

REVIEW AND APPROVAL

**ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE
PEA ISLAND NATIONAL WILDLIFE REFUGE**

MANTEO, NORTH CAROLINA

ANNUAL NARRATIVE REPORT

Calendar Year 2006

Refuge Manager

Date

**Refuge Supervisor
Review**

Date

Regional Office Approval

Date

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 an 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.

ALLIGATOR RIVER NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 2006

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

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A. HIGHLIGHTS

Public use survey by Hans Vogelsong (East Carolina University) finally complete. (Section D-5)

Engineering Equipment Operator Supervisor Bruce Creef recognized as Wage Grade Employee of the Year. (Section E-3)

Refuge Volunteer Program tallied 24,170 hours with 190 volunteers. (Section E-4)

Volunteers of the year - Sue Carroll and Angie Brady-Daniels. (Section E-4)

Refuge accomplished 42 prescribed fires for a total of 16,233 acres. (Section F-9)

Refuge staff attacked phragmites and alligator weed. (Section F-10)

Red wolf reintroduction in 19th year. (Section G-2)

Tundra swan, pintails, and green-winged teal account for 80% of total waterfowl use. (Section G-3)

Paddling on the rise. (Section H-4)

Wildlife Drive expanded. (Section H-4)

Red Wolf howling safaris continue to be popular. (Section H-6)

Laurel Bay unit open to small game hunting in February for second year. (Section H-8)

Coastal Wildlife Refuge Society generated over \$165,000 for refuge. (Section H-18)

Maintenance staff continued canal clean-out. (Section I-1)

B. CLIMATIC CONDITIONS

Total precipitation was significantly lower than normal for February and March 2006, allowing for an exceptional two month period of prescribed burning. Early April started out with some very high fire danger days; however, normal rainfall patterns returned later in the month mitigating the danger significantly. May and June turned out to be very wet, with almost 16 inches of rainfall total. July was relatively normal, but August and September brought a total of 14 inches, preventing any growing season burns. October started a good drying trend; however, around the end of October, excellent conditions for prescribed burning were beginning to occur. Unfortunately, after just getting resources in place and getting started on some burns, the rains returned and we ended the year with an overabundance of moisture, approximately 9 inches above the norm.

There were a total of 10 named storms for the 2006 hurricane season. Three of them affected refuges in eastern North Carolina, but without significant adverse impacts. The first of the storms, Alberto, formed in the Caribbean and ran up through Florida, Georgia and the Carolinas where it died out on June 14 after sending copious quantities of rainfall up the East Coast. The second named storm, Berryl came a month later, forming just off the Carolina Coast. It threatened, but never made landfall and moved on out to sea. In late August, Ernesto hit Florida as a tropical storm, went back to sea and again made landfall near Wilmington, NC. It headed due north over Roanoke River NWR, dropping several inches of rainfall across the region. Six additional storms, including significant hurricanes, formed in the Atlantic. Fortunately none came close to shore. The refuges were affected only by waves generated by the storms and experienced significant beach erosion.

2006 Rainfall Totals by Month (inches)

January	4.19
February	1.38
March	1.59
April	4.14
May	8.27
June	7.59
July	4.30
August	6.56
September	8.36
October	3.58
November	7.47
December	4.33
Total	61.76

C. LAND ACQUISITION

2. Easements

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 was to construct sewage collection lines across refuge land for a wastewater treatment plant 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 continued into 2004 and, because of regulations at the state and federal level, the original was modified to locate the facility in an area with no direct impacts on the Refuge. During 2005, discussions arose regarding permitting requirements for a treated wastewater discharge line crossing the Refuge. The discussions did not initiate any action by the Refuge. In 2006, the project was modified to have a 2.5 inch low pressure sewer collection main installed within an existing easement along the shoulder of US Highway 264. An existing right-of-way easement was modified to accommodate this use on the Refuge.

3. Pre-Acquisition

FT Van Druten assisted Mackay Island NWR in March with a memo certifying there had been no changes to the Tillet Tract since he completed the Level 1 Pre-acquisition Contaminants Survey in September of 2004. This is an approximately 10-acre parcel adjacent to the Refuge that contains Loblolly Pines that are greater than 100 years old.

FT Van Druten completed a Level 1 Pre-acquisition Contaminants survey for the Broad Creek Land Parters Tract (aka South Boundary Tract) in March. This approximately 100-acre tract is east of US 264 and adjacent to the southern boundary of Alligator River National Wildlife Refuge. The tract sits between Alligator River National Wildlife Refuge and the Long Shoal Tract of the Gull Rock Gamelands, which is owned by the State of North Carolina. The result of the Level 1 survey found no contaminants issues with the tract. This information was given to Jackie Cumpton in the Regional Office.

D. PLANNING

1. Master Plan

During 2006, WIS Strawser took the lead in planning. The draft CCP that had been sent out for internal review was returned to the Refuge for a re-visit to the approach on wilderness areas. The third alternative was re-written to include the nomination of wilderness areas.

On June 5, the draft CCP was submitted for public review and comment, with the comment period ending on July 14. During the comment period, refuge staff were available at an "Open House" setting to receive comments on the plan on Tuesday, June 13 from 5:00 to 9:00 pm at the Refuge Administrative Office in Manteo.

At the close of 2006, public comments had been collected and assigned to specific staff for response and summary. The final CCP is expected to be completed early in 2007.

3. Public Participation

Public review of the Alligator River CCP/EA was solicited for the mandatory 30-day comment period in mid-summer. An Open House was also held to encourage public participation.

5. Research and Investigations

Black Bear & Red wolf: A proposal designed to assess habitat use by the black bear and red wolf population along the US 64 Highway corridor was completed and submitted to the N. C. Department of Transportation. This research will begin 2 years prior to the construction start for upgrading the current highway from 2 lanes to a 4-lane system.

Effects of Sea Level Rise: RB Stewart coordinated planning sessions with The Nature Conservancy for a climate change workshop to address issues regarding management options for adapting to rising sea level. The workshop was held in February, 2006 and was attended by about 50 people from federal and state agencies, as well as private conservation organizations.

Geological History: The Department of Geology at East Carolina University continued data collection from the Refuge for the purpose of learning more about the geological history of the area and for developing predictive models of landscape changes as sea level rises.

Vogelsong Study: In FY 2003, the Coastal Wildlife Refuge Society, having received a FWS grant in the amount of \$40,000, contracted with East Carolina University (Dr. Hans Vogelsong) to conduct a Visitor Use Study on eight national wildlife refuges in the Roanoke-Tar-Neuse-Cape Fear Eco-system. Alligator River, Pea Island, Pocosin Lakes, Mattamuskeet, Back Bay, Roanoke River, Great Dismal Swamp, and Mackay Island National Wildlife Refuges were included in the study. The purpose of the study was to quantify economic impacts of refuge visitors to the communities in which they are located and measure various components of a refuge visit. Due to complications at OMB, the actual research was not done until 2005. Late in 2006, a draft report was finally received from ECU. At this writing, a final report had been received in digital format, but the promised hard copies had not arrived.

6. Other (GIS)

Development of the Geographical Information System (GIS) for Alligator River began in the mid-1990. Since that time, the Alligator River staff have acquired and created data for all refuge programs and all of the nine refuges in eastern North Carolina. The Refuge maintains approximately 3,400 GIS files and six sets of aerial photography, as well as a data sharing agreement with Dare County. Currently there are one staff member using GIS on a regular basis and three that use it occasionally. The majority of the GIS work is completed by FT Brian Van Druten.

Program highlights and accomplishments for 2006 include: Setup of ArcGIS 9 on 6 refuge computers in the Manteo Office; updated fire locations for Fire Program Analysis; provided instructional sessions at the NC Wildland/Urban Interface Conference on ArcGIS use; assisted with the instruction of S-341 GIS Specialist for Incident Mapping; created GIS files for aviation hazards in the Southern Area (see further down in this section for more information); produced maps for Red Wolf outreach program for howlings and publications; updated near-refuge bear mortalities data layer; provided maps to refuge and state law enforcement to assist in their operations; created maps to support a fire on Cape Hatteras National Seashore and prescribed burning operations on five northeastern North Carolina refuges; generated metadata; created maps for the Wildland-Urban Interface program; participated on Southeast Region GIS committee; obtained 1 new set of aerial photographs; created posters for fire management workshop and Atlantic White Cedar Conference (see section F.3.); created a set of fire planning maps for four northeastern North Carolina refuges; and produced maps for a Level 1 Pre-acquisition Contaminants Survey.

DFMO Crews, FF Waters, and FT Van Druten participated on a Federal inter-agency committee (USFWS, NPS, & USFS) to create a set of protocols for the Southern Area on creating Aviation Hazard Maps for flight safety in 2005. These protocols included style, size, and required contents of the map while limiting other information that would clutter such an important map. Both the USFS and USFWS adopted these as the mapping standards for their respective areas in the southeast. In 2006, the protocols, GIS data, example maps, and associated documents were placed online by Kurt Snider of the Cookeville Ecological Services office. This included the updated aerial hazard data for FY 06 for each state and territory in the Southern Area (US Forest Service definition). This information and data is available for download for the entire Southeast Region/Southern Area at http://www.fws.gov/southeast/gis/av_hazards.html. Work on this will continue into 2007 as FT Van Druten obtains the raw aerial obstruction data from the FAA and creates GIS layers by state for distribution of FY07 data.

E. ADMINISTRATION

1. Personnel

NAME	POSITION	STATUS	EOD
1. Susan Ahlfeld	Park Ranger (Interp.), GS-0025-05/07	TERM	07/12/04
2. Art Beyer*	Wildlife Biologist, GS-0486-11	PFT	12/02/90
3. Mike Bryant	Refuge Manager, GS-0485-14	PFT	04/14/96
4. Ann Marie Chapman	Park Ranger (Interp.), GS-0025-09	PFT	12/01/02
5. Eric Craddock	Eng. Equip. Operator, WG-5716-10	PFT	02/21/93
6. Bruce Creef	Eng. Equip. Op. Supv., WS-5716-10	PFT	04/21/71
7. Tom Crews	Fire Mgmt. Officer, (Fire)GS-0460-12	PFT	01/22/95
8. Helen Czernik	Fire Program Assist. GS-0303-05	PFT	12/18/06
9. Kris Fair	Bio. Science Tech., GS-0404-07	PFT	05/02/96
10. Buddy Fazio	Wildlife Biologist, GS-0486-13	PFT	04/22/01
11. Steven Foster	Forestry Tech. (Fire) GS-0462-04	PFT	05/14/06
12. Bobby Govan	Eng. Equip. Op., WG-5716-09	PFT	09/03/93
13. Donnie Harris	Forestry Tech., (Fire) GS-0462-08	PFT	01/11/96
14. Diane Hendry*	Outreach Specialist GS-4005-09	PFT	03/20/05
15. Janice Lane	Administrative Officer, GS-0341-09	PFT	03/25/90
16. Scott Lanier	Refuge Manager, GS-0485-13 Transferred from Carolina Sandhills NWR	PFT	02/19/06
17. Chris Lucash*	Wildlife Biologist, GS-0486-11	PFT	12/02/98
18. Ford Mauney*	Wildlife Biologist, GS-0486-09	PFT	05/15/05
19. Eric Meekins	Eng. Equip. Op., (Fire) WG-5716-08	PFT	10/25/93
20. Amy Midgett	Eng. Equip. Op., (Fire) WG-5716-08	PFT	05/14/93
21. Mike Morse*	Wildlife Biologist, GS-0486-09	PFT	04/09/89
22. Ryan Nordsven	Biological Science Tech., GS-0404-05 Term	TERM	08/07/06
23. Jonathan Powers	Maint. Mechanic WG-5716-08	PFT	04/24/88
24. Joe Sharbaugh	Forestry Technician, GS-0462-04	NTE 1 Yr.	11/27/05
25. Frank Simms	Park Ranger (LE), GS-0025-09	PFT	10/29/05
26. Dennis Stewart	Wildlife Biologist, GS-0486-12	PFT	12/27/91
27. Bonnie Strawser	Park Ranger (Interp.), GS-0025-12	PFT	12/31/80
28. Gregory Suszek	Prescribed Fire Specialist, (Fire)GS-0401-09	PFT	11/29/04
29. Jeffrey Swain	Eng. Equip. Op., (Fire) WG-5716-08	PFT	02/10/02
30. Brian Van Druten	Forestry Tech., GS-0462-07	PFT	01/15/99
31. Kelley Van Druten	Fire Mgmt. Officer(WUI),GS-0401-11	PFT	02/16/01
32. Cory Waters	Forestry Tech. (Fire), GS-0462-06	PFT	11/30/03
33. Kathy Whidbee*	Office Assistant, GS-0303-07	TERM	06/03/01
34. Jim Wigginton	Refuge Manager, GS-0485-12	PFT	03/28/99

Alligator River NWR Staff – 2006

* Red Wolf Program employee

The following personnel actions occurred in 2006:

Administrative



Left to right:

Back: Scott Lanier, Brian Van Druten, Mike Bryant, Dennis Stewart, Abbey Reibel;

Front: Bonnie Strawser, Ann Marie Chapman.

FWS

Scott Lanier transferred from Carolina Sandhills NWR on 02/19/06 as a Refuge Manager, (Deputy) GS-0485-13.



Scott Lanier reported for duty as the new Deputy Project Leader for Alligator River and Pea Island National Wildlife Refuges on February 21, 2006.

BS

Fire

Terrie Oatman resigned 03/18/06 as Fire Program Assistant.

Helen Czernik filled the Fire Program Assistant position, GS-0303-05 on 12/18/2006.

Steve Foster filled the position of Forestry Technician, GS-0462-04 on 05/14/06.

PFS Greg Suszek was promoted from GS-0401-07 to GS-0401-09 on 01/29/06.



Left to Right: Kelly Van Druten, Helen Czernik, Amy Midgett, Donnie Harris, Greg Suszek, Cory Waters, Eric Meekins, Steve Foster, Joe Sharbaugh, Jeff Swain.
Front: Tom Crews. FWS

Maintenance



Bruce Creef recognized as Wage Grade Employee of the Year.
FWS

EEOS Bruce Creef was promoted from WS-5716-09 to WS-5716-10 on 11/26/2006. Bruce was also recognized as a Wage Grade Employee of the Year on 05/08/2006.



Left to right: Jonathan Powers, Eric Craddock, Bruce Creef, Bobby Govan.
FWS

Red Wolf

Ryan Nordsven accepted a term biological technician position.

Leslie Schutte-Hildebrand left her term position with the Red Wolf Recovery Program to accept a job with the Roanoke Island Animal Clinic.

OA Kathy Whidbee was converted to permanent full time position on 05/14/2006.



Left to Right:

Back: Bud Fazio, Art Beyer, Ryan Nordsman, Michael Morse.

Front: Kathy Whidbee, Diane Hendry.

FWS

Miscellaneous



Janice Lane's final year with FWS was 2006.

This photo was taken at her retirement "roast" in early January, 2007.

Refuge Manager Mike Bryant handled the "serious stuff" just prior to the "roast".

DM

Functional Titles

The following is a table defining functional title abbreviations as they appear in the Alligator River and Pea Island Annual Narrative Reports:

AA	Administrative Assistant
AO	Administrative Officer
DRM	Deputy Refuge Manager
EEO	Engineering Equipment Operator
EEOS	Engineering Equipment Operator Supervisor
EO	Equipment Operator
FCO	Fire Control Officer
FF	Firefighter
FF/EO	Firefighter / Equipment Operator
FF/FT	Firefighter / Forestry Technician
FMO	Fire Management Officer
FMS	Fire Management Specialist
FPA	Fire Program Assistant
FT	Forestry Technician
MM	Maintenance Mechanic
MW	Maintenance Worker
OA	Office Assistant
OS	Outreach Specialist
PFS	Prescribed Fire Specialist
PL	Project Leader
RB	Refuge Biologist
RLEO	Refuge Law Enforcement Officer
RM	Refuge Manager
RV	Resident Volunteer
WB	Wildlife Biologist
WIS	Wildlife Interpretive Specialist
WS	Wage-Grade Supervisor
WUIS	Wildland Urban Interface Specialist

4. Volunteer Program

In 2006, 24,170 hours of service were contributed by 190 volunteers in the following areas:

Maintenance – 6800 hours; wildlife/habitat – 8960 hours; recreation – 7335 hours; environmental education – 525 hours; other – 550 hours. The hours were compiled from volunteers at both Alligator River and Pea Island National Wildlife Refuges; both refuges are therefore reflected in this section. Of the totals 11,080 hours were contributed to Alligator River Refuge by 95 volunteers.

Interns, resident volunteers (RV's), local refuge volunteers, and organized work groups are the four active groups which form the Refuge volunteer program.

Interns

College students and graduates seeking to gain experience in wildlife management, research, and public use continue to turn to the refuges and the red wolf program for this knowledge. Interns were required to contribute a minimum of three months volunteer service, during which they received a \$90 per week food stipend and were furnished with free housing on the Refuge. All interns worked a 40-hour work week.

Anthony Davis joined the Refuge fire staff for a second year in mid-May. He worked at the Refuge for one week, attended S 212 Chainsaw Training the following week, and then went out West on a 2 week fire assignment. Prior to his return, Anthony accepted a 30-day emergency hire firefighter position at Pocosin Lakes National Wildlife Refuge. Interns, like Anthony, are sometimes given opportunities to build a career with the Fish and Wildlife Service.

Throughout the year, volunteer caretakers maintain the Sandy Ridge Red Wolf facility under the supervision of Chris Lucash, red wolf wildlife biologist. Caretaker duties include feeding wolves temporarily located in the pens, grounds maintenance, assisting with red wolf howling safaris, supporting the work of red wolf wildlife biologists, and other duties as assigned. There were 5 caretakers at Sandy Ridge during the 2006 calendar year, including Ryan Nordsven.

Other 2006 Interns for Alligator River and Pea Island were:

Name	2006 Interns	
	Assignment	Time Period
Brenna Walker	Red Wolf Caretaker Intern	June-Sept 24
Colin Benell	Red Wolf Caretaker Intern	Oct-Dec 22
Anthony Davis	Fire Intern	May-June
Gavin Holt	General Refuge Intern/PI	May-July 28
Amanda Horning	General Refuge Intern/PI	May-July 28
Brad Cramer	General Refuge Intern/PI	May-Aug 14
Brian Kidd	General Refuge Intern/PI	Aug-Mar 28
Mike Johnson	General Refuge Intern/AR	May-Aug 10
Marcus Lashley	General Refuge Intern/AR	May-Aug 10
Blaik Pulley	3 month Biological Intern	May- Aug 18

Resident Volunteers (RV's)

Resident Volunteers, also scheduled in 3-month blocks, were provided a site for their RVs at Pea Island or Alligator River and supplied w/ electricity, sewage disposal, washer/dryer, telephone hookup, and internet. In exchange for the accommodations, the volunteers donate 24 hours per week per person in a couple, or 32 hours per week per single. They provide refuges with routine maintenance, interpretive programs, canoe tours, and Visitor Center staffing. On occasion, we have a volunteer with experience in a specific field that lends expertise to the Refuge. For example, Jim Gilbert, an avid amateur (HAM) radio operator, represented Pea Island in a radio event, which included 6 refuges across the Eastern United States promoting National Wildlife Refuge Week. They called attention to the week, but also served to practice setting up communications in remote locations as would be required in public service activities where emergency communications may be needed. The HAM station at Pea Island used the call sign W5!RW/4 and operated on the 40 meter band around 7.245 as well as the 20 meter band around 14.260.

The 2006 Resident Volunteers were:

Resident Volunteer	Award/hour pins	Work Area	Service
Rich and Colleen Burke	certificate	Maint.,VC, Public Use	Mar 1-May 1
Scott and Virginia Lloyd-Jones	500	Maint.,VC, Public Use	May 1-July 15
Jimmy Smith	250	Maint.,VC, Public Use	May1-July15
Len Howell and Claudia Fifer	500	Maint.,VC, Public Use	Aug 1-Oct 31
Jim and Jane Gilbert	500	Maint.,VC, Public Use	Sept 1-Dec 1
Bette and Sam Learned	500	Maint.,VC, Public Use	Aug 1-Nov 1
Steve Taylor		Maint., Public Use	Apr 1-July1
Rocky and Jan Larson	250	Maint., Public Use	May 15- Aug 14
Tom and Diane McFarlane	Certificate	Maint., Public Use	Aug 1-Nov 1

Organized Groups

October 2006 – APPLES/UNC service learning alternative fall break group – 13 people donated over 150 hours to Pea Island litter clean up and Wildfest (children's wildlife festival).

Local Volunteers

Most local volunteers worked on Pea Island NWR (See Pea Island Annual Narrative Report for Details). On Alligator River local volunteers occasionally staffed the reception desk at the headquarters in Manteo.

Two volunteers assisted the Outreach Coordinator with re-organizing and archiving years of red wolf program information. The red wolf volunteers also updated the slide library and assisted with two howlings.

Neither Alligator River nor Pea Island could sustain the current high quality level of interpretive programs, visitor support, or sea turtle monitoring w/o the consistent dedication of local refuge volunteers. During 2006 this devoted group provided more than 1300 hours.

2006 Volunteer Awards

Cumulative hours tallied through September 30, 2006 yielded awards which were presented at the annual Volunteer Awards Banquet in November. These awards combined volunteer service for both refuges. Awards were presented to interns and resident volunteers during the course of the year, since most were unavailable during the time of the banquet. Usually, interns reach the 500 hour “milestone” and receive a certificate (100 hours), a volunteer pin (250 hours), and a volunteer pin with a 500 hour rocker. Resident volunteer awards vary. In addition, the following volunteers were presented “milestone” awards:

Certificate (100+ hours) – Bill Slayton, Pat Duggan, Sandy Semans, Windsor Jacques, Lehanne Kidd

250 Hour Pin – Julie Truhlar, Ron Scovell, Ken Wynne

500 Hour Pin – John Gilson, Laura Gilson, Debbie Mauney

1000 Hour Pin – Larry Hardman, Neal Moore

The Outstanding Volunteers for 2006 were Sue Carroll and Angie Brady-Daniels. Over the years, these two individuals have dedicated many hours to various projects on the Refuge, especially the Wings Over Water Festival every November.

Virginia Lloyd-Jones was recognized for her Highest Gross Sales at the Visitor Center on Pea Island NWR.

5. Funding

Refuge funding for FY 06 was as follows:

FUND	NAME OF FUND	FY03	FY04	FY05	FY06
1113	Red Wolf	906.0	982.3	946.8	1243.3
1261	Operations	1211.1	1355.7	1260.2	424.7
1262	Maintenance	653.8	422.5	107.0	665.7
1263	Public Use	n/a	n/a	n/a	343.0
1264	Law Enforcement	n/a	n/a	n/a	86.2
29..	Storm Damage *	953.7	218.6	207.3*****	104.4
9131	Fire Operations	690.0	1092.5**	710.1**	622.4**
9263	Rx Burns	106.1	189.0**	205.7**	235.6**
9264	WUI	166.4	286.0***	425.7**	401.2**
9265	Rural Fire Assist.	0	37.2	35.0	62.1
TOTAL		4687.1	4583.8	3897.8	4188.6

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

**Includes last minute fund additions for fire equipment purchases.

***Includes \$67.0 to pay settlement for legal action by a contractor.

****Approximately \$67.0 of initial allocation was taken and reprogrammed by RO with no notice.

1261 funding has been inadequate to meet salaries for the past several fiscal years.

