

UNITED STATES GOVERNMENT

Memorandum

TO : Regional Director, Atlanta, GA

DATE: August 4, 1977

FROM : Refuge Manager, Mattamuskeet NWR Complex

SUBJECT: Narrative Report - July 1, 1975 through December 31, 1975

Mattamuskeet NWR

Weather conditions were near normal. Moderate rainfall resulted in little runoff. This, along with increased evaporation, brought about a slight lowering of lake waters. Various species of spikerush grew on exposed mudflats and wild celery grew well in areas which were permanently flooded.

The only construction done during this period involved temporary repairs to the Lake Landing bridge. Additional pilings and stringers were put under the bridge after a loaded grain truck almost collapsed the bridge.

The usual seasonal maintenance was accomplished - for example, dike and road bank mowing, equipment maintenance, etc. In addition, approximately 1/2 mile of drainage canal in Farm Area (FA) 5 was cleared out.

Refuge croplands (385 acres) are cooperatively farmed. The refuge takes its share (25%) entirely in corn. Yields were approximately 112 bushels per acre for corn, and 28 bushels for soybeans. Approximately 250 acres in FA's 4 and 5 were aeriually seeded to wheat and barley. A good stand of green browse resulted.

Additional plowing was done in the natural marshes. Approximately 110 acres of cattail were disked in Marsh Impoundment (MI) 3 before rain brought a halt to the work. Water level manipulation and vegetative response in the impoundments was similar to past years.

A second attempt was made to sell 125 acres of mixed pine/hardwood timber. No bids were received. This was attributed to large scale land clearing operations, creating a buyers' market; and to the conditions of sale stipulated by the Service.

Three bald eagles, two adult and one juvenile were observed off and on during this period.



An estimated 105 wood ducks were produced from 69 nest boxes and an additional 50 from natural cavities.

As usual, waterfowl populations began to build in late August, and peaked by early December. Peak populations were as follows: Canada geese, 21,400; snow/blue geese, 1,400; whistling swans, 20,000; ducks (all species), 74,000; and coots, 20,000.

Banding accomplishments for the period were: 29 osprey, 42 wood ducks, and 200 Canada geese. The geese were banded as part of a 5-year study which involves fitting 200 geese annually with plastic neck collars. A similar study is being carried out at nearby Pungo NWR. Observations of individually coded neck collars over a period of years will indicate the movement patterns of these geese.

An osprey production survey has been conducted since 1973. Results of the surveys are summarized below:

	<u>1973</u>	<u>1974</u>	<u>1975</u>
Number of active nests	24	34	32
Number Produced	19	41	29
Recruitment (Young/Nest)	.79	1.21	.91

Populations of other wildlife species were near normal.

Refuge employees Garland Swain and Thomas Sanderson assisted the Division of Law Enforcement during the first week of dove season. Several cases were made.

On December 10th Regional Director Black and Assistant Refuge Supervisor Rudolph came to the refuge to discuss matters of mutual concern with Bob Hester, Executive Director of Mattamuskeet Waterfowl Tomorrow.

All public use visits were wildlife oriented, primarily fishing, wildlife observation and crabbing.

Mrs. Sally Fisher, refuge clerk for 25 years, retired July 5. Sally's cheerful attitude and ready smile will be missed.

Mrs. Dianna J. Daniels entered on duty December 8, 1975 as Clerk (Typing). Mrs. Daniels transferred from Pungo NWR.

Maintenanceman Earl Basnight retired effective December 31.

Swanquarter NWR

Swanquarter is a satellite of Mattamuskeet NWR, and is approximately four miles SE of the master station. Swanquarter's primary value is as a staging area for diving ducks prior to the northern migration. Population peaks were: canvasbacks, 12,000; buffleheads, 6,000; scaup, 3,000; ruddy ducks, 3,000; and common scoter, 1,600.

An unusual sighting of an adult bald eagle was made December 20.

Swanquarter is undeveloped except for a 1100' fishing pier, residence, public restroom and associated sewage treatment plant. The pier attracted approximately 7,000 fishing visits.

On December 23, while investigating the cause of a fire on Judith Island, Assistant Manager Garland Swain met two men who had boat trouble. These two had set the fire to draw attention to themselves so that they would be rescued. They told Swain when he picked them up that there were three other in their party duck hunting on a nearby island. Garland then went to the island where he found the three with their guns propped against a refuge boundary sign. In addition to the other ducks in their possession, they also had two canvasbacks. Needless to say, Garland was not the form of rescue they had hoped to attract.

Cedar Island NWR

Cedar Island is also a satellite of Mattamuskeet. The budget for this refuge is not sufficient to cover fixed costs such as utilities, salaries and vehicle repairs. Therefore, the two employees, a Biological Technician and Maintenceman, are primarily involved with routine maintenance.

The only construction project was the building of a new boat dock at Lewis Creek. Hand rails were added for safety.

There is no management of Cedar Island's extensive salt marshes.

Relatively few waterfowl are attracted to the waters surrounding the refuge. The peak population of 4,300 ducks consisted of 700 blacks, 600 pintail, 600 bufflehead, 350 green-winged teal, and small numbers of other ducks and mergansers.

The most northern breeding colony of the endangered brown pelican is located near Cedar Island. A July survey of the refuge revealed that there were 197 adults and 65 sub-adults present.

High tides destroyed 100 common tern nests on Tump Island. Some renesting occurred.

Cedar Island was the scene for several incidents of vandalism. One employee's automobile tires were slashed, and the traffic counter hose was cut, and the canvas top was ripped off the boat, the bilge lines cut and the plug pulled. Fortunately, the tide was out and when the boat sank water did not get into the motor.

James H. Roberts
James H. Roberts

Bureau of Fisheries
8/25/77

Refuge Manager, PFI
Assistant Refuge Manager, PFI
Clark-Typist, PFI
Maintenance Worker, PFI

N. P. Williamson, Jr.
Jack H. Hagan
Beverly Hagan
Joseph B. Green

Refuge Staff

Supplemental and
(July 1, 1975 to December 31, 1975)

PEA ISLAND NATIONAL WILDLIFE REFUGE

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SUPPLEMENTAL ANR
July 1, 1975 - December 31, 1975

I. GENERAL

Climatic conditions were normal for this period. Rainfall was 4 inches below average but this caused no problems.

