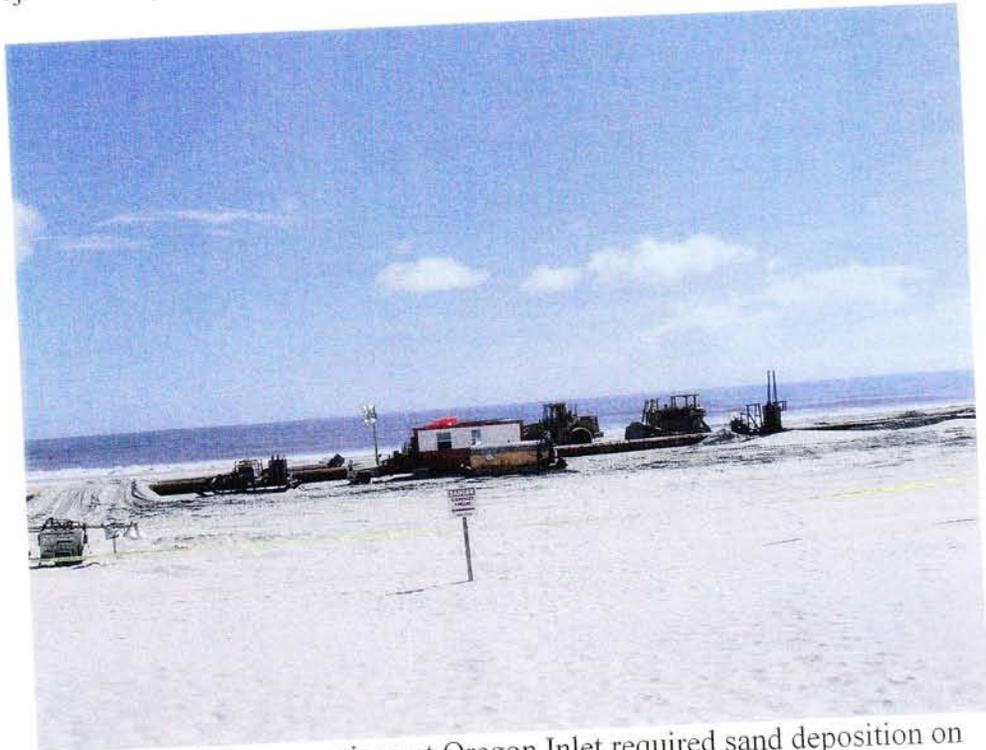
These and other issues will continue due to the proximity of the Refuge to Oregon Inlet, the need to replace the existing Bonner Bridge, the presence of NC Highway 12 - the only road to seven villages south of Nags Head - and strong political clout by Outer Banks politicians.

Maps generated by Refuge staff proved to be valuable aids when discussing Oregon Inlet and Bonner Bridge issues at various meetings. A Powerpoint presentation was developed to show inlet migration from 1852 through 2003. The presentation is available online at <http://nc-es.fws.gov/oregon/index.html>.

5. Research and Investigations

Oregon Inlet Dredging

Refuge staff continued data collection along Refuge beaches this year as part of the monitoring plan examining effects of USACE disposal of dredge material. The USACE planned to dredge 1,500,000 cubic yards of material from the Oregon Inlet Navigation Channel adjacent to and including the Bodie Island spit and the Outer Ocean Bar portion of the channel. The Bodie Island Spit dredging was done by pipeline dredge and material was hydraulically placed between miles 2 and 3 south of Oregon Inlet. Weeks Marine, Inc., one of the dredging contractors, deposited approximately 1,029,543 yd³ of material on the Refuge beach by pipeline dredging and an additional 107,631 yd³ of material was placed near-shore by a hopper dredge. Considerable time was required to prepare the Compatibility Determination and Special Use Permit for the project. Project oversight and administration required significant additional time.



USACOE dredging operations at Oregon Inlet required sand deposition on Pea Island NWR. Refuge management has concerns regarding sand compatibility. KLW

B+B Dredging used the hopper dredge "Atchafalaya" to remove material from the Outer Ocean Bar portion of the navigation channel. This dredged material was deposited in 15-20 foot water depths parallel to the Refuge beach. The monitoring plan, developed by the Refuge, was modified this year to cover 6 miles of beach for the pre-dredge disposal monitoring data and approximately 2 miles of beach for both the post-pipeline dredge data and the hopper dredge disposal data. This includes the disposal site and areas north and south of the site to serve as controls. Additional control sampling points were established just north of Rodanthe near the southern Refuge boundary and at Coquina Beach north of Oregon Inlet.

along transect lines. In addition, sand compaction (psi) was measured with a cone penetrometer prior to and after dredge material disposal. Identifying environmental conditions that influence fauna numbers will assist in evaluating effects directly associated with nourishment as well as recovery rates for the beach. All data samples, etc., were delivered to Coastal Research Associates, UVA, for completing analysis and report writing. Coastal Research Associates was issued a contract for this project using USACE transfer funds.

A new 5 year contract was awarded to Coastal Research Associates to continue a professional representation for the Service on the NCDOT Groin Monitoring Team and for the purpose of monitoring impacts and recovery resulting from beach disposal of dredged material. Dr. Robert Dolan will continue to provide professional level technical direction to the monitoring program.