Note the salary for WIS Ahlfeld was paid by the Coastal Wildlife Refuge Society (CWRS). When Susan Ahlfeld resigned, CWRS decided to hire an employee without going through FWS. That employee functions in the same way, but is paid directly by CWRS.

6. Safety

Staff safety meetings were held monthly. Safety Committee were selected from the funded Program Areas (1260, 1113, 92XX). The 2006 Safety Committee consisted of Bruce Creef, Dianne Hendry, Michael Morse, Frank Simms, Ann Marie Chapman and Greg Suszek. Jim W Wigginton continued to serve as the station's Collateral Duty Safety Officer.

2006 Monthly Safety Topics included:

- Fire Wise – Home Safety
- First Aid / CPR refresher
- Ticks: associated diseases, symptoms and protection / prevention
- FWS Safety Training: training matrix / requirements, policies and web sites
- Hurricane preparedness
- SMIS review / requirements
- Defensive driving
- OSHA – Department of Agriculture presentation
- Back injury prevention, fundamentals of firearm safety
- Blue Cross / Blue Shield coverage and requirements update
- Holiday Season safety

Two ATV Safety Institute Ridercourse Classes were taught at Alligator River NWR on February 14 and 15, 2006 by refuge instructor FT Van Druten. A third class was taught at Pea Island NWR on May 11, 2006. A total of 15 students were taught in 2006. The classes included employees from 2 refuges, Migratory Bird Office, volunteers, and interns used mostly to assist with the Sea Turtle Nesting Program on Pea Island NWR. A total of 78 students have been instructed since 2004 at either Alligator River or Pea Island NWR's.

On May 20, FT Van Druten attended his biennial ATV Safety Institute's Professional Development Workshop in Asheboro, North Carolina in order to keep his instructor certification valid.

FT Van Druten participated in the on-going dialogue within the USFWS in 2006 to come up with a national policy for ATV operation. This should continue into 2007.

7. Technical Assistance

RB Stewart continued working with Dare County and North Carolina officials and the consulting firm Wooten and Associates to discuss a proposed sewage treatment facility for the Stumpy Point community. Currently, more than 60 homes have straight pipe discharge of sewage into a canal adjacent to refuge lands that eventually dumps into Stumpy Point Bay. During 2004, Dare County made a decision to change the location of this project to an area with no direct impact on the Refuge. Little additional information came forth in 2005 except that project proponents were discussing the possibility of a treated effluent discharge pipe traversing the Refuge and discharging into the Lake Worth Canal. In 2006, Dare County and the Wooten Company concluded that the preferred alternative for the treatment plant was to locate the facility on county property beside US Highway 264 and north of Bayview Drive. Treated water would be discharged into Bayview Drive Canal. A 2.5 inch sewage collection line would be installed within an existing right-of-way along the shoulder of US Highway 264 for a distance of 3,175, including an extension of the existing right-of-way by approximately 275 feet. (See Section C-2 of this report for more information).

During the course of the year, RB Stewart interacted with Tideland Electric, the N. C. Department of Transportation, and Dare County regarding various maintenance projects within

rights-of way or requiring permits from the Refuge. Preliminary or limited planning efforts with regard to the upgrading of U. S. Highway 64 across the Refuge began in 2006.

F. HABITAT MANAGEMENT

1. General

Generally, six categories of natural, vegetated habitats 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. As the Comprehensive Conservation Plan developed, the six vegetative categories evolved into the twelve categories as shown in Table *F-3-1*.

2. Wetlands

Many areas on the Refuge have been impounded as a result of 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 100 acres of moist soil were produced in prior-converted farmland within the farm unit. The remaining approximate 1700 acres in the moist soil units were planted in corn, beans, millet, or winter wheat. 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.

3. Forests

Table **F-3-1**: Habitat types and approximate acreage of land within the boundaries of Alligator River National Wildlife Refuge located in 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

The on-going forest cover type mapping project for Alligator River NWR made substantial progress in 2006. The project was virtually completed, with slivers, overlaps, and holes yet to be filtered out. Acreages were passed to Bob Glennon for use in the Alligator River CCP and the data was incorporated into a map for the CCP. The fuels map was also completed as a result of this project. The cleaning of the data and updating of the database will continue in 2007.

FT Van Druten attended the Atlantic White Cedar Conference in Atlantic City, NJ June 5-8. The Refuge had a poster displayed in the poster session showing the current status of Atlantic White Cedar on both the Refuge and the Dare Bombing Range. Researchers presented their current works which included projects in eastern North Carolina and southeastern Virginia on refuge lands.

4. Croplands

The 2006 Cropping Season saw a marked difference from previous years. Crop production increased, as well as the variety of food sources. All three (3) farmers were operating under individual Cooperative Farming Agreements (CFA). Current CFA's are valid through December 31, 2010. The long-term agreements allow the farmers to take advantage of the USDA's – Natural Resource Conservation Services (NRCS) CP-21 Filter Strip (393) Program. One thousand, six hundred and sixty six (1,666) acres of cropland were converted to filter (field drainage filtration) strips. When maintained in an early succession stage, the filter strips provide beneficial habitat for a large diversity of wildlife species. Prescribed burning and seasonal mowing are used to maintain preferred habitat types. Addendums are used to compliment and support the current CFA's. The addendums are structured and approved on a yearly basis, depending on refuge management objectives.

During 2006 crop season, 358 acres of corn, 1250 acres of soybeans, and 200 acres of millet, 110 acres of lespedeza and 9 acres of sunflower seed were planted. Production was good with corn yielding 110 bushels per acre and soybeans averaging 35 bushels per acre. The quick maturing cereal grain / millet production was excellent as was the lespedeza crop. Harvest of the small grains provided plenty of residual grains for consumption by a variety of bird species.



During 2006 crop season, 358 acres of corn, 1250 acres of soybeans, and 200 acres of millet, 110 acres of lespedeza and 9 acres of sunflower seed were planted.

BC



Crop production and food source variety both increased in 2006 over 2005.
BC



Cooperative farming efforts on the Refuge provide a variety of grains
and other food crops for wildlife.
BC

Based on the 2006 Addendums to the long term CFA's, the Refuge share (un-harvested) was 165 acres of corn, 100 acres of soybeans, 10 – 15% of the millet and lespedeza crop and 100% of the planted sunflowers.

The 10% “equitable rent” is based on the requirement that the three cooperative farmers purchase all the fuel for the Laurel Bay and Creef Pump Stations. In 2006, the pumps ran for a total of 9,946 hours, compared to 4,865 hours during 2005. The 2006 Cropping Season was not unusually wet (61.76 in. rainfall), but heavy rains during seed bed preparation, planting and growing seasons necessitated pumping for longer periods of time. The farmers purchased 24,865 gallons of diesel fuel at a cost of \$58,432.00. Fuel prices steadily increased during the year, as did the farmers cash outlay. Without the current CFA’s in place, refuge water management objectives would not be achieved.

Based on the Minimum Procedures for Conducting a Refuge Farming Program issued June 7, 2006, this stations management of croplands and cooperative farming is in compliance.

A Genetically Modified Crops (GMC) eligibility questionnaire was completed and sent to Mr. Whit Lewis- Regional IPM / Farming Coordinator – Southeast Region, as the first step in the approval process after field staff determines GMC’s are eligible for use.

9. **FIRE MANAGEMENT:**

DFMO Crews is the primary prescribed fire planner in District 1 for all high and moderate complexity prescriptions and focused on looking after fire management needs and issues on all nine eastern North Carolina refuges in the district. DFMO Crews and FCO Donnie Harris updated burn plans for Alligator River and Pea Island Refuges. Pocosin Lakes NWR FMO Vince Carver served as the District Assistant FMO and training specialist. He is also serving on the North Carolina Fire Environment Working Team and specializes in smoke management planning, and also served as prescribed fire planner for Pocosin Lakes NWR, assisting DFMO Crews in writing prescribed fire plans. WUIS Kelley Van Druten spent much of her time addressing needs within the district through Fire Program Analysis (FPA)- She has also been working on continuing National Fire Plan initiatives, such as rural fire assistance and community wildfire mitigation planning. PFS Greg Suszek spent most of his time planning burns at Mackay Island, Currituck and Mattamuskeet Refuges.

Wildfire Preparedness:

Staffing Class Days for Spring Fire Season 2006 (March-May)
(RP – Readiness Plan or Staffing Class)

Month	RP 5 (Very High)	RP 4 (High)	RP 3 (Moderate)
March - May	4	25	22

Wildfires/acres:

North Carolina Refuges in District 1 responded to 18 wildland fires, totaling 586 acres (FMIS records): seven fires at Pocosin Lakes NWR, ten fires at ARNWR, and one fire at Mackay Island NWR.

Wildfires at Alligator River National Wildlife Refuge 2006

FIRE NAME	ACRES	FIRE #
DUMP FALSE ALARM	0	CD8V
SHIPYARD ROAD FIRE	0.5	CEC9
BOOTLEGGER CAMPFIRE	1.5	CEG2
TRACTOR FIRE FA	0	CEL2
5 OCLOCK SOMEWHERE	1	CEM7
MASHOES ARSON	0.5	CE7L
FALSE ALARM AG FIRE	0	AP7W
NAVY CENTER	299	CCX8
ALLIGATOR RIVER FA	0	CQ2G
LONG SHOAL WF	185	CRB0
FALSE ALARM AG FIRE	0	AP7W
TOTAL	487.5	

Other Significant Wildfire Activity:

Two Type 3 project wildland fires occurred at Great Dismal Swamp NWR and one Type 4 wildfire occurred at Whalebone Junction on Cape Hatteras National Seashore. District 1 personnel were the primary responders and were instrumental in suppressing these fires, resulting in better cooperative relations with our sister refuge to the North in Region 5, as well as the National Park Service (Cape Hatteras Group).

Dispatch Operations:

Wildfire suppression and prescribed fire operations for District 1 were coordinated out of the Fish and Wildlife Service Dispatch Center located at East Lake, NC. The Fire Program AA position vacated by Terrie Oatman in February 2006 was temporarily held by FF/EO Amy Midgett until it could be filled in December by Helen Czernik from Kill Devel Hills, NC. In addition to dispatch functions, Czernik has been learning several programs, including Fire Management Information System (FMIS), Interagency Qualifications Certification System (IQCS), Resource Ordering and Status System (ROSS), and the Weather Information Management System (WIMS), as well as the payroll, purchasing and budget protocols and programs.

Staff from the North Carolina refuges were dispatched by the Fish and Wildlife Service Dispatch Center at East Lake to 70 off-station (out of state) assignments during the FY-06 totaling 960 days. The locations for these assignments spanned from Florida refuges earlier in the year when they were experiencing project wildfires, to the Lake States, Southwestern US, Northwestern US and later Southern California. No hurricane assignments were undertaken since responding to Hurricane Rita during the fall of 2005.

Fire Organization:

Awards:

DFMO Tom Crews received the Southeast Region's All Risk Management Leadership Award for his role as Incident Commander with the USFWS Southern Region Incident Command Team for Hurricane Katrina. He was also recognized for his work in this role by Secretary of Interior Gail Norton, Director of the USFWS Dale Hall, and USFWS Southeast Regional Director Sam Hamilton.

FCO Donnie Harris received an award for fire leadership in the district.

FT Cory Waters received an award for his role in radio management.

FF/EO Amy Midgett received an award for her work in maintaining dispatch operations while the fire program administrative assistant position was vacant.

WUIS Van Druten received an On-the-Spot Award from the National Park Service for her coordination with Fire Program Analysis (FPA) for the NC Coast Fire Planning Unit.

Current Fire Personnel Stationed at Alligator River National Wildlife Refuge

District or Zone Personnel:

District Fire Management Officer	Tom Crews
District Wildland Urban Interface Specialist	Kelley Van Druten
District Prescribed Fire Specialist	Greg Suszek
District Fire Program Administrative Assistant	Helen Czernik

Refuge positions:

Refuge Fire Control Officer	Donnie Harris
Senior Firefighter/ Forestry Tech	Cory Waters
Firefighter/Forestry Tech	Steve Foster
Firefighter/Forestry Tech (seasonal)	Joseph Sharbaugh
Firefighter Equipment Operator	Eric Meekins
Firefighter Equipment Operator	Jeff Swain
Firefighter Equipment Operator	Amy Midgett

Auxiliary Firefighters:

Forestry Tech (GIS)	Brian Van Druten
Biological Technician	Leslie Shutte
O&M Engineering Equipment Operator	Bobbie Govan
O&M Maintenance Worker	Jonathan Powers

Fire Interns:

Anthony Davis, a great fire intern for ARNWR in 2005, returned briefly in May 2006 for a second intern position before quickly being picked up by Pocosin Lakes NWR as a temporary FF/FT. Anthony was later selected to fill the permanent Forestry Technician position vacated by Matt Brown in December and will start work early in 2007.

Communications:

With upgrades of all refuge radios to narrow band digital systems and the addition of the Columbia Repeater site on the 1300-foot WUNC tower platform, radio communications made a tremendous leap in technology during the past five years. Mobile radios have full coverage over all refuges in eastern North Carolina and hand held radios have around 50-75% coverage in this area. Most fire operations were conducted with radios in analog mode in order to allow cooperators to communicate using their non-digital, high-band radios. During 2006, the North Carolina Forest Service completed a migration to high band radio frequencies with new repeater towers and tactical frequencies. Therefore, communications with the state Forest Service remained excellent as long as everyone stayed in analog mode.

Unfortunately, the expensive hand-held Motorola radios do not have the programming capabilities to be compatible with radios used by the US Forest Service and other agencies in the interagency fire community and are therefore often unusable on fire assignments.



FWS Firefighters completing a controlled burn at Pea Island NWR.
FWS

Hazardous Fuels Mitigation:**Prescribed Fire Planning:**

PFS Greg Suszek assisted Mackay Island and Mattamuskeet Refuges in updating and writing new prescribed fire plans, including those for Cedar Island and Swanquarter NWRs. FCO

Harris, PFS Suszek, WUIS Van Druten, DFMO Crews, FT Cory Waters, and FF/EO Meekins wrote updated prescribed fire plans for Alligator River NWR. Over 70 burn units were prepared for implementation on eight different refuges. Refuge Managers met with fire staff to help establish the year's priorities for prescribed burning. Burning was coordinated at a district level based on the agreed priorities such as narrow burn windows, wildland-urban interface, and hazardous fuels.



Landscape scale burning at Alligator River NWR.
FWS

Hazardous Fuels Projects:

There were 62 hazardous fuel projects completed in 2006, totaling 28,289 acres (NFPORS records). The most significant of the prescribed burn projects were the five Joint Fire Sciences Program burns completed with marsh and pocosin fuels at Alligator River NWR and pocosin fuels at Pocosin Lakes NWR. Many of these were very difficult burns due to heavy shrub and timber fuels that had never burned under controlled conditions. There were six burns totaling 1,014 acres performed at Cedar Island NWR that were especially challenging due to heavy fuels, close proximity to houses and the logistics issues of traveling to this remote refuge. However, FWS gained excellent support from the residents at Cedar Island NWR during this prescribed burning program.

Total Hazardous Fuels Projects Accomplished in District 1

Refuge	Number of Treatments	Acres
Alligator River	42	16,233
Pea Island	3	573
Swanquarter	6	6,192
Pocosin Lakes	9	2,536
Mackay Island	8	904
Cedar Island	7	1,014
Total	75	27,452

(316 acres were mechanical projects)

Prescribed Burns at Alligator River National Wildlife Refuge 2006

Fire Name	Acres	Fire Num
NORTH NAVY RESEARCH 4.5.3	293	4994
NORTH NAVY RESEARCH 4.5.5	250	4996
CREEF AG 3.3A	465	D142
CREEF AG. 3.3B	400	D143
CREEF AG 3.3.C	480	D167
CREEF AG 3.3.D	550	D169
CREEF AG 3.3.E	88	D179
TWIFORD AG A	83	D180
TWIFORD AG B	139	D181
MASHOES UNIT 1.1.3	408	D196
NORTH NAVY SHELL UNITS C	50	D203
LONG SHOAL 2.5.4	500	D208
LONG SHOAL 2.5.3	300	D209
LAUREL BAY 3.1.3	296	D210
LAUREL BAY3.1.1.	50	D211
LAUREL BAY 3.1.4	250	D212
NORTH STUMPY POINT 2.3.2	800	D233
ROANOKE MARSHES 2.2.5	2828	D263
ROANOKE MARSHES 2.2.1.A	1178	D266
ROANOKE MARSH 2.2.8	970	D267
ROANOKE MARSH 2.2.9	90	D268
ROANOKE MARSHES 2.2.3.A	265	D269
LONG SHOAL 2.5.6	1739	D313
LONG SHOAL 2.5.5	1308	D314
NORTH NAVY RESEARCH 4.5.4	533	D331
NORTH NAVY RESEARCH 4.5.1	547	D332
NORTH NAVY RESEARCH 4.5.2	978	D333
LONGSHOAL RIVER 2.5.6 B	200	D337
LONG SHOAL RIVER 2.5.5.B	15	D338
TWIFORD AG 3.2.11	80	D378
Total	16,133	

Prescribed Burns at Pea Island National Wildlife Refuge 2006

Fire Name	Acres	Fire Num
NORTH PEA ISLAND 8.1.1	0	D276
NORTH PEA ISLAND 8.1.3	392	D481
SOUTH PEA ISLAND 8.1.4	82	D487
NORTH PEA ISLAND 8.1.2A	99	D489
Total	573	

Mechanical Fuels Projects at Alligator River National Wildlife Refuge 2006

Maintained Firebreaks	Completion Date	Acres
West Point Peter Firebreak	23-Mar	6
S. Koehring Firebreak	28-Mar	6
Long Curve to 264 Firebreak	31-Mar	5
Lake Worth South Firebreak	3-Oct	1
Roanoke Marshes Firebreak	13-Oct	6
N. Point Peter Firebreak	13-Oct	9
East Borrow Pit Firebreak	13-Oct	6
N. Stumpy Point A Firebreak	18-Oct	34
N. Stumpy Point C Firebreak	20-Oct	7
S. Koehring Firebreak Cut 2	30-Oct	6
Ed Sawyer Firebreak	16-Nov	6
Point Peter Road Firebreak	30-Nov	8
Total		100

Firebreaks in the Parched Corn Bay Compartment are in need of rehabilitation, but this work remains unfunded for another year. With the acquisition of the new Marshmaster II with mower, along with the GeoBoy brush cutter tractor, the Refuge is better able to maintain the firebreak system on an annual basis. This eliminates the need for costly firebreak rehabilitation every 3 to 4 years.



Specialized Flex-Tracked fire tractors are required in pocosins at Alligator River NWR.
FWS

Refuge staff is far from meeting the ten-year goals in hazardous fuel reduction at Alligator River as laid out in the 1998 Fire Management Plan. Funding and target allotment shortfalls present in past years decreased during the last two years, helping the project tremendously. However, the program is now dependant on the same Aircraft Rental Agreement (ARA) helicopters that did not provide the coverage needed in 2006. The key to increasing burning at Alligator River hinges on the ability to take advantage of intermittent burn windows and to expand the burning season on into the spring (March and April) when appropriate. The backlog of prescribed burn acres at Alligator River NWR now totals 30,000 acres.

Fire Management Planning:

Fire Program Analysis (FPA):

The FY2008 budget submission from the North Carolina Coast Fire Planning Unit (FPU) was due on February 15. The Refuge FPU consists of the nine refuges in eastern North Carolina, the National Park Service Cape Hatteras Group, Cape Lookout National Seashore, and Croatan National Forest. In addition to meeting the FPU deadline, the FPA, Budget Development and Delivery program, and line officer approval memo were also submitted. Comments on FPA implementation and model difficulties for the NC Coast FPU were compiled and sent to the Regional Office.

On March 23, there was an informational meeting at Great Dismal Swamp NWR to discuss the pros and cons of moving Mackay Island and Currituck NWRs from the North Carolina Coast Fire Planning Unit (FPU) into the Del-Mar-Va FPU. Due to problems in the model and a lack of clear direction in future modules, it was decided that the FPUs would stay the way they were.

However, there may be reason to revisit the suggestion as the model and understanding of it improve.

The current model is not workable due to discrepancies in budget submissions made by the FPU and large amounts of money required. Since the February deadline, FPA has been under an intense scrutiny by the National Wildfire Leadership Council to determine the best way to proceed with the program. In November, it was decided that the FPA-Preparedness model would not be discontinued and previous submissions would be used instead. FPA still has a target deadline of CY2009 to complete an extensive model for the fire program. Part of this will be accomplished by continuing to correct and update weather data and fire event histories as additional years are added to the dataset.

Local Fire Related Training:

Locally offered training this year included an Annual Firefighter Refresher, Marshmaster training, S-212 Wildfire Powersaws training, Plastic Sphere Dispenser Operation (PLDO) training, and L-180 Human Factors on the Fireline course.

Wildland Urban Interface (WUI):

The state forestry organizations have not been able to agree on how to update the 2001 Federal Register's list of Communities-at-Risk (CAR) from wildland fire. According to the list, Stumpy Point is the only community at risk located next to wildlife refuges in the Fire District. Therefore, the District submitted a request for the North Carolina Forest Service to recognize 30 communities adjacent to wildlife refuges as CARs. The list was approved in March, allowing the Fire District to count these communities as CARs in Firebase when proposing fire projects.

Additional progress in determining community risk was made through the completion of the Southern Wildfire Risk Assessment and the accompanying Southern Fire Risk Assessment System (SFRAS) computer program. This is a GIS-based system of determining and categorizing risk to communities across the southern United States. Through this system, the District has risk assessments and wildfire mitigation plans completed for all its Communities-at-Risk. WUIS Van Druten attended training on the system in June and received a disk with Fire District 1 data in late September. In 2007, getting familiar with the data and deciding how best to use it to complete localized community wildfire mitigation plans will be high priority.

In December, WUIS Van Druten worked with the North Carolina Forest Service in Dare County to complete a Community Wildfire Protection Plan (CWPP) for Stumpy Point. This was the first attempt in the District to complete a CWPP and was a learning process in community facilitation. In addition to Alligator River NWR and the North Carolina Forest Service, stakeholders that participated in the development of the plan included community members, volunteer fire department members, Dare County Fire Marshal, and Emergency Management. In 2007, WUIS Van Druten plans to get another 6 CWPPs completed for Communities-at-Risk in the District.

District 1 Funded Wildland Urban Interface Projects Contracted in 2006

Refuge	Project Description	Amount
Alligator River	Access – 6 culverts	\$32,000
Alligator River	Hwy 264 Access culvert*	\$25,000
Alligator River	Roanoke Marshes firebreak rehab	\$60,000
Mattamuskeet	Southwest WUI boundary firebreak	\$15,000
Pocosin Lakes	Clayton Road firebreak	\$35,000
Pocosin Lakes	Shore Drive firebreak	\$35,000
	Total	\$202,000

*This project was an attempt to work with a military construction unit as a training exercise. However, the costs were projected to be much more than what the Refuge had initially estimated. Therefore the project was not attempted, and the money was used to purchase culverts for the “Access – 6 culvert” project and to fund the higher bids that came in on the Mattamuskeet WUI boundary project instead.