II. CONSTRUCTION AND MAINTENANCE

Routine maintenance occupied much time.

III. HABITAT MANAGEMENT

A. Croplands

Planted 50 acres winter pasture for geese in the high area of New Field.

B. Grasslands

Prescribed burns were conducted on 30 acres in New Field and 115 acres on the south end of the refuge.

C. Wetlands

All refuge impoundments, totalling 1,300 acres, were kept at full pool levels, or as near so as possible. Salinity readings were high for New Field, 50.13‰ in September, while North and South Pond was much lower, 7.61‰ and 12.89‰ respectively.

D. Forest Lands

NA

E. Other Habitat

Approximately 1,000 acres of Pea Island is in this category. This area consists of ocean beach and associated sand dune systems. No active management is carried out in this habitat.

F. Wilderness and Special Areas

NA

NA

IV. WILDLIFE

A. Endangered and Threatened Species

1. Peregrine Falcon

No special surveys were made, however; when a sighting was made it was recorded. Fourteen sightings were made this period. The peregrine study will be continued next year.

2. Atlantic Loggerhead Sea Turtle

Seven natural nests and 9 false crawls were found during this period. These nests contained 669 eggs, of which an unknown number hatched (several nests were left on the beach to hatch naturally). Additionally 10 nests containing 1,357 eggs were transplanted to Pea Island from Cape Romain NWR. 748 hatched and were released.

3. Least Terns

Four colony attempts were noted on the refuge. All four colonies were posted. A total of 80 birds were fledged.

B. Migratory Birds

1. Waterfowl

Use days for this period were up for all groups over the same time period in 1974; swan up 231%, geese up 216%, ducks 191%, and coots 306%.

2. Marsh and Water Birds

Marsh and water bird populations were comparable to those of previous years. Production for this period was as follows: 110 glossy ibises, 55 great egrets, 55 snowy egrets, 150 Louisiana herons, 36 little blue herons, 7 cattle egrets, and 110 black-crowned night herons.

3. Shorebirds, Gulls, Terns and Allied Species

Populations of these species have remained stable for several years.

4. Raptors

3.

Normal populations of sharp-shinned hawks, Cooper's hawks, kestrels and merlins were observed in the fall migration.

5. Other Migratory Birds

Mourning doves produced 25 young this period.

C. Mammals and Non-Migratory Birds

1. Game Mammals

Nutria produced an estimated 75 young this year. Their populations are increasing on the refuge. Muskrats added 300 young to their population and river otters 10.

2. Other Mammals

Feral cats are numerous on the refuge with a population near 150. These cats pose a threat to other wildlife, so we eliminate every cat we find.

3. Resident Birds

Two-hundred ring-necked pheasants were produced by the Pea Island populations.

4. Other Animal Life

Other wildlife populations remained stable.

V. INTERPRETATION & RECREATION

A. Information & Interpretation

1. On-refuge

Eight programs were presented that totalled 700 activity hours.

2. Off-refuge

NA

C. Items of Interest

5.

NA

D. Safety

Monthly safety meetings were held. Topics for discussion included: defensive driving tips, fire prevention, proper use of power tools and other safety items. No lost time accidents occurred this period.

PEA ISLAND NATIONAL WILDLIFE REFUGE

Narrative Report

**Calendar Year 1976
(January 1, 1976 to December 31, 1976)**

Refuge Staff

N. F. Williamson, Jr.

Jack H. Hagan

Thomas J. Smith III

Beverly Midgett

Joseph B. Creef

Refuge Manager, PFT

Assistant Refuge Manager, PFT

(Transferred to Cape Romain 5/23/76)

Assistant Refuge Manager, PFT

(EOD 5/24/76)

Clerk-Typist, PFT

Maintenance Worker, PFT

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I. GENERAL

A. Introduction

Pea Island National Wildlife Refuge, established by Executive Order # 7864 on April 8, 1938 is located in Dare County, North Carolina.

Occupying the northern 13 miles of Hatteras Island on the Outer Banks, the refuge contains some 5,915 acres of ocean beach, barrier dunes, brushland, fresh water impoundments, brackish and salt marsh. Additionally, 25,700 acres of Pamlico Sound adjacent to the western shore of Pea Island are included as Presidential Proclamation Waters.

By act of Congress the refuge was included in the Cape Hatteras National Seashore Recreational Area.

B. Climatic and Habitat Conditions

Weather for 1976 deviated somewhat from the norm. Between January first and the end of April, rainfall was 10.21 inches below average, totaling a mere 5.11 inches. Early summer brought a return to the normal weather pattern. By mid-summer rainfall was increasing, and during July and August 5.31 inches more than normal was recorded on the refuge. Drought conditions prevailed again from September through December. For the year, precipitation was 8.44 inches below average.

The increased rainfall during July and August prevented the three refuge impoundments from going dry. Consequently, adequate stands of aquatics were available for waterfowl food in the fall.

In addition too, much needed rain, the months of July and August brought scorching heat. Rarely does the mercury creep above the 90 degree mark here on the Outer Banks. In July, 17 straight days saw this or higher temperatures. The low for the year was on the tenth of January with a temperature of 10 degrees.

Periodic winter storms continued to erode refuge beaches. In two areas the primary dunes are being slowly eaten away. (See photos after C. Land Acquisition.)