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

6. Other

Following each relatively minor storm ranging from northeasters to offshore tropical storms, NCDOT was issued authorization to make emergency repairs on sections of damaged dune line. Normal high tides were inundating sections of NC Highway 12. The Refuge authorized use of sand that accumulated in berms on the west side of the highway over time for dune reconstruction. An advantage to using this material is that it contained root-stock, seeds, and rhizomes which would make re-vegetation quicker.

E. ADMINISTRATION

1. Personnel

Pea Island is officially unstaffed and unfunded. However, one PFT Park Ranger, one temporary Park Ranger, and one Maintenance Worker are typically assigned to the Refuge.

4. Volunteer Programs

As in past years, the day-to-day operation of Pea Island depended heavily on local and visiting volunteers, both individuals and work groups. The volunteer Hosts and Hostesses of the Visitor Center (which receives over 60,000 visitors annually) continued to represent Pea Island proudly with friendly reception and helpful information. Two-thirds of the 3,150 hours provided by the Hosts and Hostesses in 2003 were covered by local volunteers; the additional days, the visitor center was staffed by Workampers and Interns. The Visitor Center was open daily throughout the winter season and closed only for post-hurricane cleanup, one snow day, and a handful of holidays.

Sea turtle monitoring, through the programs of Turtle Patrol and Turtle Watch, was made possible by 32 volunteers who donated more than 1,600 hours of their time.

Several coordinated work groups, Scout Troops, and individuals contributed to beach cleanups, maintenance, biological assistance, and special events.

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

7. Technical Assistance

Refuge staff worked with a private land appraiser to determine a monetary value for land in the Refuge. This information will be used as the basis for future revenue sharing disbursements to Dare County as payment in lieu of taxes. Assistance included producing maps for the appraiser.

8. Other

Spill and HAZMAT Response

Appropriate authorities were notified upon discovery of a 55-gallon plastic drum containing about 10 gallons of an unknown liquid. The drum was removed under U. S. Coast Guard supervision.

The U. S. Coast Guard responded to a call from Refuge staff about a U. S. Navy flare washed up on the Refuge beach. After inspecting the flare, they removed it from the Refuge.

F. HABITAT MANAGEMENT

1. General

Pea Island NWR, a section of a coastal barrier island, consists of several basic habitat types. Table 1 presents results of the most recent mapping exercise with regards to habitat type/land use and acreages. This table is a result of preparing the Comprehensive Conservation Plan. Due to prescribed fire, some cover types are in a transitional stage between shrub and grassland/marsh. Beach and dune acreage changes from year to year.

**Habitat Types and Land Use
2003**

Habitat Type/Land Use	Approximate Acreage
Impoundment	790
Ocean beach	220
Ocean overwash impact area	23
Mitigation site	27
Terminal groin & impact area	55
Dike	52
Transitional (fire)	50

Soundside islands	264
Estuarine ponds	41
Estuarine salt flats	136
Emergent marsh	1,373
Sand ridge	183
Maritime shrub	650
Palustrine marsh	184
Palustrine grassland	28
Barrier dune	448
Reconstructed dune	71
Parking lots & structures	8
NC 12 ROW and paved road	203
TOTAL	4,806
Open water (Proclamation area)	25,700

2. Wetlands

Wetland management on the Refuge focuses on three man-made impoundments. They are North Pond (397 acres), New Field Pond (320 acres), and South Pond (223 acres). These impoundments are managed primarily for submerged aquatic vegetation production to provide high quality habitat for wintering waterfowl. Over time, management strategies have evolved to accommodate near optimum habitat conditions during peak migratory periods for shorebirds.

North Pond

Water management in North Pond was largely on target throughout most of the year. Average annual deviation from planned water level was - 0.31 ft. This lower than planned water level was not enough to impact submerged aquatic vegetation or invertebrate production. Although there is no way to control salinity except through prudent holding and releasing water in conjunction with rainfall events, average annual salinity was near the desired level. Plant species rated as good or fair waterfowl food were found on 57% of the transect plots. The remaining 43% of the plots consisted of bare ground (40%) or plant species of no food value for waterfowl (3%). *Chara* spp. (30%) and widgeon grass (13%) dominated the "good" foods and the "fair" category was dominated by saltgrass (*Distichlis spicata*) (17%) and saltmeadow hay (*Spartina patens*) (8.2 %). Overall, data show relatively good submerged aquatic production. Of special concern is the occurrence of 40% of the sample points being considered "bare." Heavy feeding by resident Canada geese throughout the growing season is the most logical explanation for this high frequency of bare substrate. Further support for this postulation is derived from the numerous depressions in the bottom substrate and observations of up to 300 resident Canada geese feeding in the pond during the growing season.

New Field Pond

New Field Pond water management was slightly above target level throughout the year. Average annual deviation from planned water level was + 0.20 ft. This higher than planned water level did not appear to impact submerged aquatic vegetation or invertebrate production. Although there is no way to control salinity except through prudent holding and releasing water in conjunction with rainfall events, average annual salinity was only 0.25 ppt higher than the desired level. Plant species rated as good or fair waterfowl food were found on 54% of the transect plots. The remaining 46% of the plots consisted of bare ground (35%) or plant species of no food value for waterfowl (11%). *Chara* spp. (30%) and widgeon grass (13%) dominated the "good" foods and the "fair" category was dominated by saltgrass (*Distichlis spicata*) (11%) and saltmeadow hay (*Spartina patens*) (21 %). Overall, data show relatively good submerged aquatic production. As with North Pond, of special concern is the occurrence of 35% of the sample points being considered "bare". Heavy feeding by resident Canada geese throughout the growing season is the most logical explanation for this high frequency of bare substrate. Further support for this postulation is derived from the numerous depressions in the bottom substrate and observations of up to 300 resident Canada geese feeding in the pond during the growing season.

