

PEA ISLAND NATIONAL WILDLIFE REFUGE

Rodanthe, North Carolina

ANNUAL NARRATIVE REPORT

Calendar Year 1984

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

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Calendar Year 1984

Alton Dumanway
Refuge Manager

4/16/85
Date

James H. McDaniel
Refuge Supervisor Review

4-22-85
Date

Regional Office Approval

Date

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INTRODUCTION

Location and General Description

Pea Island National Wildlife Refuge was established in 1938 by Executive Order 7864 as a wintering area for the greater snow goose and other migratory waterfowl. Presidential Proclamation #2284 closed 25,700 acres of adjacent waters in the Pamlico Sound to migratory waterfowl hunting.

The Refuge is located on the north end of Hatteras Island, a coastal barrier island which is part of a chain of islands known as the "Outer Banks". These islands are separated from the mainland by a series of marshes and/or sounds which are up to 25 miles wide.

Located within the boundaries of Cape Hatteras National Seashore, Pea Island is approximately 175 miles east of Raleigh, N. C. and 225 miles southeast of Washington, D. C.

Pea Island's climate is generally moderated by the ocean, thus being cooler in the summer and warmer in the winter than the North Carolina mainland. The annual daily maximum is 69 degrees and the minimum is 56 degrees. Due to heavy and prolonged storms, the average rainfall is 55.6 inches, most of which occurs during the winter and summer. It is frequently windy during both day and night with 11 mph as the annual mean wind speed. The prevailing summer wind is from the southwest and from the northeast in the winter.

Habitat

The Refuge itself contains 5,915 acres with an adjacent 25,700 acres of Proclamation Waters in Pamlico Sound. Habitat types and land uses follow:

Habitat Types

456 acres	Beach
518 acres	Barrier Dunes
630 acres	High Marsh and Dikes
3024 acres	Marsh (Irregularly Flooded Saltmarsh)
950 acres	Impoundments
9 acres	Pond
328 acres	Salt Flats

Land Use

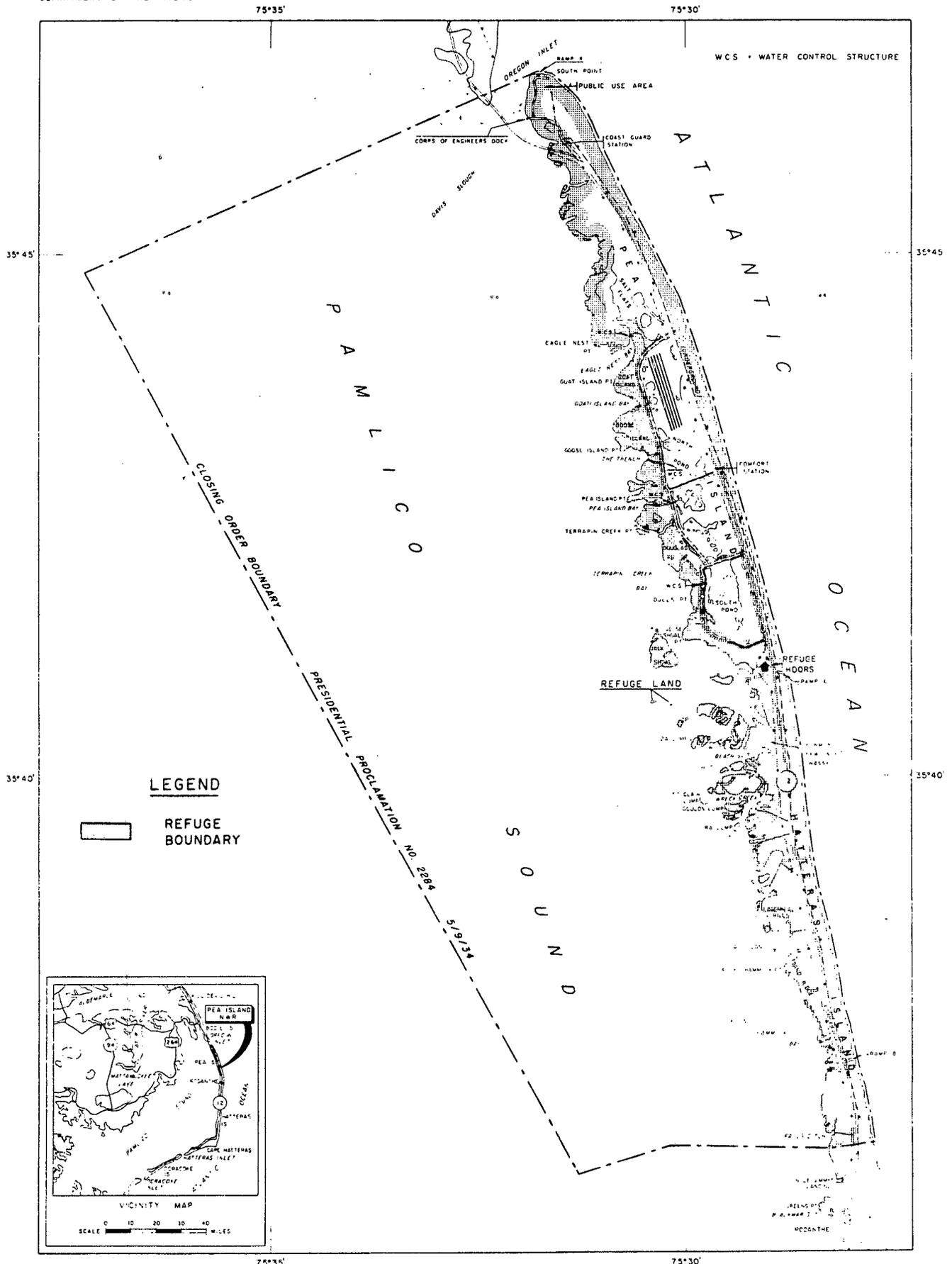
79 acres	Right-of-way Cape Hatteras Electric Corp.
158 acres	Right-of-way N. C. Dept. of Transportation
10 acres	U. S. Coast Guard

PEA ISLAND NATIONAL WILDLIFE REFUGE

DARE COUNTY, NORTH CAROLINA

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY FROM
SURVEYS BY USGS AND AERIAL
PHOTOGRAPHS

Scale 0 2000 4000 8000 12000 16000 FEET

MEAN
DECLINATION
1974

A. HIGHLIGHTS

Headquarters parking lot fails final inspection. (Section H, part 6).

Two interpretive kiosks help to tell "Refuge Story". (Section I, part 1 and Section H, part 6).

National Hunting and Fishing Day 1984 provides "hands-on" for "youth of all ages". (Section H, part 6).



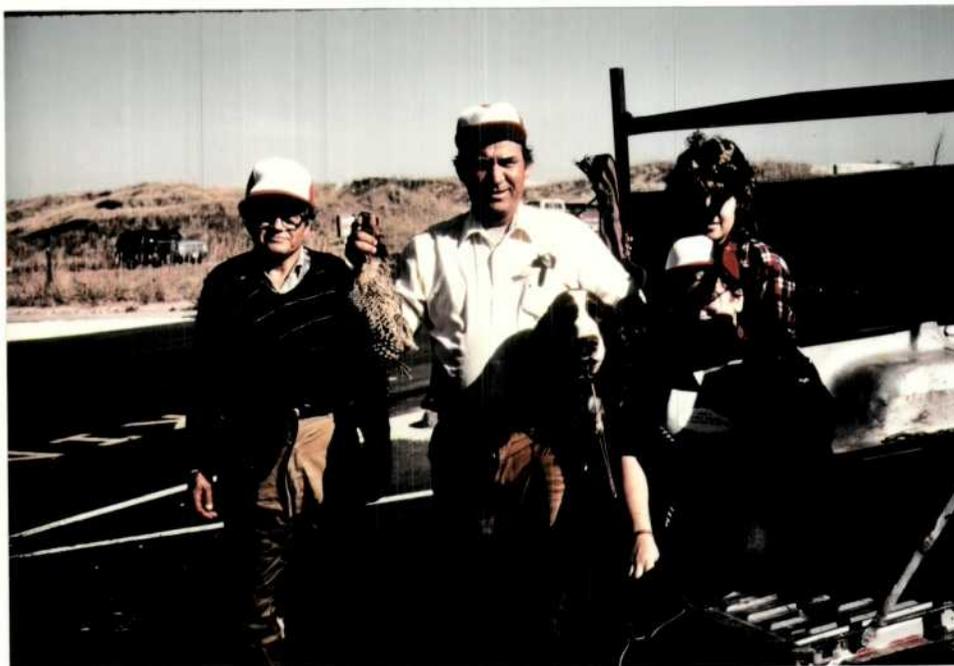
"Ya hoo!!!!". The NHF Day Youth Fishing Contest
was again, a winner!! 9/85 BWS

Record year for waterfowl food production in impoundments.
(Section F, part 2).

Waterfowl populations declining trend continued. (Section G,
part 3).

Hurricane Josephine misses refuge but leaves her mark. (Section F,
part 5).

1984 - The year of Pea Island's first hunt. (Section H, part 8).



Pea Island's first hunt ever!!

11/84 BWS

Soundside flooding strands 40 vehicles. (Section B).



On February 28, some drivers braved the deep water on Highway 12. Most didn't make it!!!!

2/84 MAD

B. CLIMATIC CONDITIONS

1984 started out cold - such freezes are uncommon on the Outer Banks! 1/84 MAD

The weather was relatively mild throughout most of 1984. February 2, was the coldest day, with temperatures dropping to 22 degrees (Fahrenheit). Highest temperatures were recorded on June 19 and August 8, when they reached 92 degrees (Fahrenheit). August was the warmest month with temperatures averaging 86 degrees (Fahrenheit).

Total precipitation for 1984 was 41.55 inches, slightly lower than the annual mean. (Annual mean precipitation since 1975 is 55.02 inches.) The wettest month was September, which received 9.25 inches of rain.

Several storms merit further discussion:

On February 28, high tide and west winds up to 65 mph caused severe sound side flooding. Beginning mid-afternoon, the water rose to approximately 3 ft. over N. C. Highway 12 for 4.1 miles, south of Refuge Headquarters. To the north of Pea Island, over 18 inches of water flooded Highway 12 on Bodie Island at Oregon Inlet. As a result, approximately 40 cars were stranded on the Refuge. The highway was closed by the Dare County sheriff's office from 4:00 p.m. until approximately 9:30 p.m. when most of the cars, led by Sheriff Bert Austin, braved the deep salty water and headed south. Five cars and occupants spent the night in the Refuge Headquarters parking lot. An elderly couple and two couples with infant children spent the night at the residence

of Assistant Manager Hebert and his wife, who stayed up most of the night attending to the needs of stranded motorists and answering telephone requests for information on conditions.

Inspection of the Refuge on February 29, revealed minor erosion on the west side of North Pond and New Field dikes and some damage to the South Pond road. One window was blown out of the shop. During the storm, Oregon Inlet eroded to within 6 feet of the freshwater pond on the north end of the Refuge.

D. PLANNING

1. Master Plan

The Refuge Master Plan, which was completed in 1981, was updated to reflect changes in overall Interpretation and Recreation program direction. Interpretation and Recreation objectives were revised to reduce staff involvement with activities such as environmental education workshops and scheduled Refuge tours and programs. A youth pheasant hunt was added.

3. Public Participation

On March 21, Assistant Manager Hebert, ORP Strawser, and Refuge volunteers attended a public meeting held by the N. C. Wildlife Resources Commission in Edenton, N. C. The meeting was held to receive public comment on proposed changes in the State Hunting Regulations for 1984. Included was the opening of pheasant and rabbit hunting on Pea Island. No comments were aired concerning the proposed Pea Island hunt.

4. Compliance With Environmental Mandates

In November, an application was made with the Wilmington District, U. S. Army Corps of Engineers for a permit to excavate a small marsh area bordering the west side of the New Field Impoundment. The work will be necessary to create a pumping basin at the head of a tidal creek for a low-lift pump unit scheduled for installation in the New Field dike in 1985. The project is also being coordinated with Ecological Services, Raleigh, N. C., the E.P.A., and the N. C. Office of Coastal Management.

E. ADMINISTRATION1. Personnel

Front Row: 4, 6, 5
 Back Row: 2, 1, 3

8/84 BWS

PERSONNEL

1.	Mervin A. Dunaway	Refuge Manager	GS 11 EOD 07/24/83 PFT
2.	Charles E. Hebert	Asst. Refuge Manager	GS 7 EOD 12/11/83 PFT
3.	Bonnie W. Strawser	Outdoor Rec. Planner	GS 7 EOD 12/31/80 PFT
4.	Beverly A. Midgett	Secretary (Typing)	GS 4 EOD 10/06/71 PFT
5.	Joseph B. Creef	Maintenance Worker	WG 8 EOD 04/21/75 PFT
6.	Angela E. Elmore	Laborer	WG 2 EOD 04/19/82 TFT

Assistant Refuge Manager Charles Hebert transferred to Delta NWR with a promotion effective in November, 1984.

A breakdown of refuge staffing for the last 5 years follows:

<u>CY</u>	<u>Permanent</u>		
	<u>Full Time</u>	<u>Part Time</u>	<u>Temporary</u>
1984	6		
1983	6		2
1982	5		2
1981	5		1
1980	4	1	

2. Youth Programs



8/84 BWS

YCC ENROLLEES

1. Jimmy Bliven 06/25/84 - 08/23/84
2. Chris Payne 06/25/84 - 08/23/84
3. Shanda Harrelson 06/25/84 - 08/03/84

Again during 1984, Pea Island hosted a non-residential YCC Camp consisting of 3 enrollees. Jack Hohmann, writer for the Coastland Times selected YCC enrollees and alternates by random drawing. An orientation meeting was held in April and the camp began on June 25. Enrollee Jimmy Bliven was appointed as Youth Leader and Laborer Elmore took on the task of coordinating YCC activities.

YCC work projects encompassed many different tasks and skills. Accomplishments for the summer included construction of a shed to house the South Pond pump engine, rehab of the North Pond trail including repair of a concrete walkway, clearing of New Inlet trail, establishing and sandbagging experimental vegetation plots in wash-outs along New Field dike, and construction of a walk-in duck trap in South Pond. Special projects included assisting with establishing a new loggerhead sea turtle nursery and assisting with royal and sandwich tern banding.



Wow!! There's just nothing like the feeling of accomplishment of a job well done!! 8/84 BWS



YCC spent a day helping John Weske (Smithsonian Institute) band 4,400 royal tern and 334 sandwich tern chicks! 6/84 BWS

Although no specific environmental awareness classes were conducted for YCC, the enrollees learned a great deal about the barrier island environment through talks before and during work details and through the work itself. An educational field trip to the new Alligator River NWR occurred near the end of the summer.