C. Land Acquisition

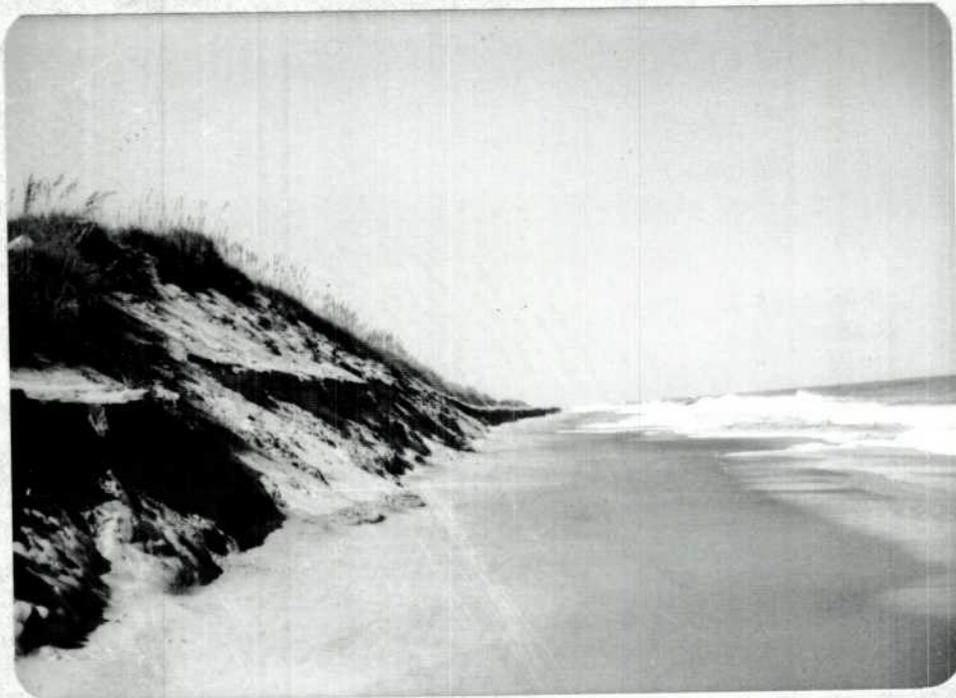
1. Fee Title

NA

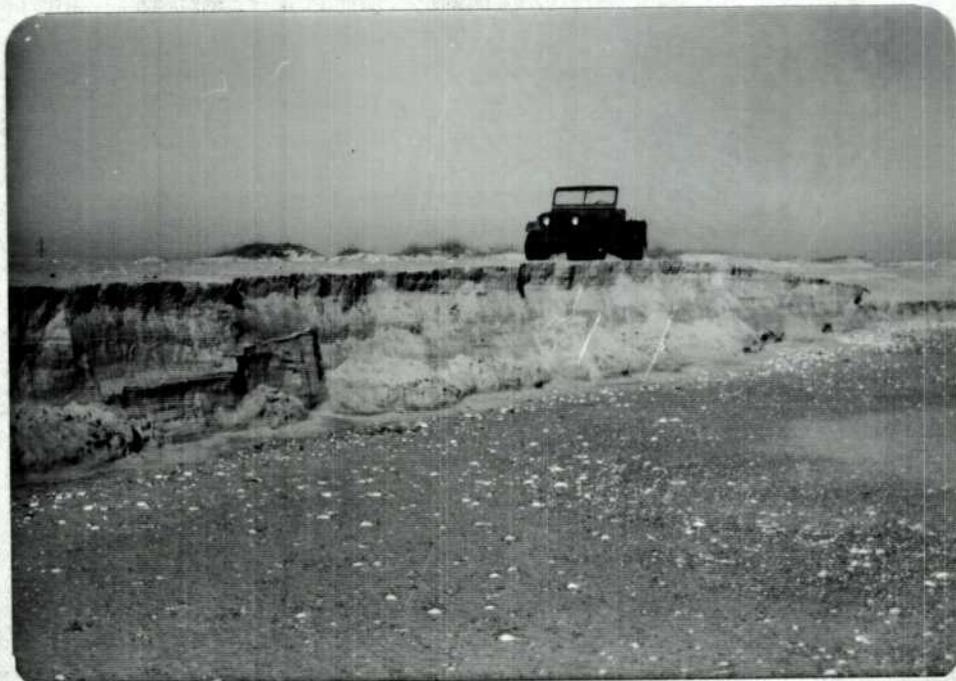
2. Easements

NA

NA



Sand dune slowly being eroded by the ocean. Pea Island slowly disappears as the Atlantic advances westward. This photo was taken 1 mile north of the refuge headquarters, opposite South Pond.



More beach erosion.

D. Systems Status

3.

1. Objectives

Pea Island is the southern most in a chain of four refuges set up to provide wintering grounds for the greater snow goose (the other refuges being Brigantine, Chincoteague, and Back Bay).

Although the snow goose receives the major thrust of refuge work, many additional species accrue benefits. Over the years other objectives have been defined.

Once one of the major northern nesting beaches for the Atlantic loggerhead sea turtle, Pea Island is little used now by this species. Beginning in 1970 intensive management was begun in an attempt to restore the species to its former level.

Located on an important migratory pathway for the peregrine falcon, Pea Island serves as both a temporary rest stop and permanent wintering ground for individuals of this species.

Two areas of the refuge are actively managed to provide suitable shorebird habitat.

2. Funding

Although the refuge budget has increased steadily in the past years it has not kept pace with inflation. Overall our spending capabilities were \$8,000. less in 1976 than in 1975 and projected to be \$12,000. less in 1977 than for 1975.

Two permanent full time positions have been lost at Pea Island and not replaced. The maintenanceman's slot was vacated in 1975 and was re-filled with a part time position. The assistant manager's position, vacated in May, was also filled on a PPT basis.

Projected needs for the future include returning the assistant manager and maintenanceman to PFT status. Additional manpower in the form of a Biological Technician and a laborer would aid in attaining our objectives. Seasonal laborers, TPT 700 hours, could be utilized to fullfill cyclic maintenance requirements.

II. CONSTRUCTION & MAINTENANCE

A. Construction

Christmas came to Pea Island early this year with the delivery of a new Caterpillar D-6C bulldozer on December 7. Little use was made of this piece of equipment this year. In coming years it will dramatically increase our capability for marsh rehabilitation. A greater area will be rehabilitated in less time than was possible with the refuge's old D-4. As the marsh is rehabilitated Pea Island will be able to meet its water-fowl maintenance objectives.

B. Maintenance

4.

Routine maintenance was carried out as usual. Included was mowing dikes, painting signs and buildings, and keeping our motor vehicles in operating order.

C. Wildfire

None.

III. HABITAT MANAGEMENT

A. Croplands

In the past, a 50 acre section of high ground adjacent to the New Field impoundment was planted in winter rye to provide green browse for geese. Due to the sky-rocketting costs of seed and fertilizer this was not done in 1976. It is felt that enough food grows naturally or in other managed areas so that the green browse is not needed. Other management techniques such as controlled burning, plowing, and disking are as effective in providing food as farming and much less expensive.

B. Grasslands

No true grasslands are found on Pea Island.

C. Wetlands

Our ability to manipulate the water level in refuge impoundments at present is minimal. The level is raised by closing the stop log structures to catch rainwater or by opening the stop logs to allow windblown soundwater to enter the impoundments. It is obvious that mother nature must be cooperative when we wish to manipulate the salinity or water levels and this is seldom the case.