South Pond

Although South Pond has no water management capabilities, fair to good food value species were found on 77% of the sample plots. The remaining 23% of the plots consisted of bare ground (18%) and species having no food value (5%). *Chara* spp. (26%), widgeon grass (24%), and sago pondweed (15%) dominated the "good" foods and the "fair" category was dominated by saltmeadow hay (*Spartina patens*) (11%). Overall, SAV production in South Pond was best even without any water management capabilities. This is largely due to the frequent rain events for the entire year during 2003. A new water control structure was put in through the dike during the summer. In late summer boards in the new water control structure floated up and the pond nearly dewatered. The problem was identified in time to save the SAV production for the year. For some unknown reason, resident Canada geese were not observed using South Pond nearly as much as New Field and North Pond.

Salt Flats

Wetlands in the Salt Flats are flooded and dewatered by natural ebb and flow in wind/tides and by rainfall/runoff. Vegetation has remained relatively unchanged for many years in this area. The predominant vegetation is glass wort (*Salicornia* sp.), sea oxeye, black needlerush, salt marsh cordgrass, salt meadow hay, and salt grass.

Mitigation Ponds

The two small mitigation ponds near the southern boundary created by NCDOT again produced good widgeon grass. The pond fringes also continued to produce stands of *Bacopa* sp., *Scirpus* sp., and *Cyperus* sp. Resident Canada geese consume most of the plant growth before migratory birds arrive. Migratory waterfowl use is light to moderate and appears to be decreasing, primarily due to resident Canada geese. Of waterfowl species observed northern pintails and green-winged teal were most common.

4. Croplands

The area previously known as New Field was planted in permanent cover, and is no longer managed as cropland. This is due to the relocation of NC Highway 12 and salt buildup from ocean overwash. Therefore, there is no cropland on the Refuge.

6. Other Habitat

Hurricane Isabel altered approximately 181 acres of dune and vegetated barrier island habitat to overwash fan in September. Restoration of the dune line to protect NC Highway 12 resulted in an overwash footprint without vegetation. Some of these areas will recover quickly into wetland and dune plant communities. Other areas will remain as wind blown sand largely devoid of vegetation. Leaving the sand in place would have resulted in maritime shrub plant communities within a relatively short time period. Depending upon location, there will be various successional stages ranging from bare overwash sand to maritime grassland/shrubs for several years to come.

9. Fire Management

A prescribed burn was held in the north Pea Island units (8.1.1) on March 12. A total of 1,674 acres was burned.

A 1/10 acre fire was ignited on Pea Island in January when a vehicle accident resulted in a Winnebago catching on fire on NC Highway 12.

See the Alligator River NWR narrative (Section F.9) for details additional details on Fire Management.

G. WILDLIFE

1. Wildlife Diversity

Pea Island has a high natural diversity of habitat types. Habitat management practices, such as prescribed burning, moist soil management, brush removal, and mowing serve to enhance habitat quality and wildlife diversity. Pea Island provided habitat for a wide variety of mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans during 2003. This diversity was especially evident in birds as 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*, can sometimes be seen flying over the Refuge. There were reports of an occasional bald eagle during 2003, including over North Pond at the Visitor Center. All of these birds were transient with none remaining in the area more than a few days.

Piping plover (Threatened): The Atlantic coast population of Piping plover, *Charadrius melodus*, was listed as a threatened species under the Endangered Species Act in January 1986. In 2003, there were no piping plover nests on the north end of the Refuge. Although some nesting behavior was observed in early spring, no nests were observed. A range of one to ten plovers were consistently observed wintering on the north end of the Refuge.

Atlantic loggerhead sea turtle (Threatened): Pea Island has an average of 10-12 nests per year. The 1994 nesting season had a record high of 35 nests and 41 false crawls occurring on the Refuge. The 2003 nesting season resulted in 2 total nests and 6 false crawls. This low level of turtle nesting activity is believed to be positively correlated with water temperatures much cooler than average – including 58 degrees in July.

Pea Island has a severe beach erosion problem resulting in a narrow beach and frequent over-wash. In 1994, Refuge personnel determined that the best management strategy to optimize survival of turtle hatchlings was to move nests to a turtle safe zone. Subsequent to that decision, guidelines specific to conditions at the Refuge were developed to facilitate the process with regards to making informed decisions regarding relocation of turtle nests. To assist with application of the nest relocation guidelines, new maps were generated to show areas of unfavorable coastal process conditions or dredge material disposal activity. In 2003, one nest was relocated to the turtle safe zone at the widest stretch of beach and the other was left in place.

The nest remaining in place had reached the hatching window when it was partially washed away due to high surf conditions from Hurricane Fabian out in the Atlantic Ocean. After the high surf returned to normal the nest was excavated and 40 empty shells were found along with one un-hatched egg. Although there is no way to determine hatch rate since the nest was not relocated and there was no total egg count, the Refuge assumed that at least 40 turtles hatched from this nest. The relocated nest was approaching the hatching window when Hurricane Isabel made landfall in September. The nest was inundated for several days due to unusually high tides prior to landfall and storm surge. It is believed that this extended submergence period drowned the eggs. No hatchlings were produced from the nest.