4. Volunteer Programs

A total of 52 volunteers participated in refuge activities in FY 1984 contributing 823 man hours to Pea Island.

Cliff Kevill, VIP (Volunteer In Park) with Cape Hatteras National Seashore, volunteered one day each week to work on Pea Island through February 22. Cliff participated primarily in the waterfowl banding effort.

Suzie Harris volunteered one week of her time to rehabilitate a red-tailed hawk. The bird was released in good health on February 22. (See photo next page).

In March, Gib Backlund volunteered his many talents on such projects as establishing erosion control vegetation plots, pheasant flush count, dune erosion study, and construction of a new sea turtle nursery. His 25 hour contribution also included some excellent wildlife photography.



Another success story!! Don't you just love "happy ever afters"?

The largest single volunteer project in 1984 was the National Hunting and Fishing Day celebration held on September 22. Twenty-four volunteers assisted with activities ranging from a youth fishing rodeo in the morning involving seven Dare County piers to running approximately 30 different activities and exhibits in the afternoon at the N. C. Marine Resources center.

5. Funding

Base funding for 1984 was \$177,400 which included \$10,000 for ARMM projects. Three-fourths of the ARMM funds was used to purchase clay dirt for the road leading to the new South Pond pump facility. The remainder was used for equipment repair and tires.

Of the Jobs Bill monies allocated for repaving and expansion of the headquarters parking lot in 1983, \$6,198. has been retained from payment to the contractor. An upcoming Federal court hearing will determine whether or not the

contract awarded to Albemarle Asphalt Company has been fulfilled. Poor water drainage from the lot and soft asphalt continue to be problems.

A breakdown of funding history follows:

	Migratory Birds <u>1260</u>	I&R <u>1240</u>	Endangered Species <u>1400</u>	Mammals & Non-Migratory Birds <u>1220</u>	<u>1994</u>	Fiscal Year Total
FY 84	177,400 3,600(YCC) 100 (Donation)				3,000	184,100
FY 83	124,000 (8,000)** (65,000)***	31,000		2,000	2,500	159,500 (8,000) (65,000)
FY 82	123,000 (83,000)*	23,000	1,100	2,000	4,331	153,431 (83,000)
FY 81	100,000 (60,000)*	19,000	1,100		1,800	121,900 (60,000)
FY 80	100,000 (60,000)*	19,000	1,100			120,100 (60,000)

* BLHP - Force Account Job Order - Water Management

** Replace Vehicle (Storm Damage)

*** BLHP - Jobs Bill - Rehab Headquarters Parking Lot

6. Safety

Pea Island experienced another year without a lost-time accident. The last lost-time accident was in 1959. One minor injury was incurred by a YCC enrollee.

Monthly safety meetings were held on a variety of topics which included fire equipment and safety, proper lifting, defensive driving, wildlife related diseases, and shop safety. Weekly safety meetings were held for YCC enrollees.

Assistant Manager Hebert, ORP Strawser, Secretary Midgett, Laborer Elmore, YCC Enrollee Harrelson, and Volunteer Brockway successfully completed a N. C. Defensive Driving Course on July 18.

7. Technical Assistance

ORP Strawser represented the USFWS at the "Career Days" expo at the College of the Albemarle in Elizabeth City on January 11 and at the Annual Career Days for Dare County Schools on March 22. Charles Hebert assisted with the Dare County Career Days.

A waterfowl hunting workshop was conducted for Cape Hatteras National Seashore rangers by Assistant Manager Hebert on November 8. The training, which was requested by the National Park Service, emphasized waterfowl identification and conducting safe hunter checks in the field.

ORP Strawser met with representatives of the local chapter of the Audubon Society in November to discuss involvement in their "Adopt-A-Refuge" program. (See Section J.1.).

8. Other Items

Refuge Division Supervisor Travis McDaniel visited Pea Island on August 1-2, and conducted the annual operations inspection.

F. HABITAT MANAGEMENT

1. General

Pea Island, a coastal barrier island, consists of seven basic habitat types which cover 5,915 acres. The most recent survey revealed 456 acres of ocean beach, 518 acres of barrier dunes, 630 acres of sand ridge brush and grassland, 3,024 acres of irregularly flooded salt marshes, 328 acres of salt flats, three brackish water impoundments totalling 950 acres, and one nine acre fresh water pond. Beach and dune acreages have changed since the survey. Several intense northeast storms have hit the area within the past several years and caused moderate to severe erosion along the beach and dunes. The exact acreage lost has not been calculated.



North Point at Oregon Inlet at end of 1984.
Arrow shows where dune line was in December
1983. 12/84

2. Wetlands

Refuge wetlands consist of irregularly flooded salt marsh, salt flats, impoundments, and one fresh water pond. The sizes of the impoundments are: North Pond (461 acres), New Field (266 acres), and South Pond (223 acres).

Although total precipitation in 1984 was slightly below average, moisture conditions were favorable throughout most of the spring and summer. As a result of the favorable growing season and our increased management capability in North Pond and South Pond, we had a record year in waterfowl food production.

For the second consecutive year, South Pond was dewatered in the spring to encourage the production of good emergent waterfowl foods. The South Pond pumping station which was completed in 1983 makes gradual drawdowns practical. Due to the wet growing season, the middle of the pond stayed wetter this year than last and this favored the excellent food sago pondweed (Potamogeton pectinatus). The fair waterfowl food water hyssop (Bacopa Monniera) was the most abundant plant in the impoundment again this year followed by sago pondweed and spikerush (Eleocharis sp.). These three plants comprised over two-thirds of the vegetation. (See Table 1). Also of interest is the decrease of desirable grasses that occurred in the drier 1983 (panicums and wild millet).

Water levels in New Field impoundment were maintained by rainfall and by opening a flap gate water control structure during high sound tides. The management scheme in this impoundment is opposite that of South Pond in that we attempt to keep New Field flooded throughout the growing season. As much water as possible was held in New Field during 1984. This has been so successful that for the second consecutive year (see Table 2) record high widgeongrass (Ruppia maritima) production has occurred. This excellent food covered nearly half the impoundment. The permanent pool management scheme has also severely curtailed encroachment of undesirable saltmeadow cordgrass (Spartina patens) which at one time dominated New Field.

North Pond was also managed as a permanent pool to favor submergent vegetation. Sago pondweed and muskgrasses (Chara sp.) dominated the vegetation present. Vegetation transects were not run in North Pond in 1984. The North Pond pumping station was run a total of 124 hours in 1984, mostly in July and August.

Table 1

South Pond Vegetation Transect Line Comparisons¹

Plant Species	1984	1983	1982	1968 -76	1977 -83
Water Hyssop (<u>Bacopa Monniera</u>)	32.9	26.3	1.0	3.8	8.5
Sago Pondweed (<u>Potamogeton pectinatus</u>)	23.1		18.5	6.9	6.8
Spikerushes (<u>Eleocharis</u> spp.)	11.6	2.0	7.9	4.6	11.1
Muskgrasses (<u>Chara</u> spp.)	5.5		42.3	66.0	20.4
Dwarf Spikerush (<u>Eleocharis parvula</u>)	5.3	9.3	10.8	1.7	8.7
Knotgrass (<u>Paspalum distichum</u>)	2.9	0.9			1.0
Three-square (<u>Scirpus Americanus</u>)	2.6	0.4	2.1	0.2	1.7
Panic Grasses (<u>Panicum</u> spp.)	2.2	20.6		0.1	4.5
Wild Millet (<u>Echinochloa crusgalli</u>)	1.6	6.4	1.0	T	1.7
Beakrushes (<u>Rhynchospora</u> spp.)	0.6	0.4			0.1
Flat Sedges (<u>Cyperus</u> spp.)	0.4	1.3	0.4	T	0.5
Bald Sedge (<u>Fimbristylis</u> sp.)	0.2				
Saltmarsh Bulrush (<u>Scirpus robustus</u>)	0.2				
Smartweed (<u>Polygonum</u> sp.)	0.2				
Unidentified	0.2				
Fleabane (<u>Pluchea camphorata</u>)		12.6	0.2	T	2.6
Bare Ground	10.5	19.3	13.9	12.5	24.4
Totals	100.0	99.5	98.1	96.1	92.0
Plants Per Point Sample	1.32	1.06	1.12	--	--

¹ 1984 Wetland Vegetation Survey Results, Otto Florschutz,
East Coast Biologist

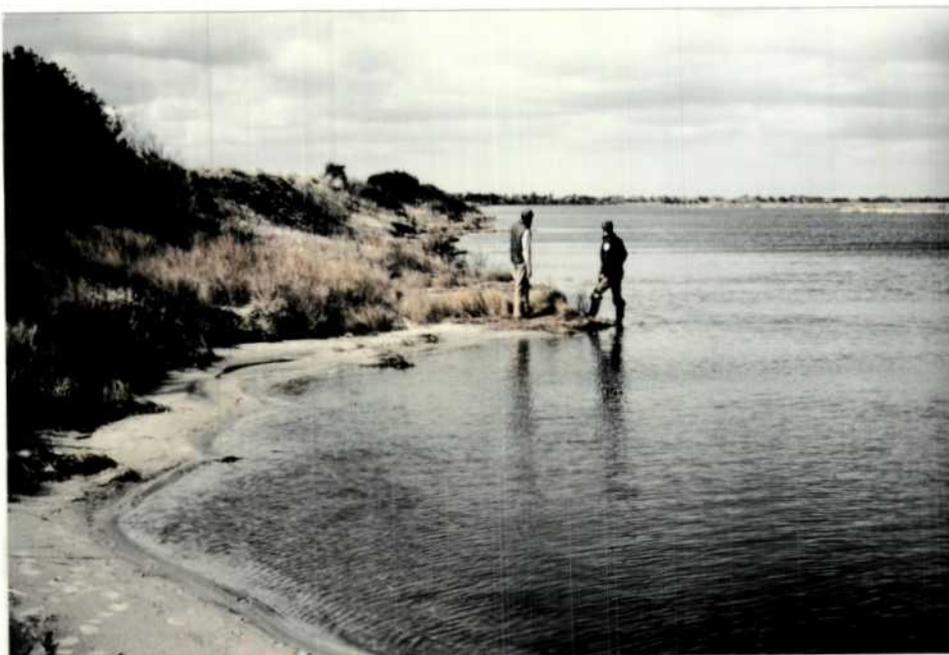
Table 2

New Field Vegetation Transect Line Comparisons¹

Plant Species	Percent Composition				
	1984	1983	1982	1968 -76	1977 -83
Widgeongrass (<i>Ruppia maritima</i>)	40.9	37.5	21.8	17.4	24.5
Muskgrasses	13.1	7.1	9.5	1.0	5.0
Water Hyssop	9.7	3.2	1.8	T	2.8
Dwarf Spikerush	5.2	15.0	16.8	1.1	10.8
Fleabane	4.3	6.4	3.2	0.4	3.9
Three-square	2.8	1.3	3.2	3.9	2.9
Spikerushes	2.2	2.1	10.7	5.6	7.8
Saltmeadow Cordgrass (<i>Spartina patens</i>)	1.9	5.2	7.6	17.3	7.8
Panic Grasses	1.3	1.9	1.6	T	1.1
Flat Sedges	1.1	1.3	4.8	2.5	3.8
Wild Millet	1.1	6.3	10.7	2.0	5.2
Saltmarsh Bulrush	1.1	0.6	0.2	0.9	0.4
Beakrushes	0.9	0.2		T	T
Marsh Aster (<i>Aster</i> sp.)	0.6			T	T
Goldenrod (<i>Solidago</i> sp.)	0.4				
Saltgrass (<i>Distichlis spicata</i>)	0.4	1.9	0.2	3.4	1.6
Saltmarsh Cordgrass (<i>Spartina alterniflora</i>)	0.4	0.2	0.8	3.3	0.2
Climbing Hempweed (<i>Mikania scandens</i>)	0.2			1.3	0.4
Grouselbush (<i>Baccharis halimiflora</i>)	0.2	0.5		1.9	0.2
Bare Ground	12.1	7.9	3.6	23.0	16.9
Totals	99.9	98.6	96.5	85.0	95.3
Plants Per Point Sample	1.16	1.20	1.47	--	--

¹ 1984 Wetland Vegetation Survey Results, Otto Florschutz
East Coast Biologist

In March, experimental vegetation plots were established in erosion cuts on the impoundment side of the New Field dike. Saltmeadow cordgrass, cattail, California bulrush, phragmite, giant cordgrass, and panicum plots were planted and fertilized. The cut areas were sandbagged or skirted with fiberglass cloth for protection from wave action. These plots will be monitored to determine growth rates and their effectiveness for erosion control. By the end of the first growing season, the saltmeadow cordgrass, cattail, and phragmite plots were most successful.



Erosion along New Field Dike caused by wave action in the impoundment. 2/84 CEH



Planting experimental vegetation plot in erosion cut in New Field dike. 3/84 MAD

4. Croplands

Approximately 25 acres of fescue were planted for goose browse in New Field. Brush was cleared and a seed bed prepared along a 10 acre strip bordering the east side of South Pond. This area was also planted in fescue during the period September 20-25. Both fields were fertilized with 10-10-10 at a rate of 1,000 pounds per acre and broadcast seeded at a rate of 100 pounds per acre. It was hoped that the new area at South Pond would provide an additional banding site for Canada geese, but the small number of geese attracted to the browse concentrated in New Field as in years past.

Soon after the fescue germinated, salt groundwater forced up by Hurricane Josephine took its toll. Fescue in low portions of both fields was lost, and the remainder of the crop never fully recovered.

5. Other Habitats

The areas of ocean beach and barrier dunes are not actively managed but undergo constant gradual change and are subject to abrupt changes during storms. Strong northeast winds caused by Hurricane Josephine produced severe ocean overwash on October 13 and 14. High tides and strong winds decimated dunes and covered N. C. Highway 12 with over three feet of sand in the area of the S-curves. Minor overwash and highway flooding occurred in several other areas.



During strong NE winds, such as associated with Hurricane Josephine, ocean overwash can leave 3 or more feet of sand on Highway 12. 10/84 MAD

Data collected for the dune erosion study for that quarter revealed a loss of 65' at the north tip and a loss of 25' at the south end of the refuge. All sections of beach showed at least minor erosion.



Dune erosion in S-curves area (photo taken from N. C. Highway 12). 10/84 MAD

The dune erosion study was initiated in 1982 to document losses to the dune line from wave and wind erosion. The study indicates that severe winter storms cause the greatest amount of change in the dune line.

9. Fire Management

Only one wildfire occurred on the Refuge in 1984. The fire was ignited on June 6 by a cigarette tossed from a vehicle on Highway 12. Seventeen acres of grass and wax myrtle scrub brush burned between the highway and the barrier dunes before the fire was contained by Refuge personnel.