The program scheduling effort conducted this year for FY 1977 included several packages designed to alleviate this problem by providing for pumps to move water from impoundment to sound or vice versa at our discretion. We are hoping the BLHP provides the funding to implement these packages.

Control of water level and salinity allows us to produce conditions which promote growth of plants utilized by waterfowl for food.

In the marsh areas two methods of control are exercised over undesirable plants; controlled burns and disking. Burning is most effective in high marsh areas. The fire kills encroaching vegetation and the ash produced serves as a natural fertilizer which enhances the growth of food plants which grow after the burn. The problem with burning, especially when dealing with woody shrubs, is that the roots are seldom killed. This means the plant sprouts back from the roots. At Pea Island we have found that burning followed by disking is very effective against woody plants. Disking incorporates the burned remains into the soil and exposes the roots to the air which kills them.

25% COTTON CONTENT



Snow geese utilizing recently burned area south of New Inlet.

6.

In low marsh areas which are too wet to burn, disking is good for plant control. About 1,000 acres were subjected to burning and/or disking operations this year. In these areas the amount of waterfowl use was much higher than in past years.

D. Forestlands

None on the refuge.

E. Other Habitat

Although Pea Island contains about 2,000 acres classed as other habitat (all of it beach or barrier dunes) no active manipulation of this habitat is carried out. Because the vegetative cover of the dunes is very fragile, measures are taken to protect and preserve this area as it is. Picking sea oats (the dominant plant type) is strickly forbidden as is driving beach vehicles in the dunes areas.

F. Wilderness or Special Areas

None.

G. Easements for Waterfowl Management

None.

IV. WILDLIFE

A. Endangered and/or Threatened Species

1. Atlantic Loggerhead Sea Turtle

The Atlantic loggerhead sea turtle is considered endangered by the state of North Carolina and is proposed to be listed with the U. S. Government as well.

Historically it utilized the beaches of Pea Island rather extensively for nesting. In recent times, however; the nesting population has been very small, averaging five nests per year since 1971. This year there were eight recorded nests with a total of 751 eggs. A total of 349 young turtles were released, the remainder being completely infertile eggs, eggs which didn't hatch, young which died in the nest, or those lost from other causes. (See photos on next page).

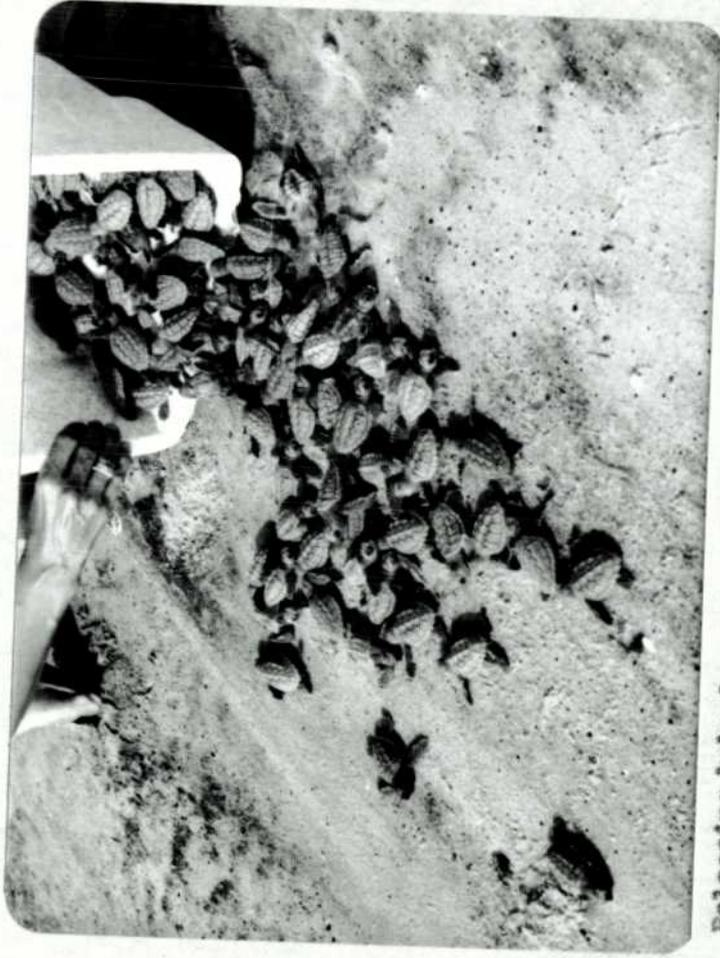
The egg transplant project between Pea Island and Cape Romain was cancelled this year due to egg poaching problems at Cape Romain. If conditions are favorable in 1977 we will try to continue the program.



Exclosure for protecting transplanted turtle nests. This facility is located near the refuge office to maximize protection of the resource.



Hatchling loggerheads in wire cylinder which enclosed nests.



Releasing baby loggerheads into the ocean.



Young turtles crawl towards the ocean and an uncertain future.

2. Merlin, Peregrine Falcon, Osprey

9.

Pea Island is on the migratory pathway of both the merlin (threatened) and peregrine falcon (endangered). Sightings of these two species were recorded and regular surveys made in the spring and fall. A summary of sightings by month appears below.

<u>Month</u>	<u>Peregrine</u>	<u>Merlin</u>	<u>Month</u>	<u>Peregrine</u>	<u>Merlin</u>
January	7	0	July	0	0
February	3	0	August	0	0
March	2	0	September	11	6
April	6	0	October	21	4
May	0	0	November	1	0
June	0	0	December	1	2

The osprey is a regular summer visitor to the refuge. Although they are often observed hunting in the refuge impoundments, none have utilized the nesting platforms which were erected on the refuge in 1974. The nearest active nests are on Roanoke Island some five miles distant.

3. Least Terns

This species is considered endangered by the state of North Carolina. In 1976 two nesting colonies were posted as closed areas. Unfortunately bad weather and human interference reduced production to zero. A summary of nesting activity on the refuge for 1970 to 1976 is given below.

<u>Year</u>	<u># Colonies</u>	<u># Breeding Pairs</u>	<u># Young to Flight Stage</u>
1970	0	0	0
1971	1	35	15
1972	1	20	0
1973	2	35	0
1974	2	30	20
1975	4	200	80
1976	2	70	0

4. Brown Pelican

Immature birds are seen regularly in the fall. Peak numbers for 1976 were estimated at 25 on September 22.