Stranded turtles washed up on Pea Island's beaches in 2003 at higher rates relative to most previous years. A stranding event in early May resulted in 21 dead loggerheads. Altogether, data were collected on 35 dead loggerhead sea turtles. Most of the turtles were already moderately decomposed when found on the beach. The greater the level of decomposition the less likely markings or other evidence that could be used to determine causes of death will be found. The usual missing flippers, cracked skulls, puncture wounds, and lacerations were observed. Measurements were collected and recorded for all stranded turtles and sent to the North Carolina Sea Turtle Coordinator.

Green sea turtles (Threatened): The first green sea turtle (*Chelonia mydas*) known to nest on Pea Island was in 1993. No green sea turtle nests occurred on the Refuge during the 2003 nesting season.

b. State Listed Endangered and/or Threatened Species

Of other species occurring on the Refuge and not federally listed, the State of North Carolina lists some as endangered, threatened, special concern or significantly rare. Although the Refuge is not managed for all of these species, present practices do provide benefits for many of them. Species occurring on the state list and Refuge are:

Least tern (Significantly Rare): Historically, least terns have nested 1.5 miles south of the Pea Island NWR Headquarters. During 2003 nesting colonies were observed at the Oregon Inlet terminal groin, approximately 3 miles south of the Refuge headquarters, and approximately 5.5 miles south of headquarters. Least tern numbers peaked in late July at 709.

Caspian tern (Significantly Rare): This species is not very common on the Refuge with numbers peaking in the fall, usually during October. The peak number during 2003 was 71 and the peak occurred in October. Nesting has not been documented.

Common tern (Significantly Rare): Common terns are found nesting with other terns. During 2003, nesting colonies were observed at the Oregon Inlet terminal groin, approximately 3 miles south of the Refuge headquarters, and approximately 5.5 miles south of headquarters. Common tern numbers peaked in August at 334.

Gull-billed tern (Significantly Rare): Gull-billed terns occur in the lowest numbers. During 2003 nesting birds were observed in the least tern and common tern colonies at the Oregon Inlet terminal groin. Gull-billed tern numbers peaked in May at 41.

Black skimmer (Significantly Rare): Although numbers were lower in 2003, black skimmers are observed along the oceanfront, sound, and impoundments on the Refuge. During 2003, nesting birds were observed adjacent to the least tern and common tern colonies at the Oregon Inlet terminal groin. Nesting bird numbers were considerably less than in previous years. Black skimmer numbers peaked in September at 35.

Little blue heron (Significantly Rare): The little blue heron is found mostly around the three impoundments or marsh edges. Numbers peaked at 104 in September. Nesting was not documented.

Snowy egret (Significantly Rare): The snowy egret is found mostly around the three impoundments or marsh edges. Numbers peaked at 145 in August. Nesting was not documented.

Tri-colored heron (Significantly Rare): The tri-colored heron is found mostly around the three impoundments or marsh edges. Numbers peaked at 32 in August. Nesting was not documented.

Black-necked stilt (Significantly Rare): The black-necked stilt is found mostly around the three impoundments. Numbers peaked at 9 in September. Nesting was not documented.

Peregrine falcon (Endangered): The Arctic peregrine, *Falco peregrinus tundrius* can be observed on the Refuge with some regularity. Nesting does not occur on the Refuge.

3. Waterfowl

Waterfowl surveys were conducted from September through March. Waterfowl numbers peaked at 7,220 in mid-November and 8,773 in early January. Use Days percent difference in the Table compares use days by species for the 2002-2003 season versus the mean use days by species for the past 10 years. Surprisingly, all species except for the redhead, scaup, and scoters had decreases in Use Days. It is not clear why these species are increasing use of the three impoundments

Although no formal survey was conducted, informal brood counts were conducted in conjunction with shorebird surveys. A few black duck and gadwall broods were observed in all three impoundments. Breeding by the gadwall appears to be increasing on the Refuge.

Other interesting observations not reflected in the table included female common goldeneyes and Eurasian wigeon. Although a few Eurasian wigeon sightings occur annually, goldeneye observations are very rare on the Refuge.

Composition of Wintering Waterfowl, Pea Island NWR
2002-2003

SPECIES	PEAK PERIOD	Peak #	# USE DAYS 2002-03	% TOTAL USE DAYS 2002-03	USE DAYS % diff from 10 yr avg
Tundra Swan	Jan	795	63697	8.2	-16
Snow goose	Nov	2682	80449	10.4	-31
Canada goose	Dec	286	19234	2.5	-56
Mallard	Dec	90	4092	0.5	-66
Black duck	Nov	351	21460	2.8	-86
Gadwall	Mar	958	63563	8.2	-71
American wigeon	Dec	2681	148638	19.2	-39
Northern Pintail	Dec	2789	122428	15.8	-59
Green-winged teal	Mar	569	38437	5.0	-69

<i>Cont.</i> SPECIES	PEAK PERIOD	Peak #	# USE DAYS 2002-03	% TOTAL USE DAYS 2002-03	USE DAYS % diff from 10 yr avg.
Blue-winged teal	Sep	743	5128	0.3	-75
Northern shoveler	Jan	1233	90199	11.7	-29
Wood duck	N/A	0	N/A	N/A	N/A
Ring-necked duck	Feb	35	672	0.1	-87
Redhead	Dec	700	18652	2.4	+18
Canvasback	N/A	0	N/A	N/A	N/A
Scaup	Jan	1041	31839	4.1	+154
Bufflehead	Dec	344	11355	1.5	-20
Ruddy duck	Jan	309	12781	1.7	-61
Mergansers	Nov	466	17075	2.2	-30
Golden eye	N/A	0	N/A	N/A	N/A
Scoter	Oct	14	228	0.01	+500
Coot	Dec	344	22346	2.9	-88
Unknown	Mar	129	1159	0.1	-99

4. Marsh and Wading Birds

Marsh and wading birds were counted 3 times per month during regular bird surveys. Numbers increased to approximately 500 by mid-June and remained at that level until late August with peak numbers at 684. Other commonly occurring species include great and snowy egrets, great blue heron, little blue heron, green heron, tri-colored heron, black-crowned night heron, yellow-crowned night heron, white and glossy ibises, double-crested cormorants, American bittern, Virginia, clapper, and yellow rails.