The North Carolina Wildland Urban Interface (WUI) Symposium was held in Greensboro, NC February 28 - March 2. It focused on education, training, networking, and WUI issues for agencies, local governments, developers, and homeowners. WUIS Van Druten and FT Brian Van Druten were both presenters at the symposium. WUIS Van Druten gave two presentations on Firewise landscaping and FT Van Druten taught two sessions on Introduction to GIS.

Rural Fire Assistance (RFA):

During 2006, WUIS Van Druten completed final reports for six volunteer fire department grants and secured additional funding for six more departments in the Fire District. Two other volunteer fire departments still need to complete their final paperwork.

Manns Harbor Volunteer Fire Department completed a grant agreement with Alligator River NWR in March. Over 4 ½ years, the Manns Harbor Volunteer Fire Department received 3 grants for a total of \$10,722.29. The department utilized the money to outfit 20 firefighters with wildland fire PPE, purchase hand tools and other basic wildland fire equipment, and receive some wildland fire training.

Stumpy Point Volunteer Fire Department extended the grant agreement with Alligator River NWR another year with an increase of \$6,000 in funding to purchase basic wildland firefighting PPE. Five other departments in Fire District 1 received additional funding for PPE and communications equipment. The District received a total of \$62,083 in Rural Fire Assistance grant money during 2006.

Cooperative Relations:

Several meetings took place throughout the year with the North Carolina Forest Service to discuss cooperative efforts. DFMO Crews keeps stressing the concept of “Appropriate Management Response” (AMR) which includes the use of indirect attack suppression strategies in marshes, pocosins and woodlands at Alligator River NWR. During the early spring fire season, FCO Harris and DFMO Crews flew NCFS District 13 Forester Robbie Talbert and District Ranger Brickhouse in the NPS aircraft to review using an AMR on areas such as North Stumpy Point Compartment, where there is a lot of thick shrub, hurricane damaged timber and

very wet soils, resulting in logistical issues and potentially very dangerous conditions for conducting direct attack suppression responses.

Other meetings with the NCFS included the annual cooperator's meetings with Districts 13 and 4 to discuss personnel and equipment changes in preparation for the spring fire season. DFMO Crews and WUIS Van Druten attended a NC Interagency fire planning meeting on September 7 and 8 in Asheville, NC. Topics discussed included an interagency coordination center, community wildfire protection plans, interagency type 3 teams, and a training academy

WUIS Van Druten represented refuges at the North Carolina Prescribed Fire Council meeting on March 3. This meeting formalized the Council by adopting by-laws and voting on a Steering Committee.

10. Pest Control

Phragmites

Phragmites, *Phragmites australis*, continue to be a problem on Alligator River NWR. A major effort was put forth to spray Phragmites on Alligator River NWR road shoulders and farm fields in 2006. In preparation for the spraying, FT Van Druten and MM Powers devised a boom that hung from the side of the rollback truck and mounted the 200 gallon spray tank and pump unit. Spraying was initiated on July 21 and 18 total days were dedicated to spraying Phragmites on the Refuge. A total of 33.7 acres were treated by ground application with glyphosate (Aquaneat), this included approximately 12 miles of road shoulder. Results were excellent except for areas where the Phragmites were resprouting due to accidental mowing. No aerial application was performed in 2006 due to the inability to secure a contract for application. This work will continue in 2007.

Also in 2006, 100 gallons of Aquaneat (a glyphosate herbicide) were purchased through NaturChem in Greenville, North Carolina for use in the control of phragmites. Five area suppliers were contacted for bids, with NaturChem providing the best pricing for delivered product. This should give the Refuge enough herbicide to spray both Alligator River and Pea Island NWR's in 2007.

Alligator weed

Alligator weed, *Alternanthera philoxeroides*, is a growing problem on Alligator River NWR. Historically, Alligator weed has totally obstructed narrow waterways, which are prevalent throughout the Refuge. Not only does this impede passage along these waterways, it restricts the flow of water. Reports have been coming in from local paddling enthusiasts about alligator weed appearing area waterways for two years. FT Van Druten and MM Powers initiated spraying on July 10 and 6 total days were dedicated to spraying Alligator weed on the Refuge. A total of 4 acres (3.7 miles of canals) were treated by ground application with Habitat. Results were excellent except for one area which was retreated on August 24. The August 24th spraying proved very effective in killing the alligator weed that had resprouted after the first treatment.

Also during this time WS Creef and FT Van Druten surveyed lower Milltail Creek and Sawyer Lake for Alligator weed. Luckily the survey turned up none. This herbicide work will continue in 2007.

Also in 2006, 10 gallons of Habitat and 5 gallons of the surfactant Cidekick were purchased through NaturChem in Greenville, North Carolina for use in the control of Alligator weed. Five area suppliers were contacted for bids, with NaturChem providing the best pricing for delivered product. This should give the Refuge enough herbicide to spray in 2007.

Southern Pine Beetle

Trapping of southern pine beetles was done at 3 locations on the Refuge from April through early May. This was 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. Results for refuge lands were 2.2 pine beetles per trap per day compared to 13.7 clerids (natural pine beetle predator). This correlated to a predicted declining/low Southern Pine Beetle problem for 2006. No survey flights were conducted in 2006 due to a lack of funding.

G. WILDLIFE

1. Wildlife Diversity

The vast expanse of swamp-forest and marsh 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 American 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 no longer listed, 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 2006 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 2006.

Red-cockaded woodpecker (Endangered): Prior to Hurricane Isabel, trails were cut to previously tagged cavity trees south of Whipping Creek Road. Of the three known clusters on the Refuge, one produced a fledgling. None of the U. S. Highway 264 clusters were accessible during the 2004 nesting season. It was not possible to assess nesting activity during 2005 or 2006 as the cavity tree in the only accessible active cluster was dead and leaning at a 45° angle.

Damage from Hurricane Isabel in September 2003 ranged from moderate to extensive in red-cockaded clusters. It appears that 50-70% or more of the cavity trees were blown down or broken off. However, most of these trees were considered inactive trees. An attempt to conduct an assessment was made to determine the need for artificial cavities. Basically, the post-Isabel pocosin is inaccessible from the ground. This process is seriously complicated due to the fact that there is no funding or staffing allocated for such biological work on the Refuge. The basic conclusion from the 2005 RCW efforts is that the Refuge needs to start over with regard to locating active clusters and cavity trees by helicopter. This will take special funding and additional staff. Due to the funding and staffing situation in 2006, no RCW work was done this year.

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 2006 represents the 19th consecutive year of successful management. By spring 2006, the wild population had produced over 400 wild pups, with approximately 50 pups born in the wild in 2006. The wild population of red wolves is currently composed of more than 100 wolves comprising nearly 18-22 packs distributed across 1.7 million acres in five North Carolina counties. Population monitoring is done in a number of ways: trapping, scat sampling and tracking using ground and aerial telemetry.



Red wolf pups.
FWS

Red Wolf Adaptive Management Plan

The Red Wolf Adaptive Management Plan began in 1999 and was 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 population dynamics, and make recommendations to the Service regarding adaptive management and red wolf recovery. Reviews by the Recovery Implementation Team show the Plan is effective in restoring the wild red wolf population and managing competitors (eastern coyotes). Since 1999, 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. The Adaptive Management Plan utilizes a 3-zone approach over a 5-county area: Dare, Tyrrell, Hyde, Beaufort and Washington Counties and encompassing 1.7 million acres. Overall, the Red Wolf Adaptive Management Plan 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 38 captive facilities across the United States. The effort is overseen by the Red Wolf Recovery Program Team Leader, Bud Fazio, located at the Alligator River National Wildlife Refuge, and is coordinated daily by the Red Wolf Species Survival Plan Leader, Will Waddell, at the Point Defiance Zoo and Aquarium in Tacoma, Washington. As of December, 2006, the current total number of wolves in the captive population was 178 (this number changes frequently). Red wolves are held in captivity for a number of reasons including cooperative breeding, reproduction research, and conservation genetics work. The breeding program maintains genetic diversity among red wolves and prepares a small number of red wolves for possible release into the wild.

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 northeastern North Carolina. St. Vincent National Wildlife Refuge in Florida maintains a pair of red wolves for breeding in the wild. The pair did have pups in 2006. Bulls Island is part of the Cape Romain National Wildlife Refuge in South Carolina and currently has no red wolves on site. There is a breeding pair and pups on Cape Romain's mainland property at the Sewee Visitor Center. The Cape Romain Refuge educates approximately 200,000 people per year about red wolves. These island programs play vital roles in the red wolf captive breeding program via education and producing wild-born red wolf pups for release.

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. These tracts of land were 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. & PhD)

The Red Wolf Recovery Program is working with wildlife genetics researchers to identify gene loci in red wolves and coyotes. This information provides red wolf biologists with data to distinguish and manage red wolves and other canids such as coyotes in the recovery area. Genetic analysis provides invaluable statistics on which to base sound management decisions that will ensure the success of the red wolf reintroduction effort and the long-term survival of the species. Both Master's degree and PhD 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 researchers from Trent University in Canada who are modeling survival and demographics of the North Carolina wild red wolf population. The population demographic model shows 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, important research on captive red wolves is conducted annually. 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.

Red Wolf Coalition

The Red Wolf Recovery Program continues to work closely with the Red Wolf Coalition (RWC), a citizen-support organization whose mission is to educate and promote community awareness for the red wolf. Its Board of Directors consists of 12 members from various locations in North Carolina, Virginia, California, Ohio and Washington DC. This non-profit organization co-sponsors howling safaris with the Service and participates in outreach events throughout the year. Kim Wheeler has been the Executive Director, with an office in Columbia, for approximately one year.

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 the number of these 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 the number of these 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 during migratory periods. 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.

Results of this year's surveys are given in Table **G-3-1** below. Tundra swan, pintails, and green-winged teal use accounted for over 80% of the total waterfowl use and are certainly the most common species found on the Refuge during the wintering period. Use data for Canada geese and snow geese is not measurable because of the very low numbers. Historically, the Refuge has never been used by either the snow goose or the Canada goose. Large numbers of wood ducks can be observed on the Refuge, but they use the flooded farm fields mostly for roosting and refuge surveys are done through the day. Wood ducks are most common in the moist soil units when cold weather causes the sloughs and swamps to freeze while the open fields with full exposure to sunshine thaw sooner. Substantial changes such as those shown for the ruddy duck, bufflehead, blue-winged teal, Canada goose, redhead, and coot are indicative of sporadic use by such species. Although the table shows a decrease in use, the number of shovelers and mergansers is increasing each year. Higher numbers of these species are present for fewer days. Figures **G-3-1** and **G-3-2** illustrates seasonal shifts in numbers for each species.

Table **G-3-1**: Composition of wintering waterfowl at Alligator River NWR during the 2005-2006 survey period in Dare and Hyde Counties, North Carolina.

SPECIES	PEAK PERIOD	<i>SURVEY</i> PEAK #	# USE DAYS 2005-06	% TOTAL USE DAYS 2005-06	USEDAYS % diff from 2004-05 avg	USEDAYS % diff from long-term avg
Tundra Swan	Dec	2301	98240	20.5	-19	80
Snow goose	N/A	0	0	0	0	0
Canada goose	Dec	30	463	0.1	1495	-17
Mallard	Jan	461	21486	4.5	-34	-50
Black duck	Jan	174	11931	2.5	44	-42
Gadwall	Jan	153	7891	1.6	71	-14
Wigeon	Feb	152	2401	0.5	-14	-80
Pintail	Dec	6973	186506	38.8	-45	-19
GWT	Dec	4266	123235	25.7	-25	-32
BWT	Mar	6	122	0.001	479	-81
Shoveler	Jan	93	3752	0.8	-15	40
Wood duck	Nov	130	3542	0.7	-74	-78
Ringneck	Dec	890	9886	2.1	-36	-81
Redhead	Dec	10	55	0.001	-61	210
Canvasback	Dec	2	12	0.001	N/A	97
Scaup	Mar	163	1214	0.3	N/A	848
Unknown	Jan	70	3160	0.7	5	-84
Bufflehead	Dec	23	514	0.1	994	431
Ruddy	Dec	91	2378	0.5	1833	735
Merganser	Dec	3	50	0.001	-55	-41
Coot	Mar	423	17086	3.6	636	162

Figure **G-3-1**: Abundance of tundra swans and geese at Alligator River National Wildlife Refuge during the 2005 – 2006 wintering period.

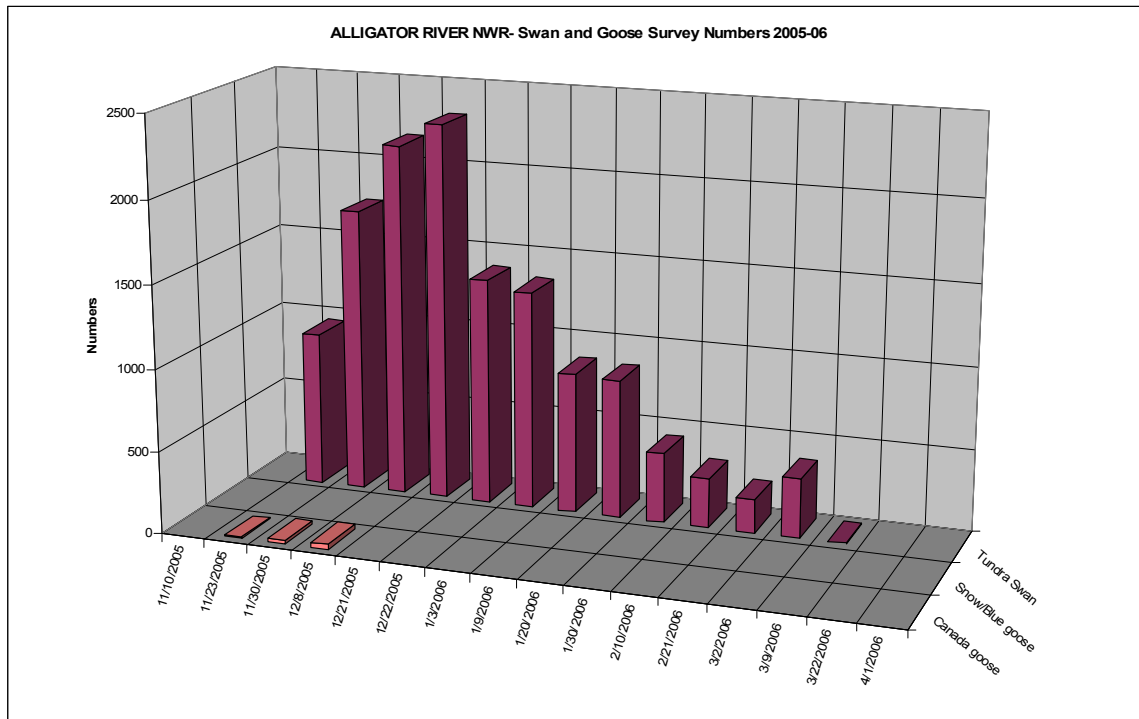
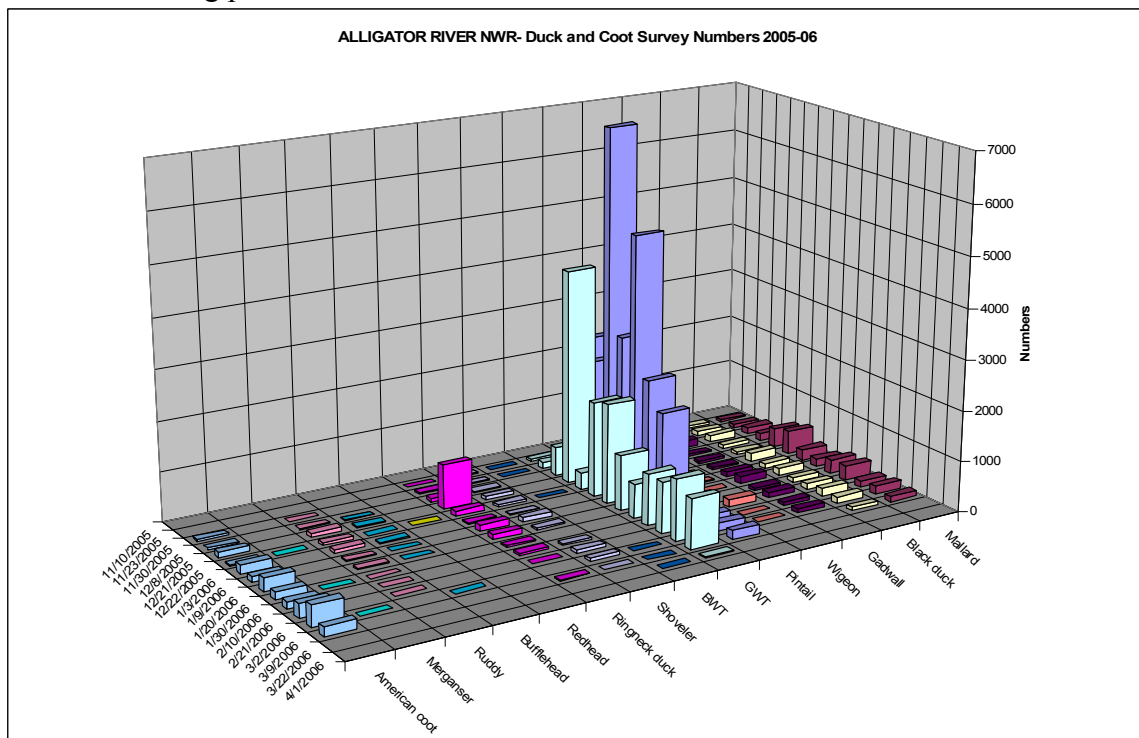


Figure **G-3-2**: Abundance of ducks at Alligator River National Wildlife Refuge during the 2005 – 2006 wintering period.



In order to assess the quantity and quality of moist soil plants for waterfowl during the 2005-2006 wintering period it is necessary to examine vegetation data from the fall of 2005. Vegetation data was not collected during the fall of 2005 due to changes in management and management strategies.

With regard to moist soil management, generally 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 or by positioning portable pumps to targeted units. 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. If water becomes too deep in a moist soil unit, dabbling ducks either quit using it or just use it for roosting, resting, and loafing. All is not lost if water levels do not cover each field entirely within the moist soil units. First, there is no evidence that waterfowl have ever completely eaten moist soil production with fields partially flooded. Second, the un-flooded portion of the moist soil unit provides valuable habitat for marsh birds, especially rails, as well as grassland birds along with numerous other wildlife species, including the prey base for the red wolf and a large numbers of raptors. Completely flooding the entire moist soil unit acreage eliminates valuable habitat for other wildlife.

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, fewer 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, bats, and bees. At the last count, fewer than 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 provided that water levels are kept at appropriate levels for dabbling ducks. 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. However, marsh and shore bird numbers are relatively low, resulting in data analysis that is not very meaningful.

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). 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 record high of nine bald eagles were observed in the Twiford Farm Units during a January waterfowl survey, but did not show up on the raptor survey before or after the observations. During late 2004, some preliminary effort went into establishing grassland bird and diurnal raptor surveys in the farm fields. Routes and protocols for raptor surveys were established during 2005 and data collection began. Data collection continued throughout 2006. Results so far show the Northern harrier to be the most common raptor. Late summer months are not very productive for data collection due to low raptor numbers. Table **G-6-1** presents the data for the raptor survey. Interpretation of the data is limited due to the fact that surveys are limited in number and do not represent a uniform effort over the entire year. The survey will be continued in 2007 and an effort will be made to establish a more systematic sampling regime over the farm unit.

Table **G-6-1**: Summary of raptor data collected from farm units at Alligator River NWR during 2006. The total number counted for the year is shown in the # column; the % column is the percent of total birds counted; and the N_{\max} column is the maximum number counted on any survey for the entire farm unit.

Species	#	%	N_{\max}	Peak date
Bald eagle	29	2.2	5	1/28/06
Sharp-shinned hawk	5	0.4	2	N/A
Northern harrier	550	40.9	57	2/3/06
Red-tailed hawk	218	16.2	19	2/13/06
Red-shouldered hawk	0	0	0	N/A
Rough-legged hawk	3	0.2	1	1/19/06
Broad-winged hawk	1	0.1	1	1/19/06
American kestrel	46	3.4	6	1/19/06
Merlin	6	0.4	1	1/19/06
Peregrine falcon	13	1.0	3	11/17/06
Black vulture	0	0	0	N/A
Turkey vulture	457	34	54	2/3/06
Osprey	0	0	0	N/A
Unknown raptor	18	1.3	3	1/28/06

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 when they are managed to maintain moist soil vegetated habitat, 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 other habitat types, such as bottomland hardwoods, deer population size appears to be relatively constant and they are providing sportsmen with considerable recreational opportunity.

Other game mammals on the Refuge include the gray squirrel, cottontail rabbit, and marsh rabbit. Although the black bear is abundant on the Refuge, there is not a refuge hunting season for the bear at this time.

10. Other Resident Wildlife

Wild turkeys are observed frequently during the spring and summer. During the fall and winter of 2006, flocks of 6-20 birds were observed in various locations. Other turkeys were observed over much of the Refuge, even along roads transecting pocosin habitat. Turkey numbers have been steadily increasing since the restoration project began in 1999 with the release of 16 birds.

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

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. Local groups also sponsored an Open House event in October on the Refuge to highlight some of these uses to the public. Only a handful of refuge visitors took advantage of the free canoe tours, nature hikes, and light refreshments. Unfortunately, the Alligator River Open House coincided with many other events taking place in the state that day including the Scuppernong River festival, opening day of gun season, and the opening weekend of the State Fair.



Wood Duck and Alligator working hard to get motorists attention during the Alligator River Open House, October 14th. FWS

Total visits to the Refuge in 2006 were estimated to be 35,000. Administrative offices for the Refuge 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 2006, the Refuge continued to focus on providing a greater number of media contacts while keeping the messages short and simple. A total of 56 news releases were distributed.

A new red wolf brochure draft was finalized with the help of Ellen Marcus, R4 graphic designer. The previous brochure was nearly 10 years old, and the new one arrived in late December, 2006, in time for the 20th anniversary of the release of wild red wolves into the ARNWR.

WIS Strawser and WIS Chapman participated as members of the Roanoke-Tar-Neuse-Cape Fear (RTNCF) Ecosystem Outreach Committee and the Outer Banks Paddlers Club (with Chapman serving as coordinator for the group). The participation in these organizations goes a long way in promoting the refuges and soliciting volunteer participation for refuge projects.

2. Outdoor Classrooms – Students

Creef Cut and Sandy Ridge Wildlife Trail are used frequently by groups of students on their way to and from the Outer Banks from inland areas. Both trails are safe and accessible places where children can stretch their legs, work off some energy from a long bus ride, and learn something in the process. Some of these groups contact the Refuge to request a 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 Refuge their ultimate destination and are requesting a variety of programs. During 2006, 41 students from 2 schools were taught on-site at Alligator River by staff and volunteers as a part of an organized educational program.

3. Outdoor Classrooms – Teachers

“Far Traveler” teacher workshops are held semi-annually by the Red Wolf Recovery Program and focus on grades K-8. Two workshops were offered this year, with a total of 33 educators taking advantage of the opportunity. As part of red wolf educational outreach, Discovery Boxes are circulated among educators. A Discovery Box contains red wolf teaching tools such as a red wolf pelt, collar, track cast, “Recovering a Species” video, howling cassette and informational materials. An additional box was added for 2006, bringing the total to three. New to the Discovery Boxes are a coyote pelt and skull, a “Far Traveler” teacher curriculum, literature packet and a laminated map of the recovery area.