5. Others

The state of North Carolina lists the following species found on Pea Island as endangered: gull-billed tern, royal tern, common tern, sandwich tern, yellow rail, and black rail.

1. Waterfowl

a. Populations

Waterfowl populations are censused weekly all months except May-August. The counts are done on the ground by traversing a prescribed course and estimating numbers. Ground counts cover only 80% of the refuge and 10% of the proclamation waters. Accuracy of these counts depends primarily on the experience of the personnel making them. Usually the data is class D data and can be used for establishing trends only.

Ground counts are supplemented by bi-monthly aerial surveys. Population estimates taken from the air are much more accurate because the birds are easier to see and the entire refuge is censused along with the proclamation area. It is felt that the aerial surveys are accurate to within $\pm 5\%$ of the actual number of birds present.

Population estimates are made for individual units of the refuge (these being the Salt Flats, North Pond, New Field, South Pond, the Sound). By keeping separate records the effect of the management practice applied to each area, on waterfowl use, can best be determined.

Waterfowl use days for 1967-1976 are summarized in the table on a calendar year basis. (Table is on the following page).

Although the total waterfowl use was up by 11% (336,000 use days) in 1976 as compared to the ten year average, it was down 23% from 1975.

Whistling swan were less than 1% down from '75 and still 39% above the 10 year average. Snow geese were down 30% from '75 and 18% from the ten year average with Canada geese showing 51% and 35% decreases respectively. Diving ducks remained 30% above the ten year average while being 41% below their 1975 use day total. Dabbling ducks were less than 10% above the ten year average and 12% below 1975 figures. Coots were 25% above '75 use and 111% above the ten year average.

From the table it can be seen that whistling swan use has increased markedly in the last two years (as has coot use). This parallels the pattern seen at nearby refuges, particularly Mattamuskeet and Pungo. Diving duck use has also been trending upward in the past several years. The drop this year was due to the failure of redhead and canvasback to appear in the numbers they did in 1975. (The Christmas count for 1976 indicated no redhead in the area at all, compared to approximately 7,000 in 1975).

WATERFOWL USE DAYS

Date	Geese				Ducks			Total
	Swan	Snow	Canada	Diving	Redbiling	Coots		
1967	36,800	738,300	492,700	252,700	955,600	114,200	2,590,300	
1968	16,600	420,500	266,700	236,500	904,600	105,200	1,950,300	
1969	22,900	605,600	411,800	159,300	1,058,200	182,800	2,440,600	
1970	15,900	723,500	396,300	311,600	1,452,800	213,500	3,113,600	
1971	24,800	835,700	338,500	531,800	1,322,000	450,000	3,502,800	
1972	29,800	641,100	367,700	170,500	1,478,300	248,900	2,936,300	
1973	25,000	448,300	410,300	363,800	1,328,800	229,900	2,805,800	
1974	30,100	495,100	684,300	638,400	1,234,400	159,700	3,241,900	
1975	50,600	716,500	554,500	1,039,200	1,542,100	410,100	4,313,300	
1976	49,900	504,100	275,000	612,500	1,364,900	554,700	3,361,100	
10. yr. average	30,200	612,900	419,800	431,600	1,264,200	266,900	3,025,600	

12.
After the spectacular winter 1966-67 in which almost 16,000 snow geese utilized the refuge the flock has fluctuated around 9,500 birds annually. The peak in 1976 being 11,000 birds.

The peak number of Canada geese has been trending upward since 1968, The '76 peak was some 1,000 birds below that of '75 (8,000 compared to 9,000).

Whistling swan, though continuing to increase in numbers have not approached their peak of 1966.

Comparison of the use day data and the peak population data in graph 1 shows that population figures can be misleading. Peak populations for Canada geese differed by 13% between 1975 and 1976, but use days for the two years were different by 51%. This means that in 1976, even though we had close to the same number of Canada geese, they remained on the refuge for a much shorter time. There were more snow geese on the refuge in '76 than '75, but 30% less use by them in '76 than in '75. Both types of data must be collected to properly analyze the management programs of a refuge.

b. Waterfowl Production

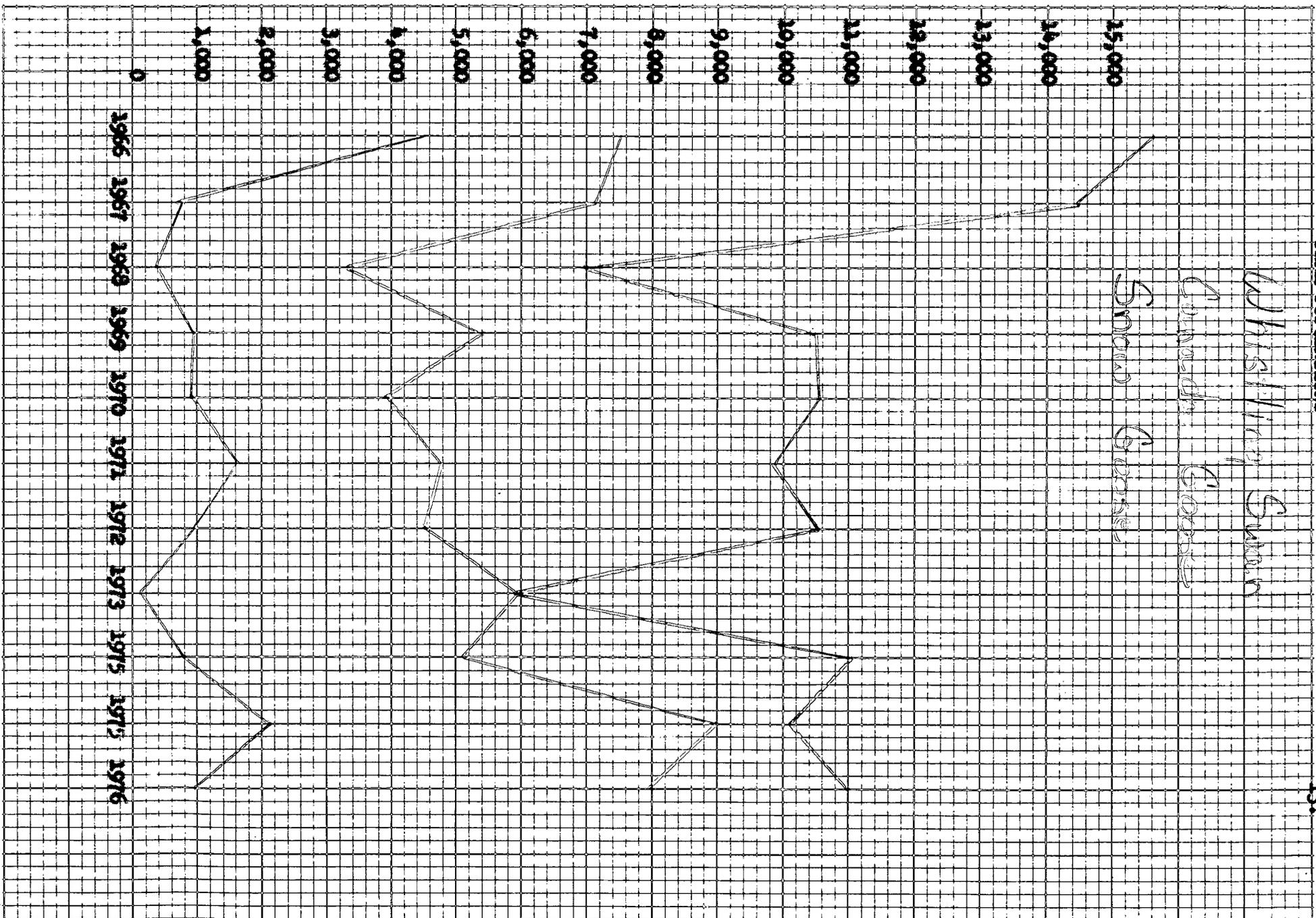
Gadwall and black ducks have nested on Pea Island since before the refuge was established. This year gadwall production was estimated at 125 birds, black duck production was only 75 birds. Production was down from last year and well below the average for 1969-1976 (see graph 2).