Brown pelican numbers have continued to increase over the past few years as the species has expanded northward into coastal North Carolina and Virginia. These birds were previously listed as a threatened species in North Carolina and were rarely observed. A group of about 12 white pelicans was observed on the Refuge near the end of November and remained until about mid-December.

5. Shorebirds, Gulls, Terns, and Allied Species

Shorebird surveys were conducted three times per month during the year. Shorebird numbers peaked at approximately 7,500 in mid-May and at about 3,000 in mid-August. The mid-May count reflects the effects of spring migration and the mid-August count illustrates less definition of the fall migratory period. Some of the commonly occurring species include semi-palmated and western sandpipers, semi-palmated plovers, sanderlings, whimbrels, American oystercatchers, Black skimmers, various terns and gull species, dowitchers, marbled and Hudsonian godwits, willets, dunlins, black-bellied plovers, ruddy turnstones, American avocets, red knots, greater and lesser yellowlegs, and black skimmers.

Colonies of nesting black skimmers, common terns, least terns, and gull-billed terns were observed behind the terminal groin at Oregon Inlet and others were observed on the beach in three locations further to the south. All areas were posted as closed to public access and a string with flagging was placed around the perimeter of the posted area. Perimeters of the closed areas were recorded with a GPS unit and transferred to Refuge maps. The primary purpose for mapping closed area perimeters was to determine total area closed and linear distance of closed beach.

6. Raptors

The Carolina Raptor Center re-established a raptor banding and hawk station in early October for the first time since 1987. Mist nets, bow nets, and lure birds were used to capture 1 juvenile female peregrine falcon, 1 adult female merlin, and 1 juvenile male sharp-shinned hawk. Even though poor weather conditions affected surveys during the census period, 42 raptors were observed. The Center hopes to continue this work as an annual project.

During the summer an osprey nesting platform in North Pond near the Visitor Center was struck by lightning. One chick was found dead near the base of the pole. From available evidence, it appeared the chick most likely died from exposure after being knocked into the water. The adult osprey survived but there was no attempt to re-nest because the platform was on the ground and the pole was broken. A new platform was erected in late 2003.

A great-horned owl was observed on an osprey platform in late January. After a few days of observation, refuge staff determined the owl was incubating eggs and in March, 2 owlets were observed in the nest. One owlet was lost to unknown causes and the other was chased from the nest by crows. The owlet was transported to the Carolina Raptor Center on the same day. It died the following week from congenital problems and injuries suffered from the fall.

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 passerine species. Some 115 different

species of songbirds migrate through Pea Island. However, little is known about the use of Refuge habitat by neotropical and other migrant birds.

8. Game Mammals

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

Presence of scat, tracks, and road kills indicate a continued presence of foxes and opossums. Based upon anecdotal observations, it appears that the raccoon population is increasing rapidly. The presence of these species as well as feral house cats may be one of the causes for the decline in pheasant populations.

Deer tracks have frequently been observed around North Pond, New Field, South Pond, and in the Salt Flats. Staff members have seen both does and bucks on Pea Island. Although no formal surveys are being done, increasing observations of deer and number of tracks suggest that the herd is increasing.

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

9. Marine Mammals

During 2003, 12 stranded marine mammals were found on the Refuge beach. Appropriate National Marine Fisheries staff was contacted and they performed required necropsies and data collection. The twelve strandings consisted of harbor porpoises (3), bottlenosed dolphin (3), short-beaked saddleback dolphin (2), Atlantic spotted dolphin (1), Pantropical spotted dolphin (1), and Risso's dolphin (1). One marine mammal was decomposed to the point that species could not be determined.

10. Other Resident Wildlife

In past years, ring-necked pheasants were occasionally observed in salt marsh, brushland, dunes, and in the Pea Island grain field. This population was descended from birds introduced in the 1920's and 1930's prior to the area becoming a Refuge. Sightings have decreased in recent years. Although no sightings were reported during 2003, the exact status of the pheasant population is unknown.

The resident Canada goose population has become a significant problem with regards to growing food for migratory waterfowl. During the summer months up to approximately 300 resident geese constantly foraged on plant material in the impoundments. By the time migratory birds arrived, primary production in the three impoundments was largely consumed by resident Canada geese.



Resident Canada geese are becoming more of a management concern at Pea Island due to the impacts of their foraging habits on migratory birds. K LW

14. Scientific Collections

Tissue samples were collected from stranded sea turtles and given to the North Carolina Sea Turtle Coordinator. Tissue samples were collected from stranded marine mammals by the National Marine Fisheries Service Marine Mammal Stranding Network Coordinator.

15. Animal Control

Feral cats continued to be a problem with nesting birds, waterfowl, and turtles. Mink, cat, and small canid tracks were observed along the terminal groin at Oregon Inlet during the summer. Non-native and other problem animals will be removed in the future.