Prescribed burns were accomplished at New Inlet on February 13 and in the Salt Flats on February 16. On March 15, a controlled burn was conducted along the east border of South Pond. A total of approximately 265 acres were involved. Sections of the burn areas were disked to reduce wax myrtle stands.

One 30" and two 36" culverts were installed in lateral ditches on the south end of Pea Island to provide access for fire equipment to that area. The N. C. Department of Transportation, who maintains the ditches, supplied the 36" culverts.

G. WILDLIFE1. Wildlife Diversity

Pea Island exhibits a natural diversity of habitat types. Habitat management practices such as prescribed burning, disking, brush removal, and green browse plantings also serve to diversify habitat and thus enhance wildlife diversity. Pea Island exhibits a rich diversity of mammals, birds, fish, reptiles, amphibians, mollusks, and crustaceans. This diversity is especially evident in birds with over 315 species of birds having been identified in the area. The 1984 Christmas Bird Count identified 143 species on December 28.

2. Endangered and/or Threatened Speciesa. Federally Listed Endangered and Threatened Species

Brown Pelican (Endangered). Brown pelican numbers have increased steadily over the past several years as the species has expanded into coastal North Carolina. Once considered a rare sighting in the area, they are now quite common especially from Spring through the Fall months. This year was no exception with pelicans being sighted during every month. Total use days for 1984 were 33,600. This compares to 11,700 in 1983.

Reports of several sightings of brown pelicans around Roanoke Island were received in February indicating their earlier arrival this year.

A June 19 aerial survey revealed a large colony of nesting brown pelicans on a spoil island adjacent to Oregon Inlet. Dr. Jim Parnell and Walker Golder of the University of North Carolina - Wilmington surveyed the colony from the ground on June 24, and counted 65 active nests. Three nests in the same area were confirmed in the Spring of 1983. These were the northern most nesting ever recorded for brown pelicans. (See photo next page).

On September 22, rangers from Cape Hatteras National Seashore delivered a brown pelican to the refuge that died in transport. On September 28, another brown pelican (immature) was delivered to the refuge. This pelican was released into North Pond.

Peregrine Falcon (Endangered). On January 22, Assistant Manager Hebert picked up a peregrine falcon near South Pond that was apparently sick. The bird died the next day and was sent to the Fish and Wildlife Health Lab in Madison, Wisconsin for necropsy. The diagnosis was yolk sac/umbilical inflammation (lesion).



Brown pelican nesting colony on spoil island.

6/84 CEH

A second peregrine of the Spring migration was observed on February 1, by Assistant Manager Hebert at Oregon Inlet.

The first peregrine falcon of the Fall migration was sighted by Refuge staff on September 6. A special use permit was issued to the Carolina Raptor Center to capture and band raptors on the refuge through the Fall for the second consecutive year. They operated a raptor banding and observation station on Pea Island for 25 days during the period September 21 to November 4, capturing and banding 10 peregrines and capturing one previously banded falcon. A total of 62 peregrines were observed during the period.

Atlantic Loggerhead Sea Turtle (Threatened). Loggerheads utilize Pea Island for nesting even though the beaches are highly vulnerable to ocean overwash and severe erosion. A daily beach survey is performed from Memorial Day until August 31, to locate nests. Any nest found in an area subject to overwash or severe erosion is transferred to a protected hatchery located in the dunes. Once the nests have incubated for 50 days, they are checked daily. When a nest hatches, the hatchlings are carried to the beach and released.

On March 23, Assistant Manager Hebert and ORP Strawser met with Nora Murdock (Endangered Species, Asheville, N.C.) to discuss plans to construct a new turtle hatchery. A site was selected and a better predator guard fence was designed. The hatchery was completed in May.

This year 8 nests were found on Pea Island beaches. The first nest was discovered on June 24, 2 weeks later than normal, and the last on August 11. All 8 nests were relocated to the hatchery. A total of 505 hatchlings were released from 868 eggs (58% hatch rate).

National Park Service personnel found 1 nest on non-refuge beaches of Cape Hatteras National Seashore that was relocated to the Pea Island hatchery. A total of 85 hatchlings were produced from 103 eggs (82.5% hatch rate).

A total of 971 eggs were transplanted into the hatchery with 590 hatchlings produced for an overall hatch rate of 61%. These figures compare to a total of 3,539 transplanted eggs and 2,176 hatchlings produced in 1983.

On September 20, Melinda Welton, Endangered Species Specialist for the N. C. Wildlife Resources Commission assisted Assistant Manager Hebert in excavating several loggerhead sea turtle nests which had hatched 10 days to 2 weeks earlier. Twelve live turtles were discovered trapped in a nest. These hatchlings were already showing signs of a common dermatitis caused by a vitamin deficiency and were very weak. They were taken to the N. C. Marine Resources Center for treatment; however, they all died before the next morning. On September 21, twelve active, healthy turtle hatchlings were taken to the N. C. Marine Resources Center for use in educational exhibits. These will be released at a later date.

A workshop was held on November 27, to update all agencies and individuals involved with loggerhead sea turtle nesting and strandings. Though Pea Island did not send a staff member to this meeting, refuge hatching results were presented by Steve Chapman with Cape Hatteras National Seashore.

Bald Eagle (Endangered). An immature bald eagle was sighted on the south end of the refuge on several occasions throughout the month of May.

On June 1, an immature bald eagle was sighted on the beach at Currituck Banks. Behavior of the eagle indicated that it was sick; however, Refuge staff could not catch the bird. Assistant Manager Hebert returned to Currituck on June 3, but could not find the eagle.

On June 2, an apparently healthy immature bald eagle was sighted by Assistant Manager Hebert on Pea Island.

On November 18, Kent Turner (Cape Hatteras National Seashore) sighted an immature bald eagle on the north end of Pea Island. The bird had a red leg band on the right leg and from the description, was probably a second year bird.

True's Beaked Whale (Endangered). On November 22, a True's beaked whale beached approximately 2 miles north of Avon. Refuge staff were notified and attempted to reach the Smithsonian staff. The whale died shortly after.

b. State Listed Endangered and Threatened Species

Of the other species that occur on the Refuge, the State of North Carolina lists 7 as threatened and 26 as species of special concern. Although Refuge management does not emphasize every one of these, they do benefit from present practices. The species specifically managed for are listed below:

Osprey (Special Concern). Three elevated platforms were constructed in 1981 to provide nest sites for ospreys. One platform had an active nest. Adult pair behavior indicated that young were in the nest; however, no young ospreys were ever sighted.



Osprey nest on North Pond platform.

5/84 CEH

On May 20, Assistant Manager Hebert assisted the Coast Guard in dealing with an osprey nest on an intercoastal waterway navigational aid. A battery change required personnel to be in very close proximity to the nest and the Coast Guard requested assistance to protect both the nest and USCG personnel.



"Where's the beef? I mean ... fish!" 5/84 CEH

Least Tern (Special Concern). Least terns have nested at specific areas along the beach for many years. The primary management tool has been the exclusion of human disturbance from nesting areas. This has been accomplished by posting the nesting areas and excluding vehicular traffic on the beach.

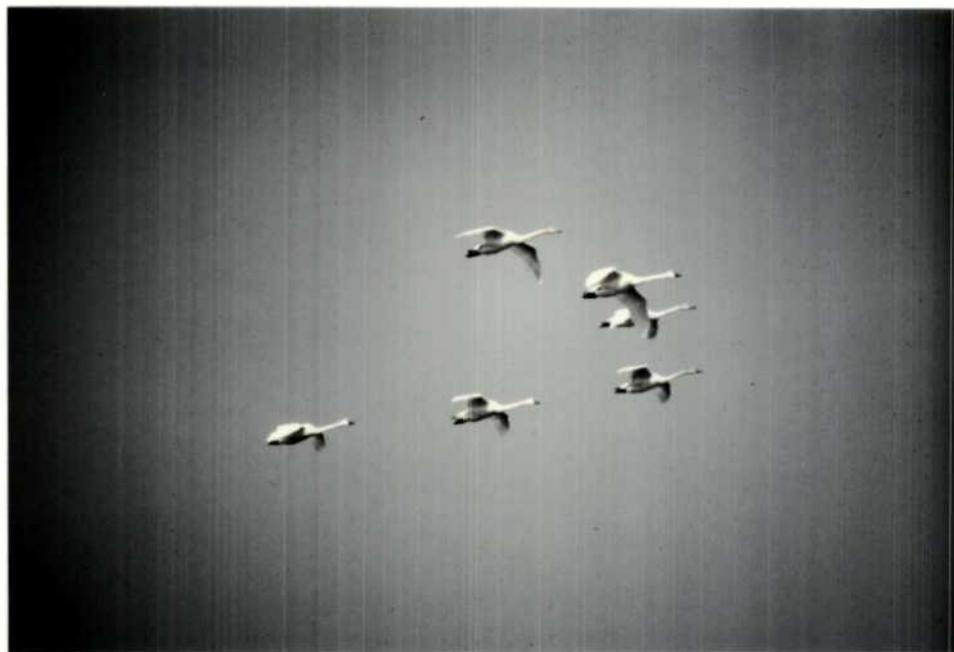
On May 10, a shorebird, gull, tern, and allied species census was conducted in which 126 least terns were observed.

Walker Golder, a student of Dr. James Parnell (UNC-Wilmington) conducted censuses of colonial shorebirds throughout the summer on Cape Hatteras National Seashore and volunteered his time to monitor the Refuge populations of these birds. On May 29, he censused the beach colony and observed 85 active least tern nests. A total of 114 least tern nests were present in the beach colony on June 22. (See Section G.5).

3. Waterfowl

Waterfowl populations continued to be down from previous years. The peak January populations included 1,563 tundra

swans, 5,523 geese, and 9,246 ducks. By the end of February numbers had dropped to 850 swans, 2,242 geese, and 8,791 ducks. Populations continued to decline throughout March and practically all migrating waterfowl were gone from the Refuge by April.



"Okay, all together now ... stroke ... stroke..."
2/84 CEH

In April, approximately 600 black ducks and 600 gadwalls remained on the Refuge and were assumed to be breeding population ducks. The estimated production on Pea Island was 380 black ducks and 350 gadwalls.

On October 6, approximately 300 snow geese arrived at Pea Island representing the first of the season. The population increased to \pm 2,000 by the end of the month. Canada geese numbers rose steadily through November. Black ducks and pintails were the most abundant ducks through October. Tundra swans arrived earlier this year with 1,100 being present by the end of the first week in November. The Fall peak for most species occurred in early December when 34,382 waterfowl were present on Pea Island. Duck populations generally declined in December due to unseasonably warm temperatures.

The following are the dates and peak numbers for different groups: Tundra swans peaked at 3,286 birds on December 20, snow geese peaked at 8,000 birds on January 7, and Canada geese peaked at 3,950 birds on December 20. The aggregate duck population peaked in mid-November at 15,500 birds. (For comparison charts see page 29).

The most numerous of these were American wigeon (5,044), pintail (4,040), and black ducks (2,130).

In the Fall, Otto Florschtuz (USFWS, East Coast Biologist) and Refuge staff members conducted snow goose and tundra swan productivity surveys on Pea Island. Results showed that 31.0% of all snow geese present were young of the year, and the average snow goose family contained 2.94 young. Swan families averaged 2.26 young while 17.7% of swans present were young of the year.

4. Marsh and Water Birds

The upward trend of marsh and water bird use on Pea Island continued in 1984. Refuge beaches, marshes, and impoundments were heavily utilized by marsh and water birds for both feeding and nesting. Use days for 21 species using the Refuge totalled 1,187,400. Although no active management occurs exclusively for species in this category, a steady increase in use days has been observed. It is believed that resource management practices followed for waterfowl and other species groups have had a positive influence on marsh and water bird use of the Refuge. For example, bird use in South Pond has greatly increased since the management scheme was changed to include a complete Spring draw down.



"You found what??"

5/84 CEH

The increasing use of the Refuge may also be due to habitat loss along the Outer Banks and increased beach use and disturbance. The following table shows increases in marsh and water bird use days over the past 7 years:

<u>Year</u>	<u>Use Days</u>
1984	1,187,400
1983	1,155,338
1982	1,031,700
1981	1,009,075
1980	879,075
1979	584,635
1978	450,057

Numbers increased through the Spring. Summer and Fall had the greatest diversity and numbers of birds.

5. Shorebirds, Gulls, Terns, and Allied Species

Total use days for 1984 were 3,708,085, down slightly from last year. Peak populations occurred in December. The most numerous species included 10,800 great black-backed gulls, 18,250 ring-billed gulls, 4,100 herring gulls, and 3,475 sanderlings. Shorebird numbers were unusually high in late July. Over 2,500 sanderlings were observed on the Refuge beach on July 24. Black terns were also sighted in New Field and North Pond. South Pond was completely drawn down for the second consecutive year and again received heavy shorebird use.

Walker Golder, Refuge volunteer and student at UNC-Wilmington surveyed colonial nesting shorebirds on Pea Island on May 29, June 22, and July 13. Active nests found in three colonies included:

	<u>Beach Colony</u>	<u>New Field Colony</u>	<u>North Pond Colony</u>
Gull-billed Tern		10	3
Least Tern	114		
Common Tern	9	113	39
Caspian Tern	1		
Black Skimmer	109		

The July survey revealed that the colony of common and gull-billed terns in New Field had been abandoned. The island where the colony was located was littered with nutria tracks and holes had been dug in many places.

In June the Refuge staff assisted Dr. John Weske (Smithsonian) with tern banding on a spoil island adjacent to Oregon Inlet. In one morning of banding, 4,400 royal terns and 334 sandwich terns were banded.



Black skimmer/tern colony on Pea Island beach.
6/84 CEH

6. Raptors

The Carolina Raptor Center operated two banding/observation stations on Pea Island in 1984. The stations were manned a total of 214.5 hours from September 28, through November 4. Sharp-shinned hawks made up 83.2% of the 3,648 raptors observed. A total of 231 raptors were banded during the 22 day period.

7. Other Migratory Birds

The diversity of bird life on Pea Island is so great that it is sometimes referred to as a "birders heaven". This is especially true when considering the passerines. One hundred and fifteen different species of song birds migrate through Pea Island.

8. Game Mammals

Rabbits are the only game mammals that occur in any numbers on Pea Island. Cottontail and marsh rabbit numbers are estimated at \pm 1,200. They make up the bulk of the diet of wintering raptors.

Raccoons are fairly common on Bodie Island to the north. Raccoon tracks were observed on Pea Island in several marsh areas during the year. One injured raccoon was picked up on the Oregon Inlet bridge by a motorist who brought the animal to the Refuge office.

9. Marine Mammals

A Risso's dolphin (Grampus spp.) beached across from New Field on September 7. The Smithsonian was contacted and arrived on September 8 to necropsy the animal.