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

4. Interpretive Foot Trails

Sandy Ridge Wildlife Trail and Creef Cut Wildlife Trail continue to be used by individuals and groups. With 2300 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. Refuge staff tried to increase use of the trails by offering programs and guided hikes on these trails for special groups and the visiting public.

WIS Chapman worked with a group of 9 individuals from SOAR, a school based in Asheville, NC that works with learning disabled students. The group removed/scrubbed algae growth on the Sandy Ridge boardwalk, picked up trash from Alligator River parking lots and volunteer living areas, and cleared canoe trails. The group worked on the Refuge and camped at the helipad April 27th and 28th.



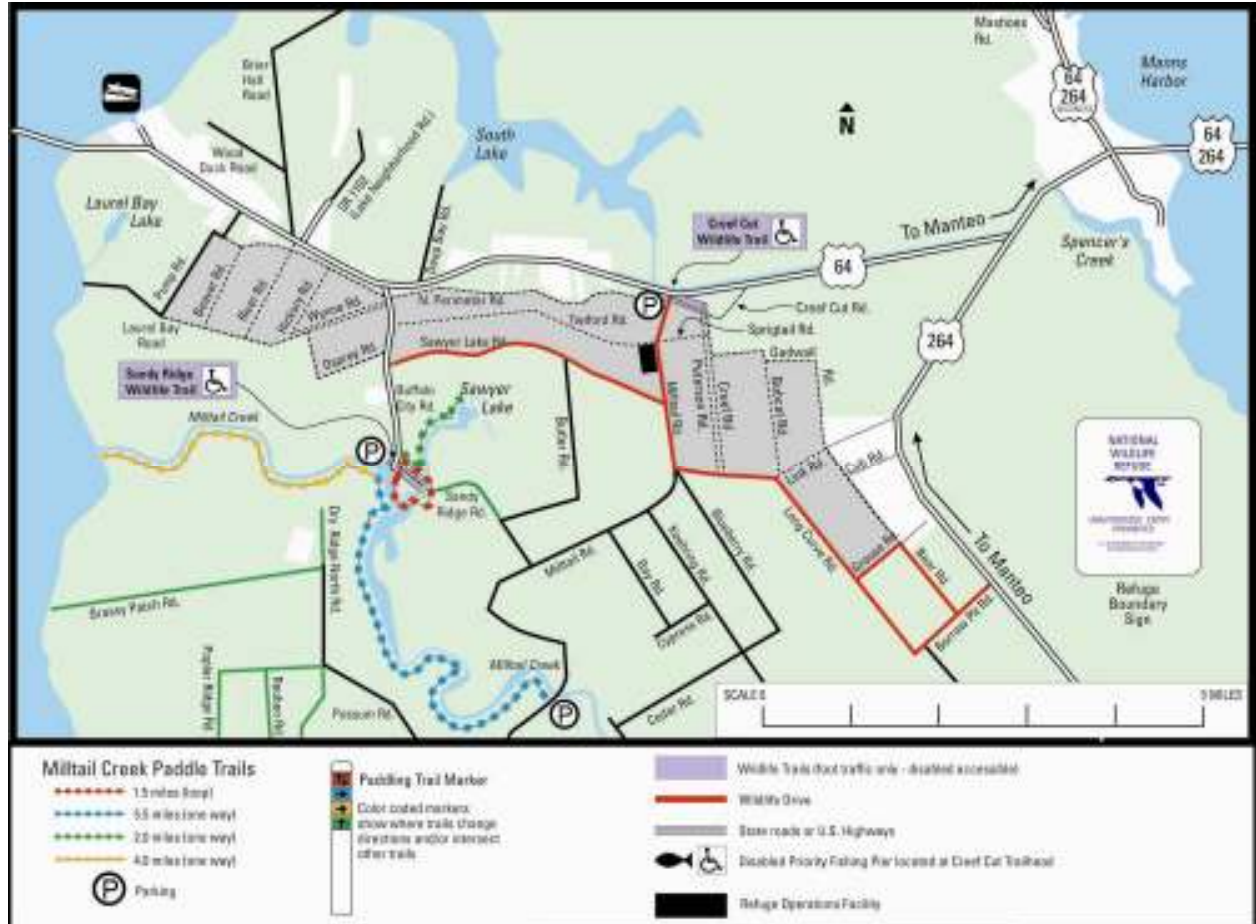
Visitors continue to use the foot, driving, and paddle trails to view refuge wildlife.

JL

Though not a foot trail, the Milltail Creek Canoe/Kayak Trail System continues to be quite popular. In 2006, the Coastal Wildlife Refuge Society, in cooperation with the Outer Banks Paddlers Club, replaced the paddle trail markers using floating PVC pipes weighed down by sand. On most days, there are several groups using the trail. If there were a local place to rent canoes or kayaks, use would increase dramatically. However, there is not a demand great enough to consider a concession for this purpose. Three local businesses were issued special use permits (SUP) to conduct guided canoe or kayak tours on the Milltail Creek Canoe/Kayak Trail System during 2006. Approximately 3,050 visitors participated in guided tours provided by the holders of these SUP's.

Approximately 3,500 people used Alligator River NWR walking trails during 2006. It is anticipated that there will be a continued increase in trail use on this refuge for some time to come. Approximately 16,000 visitors used the paddling trails, and 2,000 used the Wildlife Drive.

5. Interpretive Tour Routes



Above is the map of Alligator River National Wildlife Refuge interpretive Tour Routes.

In 2001, Alligator River National Wildlife Refuge established an 8-mile wildlife drive. The route immediately became quite popular primarily due to the likelihood of seeing black bear. This feature of the Refuge has inadvertently been left out of the annual narrative reports until now.

The original route began at the intersection of Milltail Road and US Highway 64, traveled south for approximately 2 miles, turned left onto Long Curve Road for approximately 3.5 miles, then turned left onto Borrow Pit Road for 1 mile before reaching US Highway 264. An optional “leg” added 1.5 miles to the drive, bringing the total to 8 miles.

During 2006, Sawyer Lake Road was added to the drive where visitors could exit via Buffalo City Road. This addition totaled 4 miles, bringing the wildlife drive length to 12 miles total. Sawyer Lake Road offers incredible waterfowl viewing during the winter months.

6. Interpretive Exhibit/Demonstrations

Refuge staff manned displays and exhibits at various annual events around Dare County and eastern North Carolina. Interpretive Specialists, the fire program educator, and staff from the Red Wolf Program were able to participate in conservation-themed festivals, including the NC Aquarium's Earth Day event (1,300 visitors), North Carolina Days (1,200), New Bern Wildlife Art Show (1,500 visitors), Eastern North Carolina Wildfowl Festival (3,500 visitors), Forest Festival (2,000), Music and Water Festival (300), Outdoor Festival (1,000), Scuppernong River Festival (2,000), STEP Event (300), Coastal Gardening Festival (90), Dixie Deer (2,500 visitors), Stumpy Point Annual Crab Fest (300), Kitty Hawk Heritage Day (500), Fun and Safety Day (3,800), and the Manteo and Stumpy Point Christmas parades. Alligator River and Pea Island staff and volunteers also participated in the FWS booth at the NC State Fair (80,000).



FWS staff and volunteers standing next to their float at the Christmas parade.
FWS

The Fire Program educator, WUIS Van Druten, also assisted with the development of exhibits that reached audiences at the Outer Banks Home Builders Association Table Top Night (150), the Second Annual Plymouth Forest Festival, and the Engelhard Seafood Festival.

In addition, as part of the Wings Over Water festivities, the Refuge hosted the annual Wildfest, held at the former Manteo Middle School (now owned and maintained by the College of the Albemarle) on Saturday, October 21st. JB's Rattles of Moyock, NC gave two very popular presentations on venomous snakes and reptiles. Educational exhibitors included NOAA/Marine Mammal Stranding Network, NPS, Merchants Mill Pond State Park, Dare County Firewise Council, Dare County Master Gardeners, Red Wolf Coalition, OBX Center for Wildlife Education, and NC Aquarium. Vendors included Green Heron Glass, OBX Birdwatchers, Hot

Spots, and Photos from the Porch. Waterfront Trellis catered the event. An estimated 600-800 people attended the event, which was much higher than last year's attendance.



Abbey Reibel helping children at the face painting station during Wildfest.
FWS

The Creef Cut parking area and Kuralt Trail kiosks continue to orient and educate visitors about the Refuge. Refuge visitors can also pick up hunt leaflets and refuge maps from brochure boxes posted near the kiosks.

Alec Grubbs, active member of Boy Scout Troop 820 from Chapel Hill, North Carolina, designed and constructed two red wolf interpretive kiosks to complete his Eagle Scout Project. After 375 man-hours of planning, fund-raising, and construction, the project culminated on Saturday, January 7, when the two kiosks with interpretive panels were delivered to the Alligator River National Wildlife Refuge in Manteo, North Carolina. Since the kiosks may be used on or off refuges, the Red Wolf Coalition was determined to be the most practical recipient of the donation. The Coalition is a citizen-support organization for red wolf recovery (See Section G. 2. a. **Red wolf** for more information about the Coalition).



Eagle Scout Alec Grubbs built and donated two interpretive kiosks to further red wolf awareness and appreciation. FWS

The Refuge exhibits located at the Aycock Brown Welcome Center in Kitty Hawk were viewed by 349,364 visitors during 2006.

Regularly scheduled interpretive/educational programs for the Refuge during 2006 are shown in Table **H-6-1**. Fall, summer, and spring guided canoe tours were scheduled for a \$35 fee, which is a \$5 increase over last year's price. Alligator River canoe tours were immensely popular this year, and refuge staff has decided to add an additional tour to next summer's schedule.

In the summer, weekly black bear and red wolf howling programs were offered at Alligator River. 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 was free of charge during 2006, and the Red Wolf Coalition limited the registrations to 100 per safari. However, participants could easily have exceeded that number.

Refuge volunteer Alisa Esposito continued a Purple Martin Madness program that showcased the large martin roost under the Manns Harbor Bridge and encouraged martin conservation efforts.



Red wolf howlings continue to be the most popular interpretive program held on the Refuge. MS

Table *H-6-1*. Alligator River NWR Public Use Programs

Program	#Programs	#Participants
Red Wolf Howlings	18	1,100
Canoe Tours	31	406
Bear Necessities	12	381
Purple Martin Madness	4	25

7. Other Interpretive Programs

WUIS Kelley Van Druten and FT Brian Van Druten participated in the Cape Hatteras Elementary School Science Festival on April 12. WUIS Van Druten used a pop-up house display to teach approximately 100 students in grades K-3 about modifications that can be done to a house and its yard to prepare for a wildfire. FT Van Druten gave a presentation on Invasive Species of eastern North Carolina.

The Red Wolf Recovery Program is contacted by a number of organizations, clubs and schools annually to give Red wolf presentations. During 2006, these presentations reached over 15,000 people through off-site programs. The eight-member red wolf staff participated in red wolf outreach and education as their schedules permitted.



A group of first grade Tiger Scouts from Grifton School in Grifton, NC, celebrates the red wolf. FWS

For the fourth year, WIS Chapman presented a Fish Printing program at Roanoke Island Festival Park for a total of 14 visitors.

The North Carolina Wildland Urban Interface (WUI) Symposium was held in Greensboro, NC February 28 - March 2 focusing on education, training, net-working and dialogue on WUI issues for agencies, local governments, developers, and homeowners. WUIS Van Druten and FT Brian Van Druten were both attendees and presenters at the symposium. WUIS Van Druten gave two presentations along with NC Extension Specialist Robert Bardon on Firewise landscaping. FT Van Druten taught two sessions on Introduction to GIS.

WUIS Van Druten gave a presentation on the Dare County Firewise Council (DCFC) and wildland urban interface issues to 25 individuals from the Manteo Town Council on April 4th; and 30 individuals from the Southern Shores Town Council on May 3rd.

8. Hunting

A partnership effort among FWS, the RWC, and Defenders of Wildlife resulted in a hunter education card with a "Please don't shoot east of NC32" message. The 20,000 cards printed were distributed to a number of audiences, including the North Carolina Wildlife Commission's hunter education classes.

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

With additions and deletions of land in the Refuge, the ratio of land designated for hunting with chase dogs and land designated as closed to use of chase dogs has remained relatively constant

(1:1). 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 fourteenth 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. During 2006, WIS Strawser updated the hunting leaflet.

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 cooperater 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 88 deer were taken during the 2006 hunt.



Three proud hunters stand next to their catch – totally oblivious to the “doe” violation.

FWS

This year was Dare County's sixteenth annual bear season since the NCWRC and County Commissioners reinstated a bear season. Bear hunting is not allowed on the Refuge. Refuge officers and biologists monitor bear hunting activities adjacent to refuge lands.

Most of the brochure boxes labeled with signs stating "Hunter Information" survived the winter and needed just a bit of sprucing up and stuffing. The new hunt leaflets arrived on time and were

clear and correct. Again this year, extra effort was made throughout the seasons to ensure that leaflets were always available, since the brochure contained the required hunting permit. The effort was minimal, since routine patrols took the refuge officer by the boxes frequently.

Archery season ran from September 9 to October 6. Muzzle loader season lasted October 7-13. Regular gun season began October 14 through January 1. As always, on November 1, the farm field gates were closed and locked. For the second year, Laurel Bay unit was open February for quail hunting. The Laurel Bay unit of the Farmfields Area has become a popular area for quail hunting. Raccoon, squirrel, and rabbit also remain popular species for small game hunters. For the rest of the year (and through September, 2006), this area was closed to all public entry.

Waterfowl seasons were October 4-7, November 11- December 2, and December 16 – January 27. A limited amount of waterfowl hunting took place on the Refuge, but most occurred over open water in the sounds and in Milltail Creek. The farm fields were open to public use during September and October; however, the area was closed to waterfowl hunting.

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

Estimated public hunting activity appears below:

<u>Activity</u>	<u>Visits</u>
Waterfowl	400
Big Game	800
Upland Game	200

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.

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 2006, there were an estimated 2,000 fishing visits to the Refuge. Frog gigging is allowed on the Refuge by special use permit.

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 2006 trapping season, no special use permits were issued for refuge trapping.

11. Wildlife Observation

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

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

The following figures represent wildlife/wildlands observations during 2006:

<u>Activity</u>	<u>Visits</u>
Foot	3,500
Vehicle	2,000
Boat	16,000

17. Law Enforcement

During 2006, law enforcement was conducted on the Refuge by RLEO Frank Simms, with assistance from RLEO Chris Smith of Mattamuskeet National Wildlife Refuge and Officer Mark Cagle of the North Carolina Wildlife Resource Commission.

Officer Simms has established a good rapport with state and local law enforcement agencies and has had the opportunity to travel to many of the National Wildlife Refuge's in North Carolina, gaining vital knowledge from resident refuge officers.

Throughout the year, Officer Simms assisted local law enforcement agencies on several occasions. These activities included traffic accident investigations, search and rescue, and wildfire / arson investigations.

Officer Simms conducted two law enforcement details during the year. One detail for Pea Island during the summer and one detail during Bear season on Alligator River. These two details provided vital assistance enforcing many complicated issues on the refuges.

Officer Simms assisted with two details at Currituck NWR operating a deer decoy and conducting surveillance for future details.

Officer Simms assisted with the first bear hunt on Great Dismal Swamp NWR and two waterfowl details at Mattamuskeet NWR. He traveled with Officer Smith on three occasions to Cedar Island to conduct follow up investigations and conduct surveillance for ongoing cases.

The following figures represent the case breakdown for violations during 2006. This table includes written warnings that were given for minor infractions such as dogs off leash, etc. It table does not include verbal warnings or warnings given by other officers.

50 CFR Violation	Description	Number of Cases
50 CFR 28.31	Violate Rule, Provision or Sign	8
50 CFR 26.21	Trespassing	6
	Written Warnings	80
50 CFR27.94(a)	Littering	0
50 CFR 32	Hunting Violations	9
50 CFR 27.41	Weapons Violations	3
50 CFR 32.2(d)	Illegal Take (Animals)	2
50 CFR 32.2(h)	Baiting	2

18. Cooperating Associations

Coastal Wildlife Refuge Society

The CWRS became even more active in 2006, holding monthly meeting at the headquarter office in Manteo. These monthly “work team” meetings allowed locals to get more involved in volunteering on the refuges by meeting with refuge staff, discussing refuge needs, and planning and coordinating projects. A few of the successful projects that were planned through the CWRS work teams were open houses on Pea Island (Spring) and Alligator River (fall). These 2 events allowed visitors to enjoy the refuges while participating in kayak and canoe tours, guided nature walks, bird watching, beach scavenger hunts, and native plant discussions. New markers were placed along the 13 mile ARNWR Milltail Paddle Trails. Members from the CWRS and the Outer Banks Paddling Club used PVC pipe, logos, and reflective tape to create the markers and to match the existing color-coded signs. Another work team project involved bicyclists who were given a map for Alligator River with a designated route. Their tasks were to bike the route and give any feedback they could on the possibility of naming it an established bike path. Biking trails may eventually be added to the Alligator River map, so wildlife observation may be enjoyed by visiting bike enthusiasts.

Since the Refuge was unable to create a PFT position and the position was lower graded, it was difficult to get and keep staff (high cost of living area; lack of success in being able to hire locally). Therefore, when WIS Ahlfeld left in July, CWRS offered to hire a replacement themselves, instead of donating the funds and having FWS hire someone. CWRS “donated” the position to the Refuge. So, Abbey Reibel works on the Refuge as the Manager of the Visitor Center and is supervised by the lead WIS, but is paid bi-weekly by CWRS. Thus far, the situation has worked well for all involved.

Also in 2006, CWRS donated \$42,000+ to a FWS contributed funds account, with which the Refuge paid both the salary for a term appointment (025) and the utilities for all the volunteer support facilities. The interns received a \$90 dollar a week food stipend through the duration of their stay, which was also paid for by the Society. Intern expenses at Alligator River and Pea Island totaled \$8,501.91. The total donations contributed through the CWRS for 2006 was \$16,268.03.

Canoes purchased by the Friends Group and donated to the refuges, to run tours 3 days a week showed an income of \$20,986.50. The Wings Over Water Festival generated \$11,171.94 for the previous year. The Visitor Center on PINWR grossed \$116,247.99 for the year. Making the total inflows \$165,064.58 for 2006.

I. EQUIPMENT AND FACILITIES

1. New Construction

- Began construction of an earthen pad at the south end of South Twiford Management Unit D. Construction is necessary to provide staff access for mobilization, maintenance and fueling of portable pumps used for impoundment water management. Once completed, the pad will be elevated 6ft. above the existing field level, using excavated material from an existing canal. The pad will be 50ft. long X 50ft. wide, with an access path 15ft. wide, 6ft. high and 95ft. long.

2. Rehabilitation

- Completed cleanout of Laurel Bay canal between Pump Road and the end of Laurel Bay Road at Alligator River. Accumulated storm debris from several events had plugged the canal, flooding areas to the north and east, including portions of the East Lake community.



Significant amounts of debris blocked the Laurel Bay canal and caused flooding of adjacent areas, including portions of the East Lake community. BC

- Continued efforts as needed to remove downed trees from refuge roads. Falling trees continue to be residual effects of 2003 hurricane events and several high wind / rain events of 2006. Roads that had downed trees removed this year included: Hook, Long Curve and Osprey, Laurel Bay, Possum, Koehring, Alligator, and Whipping Creek. Clearing canal access to several popular public use waterways (Whipping Creek, Swan Lake and Laurel Bay Lake) remains to be fully accomplished.
- Rehabilitated 150 acres of prior converted agricultural fields that had become overgrown with invasive / undesirable vegetation. Shelf areas outside South Twiford Management Unit perimeter dikes were mowed and / or disked in an attempt to inhibit undesirable plant growth and to enhance growth of early succession grasses to provide cover & browse for small game, deer and waterfowl. Subsequent results are good.
- Staff repaired ten (10) major water leaks under / through Sawyer Lake Road. Original road construction (1964) was accomplished by placing excavated fill material on top of felled trees and vegetation in the construction right of way. As underlying trees and vegetation continually decompose and deteriorate, the process allows excessive amounts of water from outside sources to penetrate the road / dike and flood interior portions of our management units. The water then has to be pumped back outside the management unit perimeters. Repairing the leaks entailed coring (digging out 3' - 4' wide with excavator) a total of approximately 1600 linear feet of the road, deep enough to remove / dislodge rotting trees / vegetation / and filling back in with clean / compacted material.
- A new engine block was installed in the Dresser TD12 dozer by Rish Equipment Company. Repairs were extensive due to a thrown connecting rod, which resulted in a hole in the engine block. Funds for repairs (approx. 14K) were provided by the Regional Office Facilities Management Branch.

- Replaced deck boards on the Boaz and Fontaine equipment trailers. Both had deteriorated to the extent they were unsafe to employees while loading / unloading equipment, as well as being unsafe while transporting equipment on public roadways.

3. Major Maintenance

Deferred Maintenance Projects:

- a) Rebuild of three (3) vertical shaft pumps. The 48 inch vertical propeller Couch pumps at the Laurel Bay and Creef pump stations have been in need of major maintenance and / or repairs for several years. Each individual pump is rated / operated at 50,000 GPM and is critical to the Refuge farming and moist soil programs. Sydnor Hydro Inc. – Richmond, Va. was awarded a contract to perform a portion of repairs needed. One (1) pump at the Creef pump station and two (2) at the Laurel Bay pump station were removed and evaluated for repairs. All three (3) pumps needed the same basic repairs:

- stainless steel sleeves and bearing assemblies replaced / installed on shaft above propeller
- outside edges of propellers had to be built up / machined
- shafts and propellers had to be balanced
- rubber bushings in suction bells had to be installed and balanced
- weld joints on submerged suction bells and column pipes repaired / re-welded

After repairs were completed, all units were reinstalled, started and adjusted as needed. Total amount of the contract awarded for all three units was \$86,375.00.

- b) In 2004, the FHWA – ERFO Project graveled 28.3 miles of refuge roads with 6 inches of compacted granite aggregate. Upon completion of project, it was determined that a supply of gravel was needed in order for staff to maintain existing improvements. The closest source of adequate materials is located three (3) hours driving distance from the Refuge. Rondal Cordon Trucking, Inc. – Washington, NC was awarded a contract to deliver 3,500 tons of aggregate to the designated refuge stockpile. Total amount of the contract awarded was \$77,000.00.
- c) Cavalier Seal Coating, LLC – Rocky Mount, NC was awarded a contract to resurface the 8' wide X 2,500 ft. long Creef Cut Wildlife Trail and the 1,650 sq. ft. adjacent handicap accessible parking area. Grade SF 9.5 asphalt was applied, compacted and sealed for a total contract amount of \$24,493.00.