16. Marking and Banding

There were no attempts to capture and mark or band any wildlife on the Refuge.

Every summer, Refuge volunteers and staff accompany John Weske to band brown pelicans, royal terns, Caspian terns, and sandwich terns on spoil islands located west of Oregon Inlet. This year 1,801 juvenile and 15 adult brown pelicans, 1,181 royal terns, 14 Caspian terns, and 111 sandwich terns were banded. None of this banding occurred on the Refuge.

H. PUBLIC USE

1. General

Based on the NPS vehicle counter at Bodie Island and adjusted according to new configurations from RMIS (which continue to boggle the mind!), estimated visitation to Pea Island NWR during 2003 was 2,708,432. An estimated 80% of those were passing through the Refuge on their way to other destinations. Volunteers from the Coastal Wildlife Refuge Society continued to staff the Visitor Center, which is now open daily throughout the year. Refuge visitors continue to comment on the quality of exhibits, the "hominess" and "warmth" of the Visitor Center as a whole, and the friendliness of the folks who work there. The Visitor Center is the perfect hub for the interpretive/educational programs of this Refuge. (See Section H.6. for details)

During 2003, Jennifer Howard was hired as a GS-5 Park Ranger and Mike Martin moved on to a position with Eastern National Parks and Monument Association at the Wright Brothers National Monument. With her environmental education background, Ms. Howard has had a very positive influence on the Visitor Center presentation, turning various gift shop displays into interpretive opportunities. Her influence has not only improved the quality of the products sold at the Visitor Center, but also the quantity! The credit for this year's financial success is directly attributable to her efforts.

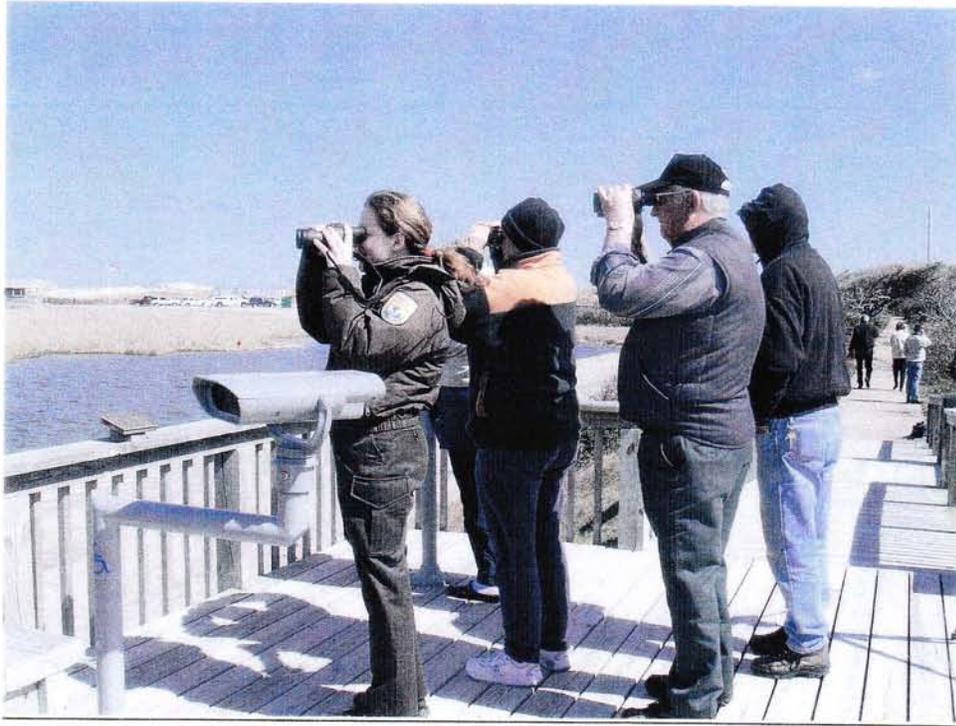
As in the past, public demand for beach access has increased and the amount of undeveloped beach frontage property locally available has decreased. Towns and villages in the area are supported almost entirely by the tourist industry, yet the burden to supply services for these visitors is thrust toward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

Attention also turned toward the Bonner Bridge replacement project. Public use staff examined alternatives for public access should the preferred alternative be selected. Staff researched similar transportation issues at Refuges and parks throughout the country.

2. Outdoor Classrooms - Students

The emphasis on non-staff led activities continued during 2003. School groups, scouts, etc. were encouraged in the independent use of the Refuge for educational activities. Marsh investigation equipment (seines, mud sieves, etc.) was available for loan from the Visitor Center. Since no registration was required for the use of outdoor classrooms, the Refuge has no record of the actual number of such uses that occurred. On the whole, this type of use continues to increase on Pea Island NWR.

4. Interpretive Foot Trails



Park Ranger Ann Marie Salewski leads a bird walk on North Pond Trail. The Trail receives almost 500,000 visitors annually. K LW

Many visitors comment that North Pond Wildlife Trail is the nicest trail they've used in the eastern United States. North Pond Wildlife Trail is universally accessible, offers 7 permanently mounted spotting scopes, and 5 major observation structures. During 2003, Ranger Howard took the initiative to send off the scopes for cleaning and repair, which are very popular with Refuge visitors, and therefore, very heavily used. The Visitor Center at its trail head provides just the right opportunity to offer information to Refuge visitors and teach the message of the Service. Approximately 421,115 visitors utilized North Pond Trail during 2003.