10. Other Resident Wildlife

Ring-necked pheasant are observed year-round over most of Pea Island. The birds concentrate around the impoundment dikes and New Field browse area. It is estimated that the peak population in 1984 was 750 birds, with approximately 500-550 being present throughout the year. These numbers represent approximately one bird per eight acres of suitable habitat.

14. Scientific Collections

Ed Thompson, curator for Fernbank Science Center in Atlanta, Georgia collected the following specimens in December for educational purposes: ring-necked pheasant 2, pintail 2, canvasback 1, black duck 1, and snow goose 1.

15. Animal Control

Muskrat and nutria continued to thrive on Pea Island with Fall populations estimated at 4,000 and 750 respectively. The trapping program initiated in 1983 has been successful as evidenced by less burrowing damage to berms and dikes in 1984.

The 1984 Refuge trapping season ran from January 20 through the end of February. One trapper worked all three impoundments this year and the take was less than half of the 1983 harvest when two trappers worked the Refuge. A total of 159 muskrats and 24 nutrias were trapped. The bid system was dropped this year in an unsuccessful attempt to attract more interest in the program. Incidental catches included 10 American coots, one mink, and one black duck which was released. No problems were encountered.

16. Marking and Banding

Pea Island again participated in the 3-year Atlantic Flyway Canada Goose Study. The 1983-84 banding season ended with a total of 93 Canada geese collared and banded.

In September a rocket net platform was constructed at the edge of Pamlico Sound behind New Field. North Carolina waterfowl biologist Dennis Luszczyk, who has successfully used "over the water rocket sets", provided technical assistance as did East Coast Biologist Otto Florschutz. The staff was unsuccessful in attracting geese to this site. A large swim-in goose trap was constructed behind the Salt Flats

in Eagle Nest Bay in October. Two live decoy geese were obtained from Pungo NWR and pre-baiting began on October 25. Although this trap proved very successful for capturing ducks, Canada geese remained leary of it throughout the banding season. Three rocket nets were set up in New Field. This effort was again plagued by frustrations from lack of geese, technical problems, and tourists scaring geese off net sites. A swim-in duck trap with 4 funnels was constructed in South Pond by YCC enrollees (see Sections 3.2).



New duck trap in South Pond.

12/84 MAD

Banding accomplishments and quotas are presented below:

	<u># Banded</u>	<u>Quota</u>
Canada Geese	93*	75
Black Duck	201	200
Mallard	99	100
Canvasback	0	50

* Also neck collared.

Waterfowl comparisons for peak populations and peak use days was not included in 3. Waterfowl so we are including them below.

Waterfowl comparison of peak populations for the past five years:

<u>Year</u>	<u>Swan</u>	<u>Snow Geese</u>	<u>Canada Geese</u>	<u>Ducks</u>
1984	3,286	8,000	3,950	15,500
1983	1,800	8,000	3,855	22,190
1982	1,650	8,250	4,030	15,676
1981	1,410	6,371	5,280	18,365
1980	2,900	7,900	5,800	24,400

The following table provides a use day comparison for each group over the last five years:

<u>Year</u>	<u>Swan</u>	<u>Snow Geese</u>	<u>Canada Geese</u>	<u>Ducks</u>
1984	230,002	560,000	276,500	1,395,000
1983	126,395	591,145	247,726	1,642,033
1982	145,577	390,095	340,045	1,519,053
1981	148,437	480,375	323,812	2,101,476
1980	150,456	444,050	295,515	1,771,105

H. PUBLIC USE

1. General

Pea Island had a total of 1,144,142 visitors during the year. The emphasis for 1984 was on establishing more self-guiding interpretive and informational facilities and making more accurate estimates on visitor use of the refuge. Major strides were accomplished in each area.

For many years, Pea Island has relied exclusively on the National Park Service for base line public use data. This data has been obtained primarily from a vehicular traffic counter located on N. C. Highway 12 on Bodie Island. Between the counter and the Refuge, several possible avenues for traffic exist. Unfortunately, though the information is accurate for the location of the counter, by the time estimates are made for the number of vehicles going to the Oregon Inlet marina picnic area, and campground, the accuracy diminishes.

Early in 1984, vehicular traffic counters were installed at 3 locations on Pea Island, bringing the total number of counters to 4. One of these, a total flow counter, was placed on N. C. Highway 12 just south of the Bonner Bridge. Data obtained from this counter has consistently indicated that approximately 90% of the total vehicles that are recorded on the Bodie Island counter do actually cross the bridge onto the Refuge. In the past, the N.P.S. assumption (estimate) was that 70% crossed the bridge.

Two other vehicular traffic counters were installed, one to measure use at each of the new interpretive kiosks. As with the total flow counters, current information now available indicates past estimates for public use have been significantly lower than actual use.

The use of traffic counters has also had its drawbacks, however. Since the Pea Island environment is a harsh, salty, sandy one, mechanical devices have a low survival rate. During an average month, 2 of the 4 counters will cease to function for one reason or another. The amount of staff time involved with checking, reading, and maintaining traffic counters is considerably more than had been anticipated.

The public use survey which was originated in 1983 was conducted only on 4 days during 1984 due to heavy staff commitments to other projects and lack of a summer intern. The quantity of data obtained in 1984 was not great enough to provide any significant information. Hopefully, these surveys will be continued in the future. So far, the survey has given strong indication of visitor trends during the summer months. A series of data for other seasons would give a sounder base for spring, winter, and fall visitor use patterns.

Early in 1984, the decision was made to use interpretive signing for the North Pond Interpretive Trail instead of printing an interpretive leaflet. Plans for the interpretive signs have not been finalized. The Refuge bird list was revised and expanded to include other Refuge vertebrates. "Wildlife of Pea Island" is scheduled to be printed in late January, 1985. As in previous years, Refuge staff served as judges for science fairs in local schools.

Cape Hatteras National Seashore printed 80,000 copies of their 12 page tabloid newspaper "In The Park", which included a full page section on Pea Island. These papers were distributed primarily during the summer months to Outer Banks visitors.

Also during the year, Refuge staff responded to approximately 8,175 public inquiries. News releases were sent out or interviews arranged for 19 Refuge events or activities. Again this year, WOBR, a local radio station, did several "spots" on various Refuge activities.



This is the smiling face that has greeted Refuge visitors as they walk into the front office since 1971!
6/84 BWS

A significant amount of new development occurred in the I&R category during 1984. At the headquarters complex, the parking lot was enlarged and paved. An island in the center was built to house a 6-sided interpretive kiosk which was installed in June. In addition to the parking lot, two turn lanes were added to N. C. Highway 12 to allow safer access to the headquarters area and the parking area on the east of the road.

Unfortunately, the "completed" headquarters parking area was not of acceptable quality and the major part of 1984 was spent in efforts to reason with the contractor and correct the problems. CGS finally declared a contract default. At the close of the year, no solution had been reached and the parking area remained uneven, cracked, and generally unacceptable.

A parking pull-off was paved at the site of the old ferry signs by the contractor for the N. C. Department of Transportation (D.O.T.) in conjunction with the repaving of N. C. Highway 12 during 1983. The Refuge responsibilities were to incorporate ferry information in an interpretive kiosk and install a dispenser for ferry schedules. The kiosk was built in June and the dispenser installed during July. It was somewhat of an embarrassment that Refuge accomplishments on this joint project were over six months late. Several events allowed some of that embarrassment to fade on the Refuge side and grow on the D.O.T. side. First, two weeks

after the kiosk was completed, a D.O.T. mower hit the south wall causing structural damage. Second, the long awaited leaflet dispenser remained empty for 3½ months after installation. It seems that, with state elections coming up, the production of ferry schedules had slowed and D.O.T. personnel were unable to provide leaflets.

Before the year's end, reconstructive work was completed on the kiosk and ferry schedules were obtained. At the close of 1984, the score remained tied with both agencies sporting renewed appreciation for "happy every afters".



Kiosk at north end. Landscaping has yet to be completed. Tune in next year for the finished product!!
9/84 BWS

Both interpretive kiosks have landscaping yet to be accomplished; however, heavy visitor use of these facilities indicate their construction was not only needed, but long overdue. Final touches are expected to be completed early in 1985.

Interpretive trail head signs were installed at both New Inlet and North Pond Trails. Extensive trail rehabilitation was accomplished by YCC on the North Pond Trail. Details about these facilities and others previously discussed are provided in appropriate sections of this narrative report.

All in all, 1984 proved to be quite a year for accomplishments in I&R. What was missed by phasing out staff conducted programs was more than made up for with the self guiding facilities. Hopefully, 1985 will bring two interpretive trails completed.

Combined with the interpretive kiosks, these will round out Pea Island's "self guided" plan and provide the "message of the Service" equally to each of the million and a half Refuge visitors each year.

2. Outdoor Classrooms - Students

As a part of the phase down of staff-conducted programs during 1983, Pea Island began placing a strong emphasis on the independent use of Outdoor Classrooms. Since registration/check-in is not required for use of the Refuge for education, monitoring this use is difficult. Unless a staff member happened upon the group, its activity went unnoticed and unrecorded.

May was obviously a very active month for Pea Island's Outdoor Classrooms. A variety of groups ranging from pre-schoolers to graduate students took part. During May alone, these visits accounted for 790 activity hours. These programs were totally teacher directed activities. Usually, a staff member presented a brief (15 minutes) orientation for the group, then the groups were on their own. The total of recorded visits to the Refuge for Outdoor Classroom use for 1984 was 950. This figure is probably low, since only the groups which requested orientation talks were counted. At present, there is no method for monitoring independent Outdoor Classroom use. (See photo next page).

3. Outdoor Classrooms - Teachers

During March, a 10 hour in-service training program was scheduled for Dare County teachers to outline strategies for utilizing Outdoor Classrooms. Unfortunately, due to scheduling conflicts, the program was cancelled. At the request of the Dare County Schools In-Service Training Committee, the program is due to be rescheduled in 1985.

On June 16, a seminar was held for Catawba County teachers to discuss ways to effectively use Pea Island for class field trips. Twenty-five teachers attended the discussion.

4. Interpretive Foot Trails

Approximately 55,993 visitors (100,644 AH) utilized interpretive foot trailson Pea Island during 1984. The addition of a pedestrian counter in the overlook on North Pond Trail during 1983 added credibility to the previously "guesstimated" figures.

During 1984, trail head signs were designed and installed for both North Pond Interpretive Trail and New Inlet Trail. Plans for the North Pond Interpretive Trail pamphlet were cancelled and plans were begun for interpretive signing of

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This "Outdoor Classroom" site was used to simulate the desert environment for survival training. Talk about an educational experience!
8/84 BWS

the trail. The designing and installation of interpretive signs for both trails is high on the list of priorities for 1985. (See photo next page).

6. Interpretive Exhibits/Demonstrations

A number of exhibits/demonstrations were set up by Refuge staff during 1984. In all, approximately 47,580 visitors utilized Refuge exhibits or demonstrations for a total of 11,901 AH.

On May 7, ORP Bonnie Strawser manned an exhibit and presented short orientation talks on loggerhead sea turtle nesting to over 650 8th grade students from Dare and Tyrrell County schools. This exhibit was a part of Dare County's first Conservation Field Day sponsored by the Soil Conservation Service.



Finally, trailheads are established! Now if we can just get some interpretation along the trails

8/84 BWS

Pea Island's "Duck Stamp Event" was scheduled for May 19. A special conducted walk was planned and the movie "The Duck Stamp Story" was scheduled to be shown at the N. C. Marine Resources Center daily the week prior to the walk. News releases were mailed out 2½ weeks prior to the event. Unfortunately, the movie never arrived, and was hence, never shown. Due to a mix-up by the local paper, the article advertising the event was run on Tuesday, May 22. Needless to say, turnout was not good. Four people participated in the walk.

"The Duck Stamp Story" finally arrived on June 20 and was shown daily at the N. C. Marine Resources Center from June 22 through July 1. Approximately 400 people viewed the film during that time period.

In addition to these "duck stamp" activities, Don Bryan, mayor of Nags Head and Manager Dunaway were photographed purchasing the "50 Years of Duck Stamps" commemorative stamp. Local newspapers carried the photo and an article on duck stamps.

Again this year, Pea Island staff participated in the annual Dare Days celebration. On June 2, ORP Strawser and Manager Dunaway manned a Refuge exhibit; approximately 4,500 people attended the celebration.



One of the best received "programs" for visitors was the loggerhead hatchling release. Though not planned as public programs, folks just naturally aggregate to watch - and, in the process, learn quite a bit about the resource.

8/84 BWS

Wilderness Graphics began construction on the two interpretive kiosks in early June. The panels were completed in Tallahassee, Florida and brought to Pea Island with the construction materials. By June 20, the construction of both kiosks was completed.

Shortly after the completion of the north end kiosk, a leaflet dispenser was installed adjacent to the kiosk for ferry schedules. The incorporation of the ferry information into the kiosk and the installation of the dispenser fulfilled the Refuge's commitment to the N. C. Department of Transportation. These commitments were made in return for a commitment from the N. C. D.O.T. to pave the parking lot associated with the kiosk. The parking lot was completed in 1983.

Unfortunately, two weeks after the kiosk construction was completed, a N. C. D.O.T. mower hit the kiosk and badly damaged the south wall. Repairs were made at no expense to the Refuge.

Though the kiosks were fully constructed and functional during 1984, final landscaping of both structures has yet to be completed. Final touches are scheduled as a high priority for 1985.

As a good-will gesture, Pea Island staff manned a Refuge exhibit at the 1984 Wanchese Seafood Festival sponsored by the Oregon Inlet Users Association. Approximately 4,000 people attended the festival.

Pea Island's immature osprey mount was requested by Larry Shank, USFWS-NCET, to be used in the FWS exhibit at the World's Fair. At the year's end, the exhibit had been transferred to another location. The osprey mount is expected to be sent back to Pea Island in February of 1985.

Nature provided a unique exhibit at Pea Island in late summer. As a result of winds and large tides associated with Hurricane Josephine, a 19th century wooden hull sailing schooner washed up on the refuge beach. The vessel, dating back to 1952, has been a focal point of public interest since its arrival.

By far, the largest, most complex exhibit for Pea Island during 1984 was National Hunting and Fishing Day on September 22. The day began with a morning Youth Fishing Contest which involved 7 local fishing piers and over 150 youths. First, second, and third place winners in each age category won rods and reels donated by Diawa Corporation and local tackle shops. (See photos next page).