Other Major Maintenance included:

- Repairs or service to a cumulative total of forty eight (48) over-the-road vehicles and ninety one (91) pieces of equipment including: light and heavy duty mobile equipment, boats, mowers, ATV's, etc.
- Ongoing road maintenance:
 1. stockpiling of fill material for road repairs
 2. grading a cumulative total of three hundred fourteen (314) miles of refuge roadway

3. hauling and spreading fill material on Bear, Blueberry, Bobcat, Brier Hall, Butler, Cedar, Deep Bay, Grouse, Laurel Bay, Osprey, Pollock, Possum, Pump, River and Sawyer Lake Roads. Materials were also hauled and spread on dikes used for vehicular access around the four (4) North Twiford Management Units.
 4. mowing and / or boomaxing canal banks & road shoulders along: Bear, Blueberry, Bobcat, Borrow Pit, Brier Hall, Butler, Cedar, Creef, Deep Bay, Dry Ridge North, Gadwall, Grassy Patch, Grouse, H&B, Hook, Koehring, Laurel Bay, Link, Long Curve, Milltail, Peterson, Pollock, Possum, Pump, River, Sandy Ridge, Sassafras, Sawyer Lake, West Widgeon and Wynn Roads
- Additional mowing and / or boomaxing was done on:
 1. field / impoundment V-ditches in: Creef A1 and A2 impoundments, South Twiford Units A, B and C
 2. field portions of corn & grasses left in impoundments for migratory bird use
 - Water management efforts included:
 1. seasonal water management of all impoundment units using water control structures, gravity water flow and portable pumps to meet management objectives
 2. ongoing pumping of farm / management units to facilitate cooperative farming operations and meet other management objectives. Water management / pumping of the Refuge farming / management units are divided between two pump stations. The Creef pump station pumps all farm fields, impoundments, wooded blocks and filter strips (inside the outer perimeter dikes) of the Creef Management Unit (east of Milltail Road), including the Dare County fields, for a total of **3,872** acres. The Laurel Bay pump station pumps all farm fields, impoundments, wooded blocks and filter strips (inside the outer perimeter dikes) of the Laurel Bay and Twiford Management Units (west of Milltail Road) for a total of **3,497** acres. Each of the two pump stations is equipped with two 48" right angle gear driven pumps. CAT diesel engines provide the power to the pumps. In 2006, at the Creef pump station, Engine 1 ran 1,873 hours and Engine 2 ran 1,401 hours, totaling 3,274 hours. At the Laurel Bay pump station, Engine 1 ran 2,245 hours and Engine 2 ran 4,427 hours, totaling **6,672** hours. Above average amounts of rainfall for the year (61.76 in.) dictated the combined total of 9,946 hours of pumping at both pump stations. Each engine has a fuel consumption rate of 2.5 gallons an hour. Using the total gallons X's fuel consumption rate, the pump engines burned **24,865** gallons of fuel. Using an average cost of \$2.35 per gallon for diesel fuel, the cooperative farmers spent **\$54,432.75** for fuel. Routine service interval for each of the four (4) engines is every 250 hours. Total hours divided by service intervals (9,946 divided by 250) equates to 40 services being done on the units. At \$85.00 each service (filters & oils), this equates to \$3,400.00 (refuge costs for oils & filters) for the year. This does not account for staff salaries or any additional repairs to the units.
 - Beaver dams in canals along Gadwall, Long Curve, Milltail and Blueberry Roads continue to be a problem. Clean out of the canals and underlying culverts requires mobilizing an excavator each time.
 - Made repairs to the Operations Facility (shop) water system
 - Ongoing cleaning of debris from farm field water control structures and culverts is required to allow sufficient drainage and water control

- Repaired deteriorated (safety) hand rail on the deck of the Creef pump station. Staff routinely accesses the deck to remove accumulated debris from the intake of the two (2) 48 inch diesel powered pumps at the station.
- Boomaxed and posted the Refuge boundary along 4th Avenue Road in Hyde County
- Assisted with spraying invasive plants (Alligator weed and Phragmites)
- Removed overhanging limbs and debris from Laurel Bay and Point Peter Roads
- Completed equipment storage shed and Operations Facility electrical repairs
- Replaced storm damaged sky light in Creef pump station. The damage was done during a November northeaster in which sustained winds were at 50 mph and gusts were clocked 75 mph
- Assisted Mackay Island NWR maintenance staff with pump problem

4. Equipment Utilization and Replacement

- Received new and put in service:
 - 50 ton Witzco / Challenger equipment trailer for Fire Management activities
 - Chevrolet K2500 4X4 pickup for Law Enforcement activities
 - Dodge Ram 1500 4X4 pickup for Red Wolf program activities
 - Ford 4X2 8 passenger van for all refuge program activities
 - Ford F550 4X4 cab & chassis (converted to pump / engine) for Fire Management activities
 - Amphibious (specialty tracked - model 2) Marshmaster equipped with hydraulic mower attachment for Fire Management activities
 - hydraulic driven Alamo single folding wing mower

Fire Equipment:

New Equipment:

- The new Marshmaster II was finally received and put into service during the summer of 2006. This machine has the capability of mowing some of our wettest firebreaks.
- A new F-550 extended cab truck chassis was purchased. The fire crew used the components from the 1994 Type 6 Wildland Fire Engine apparatus to build a new Type 6 Fire Engine (AR E-1).
- A new low-boy trailer and truck tractor was ordered to provide transportation for the IA fire tractors at ARNWR. By the end of the year the lowboy had arrived but the truck tractor had to be re-ordered due to discontinuation of the model originally requested.

IA Taskforce: ARNWR has the capability of fielding two flextracked fire tractors, a portable bridge and heavy dozer with which to set the bridge, and one Type 6 fire engine for initial action response. A second engine can be put into service within minutes following a call-out.

Support Equipment: For prescribed burning and wildland fire support, we can field one Marshmaster, one full-tracked fire tractor (off-road tracked engine with terratorch), and numerous boats; however, we do not have adequate staffing to field these support vehicles at the same time as the IA taskforce.

6. Computer Systems

In 2005, Alligator River saw a change in IT support. Office of Migratory Birds employee Buddy Jones took a new position which reduced the support he could provide for this station. FT Van Druten was assigned the task of IT point of contact for the station.

Significant time was spent in 2006 keeping Lotus Notes running on all the computers. Between new users and lost/out-of-date passwords, this was done approximately 20 times in 2006. On October 25, the Manteo Office DSL line was upgraded to a faster connection for a reduced price. While Embarq was on-site, they located a problem in their system (off station) which had been causing our connection to terminate multiple times per week. Their repair of the system, coupled with the increased connection speed, has made the Manteo Office's internet use much smoother. A major Windows update was also performed on 40 refuge computers in December. A comprehensive survey for the Regional Office was completed in preparation for conversion to Active Directory. Various technical support was given to all program areas including: reinstalling operating systems, correcting password problems, getting computers added to the network, installing software, teaching staff how to back up their computers, keeping staff's Lotus Notes functioning, keeping the DSL connection active for the Manteo Office, updating anti-virus software, setting up new computers for users, and installing hardware.

In June of 2005, new servers were installed for both the Red Wolf Recovery Program and the Manteo Office. This provided additional capacity for back-ups and data storage. In 2006 FT Van Druten was able, with Regional Office assistance, to get the Red Wolf Server running again. There were also capacity issues with the Manteo Office server. An 80 GB external hard drive was added, but there still are issues due to the number of people backing up to this server, which will have to be revisited in 2007.

The Skycasters satellite internet service at the Maintenance Facility was plagued with problems in 2006. The majority of the problems were hardware related; there were outages on a number of occasions. Hopefully, this will not continue into 2007.

8. Other

- Hosted Regional airboat and MOCC training sessions. EEO Craddock, WS Creef and RLEO Simms assisted Regional Coordinator Richard Blackburn instructing the course
- Hosted chainsaw class / EEO Craddock, EEO Govan and MM Powers attended – received certification
- Hosted Regional Heavy Equipment Safety Training class – WS Creef, FCO Harris and EEO Williams (Mattamuskeet) instructed
- Completed SAMMS, RONS, RCAR, RPI, OGM, Fleet Management, and Capitalized Property database requirements. Efforts to reach full level of SAMMS implementation required four (4) staff members to maintain program requirements. FY 06 SAMMS reports completed and closed out, FY 07 opened for entries
- Maintenance staff coordinated exchanges of equipment (& personnel as needed) with Mattamuskeet, Pocosin Lakes, Roanoke River, Mackay Island, Pee Dee Refuges, Navy Dare Bombing Range (DOD) and Cape Hatteras National Seashore (NPS).

- Participated in a series of Federal Highway Administration road assessments and planning processes
- Staff and Regional contractors completed Comprehensive Condition Assessment of Real Property Assets (CCA)
- Staff and volunteers made appropriate preparations for hurricane season

J. OTHER ITEMS

1. Cooperative Programs

Black Bear Study

A proposal was submitted to the N. C. Department of Transportation for conducting research on the black bear and red wolf relative to the pending upgrade of US Highway 64 from a 2 lane system to a 4-lane system. The basic purpose of this study is to collect baseline data on populations and habitat use before project construction, provide database for incorporation of design features into the project design in the early planning phases, and monitor impacts to wildlife during and after construction. Because of the early stage of planning for this project, most of the activity for the upcoming year will be attending planning meetings.

The Refuge Biologist frequently coordinates with the North Carolina Wildlife Resources Commission (NCWRC) on various projects. For example, refuge staff assists with collecting data from road-killed black bears, providing the data to the appropriate NCWRC staff person, and coordinate waterfowl surveys.



There is currently no refuge hunting season for the black bear.

JS

4. Credits

This Annual Narrative Report was a joint effort by the Refuge staff, with initial compilation by WIS Ann Marie Chapman, final compilation by OA Adam Fauth and editing by WIS Bonnie Strawser and DRM Scott Lanier.

Photo Credits:

BC	Bruce Creef
BS	Bonnie Strawser
DM	Debbie McGowan
FWS	Fish & Wildlife Service
JL	Jeff Lewis
JS	Jeff Swain
MS	Mack Sawyer

INTRODUCTION

Formally established as the Pea Island Migratory Waterfowl Refuge, the 5,915 acre area was designated “as a refuge and breeding ground for migratory birds and other wildlife ...” by Executive Order 7864 from President Franklin D. Roosevelt, dated April 8, 1938. Presidential Proclamation No. 2284 on May 11, 1938 also closed 25,700 acres of adjacent Pamlico Sound waters to all migratory waterfowl hunting.

Known today as Pea Island National Wildlife Refuge, the Refuge is situated on the north end of Hatteras Island and is part of a chain of islands known as the Outer Banks of North Carolina. These dynamic, ever-changing barrier islands are separated from the mainland by a series of marshes and sounds which range from very narrow to 25 miles wide. Officially unstaffed and unfunded, Pea Island is managed by staff from Alligator River NWR.

Pea Island’s climate is generally moderated by the ocean making it cooler in the summer and warmer in the winter than the mainland. During summer, southwest winds bring warm, humid air followed by cool, damp northeast winds, frequently reaching 20-30 M.P.H., during fall and winter. Average minimum and maximum temperatures are 56 and 69 degrees, respectively. Tropical storms, hurricanes, and “nor’easters” are not uncommon.

Refuge habitat types include ocean beach, barrier dune, sand ridge, brush and grassland, salt marsh, and salt flats. Three impoundments covering 790 acres are managed for food production to provide forage for waterfowl and shorebirds. Prescribed burning is conducted in marshes and impoundments to enhance wildlife habitat and maintain a healthy ecosystem.

The diversity and abundance of birds on Pea Island has deemed it a “birders paradise” – a total of 315 species of birds have been spotted at Pea Island. The refuge serves as an important wintering ground for tundra swans, snow geese, and more than 25 species of ducks. During spring and fall migration, shorebirds are abundant. Piping plovers use refuge beaches for feeding, and less frequently for nesting. A fairly low number of loggerhead sea turtles lumber into Refuge beaches during summer months for nesting as well. Other species of wildlife include a host of mammals, fish, reptiles and crustaceans.

Public use at Pea Island is centered around the Visitor Center, North Pond Trail, and undeveloped beaches. Each of these provides opportunities for excellent wildlife viewing. More than 2 million people pass through the Refuge annually along NC highway 12. The Coastal Wildlife Refuge Society (refuge support group) operates a sales area in the Visitor Center and provides critical financial support for interpretive and educational programs. The Refuge also has a very active Volunteer Program.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Manteo, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 2006

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

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A. HIGHLIGHTS

Final Comprehensive Conservation Plan completed. (Section D-1)

Bonner Bridge Replacement Project continued to monopolize staff time. (Section D-4)

Seven loggerhead sea turtle nests produced 702 hatchlings. (Section G-2)

Waterfowl numbers peaked at 6440 in November. (Section G-3)

Total visitation to Pea Island in 2006 reaches approximately 1.5 million. (Section H-1)

Annual Crabbing Rodeo drew 1000 participants. (Section H-9)

B. CLIMATIC CONDITIONS

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

C. LAND ACQUISITION

2. Easements

The ongoing effort to keep NC Highway 12 open for traffic continued in 2006. 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. Although the Refuge was spared any tropical activity causing direct problems, northeasters and remnants of tropical systems far out in the ocean caused overwash on several occasions. Most of the post-Hurricane Isabel dunes in the Canal Zone Hotspot were severely eroded and NC 12 was overwashed with part of the pavement destroyed in the Rodanthe S-curves by the Thanksgiving Northeaster on November 21-22. Reconstruction efforts lasted through December and other measures will follow in 2007. For example, sandbags will be installed along about 1000 feet of beach in early 2007 with beach nourishment following in the fall. Most of the work was permitted outside of the right-of-way.

D. PLANNING

1. Master Plan

During 2006, WIS Strawser took the lead in planning. On February 2, the draft CCP was released for public comment for a period ending March 6. During the comment period, refuge staff were available at two "Open House" settings to receive comments on the plan: Saturday, February 18 from 10 am until 2 pm at the Pea Island Refuge Headquarters and Wednesday, February 22 from 5 - 9 pm at the Refuge Administrative Office.

The Refuge staff and planning staff completed the Draft Comprehensive Conservation Plan and Environmental Assessment for Pea Island NWR and forwarded it to the Regional Office for editing. The Final Comprehensive Conservation Plan was published during 2006.

Comments were received, compiled, responded to, and summarized. The final Comprehensive Conservation Report for Pea Island National Wildlife Refuge was approved on July 7 (FONSI signed by RD), signed on July 17, printed, and copies mailed to the public on October 19.

3. Public Participation

Public review of the Pea Island CCP/EA was solicited for the mandatory 30-day comment period in mid-summer. Two Open Houses were also held to encourage public participation.

4. Compliance with Environmental and Cultural Resource Mandates

NC Highway 12

Road work completed after storms was performed under environmental documentation by the NC Department of Transportation through provisions of the National Environmental Policy Act as well as terms and conditions of the Right-of-Way Permit. The Refuge issued Special Use Permits for reinforcing dunes outside the right-of-way.

Bonner Bridge

RM Bryant continued meeting with NCDOT and various other state and federal agencies, as well as non-government organizations, to discuss alternatives for maintaining Hwy 12 through Pea Island NWR if a short bridge were built to replace the Bonner Bridge over Oregon Inlet. The NCDOT released a Supplemental Draft Environmental Impact Statement (SDEIS) in the fall of 2006. Alternatives evaluated in the SDEIS included (1) road-at-grade within the existing ROW with beach nourishment to mitigate for erosion; (2) a combination of additional short bridges and road-at-grade through the Refuge west of the existing ROW; and (3) a combination of bridging on the northern end of the Refuge and a road west of the existing alignment on the southern end of the Refuge except for the Rodanthe area. All of the short (parallel) bridge alternatives included an approximate 3-mile road relocation and bridge at Rodanthe. NCDOT was compelled to study in detail these alternatives to address concerns about access brought to them by elected and appointed officials from Dare County. After completion of the NEPA review, State Senator Marc Basnight and his staff prepared an additional alternative, locally referred to as the “Balanced Approach Alternative”. The alternative proposed to build a parallel (short) bridge over Oregon Inlet and stay within existing right-of-way. Bridging over the hot spots would occur in the future on an “as needed” basis, and temporary detours would be constructed while the hot spot bridges are under construction. The balanced approach alternative was not subjected to a cost analysis and compared to other alternatives nor was it a part of the NEPA review.

During 2006, NCDOT prepared a supplement to the Supplemental Draft Environmental Impact Statement to address the “balanced approach” concept. The word “balanced” was changed to “Phased”, and the NEPA document supplement was scheduled for release in early 2007.

USFWS PERSPECTIVE: The USFWS is committed to maintaining the ecological integrity of Pea Island NWR and ensuring long-term public access. All short bridge alternatives, including various combinations, have far greater impact on habitat for migratory birds and other wildlife and will materially detract from or interfere with the “wildlife first” mission of Pea Island NWR. A short bridge alone would not address the major issue of maintaining NC Highway 12 through the Refuge on a long-term basis. It is not likely that any of the short bridge alternatives would be found compatible with the Refuge’s mission, therefore making it unlikely that a permit would be issued for right-of-way modifications or new right-of-way.

The Pamlico Sound Bridge Alternative (Long Bridge) would reduce long-term maintenance costs, improve safety and reliability, and cause less environmental impact. While the long bridge may initially cost more than a short bridge, the long bridge 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 Pamlico Sound would be 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 public access to the Refuge and to evaluate permit applications for the groin.

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

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. Funding did not permit dredging the Bodie Island Spit section of the Oregon Inlet Navigation Channel by pipeline dredge and hydraulically placing the material south of Oregon Inlet on the Refuge beach again in 2006. Approximately 150,000 yd³ of material were placed near-shore by a hopper dredge. 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. Considerable time was required to prepare the Special Use Permit for the project.

Even in the absence of sand bypassing in 2006, sediment sampling, along with beach slope, scarp formation, and faunal data will continue to be collected along transect lines. In addition, sand compaction (psi) will be measured with a cone penetrometer prior to and after dredge material disposal. Identifying environmental conditions that influence faunal numbers will assist in evaluating effects directly associated with nourishment as well as recovery rates for the beach. All data and samples from the 2006 sampling cycle will be archived until funds become available for analysis. Coastal Research Associates was issued a contract for this project using USACE transfer funds.

Coastal Research Associates continued to work under the 5-year contract as a professional representative 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 continued 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 lines where 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. Sand fencing and sprigging American beach grass and sea oats were authorized.

GIS:

FT Van Druten completed all GIS maps for the Pea Island CCP in 2006. See the Alligator River NWR Section D. 6. for more information.

E. ADMINISTRATION

1. Personnel

See Alligator River NWR Annual Narrative Report

4. Volunteer program

From year to year, the daily operation of Pea Island depends 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.

Sea Turtle monitoring, through the programs of Turtle Patrol and Turtle Watch, was made possible by over 40 volunteers who donated more than 1300 hours of their time.

Several coordinated work groups and individuals contributed to beach clean ups, maintenance, biological assistance, and special events as well as the volunteer efforts of the CWRS work teams.

Of the complex total, 12,990 hours were contributed to Pea Island National Wildlife Refuge by 95 volunteers. For additional information about these projects and the volunteer program, see section E4 of the Alligator River NWR Narrative.

6. Safety

One ATV Safety Institute Ridercourse Class was taught at Pea Island NWR on May 15, 2006 by refuge instructor FT Van Druten. A total of 15 students were taught in 2006. The class included employees from 2 refuges, Migratory Bird Office, volunteers, and interns used mostly to assist with the Sea Turtle Nesting Program on Pea Island NWR. A total of 78 students have been instructed since 2005 at either Alligator River or Pea Island NWR's

F. HABITAT MANAGEMENT

1. General

Pea Island NWR, a section of a coastal barrier island, consists of several basic habitat types. The table below presents results of the most recent mapping exercise with regard 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.

The original acreage for Pea Island NWR was 5,915. Oregon Inlet dredging, Bonner Bridge, and NC Highway 12 maintenance and protection have influenced the loss of acreage by subduing and altering natural processes such as overwash.

Habitat Types and Land Use -2004

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

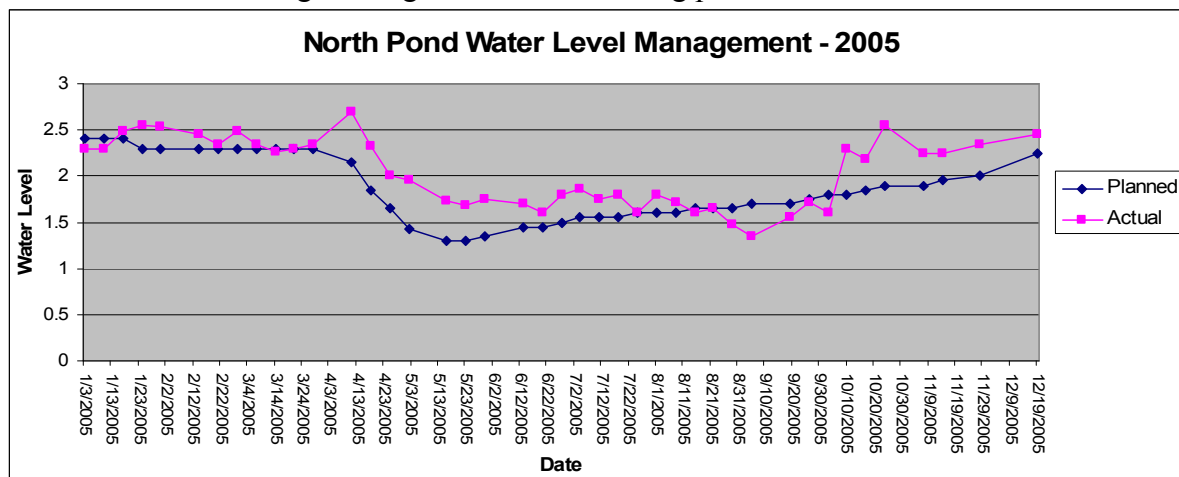
2. Wetlands

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 (SAV) 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

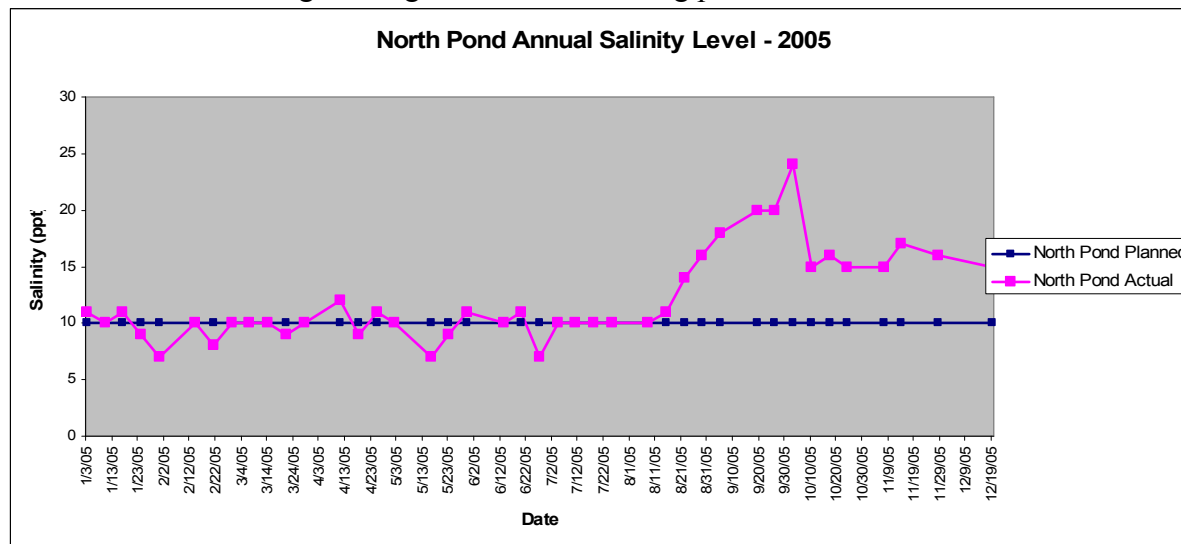
Water management in North Pond was on target throughout most of the year. Average annual deviation from planned water level was 0.18 ft. Adhering this closely to the planned water level resulted in nearly ideal conditions for SAV and invertebrate production until the combined effect of not pumping in a timely manner followed by an unfavorable wind tide over several days impacted substantial areas of production. Figure **F-2-1** provides insight into water level variation during the course of the year. The critical period that severely impacted SAV production occurred late in the growing season (August and September) as can be seen in Figure **F-2-1**.