Historically production has been estimated from brood counts taken in North Pond. When New Field was fully developed in the early 1970's it is possible that many birds began raising their broods there rather than in North Pond. Brood counts are very difficult to make in New Field because of the dense cover present there. It seems likely that our estimates are somewhat low. Before the next breeding season begins a new survey method will be developed.

2. Marsh and Water Birds

The small heron rookery in North Pond was surveyed by James Parnell of the University of North Carolina, Wilmington, and his students, in conjunction with refuge personnel. The rookery is small enough that a total nest and young count can be obtained with little disturbance to the birds. By running two censuses each breeding season, accurate counts of both the early and the late breeders are achieved.

In 1976 this rookery produced: 15 glossy ibises, 30 great egrets, 75 snowy egrets, 60 Louisiana herons, 60 little blue herons, 40 cattle egrets, and 110 black-crowned night herons. This years total production of 390 herons, egrets and ibises is 27% below last years 530



PEAK POPULATIONS

Graph 1

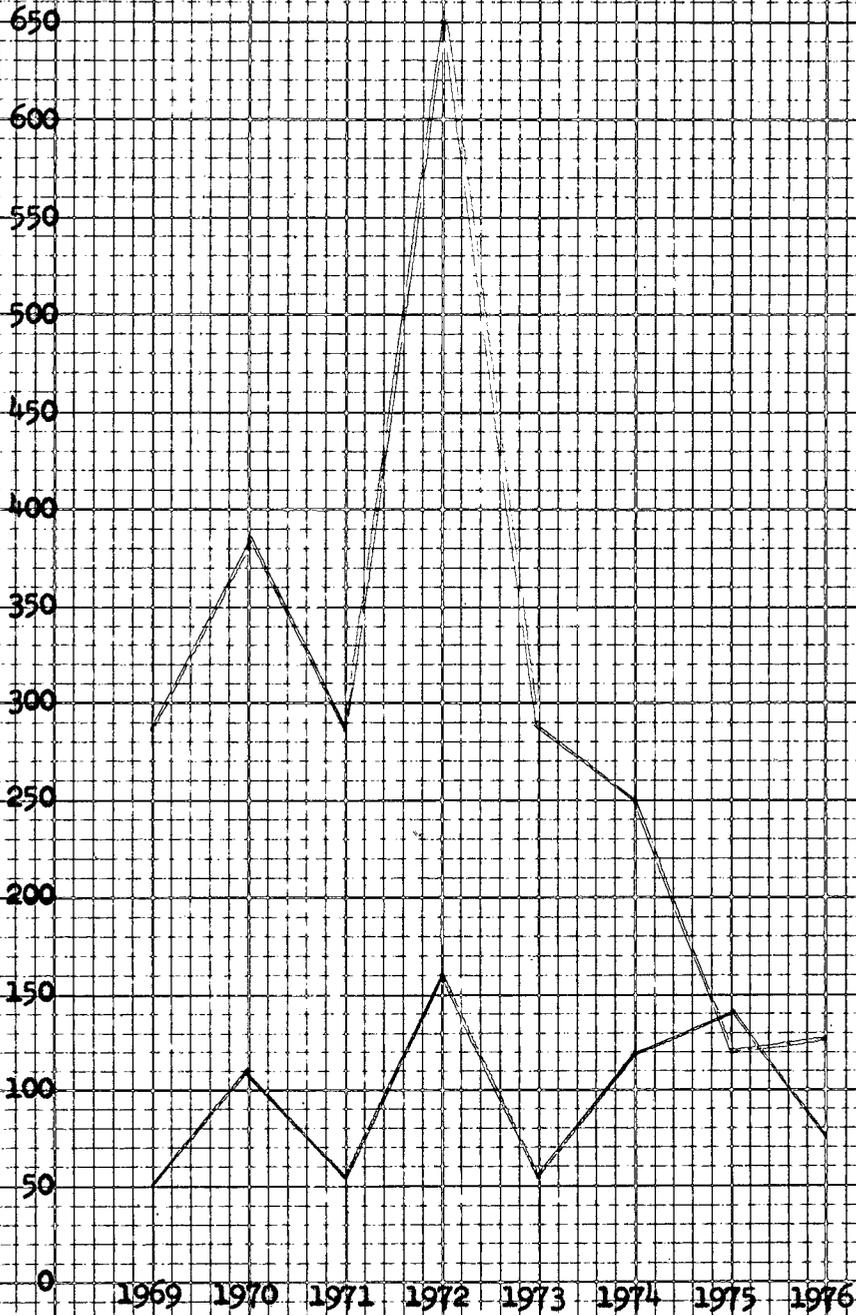
13.