6. Interpretive Exhibits/Demonstrations

The two interpretive kiosks, located at both the north and south ends of the Refuge, provide valuable information on a 24 hour basis for Refuge visitors. Panels located on the front porch of the Visitor Center are also available round the clock. The Kuralt kiosk sustained minimal damage during Hurricane Isabel, but was promptly fixed by Pea Island workampers. This year, one of our workampers (Gene Goerke) built a kiosk at the Salt Flats parking area. Specialist Salewski designed a panel for the kiosk which interprets the significance of Refuges to shorebird populations. The two other panels in this kiosk interpret the public use opportunities on the Refuge, and use of fire to manage wildlife habitat. Fee demo monies were also used to replace the panels of the north and south kiosks.

Specialist Salewski, along with the graduate student interns, designed three replacement panels interpreting endangered species on the Refuge and barrier beach geology. Panels financed by the fee demo money are still being assembled by Wilderness Graphics, Inc. in Tallahassee, Florida.

7. Other Interpretive Programs

Special programs presented off-Refuge during 2003 are included in the Alligator River Narrative. Most regularly scheduled on-site interpretive programs during 2003 were conducted at Pea Island NWR by Refuge volunteers and interns. Friday bird walks were conducted year round. Beginning in May and running through October, bird walks were offered 3 days each week (Wednesday, Thursday, Friday). Guided canoe tours (3 hours) and family canoe tours (2 hours) were offered once each week during the spring and fall and twice each per week during the summer months. Also during the summer, one Turtle Talk, one Soundside Discovery, and one Raptor Rapture were conducted each week. Special programs were also conducted for International Migratory Bird Day, Fishing and Boating Week, and National Wildlife Refuge Week.

Park Rangers participated in a two-day conservation festival at Cape Hatteras Elementary school where they presented Turtle Talks to over 315 students. Ranger Salewski also presented a Bird Migration program at Cape Hatteras Elementary school to 30 students.

Regularly Scheduled Interpretive/Educational Programs (On-Refuge)

Program Type	#Programs	#Participants
Bird Walk	87	879
Soundside Discovery	13	240
Turtle Talk	15	237
Family Canoe Tour	20	257
Pamlico Sound Canoe Tour	18	161
Raptor Rapture	11	143

Note: Off-Refuge programs included in Alligator River National Wildlife Refuge table.

9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island NWR during 2003. Bluefish, spot, pompano, croaker, and trout were the major fish caught. The annual Crabbing/Fishing Rodeo was held the second Saturday in June with approximately 300 participants.

11. Wildlife Observation



Canoeing and kayaking are popular ways to view wildlife at Pea Island NWR.

KLW

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

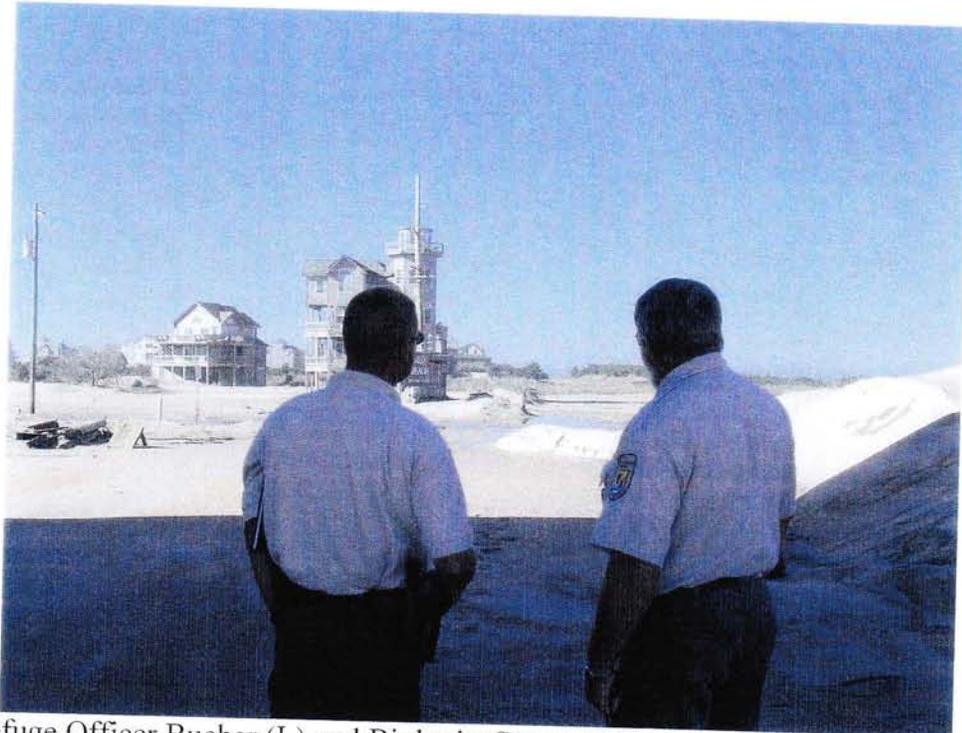
Due to the location of NC Highway 12 through Pea Island NWR, it is difficult for a traveler to pass without observing wildlife. On most days of the year, the quality of observation is quite high. During fall and winter, greater snow geese frequently feed on the road shoulders.

During spring and summer, great and snowy egrets replace snow geese as the most easily observed wildlife. Various species of raptors utilize the dunes, power line poles, and sign posts for resting and hunting.