Figure **F-2-1**: Seasonal fluctuations in water level in North Pond Impoundment at Pea Island National Wildlife Refuge during the 2005 monitoring period.



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. Average monthly salinity varied from about 9.3 ppt in the spring and early summer to a high of 19.3 ppt in September. Figure **F-2-2** illustrates variation in salinity during the course of the year. A goal of 10 ppt was arbitrarily chosen for reference purposes. It is evident from these figures that as water level drops due to evaporation, salinity increases.

Figure **F-2-2**: Seasonal fluctuations in salinity (ppt) in North Pond Impoundment at Pea Island National Wildlife Refuge during the 2005 monitoring period.

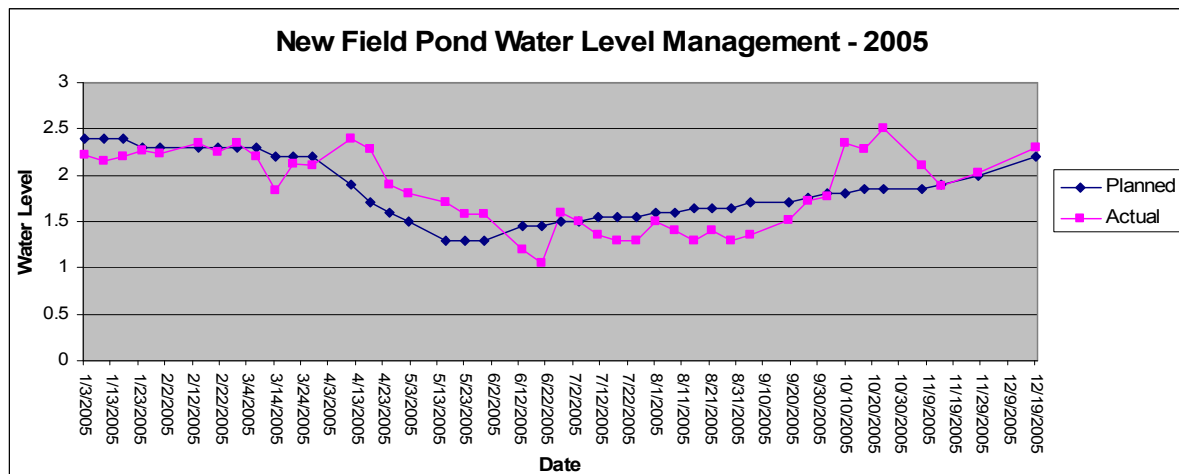


To compare plant food production for the 2005-2006 waterfowl wintering period, it is necessary to examine the vegetation survey data for the fall of 2005. Failure to pump at critical periods combined with an extended northeast wind which made the tidal creeks used as source water too shallow for pumping resulted in water loss to the point that SAV species scattered over the impoundment dried up during the 2005 growing season. Remaining SAV production in deeper water of the impoundment was fair. Extensive areas of bare ground were encountered when vegetation transects were started. A decision was made to stop collecting transect data. The high frequency of bare sample points was due to the untimely “dry-down” and resident Canada geese. Heavy feeding by resident Canada geese throughout the growing season was observed to result in large areas of bare substrate. Further support for this postulation is derived from the numerous depressions in the bottom substrate and observations of 300-400 resident Canada geese feeding in the pond during the growing season at any given time.

New Field Pond

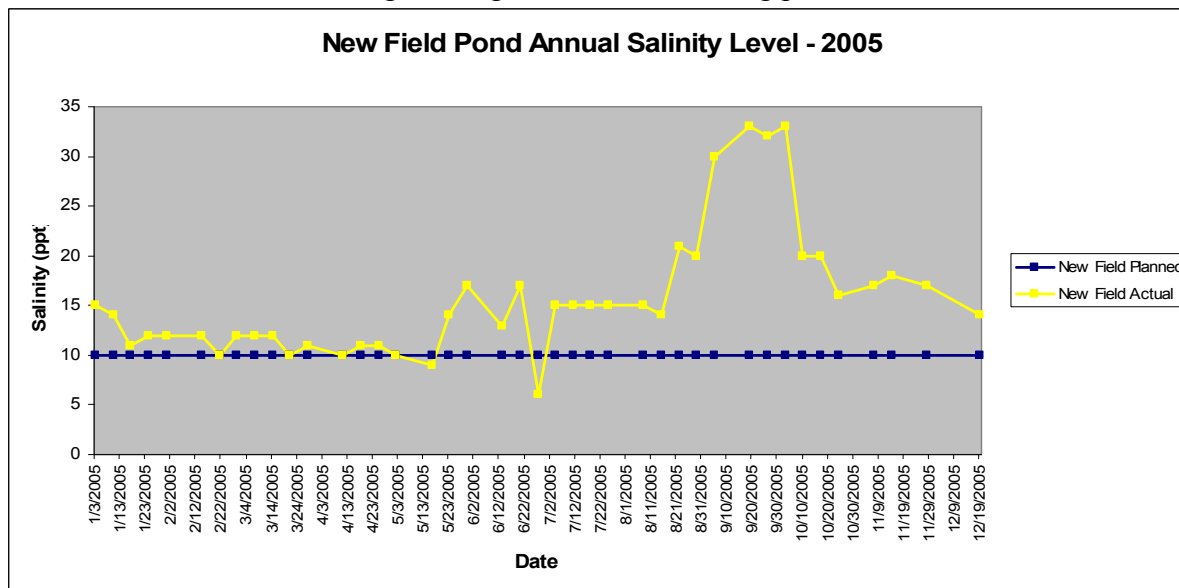
New Field Pond water management was on-target throughout most of the year. Average annual deviation from planned water level was 0.005 ft. Adhering this closely to the planned water level resulted in nearly ideal conditions for SAV and invertebrate production until the combined effect of not pumping in a timely manner followed by an unfavorable wind tide over several days impacted substantial areas of production. New Field Pond did not appear to be affected by the unplanned “dry-down” to the extent that North Pond and South Pond were impacted. Figure **F-2-3** provides insight into water level variation during the course of the year. The critical period that severely impacted SAV production occurred late in the growing season (August and September) as can be seen in Figure **F-2-3**.

Figure **F-2-3**: Seasonal fluctuations in water level in New Field Pond Impoundment at Pea Island National Wildlife Refuge during the 2005 monitoring period.



Although there is no way to control salinity except through prudent holding and releasing water in conjunction with rainfall events, readings ranged from average monthly highs of around 31.7 ppt in September to average monthly lows of 10.7 ppt in early summer. Elevated salinity from August through September reflects failure to pump during critical periods.

Figure **F-2-4**: Seasonal fluctuations in salinity (ppt) in New Field Pond Impoundment at Pea Island National Wildlife Refuge during the 2005 monitoring period.



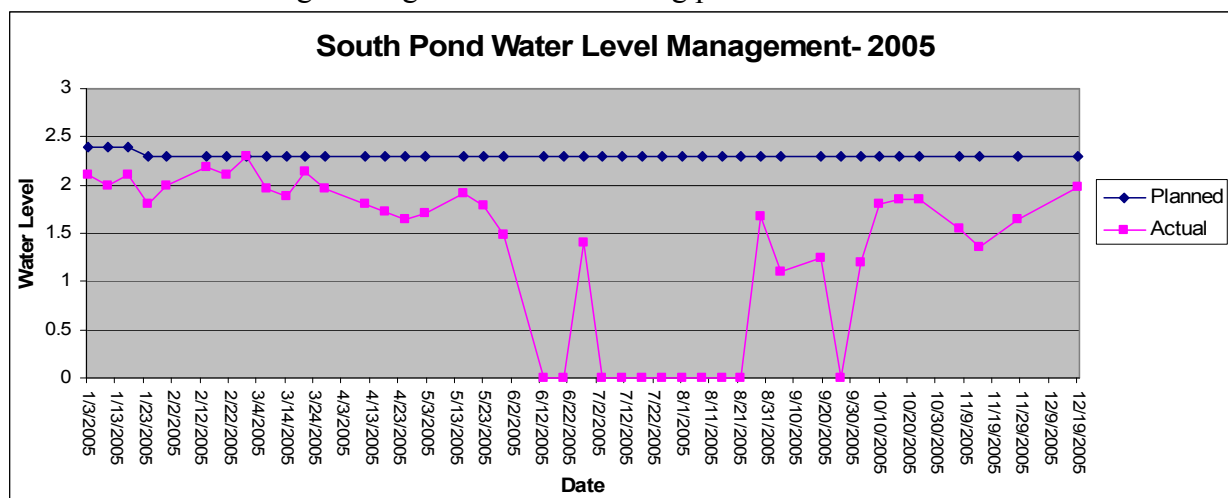
To compare plant food production for the 2005-2006 waterfowl wintering period, it is necessary to examine the vegetation survey data for the fall of 2005. Failure to pump at critical periods combined with an extended northeast wind, which made the tidal creeks used as source water too shallow for pumping, resulted in water loss to the point that SAV species scattered over the impoundment dried up during the 2005 growing season. Remaining SAV production in deeper

water of the impoundment was fair. Extensive areas of bare ground were encountered when vegetation transects were started. A decision was made to stop collecting transect data. The high frequency of bare sample points was due to the untimely “dry-down” and resident Canada geese. Heavy feeding by resident Canada geese throughout the growing season was observed to result in large areas of bare substrate. Further support for this postulation is derived from the numerous depressions in the bottom substrate and observations of 300-400 resident Canada geese feeding in the pond during the growing season at any given time.

South Pond

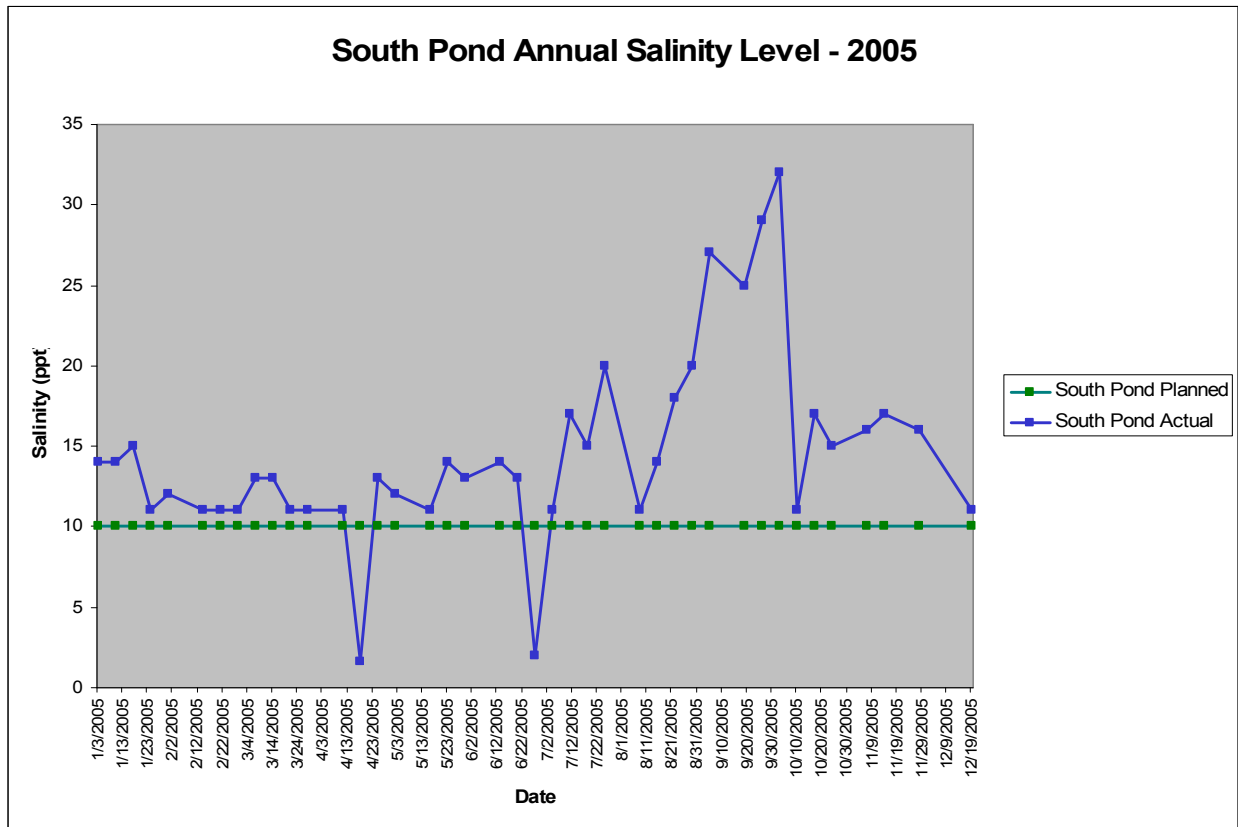
Because South Pond has limited water management capabilities, it is difficult to manage for SAV production as we are dependent upon rainfall, above average wind tide events, and transporting a mobile pump to the site for input into the system. As can be seen from Figure *F-2-5*, South Pond remained mostly dry for much of the growing season due to insufficient rainfall to keep up with evaporation, below average or only “normal” wind tide events, and failure to relocate a portable pump and pump in a timely manner. Average annual water level was -0.99 ft lower than the desired level.

Figure *F-2-5*: Seasonal fluctuations in water level in South Pond Impoundment at Pea Island National Wildlife Refuge during the 2005 monitoring period.



Although there is no way to control salinity except through prudent holding and releasing water in conjunction with rainfall events, readings ranged from average monthly highs of around 27 ppt in September to average monthly lows of 10.7 ppt in early summer as shown in Figure *F-2-6*. Profound decreases in salinity during April and June/July are attributable to significant rainfall events.

Figure **F-2-6**: Seasonal fluctuations in salinity (ppt) in South Pond Impoundment at Pea Island National Wildlife Refuge during the 2005 monitoring period.



To compare plant food production for the 2005-2006 waterfowl wintering period, it is necessary to examine the vegetation survey data for the fall of 2005. Failure to pump at critical periods combined with an extended northeast wind which made the tidal creeks used as source water too shallow for pumping resulted in water loss to the point that SAV species scattered over the impoundment dried up during the 2005 growing season. Remaining SAV production in deeper water of the impoundment was fair. Extensive areas of bare ground were encountered when vegetation transects were started. A decision was made to stop collecting transect data. The high frequency of bare sample points was due to the untimely “dry-down” and resident Canada geese. Heavy feeding by resident Canada geese throughout the growing season was observed to result in large areas of bare substrate. Further support for this postulation is derived from the numerous depressions in the bottom substrate and observations of 300-400 resident Canada geese feeding in the pond during the growing season at any given time.

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 virginica*.), sea oxeye (*Borrchia* spp.), black needlerush (*Juncus roemerianus*), salt marsh cordgrass (*Spartina alterniflora*), salt meadow hay, and salt grass. Trends show that about 64% of the plants in sample plots are usually ranked as “fair” or “good” waterfowl food. Generally, of the plots sampled, about 20%

are “bare” due to salt concentration in the soil or open water. However, these bare areas produce large numbers of invertebrates due to tidal flooding with suitable wind or spring tides.

Mitigation Ponds

The two small mitigation ponds located near the southern boundary that were created by NCDOT again produced good widgeon grass. The pond fringes also continued to produce stands of *Bacopa* spp., *Scirpus* spp., and *Cyperus* spp. 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

In November 2006, a northeaster altered extensive acreages of dune and vegetated barrier island habitat to overwash fan habitat. Restoration of the dune line to protect NC Highway 12 resulted in an overwash footprint without vegetation in a few areas. Some of these areas will recover quickly into wetland and dune plant communities although vegetation is sparser than would occur in the undisturbed state. Since all overwash sand was not removed from the fans, other areas will remain as wind blown sand largely devoid of vegetation. Depending upon location, there will be various succession stages ranging from bare overwash sand to maritime grassland / shrubs. In many areas the reconstructed dunes were severely eroded by the end of 2006. Because of the nature of barrier ecosystems and due to the effects of rising sea level, beach and dune habitat types can be expected to be continuously shifting along a habitat quality gradient.

9. Fire Management

Prescribed burns were held in marsh and impoundment areas of Pea Island NWR. See Section F.9 of the Alligator River NWR narrative for details.

10. Pest Control

Phragmites, *Phragmites australis*, continue to be a problem on Pea Island. In 2006, 52 acres of Phragmites were found on the Refuge. A major effort was put forth to spray Phragmites on Pea Island in 2006. In preparation for the spraying, FT Van Druten and MM Powers devised a boom that hung from the side of the rollback truck and mounted the 200 gallon spray tank and pump unit. Spraying was conducted on August 9. A total of 4.4 acres was treated by ground application with glyphosate (Aquaneat). No aerial application was performed in 2006 due to the inability to secure a contract for application. This work will continue in 2007.

Herbicide was ordered in 2006. See Alligator River NWR Section F. 10. for more information.

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 2006. 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 2006. 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 2006, there were no piping plover nests on the north end of the Refuge although it appeared that pairs were attempting to nest in closed areas on 2 occasions. A range of one to sixteen plovers was consistently observed during fall migration or wintering in the vicinity of Oregon Inlet and on the north end of the Refuge. However, habitat behind the Terminal Groin underwent succession due to wind and water-borne sand to the point that it is no longer suitable nesting or foraging habitat.



The Piping Plover is listed as a threatened species under the Endangered Species Act. MH

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. The 2006 nesting season resulted in 10 nests and 6 false crawls. Similar to the 2005 season, this level of turtle nesting more closely approximates the long-term average.

Pea Island has a severe beach erosion problem resulting in a narrow beach and frequent overwash. In 1994, refuge personnel determined that the best management strategy to optimize survival of turtle hatchlings was to move nests to a turtle safe zone. Subsequent to that decision, guidelines specific to coastal processes and conditions at the Refuge were developed to facilitate the process with regard 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 2006, seven nests had to be relocated to the turtle safe zone at the widest stretch of beach. In their original locations, these nests failed to meet the conditions necessary to have a reasonable probability of success during the incubation period. All but the last 4 nests hatched successfully. Of the 4 nests that did not hatch, all were overwashed for extended periods from 2-5 days, and the eggs appeared to have drowned. The last nest was deposited late in the season, and it is believed that soil temperatures dropped before the nest had adequate time to incubate. Of the nests that exhibited hatching, hatch rates ranged from 97% to 77%. The nest with the lowest hatch rate contained a high occurrence of infertile eggs. Altogether, 702 hatchlings entered the ocean as a result of many hours of effort by volunteers and staff.

Stranded turtles washed up on Pea Island's beaches in 2006 at average rates relative to most previous years. Sixteen dead turtles were reported with 11 of these being loggerheads, 3 were Kemp's Ridley, 1 was a green, and 1 was a leatherback. Most of the turtles were already moderately to severely 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 and tissue samples were taken for all stranded turtles and sent to the North Carolina Sea Turtle Coordinator with the North Carolina Wildlife Resources Commission.

Green sea turtles (Threatened): The first green sea turtle (*Chelonia mydas*) known to nest on Pea Island was in 1993. None of the nests on the Refuge during the 2006 nesting season were identified as green turtle nests.

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 species 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. State listed species occurring on the Refuge are:

Least tern (Significantly Rare): Historically, least terns have nested 2.0 miles north, 1.5 miles south, and 5.5 miles south of the Pea Island NWR Headquarters. During 2006 nesting colonies were observed at the Oregon Inlet terminal groin and nesting birds were observed approximately 3 miles south of the Refuge headquarters, and approximately 5.5 miles south of headquarters. Least tern numbers peaked at 758 in early July.

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 2006 was 48 and the peak occurred in October. Nesting on the Refuge has not been documented.

Common tern (Significantly Rare): Common terns are found nesting with other terns. During 2006, nesting common terns were not observed on the Refuge. Common tern numbers peaked in July at 107.

Gull-billed tern (Significantly Rare): Gull-billed terns occur in low numbers. During 2006 nesting birds were not observed on the Refuge. Gull-billed tern numbers peaked in May at 9.

Black skimmer (Significantly Rare): Black skimmers are observed along the oceanfront, sound, and impoundments on the Refuge. During 2006, nesting birds were not observed at the Oregon Inlet terminal groin. Black skimmer numbers peaked in August at 214.

Little blue heron (Significantly Rare): The little blue heron is found mostly around the three impoundments or marsh edges. Numbers peaked at 29 in June. Nesting on the Refuge was not documented.

Snowy egret (Significantly Rare): The snowy egret is found mostly around the three impoundments or marsh edges. Numbers peaked at 125 in August. Nesting on the Refuge 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 82 in August. Nesting on the Refuge was not documented.

Black-necked stilt (Significantly Rare): The black-necked stilt is found mostly around the three impoundments. Numbers peaked at 16 in July. Nesting on the Refuge was not documented.

Peregrine falcon (Endangered): The Arctic peregrine, *Falco peregrinus tundrius* can be observed on the Refuge with some regularity during migratory periods. Nesting does not usually occur on the Refuge, and was not documented in 2006.

3. Waterfowl

Wintering waterfowl surveys were conducted from September through March. Overall waterfowl numbers peaked at 6,440 in late November and oscillated between 2500 and over 5,000 through the remainder of the wintering period. Snow geese exhibited two peaks, one in early November and the second in early January whereas the tundra swan gradually peaked in January. Canada geese are believed to be only resident birds. All species, except for the scaup and bufflehead had decreases in use days from the 10-year average. Compared to the 2004-05 wintering period, tundra swan, gadwall, and pintail showed increases, whereas other species showed declines in use ranging from 7% to 97%. Although their numbers are relatively low, blue-winged teal, redhead, scaup, and bufflehead use-days showed an increase over the 2004-05 season.

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.