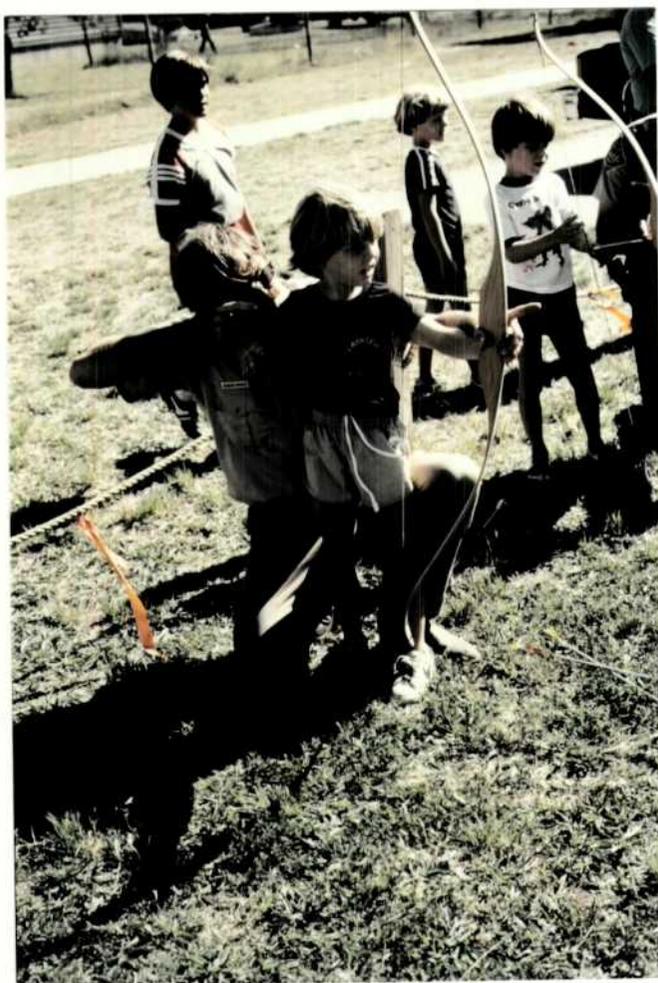
In conjunction with NHF Day, a poster contest was held in Dare County schools. Winners of the poster contest were awarded savings bonds donated by local banks on November 15.

The afternoon expo on September 22 featured a special display on duck stamps and over 30 activities/exhibits by local agencies, clubs, organizations, and individuals. Over 1,200 people participated in the afternoon events.



NHF Day Youth Fishing Contest ... seven local
piers and over 150 kids participated!

9/84 BWS



Try your hand at archery ...

9/84 BWS



... or skeet shooting. Makes you wonder how the instructor keeps his mind on the gun, huh?

9/84 BWS

7. Other Interpretive Programs

Through a cooperative agreement with the N. C. Marine Resources Center on Roanoke Island, Center staff conducted three weekly public programs on the refuge throughout the summer. Participation in these programs follow:

<u>Program Name</u>	<u># Programs Conducted</u>	<u>Total Participation</u>
Refuge Tour	12	244
Children's Wildlife Discovery	13	248
Bird Walk	13	260

It is hoped that this cooperative agreement can continue and provide on-going programs for Refuge visitors at Pea Island.

On June 4, ORP Strawser and Assistant Manager Hebert spent a "day in the life of a Refuge" with 25 Department of Interior employees as part of the Departmental Management Development Program. Pea Island's management practices and public use policies were discussed. For a hands on experience, the group waded around in North Pond and inventoried bird nests on the spoil islands.

8. Hunting

The first hunt in the history of Pea Island occurred during 1984. After careful planning, consultations with State Biologists, Endangered Species staff, with USFWS, and the East Coast Biologist, USFWS, a Youth Pheasant/Rabbit hunt was planned and executed at Pea Island.

Seventy-two party permits were issued, four for the morning hunt and four for the afternoon hunt for each of the nine hunt days. By definition, a party consisted of one adult and one youth, one adult and 2 youths, 2 adults and 2 youths, or 2 adults and 3 youths. Results from the hunt are shown below:

<u>Date</u>	<u>#Parties</u>	<u>#Hunters</u>	<u>Pheasants Flushed</u>	<u>Pheasants Bagged</u>	<u>Rabbits Bagged</u>
Oct. 27	8	28	0	4	Closed
Nov. 03	8	23	1	0	Closed
Nov. 10	4	14	5	2	Closed
Nov. 17	8	28	6	2	4
Nov. 22	5	17	0	0	0
Nov. 23	6	20	2	0	0
Nov. 24	3	10	1	0	0
Dec. 01	4	15	1	1	1
Dec. 08	4	12	0	1	0



Some of the younger hunters had it rough in the dense vegetation. 11/84 BWS



Hunter safety, endangered species identification, and target species identification were covered before each hunt. 11/84 PAP

Though the number of pheasants and rabbits bagged during the hunt was low, all in all, the hunt was considered successful. A very effective educational program was conducted prior to each hunt. The program covered basic wildlife management topics, endangered species, and special regulations.

In all 796 AH were spent hunting at Pea Island during 1984.

9. Fishing

Pedestrian surf fishing continued to be the major form of consumptive, wildlife-oriented recreation on Pea Island during 1984. Bluefish, spot, pompano, croakers, and trout were the major fish caught. As always, a popular fishing spot was Oregon Inlet; many visitors parked their vehicles on the refuge and walked onto the catwalks on the Bonner Bridge to fish. Approximately 650,907 AH (162,725 visits) were spent fishing on Pea Island during 1984.



How to find a "Blue Fish Blitz" at Pea Island. First, ride along N. C. Rt. 12 looking for an abundance of vehicles parked in every direction at one spot. 11/84 BWS



Second, walk over dunes and observe sea gulls
in the air over water and fishermen lining
the surf. 11/84 BWS



Third, watch closely for the catch! 11/84 BWS

10. Trapping

The 1984 trapping program at Pea Island was the second in Refuge history. Trapping is considered a management tool at Pea Island; therefore, the program is discussed in detail in Section G of this narrative report.

11. Wildlife Observation

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

Due to the location of the road (Highway 12) through Pea Island, it is difficult for a traveler to pass without observing wildlife. On most days of the year, the quality of observation is quite high. During the Fall and Winter, snow geese, Canada geese, and blue geese feed on the road shoulders. Often vehicles must pause to allow the birds to move out of their paths.

During the Spring and Summer, cattle egrets replace snow geese as the most easily observed wildlife. Various species of raptors utilize the dunes, power line poles, and boundary sign posts for resting and hunting, thus making them clearly observable from a vehicle. During 1984, an estimated 738,435 visitors spent time in association with vehicular wildlife observation.

The North Pond Trail and other access points are associated in such a way as to make wildlife observation (on foot) easy and enjoyable. Refuge visitors spent approximately 173,162 AH (252,003 visits) participating in this activity during 1984.

12. Other Wildlife Oriented Recreation

Wildlife photography continues to be a popular activity at Pea Island. In some cases, photographers erect temporary photo blinds, but more often, the photographers are Refuge wanderers. Good photographs tend to be the result of being at the right place at the right time.

During 1984, the Refuge photo blinds were utilized frequently. Approximately 14,380 AH (3,672 visits) were spent with photography at Pea Island last year.

15. Off-Road Vehicling

The use of ORV's on Pea Island has been restricted to State roads since 1979. Though illegal ORV traffic in the dunes and on the beach has plagued the Refuge somewhat in the past, significant erosion of the beach and dunes has caused a rise in violations of this nature. In several places, the

beach is easily visible from N. C. Highway 12 and the temptation is more than some motorists can handle. Increased signing has become a necessity. ORV violations have become more frequent and, as always, the violators are difficult to apprehend. More often than not, officers arrive at the scene to find only the tell-tale ruts in the sand.

16. Other Non-Wildlife Oriented Recreation

Because Pea Island is associated with the "beach scene", non-wildlife related recreational activities will always occur on the Refuge. Swimming, surfing, and sunbathing are major summer activities.

No facilities have been constructed for these uses. Approximately 430,802 AH (152,856 visits) were spent in non-wildlife oriented recreation on Pea Island in 1984.

17. Law Enforcement

Law enforcement at Pea Island is geared toward protecting the resource. Week-end and week-day patrols are conducted on the Refuge and in the adjacent Proclamation Waters. The Refuge staff continues to work closely with NPS rangers, the Dare County Sheriff's Department, N. C. Wildlife Resources Commission, N. C. Marine Fisheries and the N. C. Highway Patrol.

A breakdown of cases on Pea Island made by Refuge staff during 1984 follows:

<u>Violation</u>	<u>#</u>
Tresspass into a closed area	2
Non-compliance with Refuge Special Hunting Regs.	2
Driving in a closed area	1
Driving off designated roadway	9
Illegal camping	1
Aiding and abetting hunting on refuge; disturbing wildlife; shooting migratory birds from motor vehicle; wanton waste	1

Manager Dunaway completed 10 weeks of LE training at FLETC in Glynco, Georgia.

Assistant Manager Hebert attended a 1 week LE Refresher course. ORP Strawser and Maintenanceman Creef were excused from the refresher training for 1984. All LE staff qualified both with Service revolvers and shotguns.

I. EQUIPMENT AND FACILITIES

1. New Construction

Interpretive kiosks were constructed in June at the north end pull over and in the office parking lot. Wilderness Graphics, Atlanta, Georgia did an excellent job on the display panels and on constructing the kiosks. The Refuge staff erected a leaflet dispenser at the north end kiosk for the distribution of N. C. Department of Transportation ferry schedules. D.O.T. will provide the schedules and Pea Island will supply and maintain the dispenser.

A pump house was constructed to house the South Pond pump engine by staff and YCC labor. This completed a force account job order project that replaced an old stop-log water control structure with a new 30" low lift pumping unit.



Pump house housing new Caterpillar 3208 industrial engine for 20,000 gallon/minute pump at South Pond. 12/84 MAD

In October, the staff met with representatives from E.P.A., the N. C. Office of Coastal Management, and Ecological Services, Raleigh, N. C. regarding construction of a pumping facility at New Field impoundment. The facility is planned for installation on a larger tidal creek than the one at the existing flap-gate structure. An on-site inspection of the proposed location by Hugh Heine, Corps of Engineers, and George Wood, Office of Coastal Management preceded an application for a C.O.E. permit in November. Arrangements were made for the Mattamuskeet staff to construct the pump and assist with installation in the Spring of 1985.



Old New Field flap-gate structure showing evidence of leakage when the impoundment and Pamlico Sound were frozen over. 12/84

2. Rehabilitation

Expansion of the headquarters area parking lot from 8 to 26 parking spaces was completed on January 8. The job failed the final inspection by Regional Engineer Ed Organ because of poor drainage, uneven joints, and application of the asphalt in below acceptable temperatures. Sub-standard asphalt material is also suspected. The parking lot was not brought up to acceptable standards by the end of the year.

3. Major Maintenance

The service road on the South Pond dike was reshaped and 825 cubic yards of clay were delivered and spread using refuge equipment. A final grading by the N.P.S. motor grader completed this ARMM project. (See photo next page).

4. Equipment Utilization and Replacement

A 1978 4x4 utility vehicle (Ramcharger) was replaced in May with a 1984 Jeep CJ-7.

A 26' Uniflite inboard boat was borrowed from Mattamuskeet and tested for suitability in the waters around the new Alligator River NWR. It was determined that the boat drew too much water for practical use in the area.



New clay surface on South Pond service road.
12/84 MAD

7. Other

One 30" culvert and two 37" culverts were installed in lateral ditches which run from N. C. Highway 12 to the marsh on the south end of Pea Island. The installation of these culverts will provide access for fire equipment to the south end.

J. OTHER ITEMS

1. Cooperative Programs

- a. The Manteo (Shallowbag) Bay Project which was authorized by Congress in April of 1980 continues to draw a lot of attention. The U. S. Army Corps of Engineers applied for a permit from the Department of the Interior to construct a pair of jetties to stabilize Oregon Inlet, a navigable channel lying between Bodie Island and Hatteras Island. Land north of the inlet is a part of Cape Hatteras National Seashore. Pea Island NWR borders the inlet on the south. Initially, the project calls for \$100 million in funding and \$600 million over the 50 year life of the project. The basic design of the project as it affects the Refuge includes the construction of two rubble mound or concrete armor jetties and a sand bypass system that would require placement of dredge material on the Refuge. The total length of the Pea Island jetty would be 8,700

feet with the shorewardmost 2,300 feet connected to the Refuge and permanently occupying 4.4 acres. During construction, another 41 acres of Refuge land would be required for sand bypassing, storage and access areas, and pipeline right-of-way. Sand bypass would include annually pumping sand from the accretion fillet behind the north jetty onto the Refuge beach. The Corps has not yet designed the sand transport system or shown that such a system will work.

The probable effects of the project were studied and a compatibility statement was prepared. The project was determined to be incompatible, and the permit request was denied.

The Service's position has been to support the maintenance of a safe, navigable channel through Oregon Inlet by hopper dredging, a more cost-effective and environmentally acceptable alternative. In Fall and Winter of 1983 and 1984 the Corps deployed the hopper dredge MERMENTAU, a modern shallow draft, split hull vessel with a hopper capacity of 1,300 cubic yards. A navigable channel up to 20 feet deep and 300 feet wide was established in 1983. After 2 years of successful dredging channel conditions remained good at the end of 1984. Frequent trawler use was continuous throughout the year.

On October 12, legislation that would transfer Interior lands needed for the jetty project to the Corps of Engineers died in the U. S. Senate.

- b. In November, the staff met with N. C. Department of Transportation officials regarding an upcoming proposal to relocate Highway 12 in the S-curves area. Severe dune erosion and ocean overwash in recent years at the south end of Pea Island makes highway relocation inevitable. D.O.T. indicated a need to move their right-of-way approximately 400' to the west over an approximately 2 mile long stretch. Right-of-way permit application procedures were explained and discussed in the meeting. A permit request has not yet been received. (See photo next page).
- c. Special Use Permits were issued for several filming activities on Pea Island during 1984, including: Janice Pitt, Francis Thompson, Inc. and Stephan Kraseman, National Geographic.
- d. A special use permit was issued to the U. S. Army (Ft. Bragg, N. C.) to conduct "desert survival training" in the dunes of Pea Island.



The "S-curves" on Highway 12 have proved to be hazardous on many occasions. At least three fatalities in the last 4 years have been associated with this section of road. The N. C. Department of Transportation is currently looking into relocating a two mile section which would eliminate the "S-curves" 11/84 BWS

- e. The U. S. Coast Guard was granted permission to construct a 4 foot wide by 35 foot long finger pier adjacent to their existing pier.
- f. Again during 1984, The N. C. Raptor Rehab Center was issued a special use permit to capture and band hawks on Pea Island. They manned two banding sites during September and October from which raptors were observed, counted, and some captured, banded, and released. During 14 days in October, 47 peregrine falcons, 2,686 sharp-shinned hawks, 7 Cooper's hawks, 82 Northern Harriers, 15 osprey, 29 merlins, and 201 kestrels were observed.
- g. Manager Dunaway met with representatives from Cape Hatteras Electric Membership Cooperative (CHEMC) on February 28 to discuss the amendment to the "Power Line Right-of-way Permit" (Permit # ES-0852). CHEMC initiated work to replace existing power lines through the impoundment areas late in the year.
- h. On May 20, Assistant Manager Hebert assisted the Coast in dealing with an osprey nest on an intercoastal waterway navigational aid. A battery change required personnel to be in very close proximity to the nest and the Coast Guard requested assistance to protect both the nest and USCG personnel. This sort of cooperative effort between

the two agencies has helped a great deal with interagency PR and communications.