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

During 2003, there was no USFWS LE presence on Pea Island NWR on a regular basis until LEO Officer Bucher arrived for duty in September. Officer Bucher made routine patrols at Pea Island, contacting fishermen and beachgoers. Three tickets for nudity were written in November. All three individuals paid the fine, but a backlash against Officer Bucher was initiated. We are currently seeking council on what direction to take with the growing problem of nudity complaints on Pea Island beaches.

Following Hurricane Isabel, Refuge Biologist Stewart noted that at least two individuals and/or businesses stole several dump truck loads of sand from the south end of Pea Island NWR. The sand was to be used by NCDOT to rebuild dunes in that area. LE Officer Bucher is investigating the incident.



Refuge Officer Bucher (L) and Biologist Stewart (R) survey the area where several dump truck loads of sand were stolen from the refuge following Hurricane Isabel.

KLW

During the summer, patrols were made on the beach by foot and ATV and along Highway 12. Mattamuskeet NWR LEO Smith helped with these patrols. Most of the problems centered around the usual parking problems, unleashed dogs, and nude sunbathers.

Beginning on September 21, LEOs were kept busy for the two weeks following Hurricane Isabel, enforcing Refuge closures. LEO Bucher and his Training Officer, Thomas Payne arrived from Piedmont NWR, and J. D. Bricken and Greg Walmsley came from Pee Dee NWR to assist with enforcement on Alligator River NWR and Pea Island NWR. Most people were cooperative when they were informed of the closures and agreed to leave. Unfortunately, with the dunes of Pea Island NWR washed out, the ready access to the beachfront proved too tempting for some and, consequently, a problem developed with visitors driving on the beach.

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

On the whole, law enforcement needs at Pea Island focus around the huge number of visitors. LE visibility is imperative to protecting the resource when this level of visitation exists.

18. Cooperating Associations

The Coastal Wildlife Refuge Society is especially active at Pea Island National Wildlife Refuge by way of the Visitor Center.

The gift shop at the Visitor Center saw gross sales for 2003 of \$135,805.

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

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

Contract posting of the 25,700 acre Proclamation Boundary was completed in February 2003 by Winky Silver, but sustained some damage from Hurricane Isabel in September. The contract included three pile dolphins at 1 mile intervals with single pile structures in between at one-half mile intervals. A total of 19 stations were installed.

A contract to replace the damaged bulkhead on the south and south west sides of North Pond was awarded in October to Entech Enterprises of Tallahassee, Florida. The contract includes driving or jetting in 10 foot long vinyl interlocking bulkhead sheet pilings. The pilings will be stabilized with salt-treated facial/side boards then backfilled. The new bulkhead will extend for 5,010 total linear feet and cost \$320,927.00. Refuge staff had previously disposed of the old creosote bulkhead in preparation for this contract. Completion is expected in March 2004.

Other Items:

- Replaced Visitor Center water pump.
- Upgraded and replaced as needed fire extinguishers in all fleet vehicles.
- Made improvements to facilitate handicap accessibility at North Pond interpretive displays.
- Removed, reconditioned, reinstalled North Pond pump.
- Removed, reconditioned, reinstalled New Field pump.

5. Communication Systems

We continued to update the station radio system (new mobile radios, installation of towers at Pea Island Office and Visitor Center).

6. Computer Systems

A total of 3 computers were purchased, all with XP as the operating system. To date, all Refuge computers either have Windows 2000 or Windows XP as their operating system, and all systems meet and or exceed the regional standards.

To date, all permanent employees at Pea Island NWR have access to the internet either by dial-up using their assigned username and password or via network connections. Each permanent employee has a Lotus Notes email account. All employees have been given information to obtain an Active Directory password, and at this time are either using their former Notes password or AD to access SII pages, and other Service intranet sites.

Plans are being made at this time to share an internet connection with NCDOT who shares a telecommunications port for GIS purposes. This connection is a high speed internet connection maintained by the state of North Carolina.

8. Other

Maintenance staff assisted with Wings over Water and Sierra Club activities.

Staff participated in providing guidance, direction and supervision to workcampers and interns engaged in a variety of tasks on the Refuge. Additional support was provided in the form of maintenance / use of vehicles and equipment needed by workcampers and interns.

J. OTHER ITEMS

1. Cooperative Programs

The Refuge continues to work with the Department of Geology at East Carolina University on a regional project designed to learn more about the origin and evolution of the Outer Banks barrier

island system. Information gained through this research will be used to model future conditions on the barrier islands as sea level continues to rise.

3. Items of Interest

RM Bryant provided a tour of Pea Island NWR to DOI Secretary Gale Norton on December 14. DRM Whaley also provided a tour on December 15 for DOI Assistant Secretary Craig Manson, NPS Director Fran Mainella, and several other NPS Regional and Washington Office staff. All of these individuals were in the area for the First Flight Centennial. Bonner Bridge and NC Highway 12 issues were discussed.



L to R: Kathy Whaley, Wally Hibbard (Acting Deputy Director, NPS SE Region), Patricia Hooks (Acting Director, NPS SE Region), Pat Moore (PI Volunteer), Craig Manson (Asst. Secretary of the Interior), Neal Moore (PI Volunteer), Fran Mainella (Director, NPS), Larry Belli (Sup., Cape Hatteras NS), Ann Mare Salewski, Judy Forte (Chief Ranger, NPS Se Region), Dru Ferrence (PI Volunteer).

4. Credits

The annual narrative was compiled by DRM Whaley with individual sections being a joint effort by program supervisors.