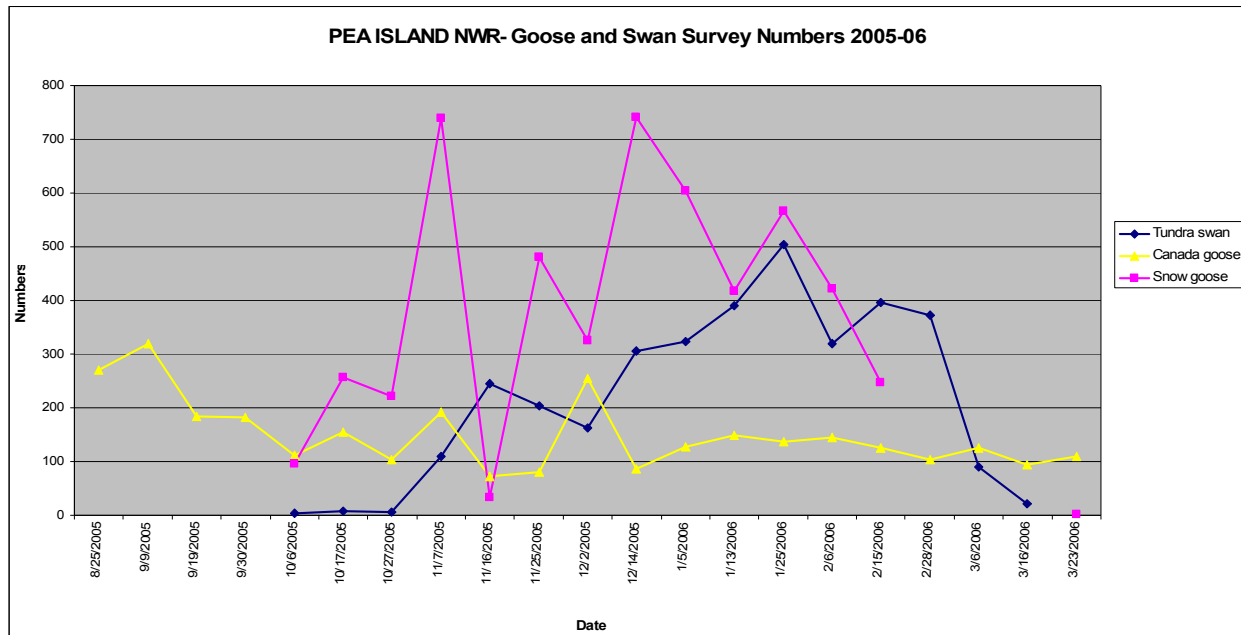
Other interesting observations not reflected in Table **G-3-1** included a pair of wood ducks and a Eurasian widgeon. A few Eurasian widgeon sightings occur annually. The wood duck is an uncommon species on the Refuge. Data based upon low observations in the column presenting the percent of total use-days were arbitrarily assigned a value of 0.01.

Table G-3-1: Composition of Wintering Waterfowl, Pea Island NWR 2005-2006

SPECIES	PEAK PERIOD	PEAK #	# USE DAYS 2005-06	% TOTAL USE DAYS	USE DAYS % diff from 10 yr avg
Tundra swan	Jan	503	36543	5.1	-43
Snow goose	Dec	741	63638	9	-40
Canada goose	Sep	319	31741	4.5	-32
Mallard	Jan	40	2764	0.4	-76
Black duck	Dec	801	71332	10	-76
Gadwall	Mar	1522	93031	13.1	-53
American widgeon	Sep	1146	44588	6.3	-75
Northern pintail	Sep	3827	184073	25.9	-35
Green-winged teal	Nov	556	46304	6.5	-63
Blue-winged teal	Sep	442	6551	0.9	-58
Northern shoveler	Dec	272	23959	3.4	-76
Wood duck	N/A	N/A	N/A	N/A	N/A
Ring-necked duck	Jan	1	17	0.01	-99
Redhead	Nov	37	540	0.1	-96
Canvasback	N/A	N/A	N/A	N/A	N/A
Scaup	Nov	394	17254	2.4	35
Bufflehead	Dec	1000	30946	4.4	115
Ruddy duck	Nov	331	11650	1.6	-49
Mergansers	Dec	301	11817	1.7	-45
Goldeneye	N/A	N/A	N/A	N/A	N/A
Scoter	Oct	27	49	0.01	-81
Coot	Nov	710	19235	2.7	-88
Unknown	Sep	282	13936	2.0	-79

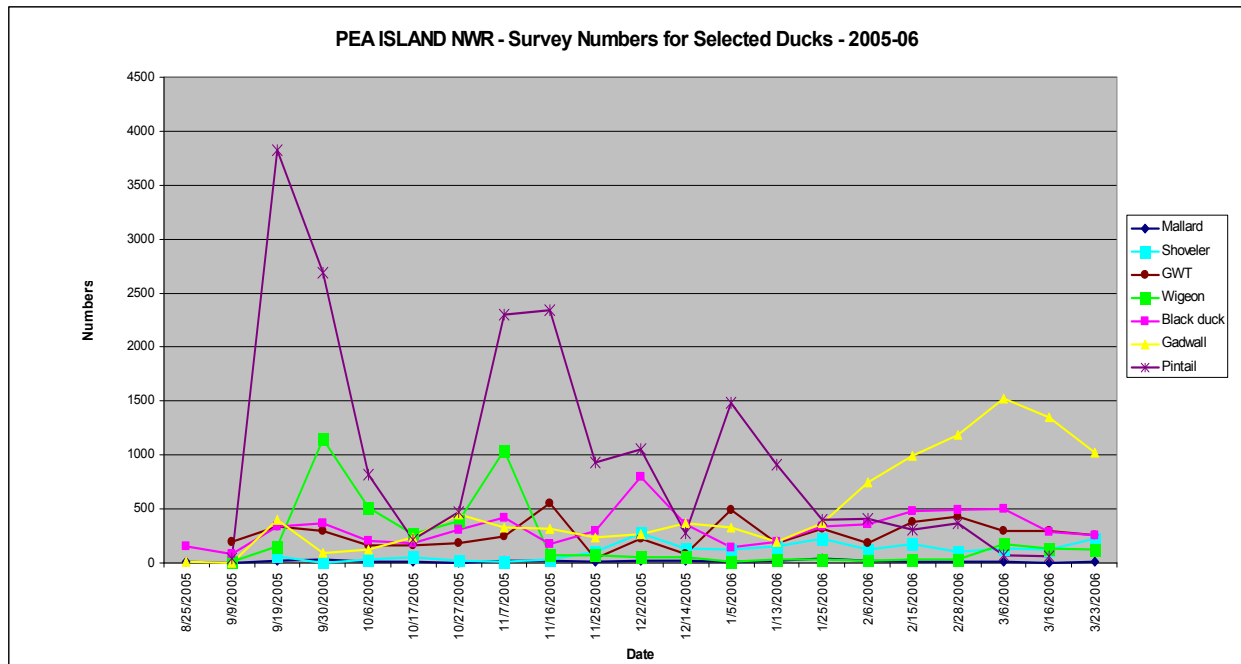
Figure **G-3-2** illustrates changes in numbers of geese and the tundra swan over the wintering period. Canada geese represented in this database are believed to be resident birds only involved with local movements instead of migrant birds. There appear to be no migratory Atlantic Province migratory Canada geese using the Refuge and few, if any, using waters within the Proclamation Boundary in the Pamlico Sound.

Figure **G-3-2**: Number of geese and swans counted during the 2005-06 wintering period surveys at Pea Island National Wildlife Refuge in Dare County, North Carolina.



Although not as distinct as in years with higher wintering numbers of ducks, Figure **G-3-3** suggests that duck numbers begin increasing by late September and remain relatively high until mid-to-late February. The Northern pintail and, to a lesser extent, American widgeon, appear to arrive, move around to other wintering sites and then return to the Refuge. A possible explanation for departures from numbers of birds relative to previous years is the poor food production (SAV) in the impoundments.

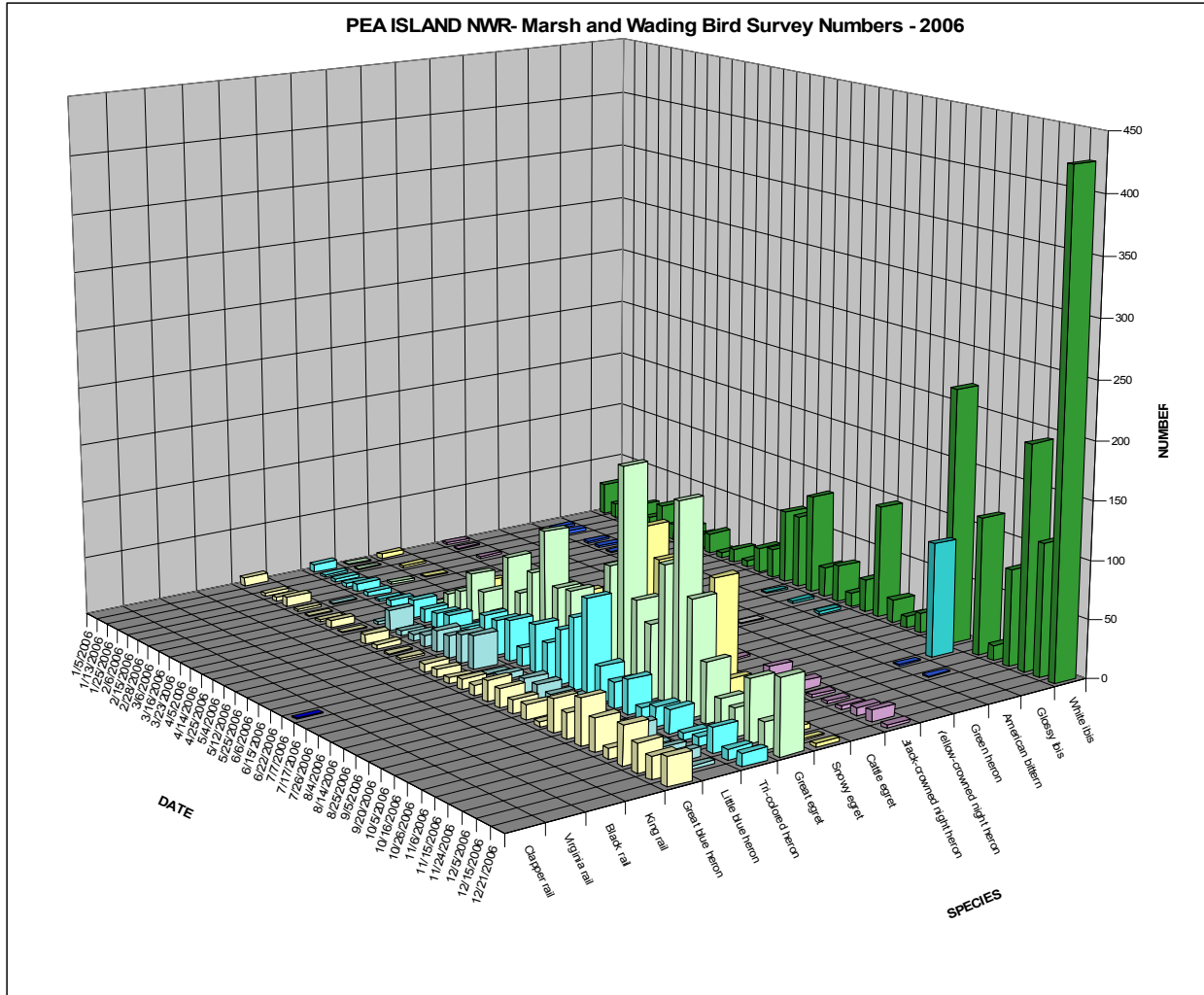
Figure **G-3-3**: Number of selected duck species counted during wintering surveys during the 2005-06 wintering period at Pea Island National Wildlife Refuge in Dare County, North Carolina.



4. Marsh and Wading Birds

Marsh and wading birds were counted three times per month during regular bird surveys year round. Refuge staff do not conduct surveys specifically for marsh birds but those species are recorded as they are encountered. Overall numbers increased to a peak of 536 in mid-October. Figure **G-4-1** provides some insight into the time of arrival by species as well as some indicator of relative abundance. 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 ibis, double-crested cormorants, and American bittern. Virginia, clapper, king, black, and yellow rails were not observed during the diurnal surveys. Rails were present on the Refuge but survey techniques were not conducive for detection.

Figure **G-4-1**: Number of marsh and wading bird species counted during surveys conducted three times per month in 2006 at Pea Island National Wildlife Refuge in Dare County, North Carolina.



Brown pelican numbers have continued to increase over the past few years as the species 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 60 white pelicans was observed on the Refuge near the middle of December. The large, seasonal concentration of double-crested cormorants is indicative of the value of the Oregon Inlet and its vicinity as a migration staging area.

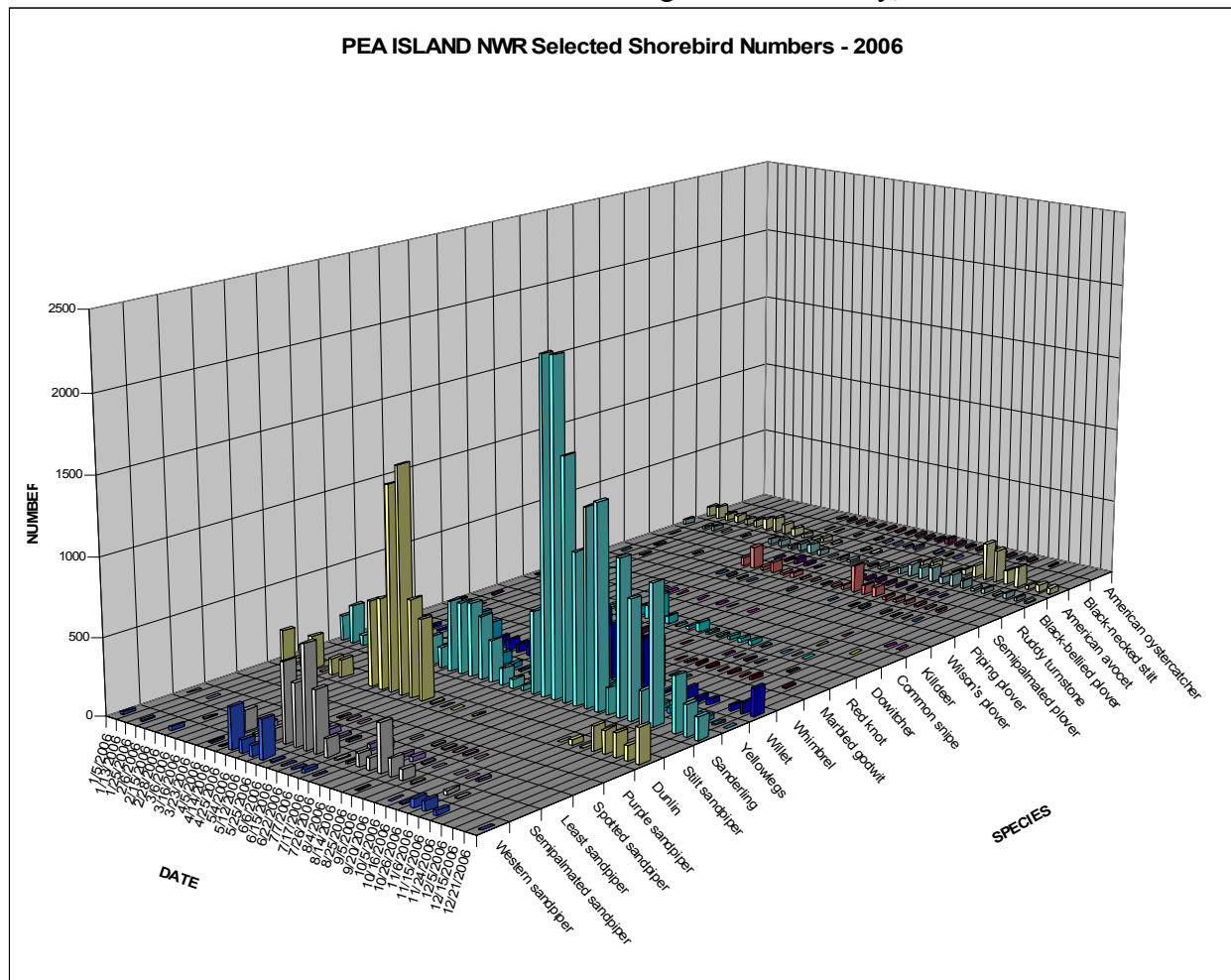
5. Shorebirds, Gulls, Terns, and Allied Species



The black-bellied plover is one of the more commonly occurring species on the Refuge. JL

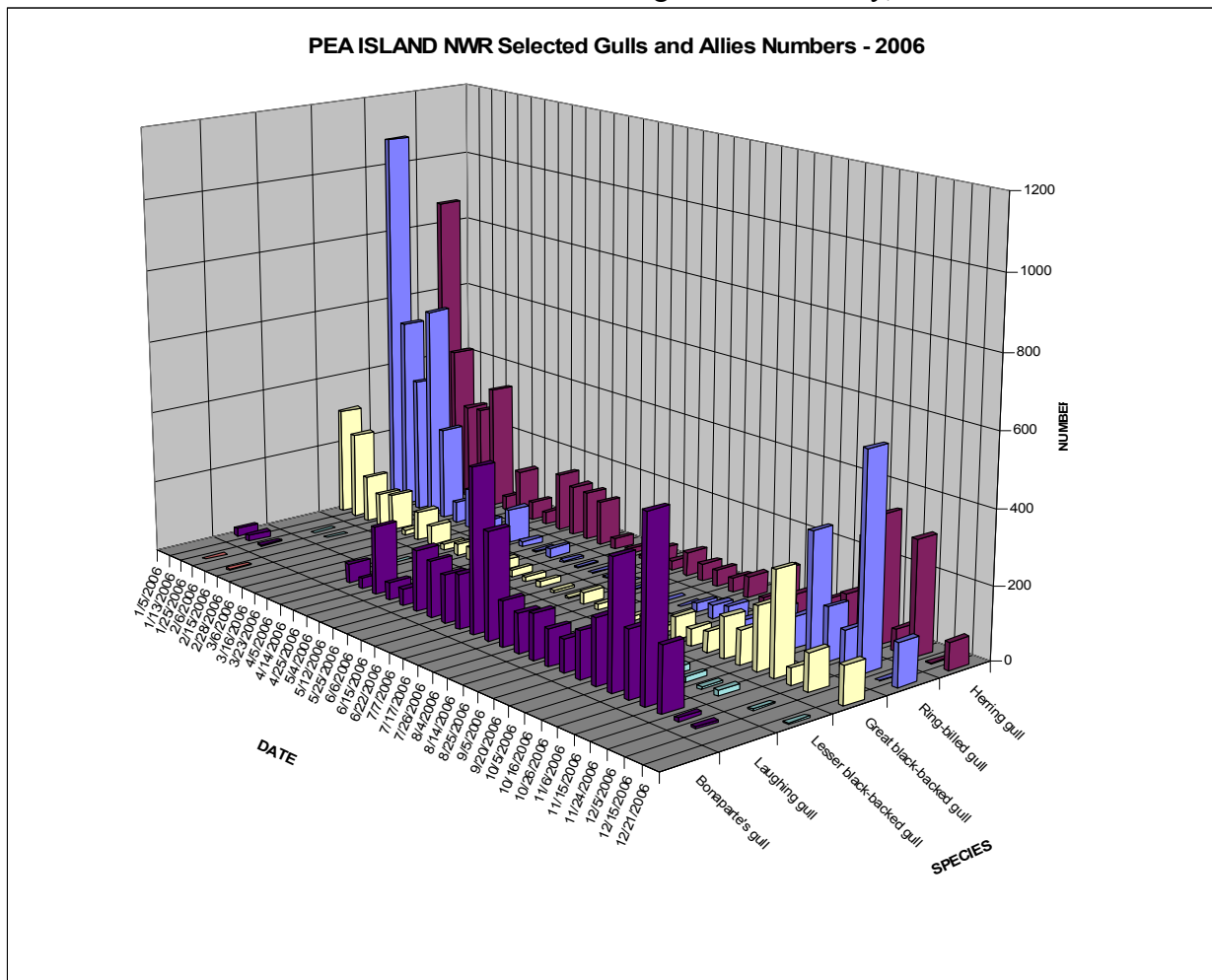
Shorebird surveys were conducted three times per month during the year. Shorebird numbers peaked at approximately 3,255 in early May and at about 3,035 in early August. The mid-May count reflects the effects of spring migration and counts during the period from late July through late October illustrates less definition of the fall migratory period. Some of the commonly occurring species include the semi-palmated and western sandpipers, semi-palmated plover, sanderling, whimbrel, American oystercatcher, black skimmer, various terns and gull species, dowitcher, marbled godwit, willet, dunlin, black-bellied plover, ruddy turnstone, American avocet, red knot, greater and lesser yellowlegs, and black skimmer. Figure **G-5-1** provides some insight as to the numeric and seasonal distribution by species.

Figure **G-5-1**: Number of shorebird species counted during surveys conducted three times per month in 2006 at Pea Island National Wildlife Refuge in Dare County, North Carolina.



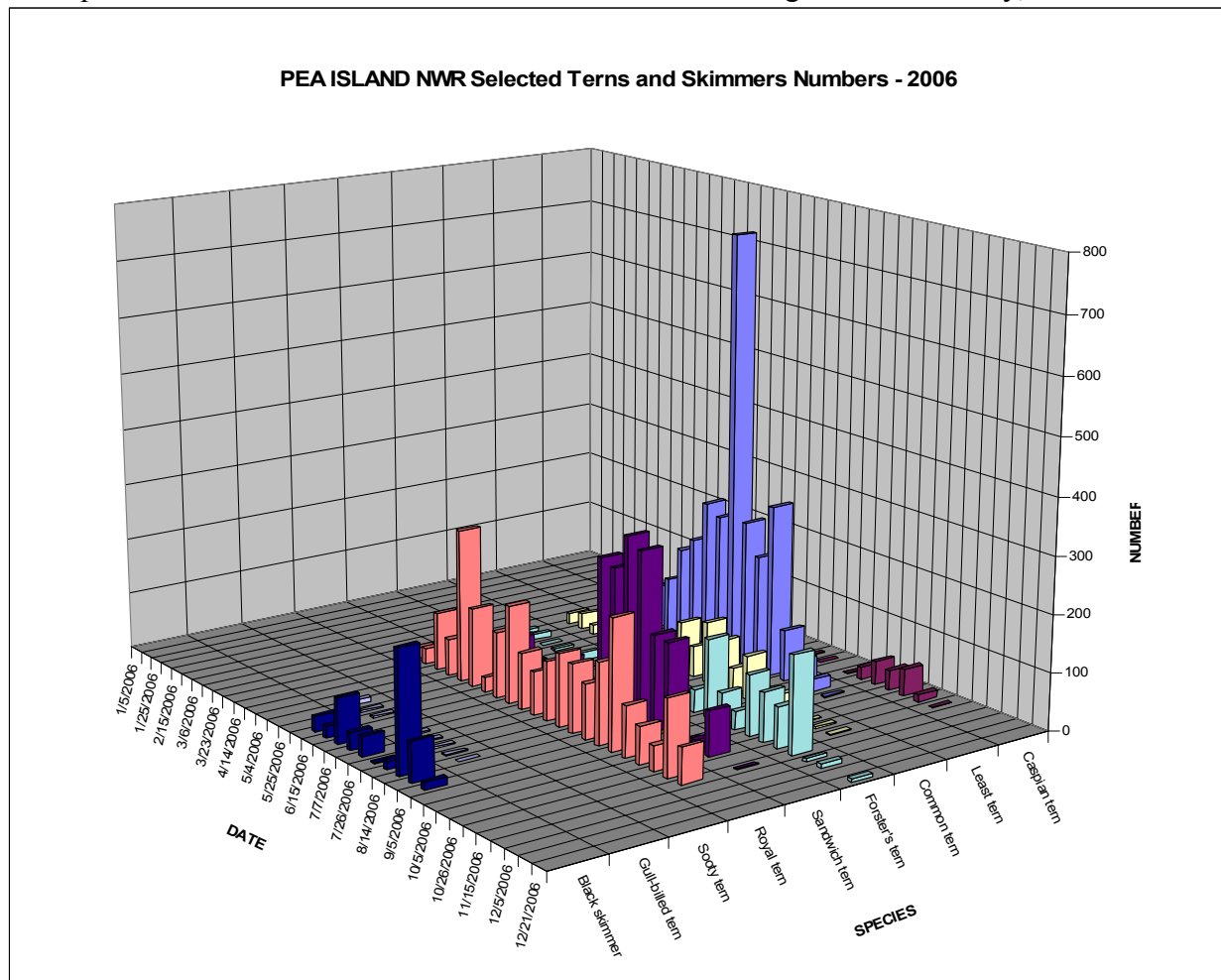
Peak numbers and dates for gulls varied by species. Herring, ring-billed, and great black-backed gulls peaked during January with 865 herring gulls, 1,077 ring-billed gulls and 300 great black-backed gulls. Laughing gulls peaked in November at 495. Other gulls counted included Bonaparte's gull and lesser black-backed gull. Gull species are of concern because of their predation on colonial nesting shorebirds. Figure **G-5-2** provides some insight as to the numeric and seasonal distribution by species.