DUCK PRODUCTION

Graph 2

14.

Goldeneye
Black Duck



birds and 15% above the five year average of 340 birds. We believe that production would have equalled last year's had a severe thunderstorm in early July not destroyed many nests in the colony. ^{15.}

3. Shorebirds, Gulls, Terns, and Allied Species

The attempts of least terns to nest on the refuge beaches this year were for naught. Two colonies were briefly established but weather and people quickly disrupted them. No nesting was successful.

The spoil islands along both Oregon Inlet Channel and Old House Channel were surveyed for nesting activity. These islands were found to be utilized extensively. The total breeding population in these islands was estimated at 2,000 royal, 500 common, 50 least, 30 sandwich terns, and 300 black skimmers. Production from this area was approximately 1,700 royal, 150 common, 25 least, 10 sandwich terns and 100 black skimmers.

The use day data and peak population data summarized below for 1972-1976 shows a tremendous increase for 1976 over past years.

<u>Year</u>	<u>Use Days</u>	<u>Peak Population</u>
1976	10,981,225	404,950
1975	2,886,875	23,130
1974	1,928,580	15,540
1973	2,022,950	13,260
1972	1,768,120	26,194

This can be attributed to the presence of a large flock of great black-backed, herring, ring-billed, laughing, and Bonaparte's gulls (400,000 birds) which was present on the refuge in early December. The birds were here for the entire month. A search of our records indicates that nothing like this has happened before. The extremely cold weather was most likely responsible for this phenomena, forcing northern birds further south than normal.

4. Raptors

The use day and peak population data for 1972 to 1976 are presented below for all species of raptors. The differences are believed to be due to differing censusing effort thru the years.

<u>Year</u>	<u>Use Days</u>	<u>Peak Population</u>
1976	8,585	85
1975	17,500	190
1974	8,650	135
1973	5,910	80
1972	4,300	85

Presently raptors are censused regularly only during the fall migration period of September thru December. Since it is known that raptors migrate in advance of southerly moving cold fronts; during these months we keep a careful watch on the weather maps. Surveys are begun 2-3 days before the cold front is predicted to arrive. The actual census is conducted by counting the birds as they fly past an observer at a fixed station. Our observation point is located at New Inlet where Pea Island is very narrow and the view across the island from the Atlantic to the Pamlico Sound is unobstructed. The data recorded using this method is very accurate. This technique was first employed in the fall of 1976. Before that time only random observations were made.

5. Other Migratory Birds

The 1976 Christmas Bird Count firmly established the Pea Island-Bodie Island area as the yellow-rumped warbler capital of the world! In 1975, 17,100 were counted, with 16,500 this year. During the count a new species was recorded for the refuge, this being a red crossbill.

Mourning dove populations increased this year. In 1970 refuge records indicate no doves were using the refuge. Since that time their numbers have grown to a peak of 300 birds. This year 25 young were produced.

C. Mammals, Non-Migratory Birds and Others

1. Game Mammals

Muskrat and river otter populations have remained stable over the past five years. Nutria, however; are on the increase with 200 individuals now as to less than 30 in 1972. The muskrat and nutria are serious pests, as they burrow into the dikes and berms. This can and has caused serious erosion problems.

2. Other Mammals

Feral cats are a problem. It is believed that, one of the reasons for our declining duck production has been the increase in cats and their preying on the ducklings and incubating hens. For this reason we take every opportunity afforded us to reduce their numbers.

Occasionally marine mammals become beached on our shores or their carcasses wash up. This happened in June of this year when a bottle-nosed dolphin washed ashore. The Marine Mammal Salvage Program at the Smithsonian Institute was notified and assistance was given when their personnel came to examine the carcass. Dr. James Mead, director of the program, provided the refuge with a detailed field guide for identifying whales and porpoises.

3. Resident Birds

17.

The ring-necked pheasant population has remained stable, near 550 individuals since 1972. This past year an estimated 200 young were produced.

4. Other Animal Life

Populations of other animals on Pea Island have remained stable.

V. INTERPRETATION & RECREATION

A. Information and Interpretation

1. On-refuge

Seven on-refuge programs were presented this year. These consisted of high school groups, three YCC camps (Cape Hatteras National Seashore and Mattamuskeet NWR) and several college classes.

The subject of the program was tailored to each groups needs. Topics ranged from identification of aquatic waterfowl foods and their management to discussions of the National Wildlife Refuge System, its goals and purpose.

A new memorandum of agreement was drawn up between the FWS and NPS concerning public use activities. Under this agreement the NPS will provide for interpretive facilities for the refuge and maintain existing public use areas. The refuge staff will only provide programs on an advance notice basis to school and conservation groups.

2. Off-refuge

Two slide programs were presented to local organizations, the Dare County Garden Club and a nearby Boy Scout troop.

During the summer months Assistant Manager, Tom Smith assisted National Park Service Naturalists in presenting evening campfire programs at the Oregon Inlet Campground. A total of 14 programs were presented to over 500 individuals.

B. Recreation

1. Wildlife Oriented

Wildlife oriented public use at Pea Island takes two major forms: fishing and wildlife observation. These accounted for 38.3% and 32.8% of Pea Islands total public use, respectively, or 348,00 and 298,100 activity hours respectively.

2. Non-Wildlife Oriented

18.

This category of recreation at Pea Island occurs in the form of swimming, sunbathing, picnicking, and off the road vehicling. The latter, though only 4.7% (42,400 activity hours) of the total public use is probably the most significant. Documented evidence exists to show the adverse impacts of this activity on least tern nesting and on the ability of hatchling sea turtles to reach the ocean from their nests.

On the morning of September 12 of this year the assistant manager came upon a nest (heretofore unknown) on the beach which had hatched the night before. In searching the beach, 12 young turtles were found, all in vehicle ruts, some over 1 mile from the nest. The turtles, unable to crawl out of the vehicle tracks, had moved north and/or south in the ruts in a vain attempt to reach the ocean. Inspection of the area and nest itself revealed that 100 turtles had hatched, 12 were found alive, 30 were predated, 14 reached the ocean, and the fate of the remaining 44 is unknown. The fact that at least 30% were lost to predation between nest and ocean is some indication of the impact of vehicles on turtle hatchlings; as this figure is generally very low, around 2-5% on beaches with no vehicle traffic.