- i. On September 6, Refuge staff met with Dennis Luszc (NCWRC) and Otto Florschutz (East Coast Biologist) to discuss the construction of a cannon netting site over the water. On September 25 and 26, USFWS and NCWRC personnel constructed a net platform for the "over the water rocket set". Both agencies cooperated throughout banding season with advice, support, and technical assistance for each other in their banding programs.
- j. As a cooperative venture between the USFWS and the N. C. Marine Resources Center, the 1984 National Hunting and Fishing Day celebration was held on September 22. The day began with a youth fishing tournament. Seven Dare County piers were involved and approximately 150 youths competed for prizes. The afternoon expo was held at the N. C. Marine Resources Center. Approximately 30 activities/exhibits were planned and executed and over 1,200 people attended. Special duck stamp displays were highlights of the expo.
- k. On November 19, ORP Strawser met with representatives of the local chapter of the Audubon Society to discuss the "Adopt-A-Refuge" program. The Outer Banks Audubon Club is interested in refuge involvement. Possible activities suggested by the Pea Island staff included Audubon sponsored bird walks and participation in the refuge volunteer program.
- l. Again this year, Refuge staff, YCC and volunteers assisted John Weske of the Smithsonian Institute with the banding of terns on a spoil island in Oregon Inlet. Approximately 4,400 royal terns and 334 sandwich terns were banded.
- m. The Christmas Bird Count was again conducted on December 28.

2. Items of Interest

Probably the most significant "item of interest" for Pea Island in 1984 were the USFWS acquisitions of two new NWR's. Pea Island was designated as the temporary administrator for the two areas. Specific activities related to each refuge follows:

Alligator River NWR

On March 13, Travis McDaniel (RO) and Jerry Vits (RO) visited the area to tour the new land acquisition with Pea Island and Mattamuskeet NWR staffs.

On April 16, Pea Island staff members were advised of the formation of a committee to develop a proposal for the newly acquired Alligator River property. The USFWS and the N. C. Wildlife Resources Commission each will have a planning team. Pea Island was advised to take the lead in gathering and organizing information on the property.

During May, a great deal of time was spent preparing maps, attending meetings and becoming familiar with the Alligator River property. This effort involved all Refuge staff members.



"The question is - Now that we have 118,000 acres, what do we do with it?" 5/84 BWS

On May 23-24, Refuge staff, Travis McDaniel, Larry Ditto (Mattamuskeet NWR), and Otto Florschutz (East Coast Biologist) met with representatives from the N. C. Wildlife Resources Commission to discuss possibilities for the management of the Alligator River property.

On May 30, Refuge staff met informally with Dare County Manager Jack Cahoon concerning the Alligator River property.

On June 5, a meeting was held in Manteo to discuss fire protection on the Alligator River property. The meeting was attended by Travis McDaniel, Al Bonsack, and Howard Poitevint (FWS-RO); Jim Mills (Regional Solicitors Office); Alton Dunaway and Charlie Hebert (Pea Island); Jack Cahoon (County Manager); and Beau Green and staff (N. C. Forest Service). After the meeting Assistant Manager Hebert took Bonsack and Poitevint on a tour of the Alligator River property.

On June 15, Assistant Manager Hebert took Ben Schaefer (Washington Office - Realty) on a half-day tour of Alligator River.

July 10, Manager Dunaway and Assistant Manager Hebert traveled to Alligator River to evaluate the condition of (and verify the existence of) a hunting camp on Milltail Creek on Service land.



"The infamous Tull Hunting Lodge on Milltail Creek ..."
7/84 MAD

July 19, Assistant Manager Hebert met with George Henderson of Atlantic Forest Products to discuss the timber contracts on the Alligator River area.

During August, a good deal of time was spent with activities concerning Alligator River NWR. An equipment list was completed and the timber contract was examined in detail. Refuge staff stopped timber cutting by Atlantic Forest Products (AFP) on the expired timber lease. An arrangement was made to allow AFP to remove downed timber.

On August 16, Derb Carter (National Wildlife Federation) presented a seminar at the N. C. Marine Resources Center entitled "Our Newest National Treasure - Alligator River National Wildlife Refuge". ORP Strawser was on hand to make a brief explanation of the current status of the new refuge. Attendance was approximately 35 people.

On September 19, word was finally released that Alligator River NWR was officially open to public hunting, fishing, and trapping.

On October 10 and 11, Maintenance man Bruce Creef assisted Warren Parker (Endangered Species, Asheville, N. C.), Alex B. Montgomery (Senior Staff Specialist, RO), and Otto Florschtuz with reconnaissance of Alligator River NWR to locate areas for small mammal studies. These studies relate to an investigation into the feasibility of releasing red wolves on the Refuge.

October 23, Manager Dunaway presented a program on Alligator River NWR to the Stumpy Point Civic Club. Approximately 20 people attended the program.

November 16, Larry Spawn, Greensboro News and Record, interviewed Refuge staff for a feature article on Alligator River NWR.

Quite a bit of staff time during November was spent with L.E. activities on Alligator River NWR and preparations for the office start-up in January. A GSA order for office supplies and equipment has begun to arrive. Mobile radios were requisitioned and ordered. Paper work to transfer 2 vehicles to the new refuge was initiated (Ramcharger from Pea Island and Dodge pickup from Mattamuskeet NWR). Office furniture and equipment was collected from local refuges and moved to the new office location.

Currituck NWR

On May 21, Pea Island was notified that the deal for the Monkey Island tract in Currituck County was scheduled to be transferred to the USFWS in mid-June. Pea Island was advised to take the lead on gathering information on and becoming familiar with this area.



Monkey Island - Currituck NWR

6/84 BWS

On June 1, Refuge staff traveled to Currituck Banks for our first look at the new Refuge.

On June 6, Regional Office staff (McDaniel, Bonsack, and Poitevint) and Pea Island staff (Dunaway, Hebert, and Strawser) toured Monkey Island with The Nature Conservancy's Fred Onnand (N. C. Assistant State Director). Monkey Island caretaker Earl Baum gave a brief history of Monkey Island and some of its problems.

On August 1, applications were filed with the Currituck County Game Commission to register the hunting blinds bordering the Monkey Island tract in Currituck County. In mid-August the Refuge received a letter stating the applications had been denied pending a survey of the blind locations. The matter remained unsettled for three months.

Manager Dunaway and Regional Archeologist Jim Cobb visited Monkey Island on August 15. Jim conducted an inspection of the Monkey Island hunting lodge and associated structures to determine if any of the buildings were archeologically significant.

The deed for the Monkey Island tract in Currituck County was recorded on October 26. This action transferred 512 acres from The Nature Conservancy to the USFWS. During the month, an agreement was finally reached between USFWS (Pea Island) and the Currituck Game Commission to allow the registration of the 18 duck hunting blinds associated with the property.

On November 2, Pea Island received final word that all 18 blinds at Currituck NWR would be licensed to FWS for the year. The Currituck Game Commission implied that surveys and possible relocation or cancellation of several blinds may be necessary in the future to ensure the 500 ft. buffer zone requirement be met on all blinds.

Other items of interest are:

February 6-10, Assistant Manager Hebert attended Fire Management Training (S-190) at Blackwater NWR, Region 5.

Secretary Beverly Midgett attended the PAY/PERS training session in Atlanta on March 19 and 20.

Assistant Manager Hebert attended the L.E. refresher course on April 16-20.

On May 2, Assistant Hebert completed CPR re-certification in Kill Devil Hills.

Secretary Midgett attended the Small Purchases/Federal Supply Schedules training May 21-25 in Norfolk, Va.

During March, April, and part of May, Manager Dunaway participated in the 10 week L.E. course at FLETC in Glynco, Ga.



Returning home after 10 weeks at FLETC!

5/84 BWS



Laborer Angela Elmore receives Special Achievement Award for overall 1983 work performance. A late, but well-deserved award!!

4/84 BWS

On September 10 and 11, Hurricane Diana dominated the Refuge stage. All measures described in the Hurricane Contingency Plan were enacted. Except for minor beach erosion, no damage occurred.

As a result of winds and high tides associated with Hurricane Josephine, a 19th century wooden hull sailing schooner washed up on the refuge beach. The vessel, dating back to 1852, has been a focal point of public interest since its arrival.

On October 17, the 37' "Croaker", a commercial fishing trawler, sunk in Oregon Inlet. News media reported the boat hit a shoal in the inlet. Several days later, however, the entire boat was salvaged and floated to the Wanchese Harbor.

On November 17, during the Refuge pheasant hunt, a human skeleton was discovered in the marsh approximately one mile south of New Inlet. The Dare County Sheriff's Department was called in to investigate and the FBI was notified. The body was later positively identified as Thad Harris of Williamston, N. C. Mr. Harris drowned in a boating accident in August of 1982; his body was never recovered. He was 56 years old and a parapalegic at the time of his death.

3. Credits

The 1984 Annual Narrative Report was written by the following:

Introduction, A, H, J	Bonnie Strawser
B	Bonnie Strawser, Beverly Midgett
D, F, I	Alton Dunaway
E	Alton Dunaway, Beverly Midgett
G	Alton Dunaway, Scott Lanier

The report was edited by Bonnie Strawser and typed and compiled by Beverly Midgett.

THE REFUGE

Pea Island National Wildlife Refuge, established in 1938, is located along the Outer Banks of North Carolina. A midpoint in the Atlantic Flyway the refuge is a valuable feeding and resting area for thousands of wintering waterfowl including snow and Canada geese, whistling swans, and over 25 species of ducks.

Ocean beach, barrier dunes, salt marsh, tidal creeks and water impoundments comprise the majority of Pea Island's 5,915 acres. Intensive management practices serve to improve habitat and increase its use by a variety of wildlife.

REGULATIONS

SPECIES - Only pheasant and rabbit may be hunted on Pea Island. Either sex of pheasant may be taken. The hunting of all other wildlife is prohibited.

HUNT DAYS - Hunting is permitted on Saturdays beginning the last Saturday in October through the second Saturday in December. In addition to the Saturday hunts, hunting will also be allowed on Thanksgiving Day and the Friday afterwards. Rabbit hunting is permitted only on these days during the State rabbit season.

PERMITS - Permits are required to hunt throughout the season. To apply, complete and mail the attached application. Applicants must be 21 years of age or older and may apply only once per season. Applications must be received by October 15 and successful hunters will be notified by mail.

WEAPONS - Shotgun hunting only is permitted.

DOGS - The use of dogs is encouraged. A maximum of two dogs per hunting party is allowed.

HOW WILL PERMITS BE ISSUED?

Permit hunters will be chosen by random drawing at 1:00 PM on October 15. Eight applicants will be chosen for each hunt day. Successful applicants chosen will be issued advance permits to hunt one half-day. Four half-day permits will be issued for each morning and four for each afternoon hunt.

MAY I BRING A GUEST?

An adult permit hunter must be accompanied by a juvenile hunter ten to fifteen years of age. A maximum of two adult hunters and three youths may hunt in a party. An adult to youth ratio of 1:1 or 1:2 is required. Both adult and youth may harvest game.

CHECK IN - CHECK OUT - Each permit hunter will be required to check in at the refuge headquarters the day of the hunt and list all hunting members within their party. Hunt parties will then be assigned to one of the two hunting areas. Before departing, hunters must participate in a short orientation program in which regulations and hunter safety will be discussed.

After completing their hunt all hunters should check out at the refuge headquarters.

Federal and State laws prohibit any activity that might harm endangered or threatened plants or animals. We believe that these hunts can be conducted without harming any endangered species and have taken certain precautions to make them so. Please be aware of the following endangered and threatened wildlife you may encounter at Pea Island:

Bald Eagle
Peregrine Falcon
Brown Pelican

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

Place
Stamp
Here

RETURN ADDRESS

REFUGE MANAGER
PEA ISLAND NATIONAL WILDLIFE REFUGE
P.O. BOX 150
RODANTHE, N.C. 27968

VISITOR INFORMATION

Headquarters for Pea Island National Wildlife Refuge is located 6½ miles south of Oregon Inlet on N.C. Highway 12. Refuge staff is usually available from 8 - 4:30 weekdays to answer visitor questions or give refuge information. The refuge offers a wide variety of quality outdoor experiences.

We invite you to enjoy Pea Island. In order to ensure that the refuge is protected for future generations to enjoy, we ask that you obey the following regulations:

- Drive only on designated roads. Refuge beaches are closed to vehicles.
- Camping is prohibited.
- Firearms are prohibited.
- Please do not litter.

Ask about the following opportunities:

- Wildlife photography/observation.
- Outdoor classrooms.
- Conducted programs.

WARNING: Insects are abundant during the months of May through September, and appear throughout the year following a warm rain. Insect repellent and appropriate protective clothing are recommended.

For more information contact the Refuge Manager, Pea Island National Wildlife Refuge, P.O. Box 150, Rodanthe, N.C. 27968 or call (919) 987-2394.

NOTES

DON'T LITTER, HELP KEEP OUR WILD AREAS CLEAN.

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

Calendar of Wildlife Events



Pea Island
National Wildlife Refuge

CALENDAR OF WILDLIFE EVENTS

This calendar is meant to provide refuge visitors with a general guide to seasonal wildlife events. Weather may cause variations of one to two weeks.

JANUARY. . . High concentrations of ducks and geese. Ducks are best observed in North Pond. Geese can easily be seen from Highway 12 in New Field. Marsh hawks and kestrels are fairly common. Herons, egrets, ibis and several species of shorebirds can be seen easily in the pond and salt flat areas. Barn owls can be seen searching the marsh for food at dusk.

FEBRUARY. Waterfowl populations continue to be high. Likewise, the January trends with raptors, waders, and shorebirds continue.

MARCH . . . Spring shorebird migration causes numbers to increase. Brown pelicans congregate in the sound. Osprey are usually evident and begin nesting activity.

APRIL Shorebird migration continues in full force. Wading birds begin to establish rookery sites. The bounties of surf fishing include big blues, big croakers, trout, and an occasional red drum. Warm weather activities begin, including yellow-bellied sliders sunning themselves on pond banks, and mullet jumping in the ponds. Diamondback terrapins can be seen in the ponds as they surface to breathe.