Figure **G-5-2**: Number of gulls by species counted during surveys conducted three times per month in 2006 at Pea Island National Wildlife Refuge in Dare County, North Carolina.



Colonies of nesting black skimmers, common terns, and gull-billed terns were not observed behind the terminal groin at Oregon Inlet. Nesting by least terns was observed behind the terminal groin and on the beach in three locations further to the south. No common tern nests were observed on the Refuge. 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. Figure **G-5-3** provides some insight as to the numeric and seasonal distribution by species.

Figure **G-5-3**: Number of skimmer and tern species counted during surveys conducted three times per month in 2006 at Pea Island National Wildlife Refuge in Dare County, North Carolina.



The concept of comparing shorebird, marsh bird and water bird use-days within and between seasons was not done to any great extent on the Refuge until the 2005 narrative. Although limitations to uses of the data are recognized, it is a useful method for monitoring change in use. Table **G-5-1** provides a summary of the use-day analysis done at the end of 2006. The long-term average is derived from a 10-year database. Data based upon low observations in the column presenting the percent of total use-days were arbitrarily assigned a value of 0.01.

Table G-5-1: Composition of Shorebirds, Pea Island NWR 2006

SPECIES	PEAK PERIOD	Peak #	# USE DAYS 2006	% TOTAL USE DAYS 2006	USE DAYS % diff from long-term avg
Water Birds & Sea Birds					
Pied-billed grebe	Oct	269	21497	2.5	137
Common loon	Dec	2	25	0.01	-84
Double-crested cormorant	Nov	1502	43150	5.01	-51
White pelican	Dec	60	2349	0.27	202
Brown pelican	Jul	395	29153	3.39	65
Northern gannet	Nov	18	434	0.05	-78
Other Water/Sea bird	Mar	1	27	0.01	20
Unknown Water/Sea bird	N/A	N/A	N/A	N/A	N/A
Marsh & Wading Birds					
Clapper rail	N/A	N/A	N/A	N/A	N/A
Virginia rail	N/A	N/A	N/A	N/A	N/A
Black rail	N/A	N/A	N/A	N/A	N/A
King rail	N/A	N/A	N/A	N/A	N/A
Great blue heron	Oct	39	3928	0.46	-2
Little blue heron	Jun	29	2424	0.28	-55
Tri-colored heron	Aug	82	7026	0.82	18
Great egret	Aug	185	18477	2.15	41
Snowy egret	Aug	125	9348	1.09	-9
Cattle egret	Apr	1	23	0.01	-86
Black-crowned night heron	Oct	11	732	0.08	1
Yellow-crowned night heron	Jun	3	33	0.01	-78
Green heron	May	1	18	0.01	-51
American bittern	Jan	3	143	0.02	278
Glossy ibis	Oct	98	1080	0.13	67
White ibis	Dec	426	20185	2.34	51
Other Marsh/Wading Species	N/A	N/A	N/A	N/A	N/A

Unknown Marsh/Wading Birds	Jul	1	9	0.01	-98
Gulls & Allies					
Herring gull	Jan	865	45594	5.29	31
Ring-billed gull	Jan	1077	44669	5.19	22
Great black-backed gull	Jan	300	23720	2.75	-17
Lesser black-backed gull	Oct	17	1029	0.12	98
Laughing gull	Nov	495	41204	4.78	118
Bonaparte's gull	Feb	4	56	0.01	-85
Other gull species	N/A	N/A	N/A	N/A	N/A
Unknown gull species	Jul	13	9	0.01	0
Terns & Skimmers					
Caspian Tern	Oct	48	2095	0.24	42
Least tern	Jul	758	29486	3.42	25
Common tern	Jul	107	7772	0.90	-51
Forster's tern	Nov	171	8460	0.98	117
Sandwich tern	Aug	318	19429	2.26	177
Royal tern	May	269	25665	2.98	62
Sooty tern	N/A	N/A	N/A	N/A	N/A
Gull-billed tern	May	9	276	0.03	-85
Black skimmer	Aug	214	5387	0.63	-64
Other tern species	Aug	23	655	0.08	9
Unknown tern/skimmer	Aug	56	2332	0.27	134
Shorebirds					
American oystercatcher	Jul	35	2353	0.27	20
Black-necked stilt	Jul	16	618	0.07	-41
American avocet	Oct	252	16967	1.97	1
Black-bellied plover	Sep	93	10966	1.27	61
Ruddy turnstone	May	38	2203	0.26	-13
Semi-palmated plover	Aug	180	8488	0.99	-45
Piping plover	Sep	9	537	0.06	-1

Snowy plover	N/A	N/A	N/A	N/A	N/A
Wilson's plover	N/A	N/A	N/A	N/A	N/A
Killdeer	May	2	121	0.01	-27
Common snipe	Jan	1	25	0.01	83
Dowitcher	Jun	177	7375	0.86	-68
Red knot	Jun	190	4279	0.50	62
Marbled godwit	Apr	77	2061	0.24	-7
Whimbrel	May	12	385	0.04	-57
Willet	Jul	425	41180	4.78	76
Yellowlegs	Apr	313	14975	1.74	-29
Sanderling	Aug	2159	18307 0	21.26	70
Stilt sandpiper	N/A	N/A	N/A	N/A	N/A
Dunlin	May	1458	66382	7.71	1458
Purple sandpiper	N/A	N/A	N/A	N/A	N/A
Spotted sandpiper	Sep	8	368	0.04	8
Least sandpiper	May	76	4043	0.47	76
Semi-palmated sandpiper	Jun	657	34015	3.95	657
Western sandpiper	Apr	268	9846	1.14	268
Other shorebird species	May	463	7816	0.91	463
Unknown shorebirds	May	1070	24976	2.90	1070



Willet use days went up 76% in 2006, compared to long term average.
MH

6. Raptors

The Carolina Raptor Center operated a raptor banding and hawk watch station in early October, 2004 for the second time since 1987. Mist nets, bow nets, and lure birds were used to capture and band peregrine falcons, sharp-shinned hawks, and American kestrel. During the hawk watch, observed species included osprey, bald eagle, northern harrier, sharp-shinned hawk, Cooper's hawk, red-tailed hawk, American kestrel, merlin, and peregrine falcon. The Center was issued a Special Use Permit to continue this work in 2006. A total of 984 raptors were counted during the October survey, and eighteen were banded. Species observed with total numbers in parentheses included osprey (27), Northern harrier (33), sharp-shinned hawk (467), Cooper's hawk (74), red-tailed hawk (2), American kestrel (229), merlin (64), and peregrine falcon (69). Thirteen raptors were not identifiable to a species. Banded birds by species with number banded in parentheses included peregrine falcon (14), merlin (2), Cooper's hawk (1), and sharp-shinned hawk (1) for a total of 18 banded raptors during the month. A great-horned owl nested on an osprey platform in South Pond. Two owlets hatched, but fledging success is unknown.

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 are believed to migrate through the Refuge. However, little is known about the use of refuge habitat by neotropical and other migrant birds. A limited, preliminary survey of passerine bird-use in various habitat types was initiated. Based upon species identified and numbers of each species, a decision was made to discontinue the survey as the data suggested a lower level of use by a wider range of species than previously believed.

8. Game Mammals

Cottontail and marsh rabbits are fairly common on the Refuge. Declines in numbers from a few years ago seem to have reversed. Raccoon tracks and scat were 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 limited numbers of foxes and opossums. Based upon anecdotal observations, it appears that the raccoon population increased rapidly and may be in a decline at the present time due to disease such as mange, distemper, and possibly rabies. The presence of these species as well as feral house cats may have been one of the causes for the decline in pheasant populations.

Deer tracks have frequently been observed throughout the Refuge. Staff members have seen both does and bucks on the Refuge. Although no formal surveys are being done, increasing observations of deer, number of tracks, and increasing road-killed deer suggest that the herd is increasing and may need to be managed.

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

9. Marine Mammals

During 2006, 2 stranded marine mammals were found on the Refuge beach. Appropriate National Marine Fisheries staff were contacted, and they performed required necropsies and data collection. The strandings consisted of a harbor porpoise and an Atlantic white-sided dolphin.

10. Other Resident Wildlife

In past years, ring-necked pheasants were occasionally observed in salt marsh, brushland, dunes, and in the Refuge 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. Two sightings were reported during 2006. However, it appears that the population has decreased to very low numbers.

The resident Canada goose population became a significant problem with regard to growing food for migratory waterfowl. During the summer months approximately 300-400 resident geese constantly foraged on plant material in the impoundments. By the time migratory birds arrived, primary production in the three impoundments had been largely consumed by resident Canada geese. Effort was expended to conduct a roundup and removal of resident geese with the assistance of the U. S. Department of Agriculture Wildlife Services staff. The roundup and removal was completed during the June molting period. The roundup and removal will be planned again for 2007 if necessary.

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 continue to be found on the Refuge. 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 as need arises in the future.

16. Marking and Banding

Every summer, refuge volunteers and certain staff accompany John Weske and Micou Brown to band brown pelicans, royal terns, Caspian terns, and sandwich terns on spoil islands located west of Oregon Inlet. This year 1,060 brown pelican chicks, 1,432 royal tern chicks, and 205

sandwich tern chicks were banded. The total for each species increased substantially over the 2005 numbers, but remained below previous peak year totals. None of this banding occurred on the Refuge.



Refuge Volunteers banding pelicans at Pea Island NWR.
FWS

H. PUBLIC USE

1. General

Based on the NPS vehicle counter at Bodie Island, estimated visitation to Pea Island NWR during 2006 was 1,498,612 (calculated from multiplying the 749,306 vehicles logged on the counter with an estimated 2 passengers per vehicle). Volunteers from the Coastal Wildlife Refuge Society continue to staff the Visitor Center, which is open daily through the spring, summer, and fall months; and open weekends during the winter. The Center is bright and cheerful – just right to match the folks who work there! 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 on this refuge. (See Section H.6. for details)

Through the tireless efforts of Neil Moore, the Visitor Center received a brand new Zeiss 85 FL Diascope with Zoom eyepiece from Carl Zeiss Optical, Inc. - free of charge. Retail cost of the scope is \$1600. The scope will be used by casual refuge visitors as well as serious birdwatchers for years to come.



Neil Moore and the new Zeiss 85 FL Diascope with Zoom eyepiece at the Pea Island National Wildlife Refuge Visitor Center. SW

The Society continued its Refuge Open House in May, including free canoe and kayak tours (in partnership with Kitty Hawk Sports), nature hikes, and light refreshments. Over 100 refuge visitors came out for the Pea Island Open House.



Bob Glennon, former FWS planner (current refuge volunteer) identifies native plants for Open House participants. BS

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 are governed by the limits set up in the Comprehensive Conservation 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 a higher quantity of visits.

From April 3-10, WIS Chapman and RV Steve Taylor worked with a group of 11 Americorps members to accomplish a number of projects on both Alligator River and Pea Island. The group planted a hardwood restoration site on Alligator River and cleared canoe trails of fallen logs and overhanging branches. On Pea Island, the group cleaned 12 miles of Route 12 and the beaches of debris, mulched a trail at the New Inlet boat launch, and removed the debris from the pole shed. The group was a pleasure to work with, and they accomplished much more than refuge staff could have dreamed!



AmeriCorps volunteers picked up trash in Pea Island National Wildlife Refuge including along NC Hwy 12, the beach, and the Oregon Inlet terminal groin.

AC

2. Outdoor Classrooms - Students

The Refuge saw a slight decrease in the number of school visits in 2006. Refuge staff were able to accommodate every group that requested a refuge-led program, and experienced the greatest need for environmental education programs during the months of May and October. Schools came from all over the state- and some as far away as Ohio and Pennsylvania- to explore the Refuge. The most popular program was Soundside Discovery, with Turtle Talk a close second. Overall, approximately 18 schools with a total of 795 students participated in environmental education programs on-site at Pea Island.

Many teachers also opt to bring their students to the Refuge for hands-on experiences. One such school that visits the Refuge annually is the College of the Albemarle. The students of Gary Crane's Art 131 Drawing I and Art 132 Drawing II classes were assigned to draw a real life subject while at Pea Island using the mounts inside the Visitor Center. The Pea Island Visitor Center has numerous mounts of native wildlife found on the Outer Banks including loggerhead sea turtles, river otter, and snow geese.

3. Outdoor Classrooms – Teachers

There is currently not a demand for teacher training on Pea Island NWR. 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. During 2006, refuge staff worked cooperatively with other agencies to offer training and promotion through local venues.

4. Interpretive Foot Trails

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 and offers 8 permanently mounted spotting scopes and 5 major observation structures. It ends with a 25 foot observation tower that provides a view of the ocean, the sound, and two refuge impoundments. Approximately 650,000 visitors utilized North Pond Wildlife Trail during 2006.

Another trail, the Salt Flats Wildlife Trail is located in the north end of North Pond and runs about 1/8th of a mile. This is another fully accessible trail and offers another opportunity for visitors to observe and photograph wildlife. In July, the Salt Flats observation overlook was dedicated to Harry Timmons, a refuge volunteer who served the Refuge as a bird walk leader and was a Society board member. Although his refuge volunteer efforts only spanned two years, the impact that Harry left on the Refuge will be remembered for years to come. Harry will be missed by Pea Island visitors, staff, and volunteers because of his passion for birding and his willingness to complete any task to benefit the Refuge. North Banks Bird Club donated the funds to place a plaque on the Salt Flats overlook memorializing Harry.

Though Pea Island has no designated paddle trails, the area of Pamlico Sound surrounding New Inlet is a popular paddling location. In partnership with the Coastal Wildlife Refuge Society, the Refuge led two types of guided canoe tours from this location during 2006. In all 337 people (25 tours) participated in the family tour- a two-hour, activity-based program, and 118 people (20 tours) participated in the standard three-hour Pamlico Sound tours. In addition, three local businesses were issued special use permits (SUP) to conduct guided kayak tours from New Inlet during 2006. Approximately 1360 visitors participated in 198 guided tours provided by the holders of these SUP's.

6. Interpretive Exhibits/Demonstrations

The three interpretive kiosks- located at the Salt Flats parking area and both the north and south ends of the Refuge- provide valuable information on a 24 hour basis for refuge visitors. The Salt Flats kiosk features interpretive panels on shorebird migration and fire management; and a refuge orientation panel. The South Kiosk has an orientation panel, refuge system panel, and wintering waterfowl interpretive panel; along with interpretive panels on barrier beach ecology, geology, and endangered species. A new sheet of Plexiglas was installed to replace a damaged piece that blocked view of the endangered species panel. The North Kiosk has a refuge orientation panel, refuge system panel, and wintering waterfowl interpretive panel. The North Kiosk also got a fresh coat of paint in 2006.

Panels located on the front porch of the Visitor Center are also available round the clock. A Power Point presentation that plays on a computer terminal is visible to refuge visitors 24 hours a day. The presentation interweaves images of refuge scenery and active volunteers, along with information about the Society.

7. Other Interpretive Programs

The Refuge, with partners, sponsored the tenth annual Wings Over Water festival in 2006. This year's event was one of the most successful yet, in that the weather was beautiful; participation was higher than the previous two years, and everything seemed to run smoothly. The event had 235 registered participants; and offered 79 field trip opportunities and a keynote presentation on the Ivory Bill Woodpecker Recovery Project by Ken Rosenberg.

Outreach efforts continued to expand to local and regional organizations throughout 2006.

- Festival Park – Turtle Talk and Soundside Discovery programs for 40 visitors.
- Outer Banks Beach Club, May-November – General refuge programs for 940 people through 15 programs.
- Outer Banks Beach Club, November-December – Turtle Talk for 63 people through 8 programs.
- Chicacomico Life Saving Station – Soundside Discovery for 64 visitors through 8 programs.
- Cape Hatteras Elementary School's Science Fair – Turtle Talks for 260 students.
- Manteo Middle School's Earth Day – Turtle Talk for 46 students.
- Museum of the Albemarle's Students Day – Turtle Talks for 400 students.
- Wanchese Christian Academy – Wildlife in Eastern North Carolina for 61 students.
- First Flight High School – Careers Presentation for 60 students.

The Junior Friends of the Refuge club, a partnership with First Flight Middle School continued strong in 2006. This club, coordinated by WIS Ahlfeld and Chapman, Amy Redford and Gail Dreis (FFMS teachers), met monthly at the middle school, planned weekend trips to the Refuge, and constructed a schoolyard habitat of native vegetation in the courtyard of the school.

WIS Chapman also presented a Bear Necessities program at the school for the Club of approximately 20 members.



Byran Combs and Kathy Mitchell from the North Carolina Aquarium prepare to plant a shrub in new schoolyard habitat of native vegetation. FFMS

WIS Chapman conducted a general refuge tour on request of the Outer Banks Visitor Bureau for a total of 7 media representatives.

Most regularly scheduled on-site interpretive programs during 2006 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 expanded to 3 days each week (Wednesday, Thursday, and Friday). Guided Pamlico Sound canoe tours (3 hours) and family canoe tours (2 hours) were offered once each week during the spring and fall months and twice each per week during the summer months. Also during the summer, one Turtle Talk, one Soundside Discovery, and one Raptor Rapture program were conducted each week. Refuge staff continued posting daily flyers (which increased interest and participation), on the visitor center door to promote the interpretive programs.

Pea Island NWR
Regularly Scheduled Interpretative/Educational Programs (On-Refuge)

Total		
Program Type	#Programs	#Partic.
Beach Geology	7	30
Bird Walk	97	841
Soundside Discovery	11	171
Turtle Talk	12	162
Family Canoe Tour	25	337
Pamlico Sound Canoe Tour	20	118
Raptor Rapture	12	38

9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island NWR during 2006. Bluefish, striped bass, red drum (especially during nighttime fishing), spot, pompano, croaker, and trout were the major fish caught. Nighttime fishing permits are distributed through the Visitor Center and local fishing and tackle stores September 15 through May 31.

Parking for the popular Bonner Bridge catwalk is located on the Refuge. This is probably the most heavily fished area on the Refuge. A total of 54,500 visits were spent fishing on Pea Island. The annual Crabbing/Fishing Rodeo was held the second Saturday in June with approximately 1,000 participants.



Crabbers of all sizes and ages came out again for the annual Fishing and Crabbing Rodeo on Pea Island. BC

11. Wildlife Observation

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

Due to the location of NC Highway 12 through Pea Island NWR, it is difficult for a traveler to pass through 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.

2006 Wildlife Observation Visits:

Foot-	650,000
Boat	7,800
Vehicle	0

12. Other Wildlife Oriented Recreation

The photo-blind, installed during 1995, continued to be utilized fully during 2006. An estimated 1,500 visitors used the photo blind. However, it is still our contention that the best photographs at Pea Island NWR have resulted from being in the right place at the right time with a camera in hand.

16. Other Non-Wildlife Oriented Recreation

Because Pea Island NWR is associated with the "beach scene", non-wildlife related recreational activities continue to occur on the Refuge. Swimming, picnicking, surfing, and sunbathing are major summer activities. The Refuge provides no facilities and few services for these activities.

17. Law Enforcement

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

The most common LE problems continued to be public nudity, littering, and dogs off a leash. Public use staff developed and distributed an updated fact sheet that clarified the Refuge's position on public nudity. Subsequently, LE started issuing more citations for this infraction.

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. For details on the law enforcement program, see section H-17 of the Alligator River Annual Narrative Report.

18. Cooperating Associations

See the Alligator River National Wildlife Refuge Annual Narrative Report.

I. EQUIPMENT AND FACILITIES

1. New Construction

- Entech Enterprise, Inc. – Tallahassee, Florida was awarded a contract to install 300 linear feet of 10' cantilevered vinyl seawall (bulkhead) with a wooden cap and stainless steel fasteners. The project was a continuation of a previous contract. The new bulkhead was needed to stabilize the area adjacent to the North Pond impoundment pump station. Moving waters from the pump discharge pipe had been severely eroding adjoining areas of the impoundment shoreline and adversely impacting the pump station access road. Total contract cost for the project was \$24,895.00.
- The 1960's era oil / paint house had needed replacement for several years. The structure had "weathered" many hurricanes and coastal storms, and showed the effects of them structurally. One portion of the building housed ATV's and supplies used for sea turtle nest location / relocation and monitoring activities. The other portion was used for storage of flammable liquids and other supplies. Staff temporarily relocated all supplies and razed / demolished the building. Remaining debris was then loaded and transported to the county landfill. AES Precast Co. Inc. was awarded a contract to supply a pre-built 10' X 20' hazardous Materials compliant / concrete structure to replace the old structure. The building was designed to perform the same dual purpose as the old building. An 8' X 10' section now stores hazardous materials and a 12' X 10' section is used for ATV and materials storage. The new building and delivery contract was awarded for the amount of \$29,000.00.



Refuge staff demolish the 1960s era oil / paint house; then load and transport remaining debris to the county landfill. AMC

3. Major Maintenance

- Made mechanical repairs to North Pond Pump engine.
- Excavated a portion of the (6' X 120') South Pond impoundment, aluminum water control structure in an attempt to make needed repairs to the pipe, a result of previous storm event damages. Due to the extent of damage found, and the structural condition of the aluminum, the decision was made to re-cover the structure with fill material and stabilize the water control / stop log portion with wooden pilings and framing until funds are available to replace the complete structure.

5. Equipment Utilization and Replacement

- Removed excess sand from the north entrance of North Pond Road. Extensive amounts of blowing sand (from storm events) had accumulated, closing off vehicular access at the entrance of the impoundment perimeter road.
- Mowed Pea Island impoundment dikes / roads and fire breaks.
- Managed North Pond and New Field impoundment water levels.
- Set up new (portable) MWI water pump in South Pond for impoundment water management purposes.



EEO Eric Craddock removes sand from the Pea Island Headquarters parking lot after a large storm event in November. BK

6. Computer Systems

There were relatively few issues with the Computer Systems at Pea Island NWR in 2006. During the Windows updates in December, a few viruses were found on 2 computers on the network. Lotus Notes was configured for new employee Abbey Reibel.

8. Other

- Maintenance staff assisted with coordination of Pea Island volunteer work projects.

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.

4. Credits

This Annual Narrative Report was a joint effort by the Refuge staff, with initial compilation by WIS Ann Marie Chapman, final compilation by OA Adam Fauth and editing by WIS Bonnie Strawser and DRM Scott Lanier.

Photo Credits:

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