MAY. A variety of terns return to the refuge and begin courtship and nesting activities. Of the many gulls, the laughing gull's courtship display is the most easily observed. Willets nest in dunes and high beach areas. Osprey hatching occurs. The first broods of black ducks and gadwalls appear, usually in the ponds. Occasionally, swallow-tailed kites can be seen. Surf fishing produces big blues, croakers, trout, flounder, sea mullet, and drum.

JUNE Duck broods are abundant in North Pond area. Black-necked stilts feign injury to lure intruders from their nests. Least terns, oystercatchers, black skimmers, and other shorebirds nest in colonies on the beach and on islands in North Pond. Surf fishing continues to yield blues, flounder, and croaker, and spots begin to show up. Crabbing begins to pick up. Loggerhead sea turtle nesting begins.

JULY Osprey fledglings leave the nest. Duck broods continue to be seen in North Pond. Surf fishing drops off with only smaller fish being caught. Fishing from the Bonner Bridge over Oregon Inlet at night produces large gray trout. Crabbing is excellent. Sea turtle nesting continues.

AUGUST. . . Brown pelican young (produced south of the refuge) begin to learn to fish and are evident off the beach and around Oregon Inlet. Bridge fishing continues to yield gray trout and small blues. Spanish mackerel and pompano begin to appear. Crabbing continues to be excellent. Sea turtle nesting drops off this month.

SEPTEMBER. Warbler and sparrow fall migrations begin with dikes providing the best observation areas. Raptor migration is evident with peregrine falcons being observed frequently. Teal migration begins through the refuge. Crabbing continues.

OCTOBER. . . Songbird, teal, and raptor migrations continue. Trout begin to get larger. Blue fish, puppy drum, and larger drum can be expected. Canada and snow goose migration becomes evident. Clamming becomes quite good, especially at low tide after a strong northeaster. Large number of cormorants can be observed this month and next.

NOVEMBER. Winter populations of gulls are highest now. Black-bellied plovers and willets may be seen on the beach. Peregrine falcons and other migratory raptors including kestrels, merlins, and sharp-shinned hawks frequent the refuge. The peak of swan migration occurs now. Numbers of ducks, geese, and coots are increasing. Lucky fishermen catch big blues, drum, or an occasional flounder.

DECEMBER. Pelagic birds can be seen off the beach, especially after strong northeast winds. Barn owls are seen frequently over the marsh at dusk. Waterfowl numbers grow by leaps and bounds. Whistling swans, Canada and snow geese, and approximately 25 species of ducks congregate and settle in for the winter.

YEAR-ROUND ON THE REFUGE

Muskrats, nutria, and otter can be seen scurrying over the dikes or swimming in the ponds. Colorful pheasants are abundant and can be seen almost anywhere on the refuge.

Beach combing is particularly productive after large storms and/or strong northeast winds.



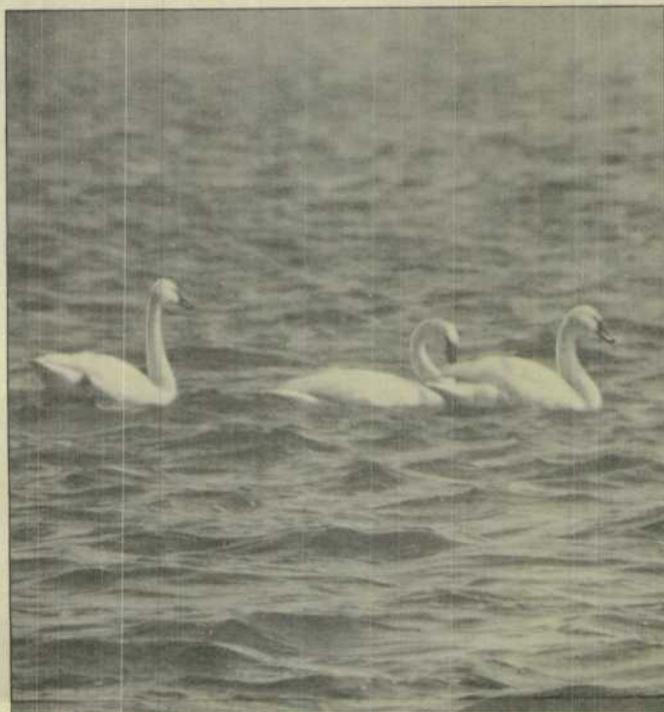
Pea Island National Wildlife Refuge is administered by the Fish and Wildlife Service on Cape Hatteras National Seashore. Pea Island is composed of 5,915 acres of coastal barrier island extending over 12 miles along North Carolina's "Outer Banks" from Oregon Inlet southward to the village of Rodanthe.

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

WILDLIFE

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

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



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

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

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

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

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

MANAGEMENT

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

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

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

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

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

RECREATIONAL OPPORTUNITIES

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

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

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

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

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

REGULATIONS

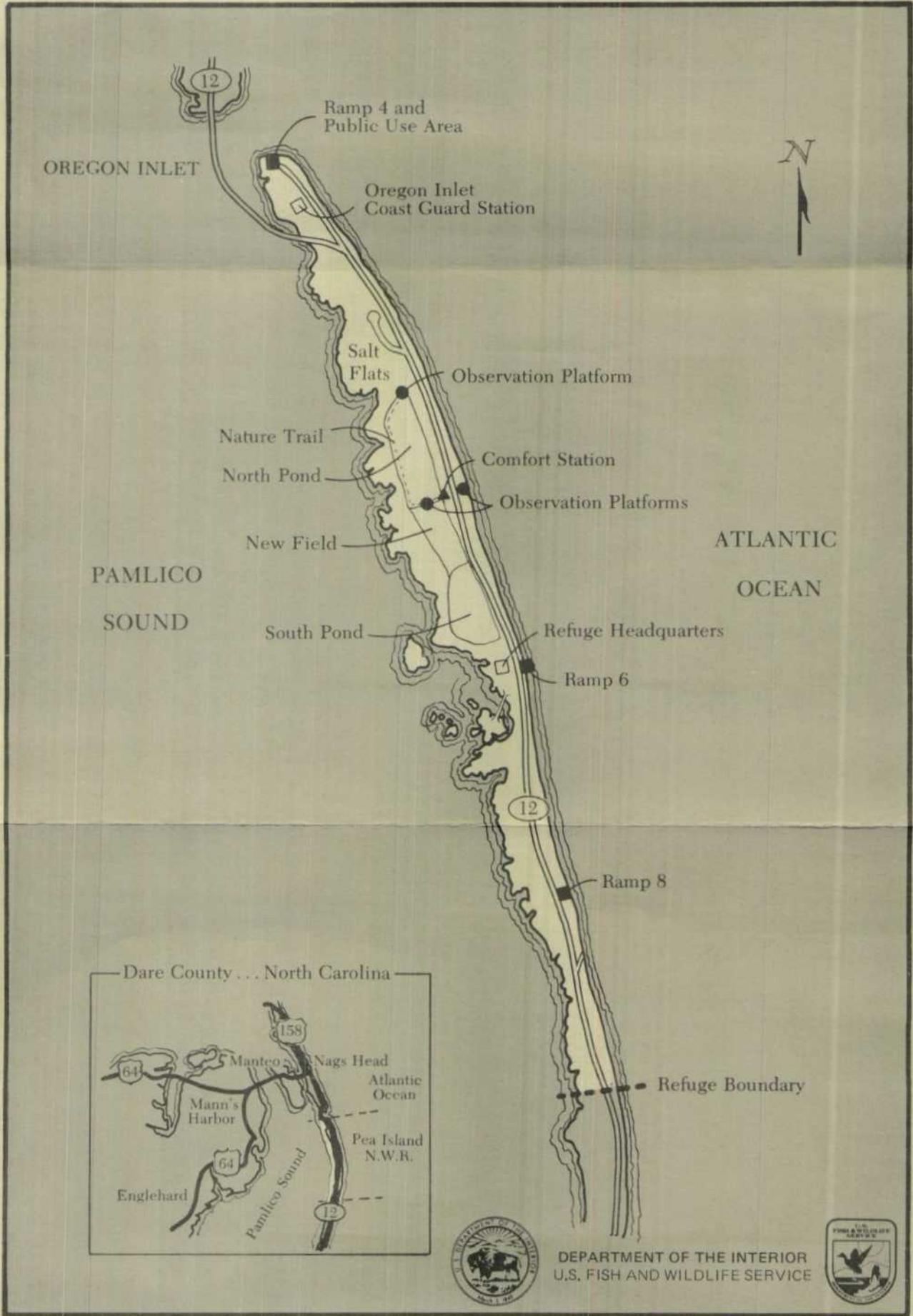
Visitors are requested to obey refuge signs to ensure that wildlife has a place to grow and survive for future generations to enjoy. It will be beneficial to inquire at the Refuge Office as to whether a specific activity is permitted or prohibited. Inquiries concerning the refuge should be directed to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

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

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

Fishing is allowed on the beach, not in the ponds.
Camping is prohibited. Check NPS camping areas on Bodie Island.
Fires are prohibited.
Pets on a leash are allowed on the beach. Pets are not allowed around the ponds.

Hunting is prohibited.
Weapons are prohibited.
Vehicles are allowed only in parking areas and on Highway 12.



Pea Island National Wildlife Refuge





WILDLIFE

**PEA ISLAND
National Wildlife Refuge**

- General Information
- Amphibians
- Reptiles
- Mammals
- Birds
- Birds
- Birds

General

Pea Island National Wildlife Refuge, located in Dare County, North Carolina, is one of over 400 national wildlife refuges nationwide administered by the U.S. Fish and Wildlife Service. Though each refuge was established to provide habitat for certain primary species, each is managed to provide for a diversity of wildlife and opportunities for public enjoyment of these natural resources. Wildlife observation is a popular pastime for millions of people each year. This publication is designed to help refuge visitors observe and identify the wildlife of Pea Island National Wildlife Refuge.

Established in 1938 as a wintering sanctuary for waterfowl, Pea Island contains 5,915 acres of coastal barrier island and 25,700 acres of Proclamation Boundary Waters in the Pamlico Sound. Management of the refuge provides diverse habitat types including beach, dunes, salt marsh, fresh and brackish water ponds and salt flats.

In observing the wildlife populations here, remember the dynamic nature of a barrier island. Over the years inlets open and close. The ocean overwashed intermittently during frequent winter storms. Sometimes all surface water is salty. Animal populations here generally have more limiting factors than other places. On an island the mere existence of a species may depend solely on its ability to swim or fly. Survival largely relates to its ability to tolerate the harsh salt environment. Is it any wonder that our richest diversity of wildlife is among the avian populations and our least diverse, the amphibians, who would dehydrate in salt water? Ponder these environmental factors as you observe refuge wildlife.

Wildlife observation can be very enjoyable. Field guides and binoculars might make the experience more rewarding. We encourage visitors to report any rare or unusual sightings to the refuge headquarters.

- **General Information**

- **Amphibians**

- **Reptiles**

- **Mammals**

- **Birds**

- **Birds**

- **Birds**

Amphibians

Toads, frogs and salamanders belong to the class Amphibia, derived from the Greek "amphibious" meaning "living a double life". Most members are aquatic and breath with gills as larvae; adults usually have lungs. Even adults, however, have thin, wet skin and must live in moist surroundings. Freshwater ponds, bogs and damp forest floors are ideal spots for amphibians. Such environments do not exist on this refuge. Few amphibians survive the salty environment of Pea Island; none thrive there.



Common Name	Status*
— Fowler's Toad	D
— Green Treefrog	D
— Squirrel Treefrog	D
— Bullfrog	E
— Southern Leopard Frog	D

* Documented - actual observations on the refuge are recorded.

Expected - species exist north and/or south of Pea Island; however, no documented observations on the refuge have been recorded.

- Amphibians

- Reptiles

- Mammals

- Birds

- Birds

- Birds

Reptiles

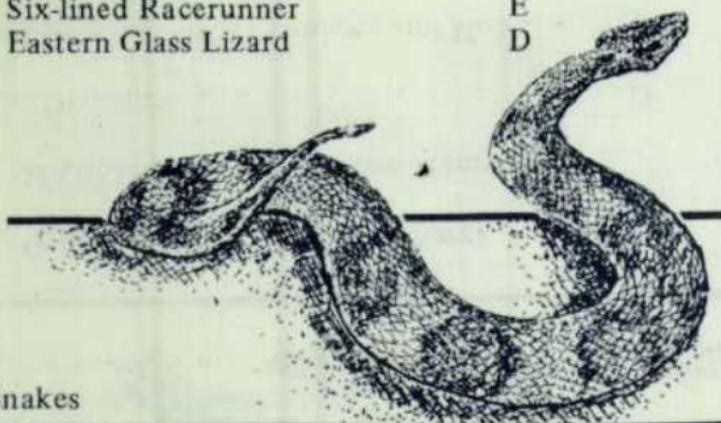
Many reptiles are as at home in water as they are on land. All are covered with scales or plates. Besides protecting these animals from injury and disease, this adaptation is an effective means of preventing water loss. Consequently, many reptiles live and thrive in the salty refuge environment.

Reptiles are also cold-blooded and utilize their surroundings to adjust their body temperatures. Basking in the sun is a class habit during cold weather; burrowing or staying submerged in water helps reptiles avoid extreme heat. On Pea Island you are most likely to observe reptiles on cool, sunny days.

Common Name	Status*
Turtles	
— Common Snapping Turtle	D
— Eastern Mud Turtle	D
— Diamondback Terrapin	D
— Yellowbelly Slider	D
— Loggerhead	D
— Atlantic Green Turtle	D
— Atlantic Hawksbill	D
— Atlantic Ridley	D
— Leatherback	D

Lizards

— Five Lined Skink	E
— Ground Skink	E
— Six-lined Racerunner	E
— Eastern Glass Lizard	D



Snakes

— Racer	D
— Corn Snake	D
— Rat Snake	E
— Eastern Hognose	D
— Eastern Kingsnake	E
— Carolina Salt Marsh Snake	D
— Rough Green Snake	E
— Brown Snake	D
— Eastern Ribbon Snake	E
— Eastern Garter Snake	E
— Eastern Cottonmouth (poisonous)	E

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• Reptiles

• Mammals

• Birds

• Birds

• Birds

Mammals

Mammals are often secretive and wary of humans, so you're not apt to see many of these individuals on a casual visit to the refuge. Try looking for animal signs: tracks, trails, scats, the remains of dinner, or their homes. Field guides that describe these signs are available in most book stores and are quite helpful in identifying mammals.

This checklist is divided into characteristic categories for your convenience. Notice that many typical mammalian species are absent here. As the barrier islands connect and disconnect and as the environment changes through the years, the species makeup will also change. What predictions can you make about these changes?



Order	Common Name	Status*
MARSUPIALIA: (Pouched Mammals)		
___ Opossum		D
INSECTIVORA: (Shrews and Moles)		
___ Southeastern Shrew		D
___ Least Shrew		E
___ Eastern Mole		E
CHIROPTERA: (Bats)		
___ Silver-haired Bat		D
___ Eastern Pipistrelle		E
___ Red Bat		E
___ Hoary Bat		E
___ Evening Bat		E
LAGOMORPHA: (Rabbits)		
___ Eastern Cottontail		D
___ Marsh Rabbit		D
RODENTIA: (Rodents)		
___ Rice Rat		D
___ Eastern Harvest Mouse		E
___ Hispid Cotton Rat		E
___ Meadow Vole		D
___ Muskrat		D
___ Norway Rat		D
___ House Mouse		D
___ Nutria		D
CARNIVORA: (Meat Eating Mammals)		
___ Gray Fox		E
___ Raccoon		D
___ Mink		D
___ River Otter		D

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• Mammals

• Birds

• Birds

• Birds

Birds

The diversity and abundance of birdlife on Pea Island explains its reputation of being a "birder's paradise". The refuge is an important wintering ground for tundra swans, snow geese, Canada geese and over 25 species of ducks. Many other interesting species can be found here during the winter months and the spring and fall migrations. During the summer months several species of herons, egrets and terns along with American avocets, willets, black-necked stilts and a few species of ducks nest on the refuge. Oceanic species can be expected during most any season offshore but are most common from late summer through the fall into late winter. Following storms many unusual species for this area have been observed.

This bird list is in accordance with the sixth A.O.U. Check-List. New names are used with the former name in parenthesis.

The seasonal occurrence and abundance of these avian species are coded as follows:

- a - abundant a common species that is numerous.
- c - common probable to be seen in suitable habitat.
- u - uncommon usually present, but not certain to be seen.
- o - occasional seen only a few times during a season.
- r - rare seen at intervals of 2 to 5 years.

Note: Accidental species (seen 1-3 times at Pea Island) are included but are listed as having no relative abundance.

- S - March-May
- S - June-August
- F - September-November
- W - December-February
- * - nests locally
- + - seasonal abundance refers to frequency offshore. Birds are occasionally observed on refuge, especially after a storm and/or strong winds.

	S	S	F	W
— Red-throated Loon	c		c	a
— Common Loon	c	r	c	c
— Pied-billed Grebe	c	o	c	a
— Horned Grebe	c		u	a
— Red-necked Grebe				r
— Eared Grebe				
— Western Grebe				
— +Northern Fulmar	a	o	a	c
— +Cory's Shearwater	u	u	u	
— +Greater Shearwater		c	c	
— +Sooty Shearwater	r	u	r	
— +Audubon's Shearwater		a	a	
— +Wilson's Storm-Petrel	r	a	a	
— White-faced Storm-Petrel				
— +Leach's Storm-Petrel	r	r	r	
— White-tailed Tropicbird				
— Northern Gannet	c	r	c	a
— American White Pelican				
— Brown Pelican	c	c	c	u
— Great Cormorant				o
— Double-crested Cormorant	a	r	c	c
— Anhinga				
— Magnificent Frigatebird				
— American Bittern	c	o	c	c
— *Least Bittern	u	u	o	
— Great Blue Heron	u	u	u	u
— Great Blue Heron (White Morph)				
— Great Egret (Common)	c	c	c	c
— *Snowy Egret	c	c	c	u
— *Little Blue Heron	c	c	c	u
— *Tri-colored Heron (Louisiana)	c	c	c	u
— Reddish Egret				
— *Cattle Egret	u	c	c	r
— *Green-backed Heron (Green Heron)	u	u	u	o
— *Black-crowned Night Heron	c	c	c	u
— *Yellow-crowned Night-Heron	r	u	u	r
— *White Ibis		o	o	r
— *Glossy Ibis	c	c	c	r
— Wood Stork				
— Greater Flamingo				

• Birds

• Birds

• Birds

	S	S	F	W
— Fulvous Whistling Duck (Fulvous Tree Duck)	r		r	u
— Tundra Swan (Whistling Swan)	c	r	c	c
— Greater White-fronted Goose	r			r
— Snow Goose	a	r	a	a
— Ross' Goose				r
— Brant			r	r
— Barnacle Goose			r	r
— Canada Goose	a	r	a	a
— Wood Duck	r		r	r
— *Green-winged Teal	a	r	a	a
— *American Black Duck	a	u	a	a
— *Mallard	u	o	u	u
— Northern Pintail	c		a	a
— *Blue-winged Teal	a	o	a	r
— Northern Shoveler	c		c	c
— *Gadwall	c	c	c	u
— Eurasian Wigeon (European Wigeon)				r
— American Wigeon	c		c	a
— Canvasback	u		u	c
— Redhead	u		c	c
— Ring-necked Duck	c		c	c
— Greater Scaup	c	r	u	c
— Lesser Scaup	c		u	c
— Common Eider				r
— King Eider				
— Oldsquaw	u		r	u
— Black Scoter (Common)	c		u	c
— Surf Scoter	c		u	a
— White-winged Scoter	u		u	u
— Common Goldeneye	r		r	o
— Bufflehead	c	r	e	e
— Hooded Merganser	u		u	c
— Common Merganser	u		u	u
— Red-breasted Merganser	a	r	e	a
— Ruddy Duck	e	r	c	c
— Black Vulture	r	r	r	r
— Turkey Vulture	r	r	r	r
— *Osprey	u	u	c	
— American Swallow-tailed Kite				
— Bald Eagle	r	r	r	r
— Northern Harrier (Marsh Hawk)	c		c	c
— Sharp-shinned Hawk	o		a	u
— Cooper's Hawk	r		r	r
— Red-shouldered Hawk	r		r	r
— Swainson's Hawk				
— Red-tailed Hawk	r		r	r
— Rough-legged Hawk				
— Golden Eagle				
— American Kestrel (Sparrow Hawk)	c		a	a
— Merlin (Pigeon Hawk)	u		c	u
— Peregrine Falcon	u		c	u
— *Ring-necked Pheasant	c	c	c	c
— *King Rail	c	c	c	c
— Virginia Rail	u	o	u	u
— Sora	c	u	a	u
— *Purple Gallinule	r	r	r	
— *Common Moorhen	u	u	u	r
— American Coot	a	r	a	a
— Black-bellied Plover	a	u	a	c
— Lesser Golden Plover	r		o	r
— *Wilson's Plover	u	o	u	u
— Semipalmated Plover	c	u	c	u
— *Piping Plover	u	u	u	u
— *Killdeer	u	u	u	u
— *American Oystercatcher	c	u	u	r
— *Black-necked Stilt	u	c	c	
— *American Avocet	u	u	u	r
— Greater Yellowlegs	a	c	a	c
— Lesser Yellowlegs	a	c	a	u
— Solitary Sandpiper	u	o	u	o
— *Willet	c	c	c	u
— Spotted Sandpiper	c	u	c	o
— Upland Sandpiper (Plover)	o	o	o	
— Whimbrel	c	r	c	o
— Long-billed Curlew				u
— Hudsonian Godwit	r	r	u	
— Bar-tailed Godwit				
— Marbled Godwit	o	u	c	u
— Ruddy Turnstone	a	u	a	u
— Red Knot (Knot)	c	u	c	u
— Sanderling	a	c	a	a
— Semipalmated Sandpiper	a	c	a	u
— Western Sandpiper	c	u	a	c
— Least Sandpiper	a	c	a	u
— White-rumped Sandpiper	o	r	c	
— Baird's Sandpiper		u	u	
— Pectoral Sandpiper	u		c	r
— Purple Sandpiper				
— Dunlin	a	u	a	c
— Curlew Sandpiper				
— Buff-breasted Sandpiper			r	
— Ruff				
— Short-billed Dowitcher	c	c	a	u
— Long-billed Dowitcher	u	r	c	u
— Common Snipe	a	r	c	a
— American Woodcock	r		r	r
— Wilson's Phalarope	r	r	u	
— +Red-necked Phalarope (Northern)	c		c	
— +Red Phalarope	c		c	r
— +Pomerine Jaeger	u	u	c	r
— +Parasitic Jaeger	r	u	u	
— +Long-tailed Jaeger	u		u	
— *Laughing Gull	a	a	a	u

• Birds

• Birds

	S	S	F	W
Little Gull				
Common Black-headed Gull				
Bonaparte's Gull	c		u	c
Ring-billed Gull	a	c	a	a
*Herring Gull	a	c	a	a
Iceland Gull				
Lesser Black-backed Gull				u
Glaucous Gull	r			r
*Great Black-backed Gull	c	c	c	a
+Black-legged Kittiwake		r	u	c
*Gull-billed Tern	c	c	u	
*Caspian Tern	u	u	c	o
*Royal Tern	c	c	c	u
*Sandwich Tern	c	c	c	
Roseate Tern	r	r	r	
*Common Tern	c	c	c	r
Forster's Tern	a	c	r	a
*Least Tern	c	c	c	
+Bridled Tern		c	u	
Black Tern	u	c	a	
*Black Skimmer	c	c	c	u
Dovekie	r		r	r
Thick-billed Murre				
Razorbill				r
White-winged Dove				
*Mourning Dove	u	u	u	u
Black-billed Cuckoo	r		r	
*Yellow-billed Cuckoo	u	u	c	
*Common Barn-Owl	o	o	o	o
Snowy Owl				
Short-eared Owl	o		u	u
Northern Saw-whet Owl				
*Common Nighthawk	o	o	o	
Chuck-will's Widow	r	r	r	
Chimney Swift	o	o	o	
Ruby-throated Hummingbird	o	u	u	
Belted Kingfisher	u	u	c	c
Red-headed Woodpecker			o	
Yellow-bellied Sapsucker	u		c	u
*Downy Woodpecker	u	u	u	u
Hairy Woodpecker	r		r	r
*Northern Flicker (Common, yellow-shafted)	u	u	a	c
Olive-sided Flycatcher			r	
Eastern Wood-Pewee	u	u	u	
Yellow-bellied Flycatcher			r	
Acadian Flycatcher			r	
Eastern Phoebe	u		u	u
*Great Crested Flycatcher	u	u	u	
Western Kingbird			u	
Eastern Kingbird	c	c	c	
Gray Kingbird				
Scissor-tailed Flycatcher				
Horned Lark	r		r	r
Purple Martin	u	u	c	
Tree Swallow	c	u	a	u
Northern Rough-winged Swallow (Rough				
winged)	r		r	
Bank Swallow	o		u	
Cliff Swallow			r	
*Barn Swallow	a	a	a	
Blue Jay	r	r	r	
American Crow (Common)	u	u	u	u
*Fish Crow	c	c	c	c
*Carolina Chickadee	u	u	u	u
Red-breasted Nuthatch	c		c	
White-breasted Nuthatch	r		r	
Brown Creeper	o		c	u
*Carolina Wren	c	c	c	c
House Wren	u		c	u
Winter Wren	o		u	o
Sedge Wren (Short-billed Marsh Wren)	c		c	c
*Marsh Wren (Long-billed Marsh Wren)	c	c	c	c
Golden-crowned Kinglet	u		c	u
Ruby-crowned Kinglet	c		c	c
Blue-gray Gnatcatcher	o		u	
Veery	u		u	
Gray-cheeked Thrush	o		u	
Swainson's Thrush	o		c	
Hermit Thrush	o		c	o
Wood Thrush			r	
American Robin	u	u	c	c
*Gray Catbird (Catbird)	a	a	a	c
*Northern Mockingbird (Mockingbird)	u	u	u	u
*Brown Thrasher	u	u	u	u
Water Pipit	u		u	u
Sprague's Pipit				
Cedar Waxwing	u		u	c
Loggerhead Shrike			r	r
*European Starling (Starling)	c	c	c	a
*White-eyed Vireo	u	c	c	a
Philadelphia Vireo			o	
*Red-eyed Vireo	u	u	u	
Blue-winged Warbler				
Tennessee Warbler	r		u	
Orange-crowned Warbler	u		u	c
Nashville Warbler			u	
Northern Parula (Parula Warbler)	c		c	
*Yellow Warbler	u	c	c	
Chestnut-sided Warbler			r	
Magnolia Warbler			c	
Cape May Warbler			c	
Black-throated Blue Warbler	u		c	
Yellow-rumped Warbler (Myrtle)	a		a	a
Black-throated Green Warbler			u	
Blackburnian Warbler			r	
Yellow-throated Warbler			r	
Pine Warbler			u	
*Prairie Warbler	u	a	a	

	S	S	F	W
— Palm Warbler	c		a	c
— Bay-breasted Warbler			r	
— Blackpoll Warbler	c		c	
— Black-and-white Warbler	u		c	
— American Redstart	c		a	
— Prothonotary Warbler	o		o	
— Ovenbird	r		r	
— Northern Waterthrush	o		e	
— Louisiana Waterthrush	u		u	
— Connecticut Warbler			r	
— *Common Yellowthroat	c	c	a	u
— Hooded Warbler			r	
— Wilson's Warbler			r	
— Canada Warbler			r	
— *Yellow-breasted Chat	o	o	u	o
— Summer Tanager	o		r	
— Scarlet Tanager			r	
— *Northern Cardinal (Cardinal)	c	c	c	c
— Rose-breasted Grosbeak			u	
— Blue Grosbeak			u	
— Indigo Bunting	o		u	
— Dickcissel			u	
— *Rufous-sided Towhee	a	a	a	a
— American Tree Sparrow (Tree Sparrow)			r	r
— Chipping Sparrow	o		c	o
— Clay-colored Sparrow			u	
— *Field Sparrow	u	u	c	u
— Vesper Sparrow			c	u
— Lark Sparrow		u	c	u
— Lark Bunting				
— Savannah Sparrow (Ipswich)	a		a	a
— Grasshopper Sparrow			u	o
— Sharp-tailed Sparrow	a		a	a
— *Seaside Sparrow	a	c	a	a
— Fox Sparrow	o		u	o
— *Song Sparrow	a	a	a	a
— Lincoln's Sparrow			u	
— Swamp Sparrow	o		a	a
— White-throated Sparrow	u		a	u
— White-crowned Sparrow			c	o
— Dark-eyed Junco (Slate-colored)	u		u	u
— Lapland Longspur				
— Snow Bunting	o		o	o
— Bobolink	c		c	
— *Red-winged Blackbird	a	a	a	a
— *Eastern Meadowlark	c	c	c	a
— Western Meadowlark				
— Rusty Blackbird			r	
— *Boat-tailed Grackle	a	a	a	a
— *Common Grackle	r	r	r	r
— Brown-headed Cowbird	c		c	c
— *Orchard Oriole	u	u		
— Northern Oriole (Baltimore)			a	
— Purple Finch			u	u
— Common Redpoll				
— Pine Siskin			u	u
— American Goldfinch	u		c	u
— Evening Grosbeak			r	
— *House Sparrow	u	u	u	u