C. Enforcement

Summarized below are cases made this year.

<u>Violation</u>	<u>Forfeit Collateral</u>	<u>Dropped</u>
Drive off of designated roadway	21	
Litter	1	
Camping	2	1
Hunting Related	6	1
Other	3	2
Total	33	4

Driving off of a designated roadway (dune busting) was the most prevalent offense, accounting for 56% of all violations. This is directly related to off road vehicle use. Access to the refuge beach is by three well marked ramps which lead over the dunes. (See photo on next page).

Vehicles are allowed to drive only on the beach. Standard brown and white regulatory signs have been placed at regular intervals along the beach. In places where the dunes are low, additional signs have been placed.

Vandalism of refuge property occurred several times this year. This is usually in the form of destruction of refuge signs, shooting them, knocking them down, painting on them, etc.. On one occasion several cartons of informational pamphlets stolen from the National Park Service were found clogging the toilets of the refuge comfort station. (See photo next page).



Vehicle tracks give evidence of someone having driven in the dunes.



NPS information brochures fill a toilet at the refuge comfort station. This was only one of many vandalism incidences confronting the refuge staff in 1976.

It is felt that people had a significant impact on the wildlife resources at Pea Island this year. Disturbances directly related to people and off road vehicles were responsible for the failure of our two least tern colonies. Although the colonies were posted with "Area Beyond this Sign Closed" markers, numerous vehicle tracks and footprints were found in these areas. Much effort was expended, enforcement wise, to protect these colonies to no avail as no citations were written (last year 10 citations were written for trespass in a tern colony).

It is unfortunate, but as public use increases, we feel that much additional time will be required for law enforcement duties. This past year two employees received law enforcement training. The assistant manager attended the NPS seasonal law enforcement school and a 10 hour firearms training course taught by the College of the Albemarle. The maintenanceman also attended the firearms training course.

VI. OTHER ITEMS

A. Field Investigations

NA

B. Cooperative Programs

1. Caretta Research

Records are kept of loggerhead turtle sightings and nesting activity. Data is forwarded every fall when the turtle season is over.

2. Colonial Bird Register

The colonial bird register of the Cornell University Laboratory of Ornithology requested information concerning colonially nesting birds; species, location, production, nature of colony, etc., on or near Pea Island Refuge. The information was easily obtainable from the refuge files or with little additional field work. This program has now evolved into a yearly practice. Reports are forwarded to the CBR at the end of the summer.

3. International Shorebird Survey

This program is carried out with the Manomet Bird Observatory. Data from our regular shorebird surveys taken during the period of July 1 to November 30 is supplied to the Manomet Bird Observatory. During this period extra effort is made to detect the presence of color marked shorebirds. Other co-operators in this project are the Canadian Wildlife Service and the Surinam Department of Forestry.

4. Beached Bird Survey

21.

During regular beach patrols a count of dead birds which are found is kept. Data on species, age, state of decomposition, and presence or absence of oil is recorded. This survey is providing baseline data on the biology and mortality rates of pelagic avian species. The principal operator is Mr. Malcolm Simons of Port Charlotte, Florida.

C. Items of Interest

Jack Hagan, Assistant Refuge Manager transferred to Cape Romain NWR on May 21. Tom Smith, fresh from the university of Florida, arrived on May 23 to replace Mr. Hagan.

On October 7, oil began to wash ashore. The United States Coast Guard sent a strike team down to advise on clean up procedures. Clean up operations were begun on Park Service beaches to the north and south of the refuge, but not on the refuge itself. Fortunately, high tides the night of the 11th washed the oil back to sea. Estimated wildlife losses were less than 50 birds, predominantly semipalmated sandpipers, out of 15,000 shorebirds on the refuge at the time.



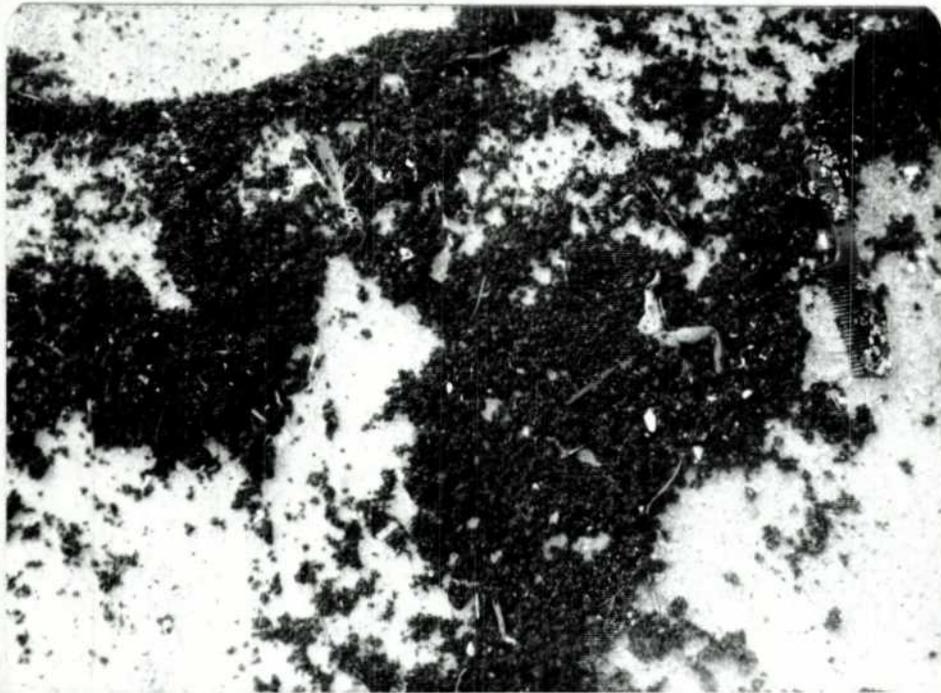
Oil washing up on the south end of Pea Island ($\frac{1}{2}$ mile north of ramp # 8).



More oil - this time $1\frac{1}{2}$ miles north of ramp # 8.



Close up of oil.



Close up of oil.

This report was prepared by Tom Smith, Assistant Refuge Manager.

D. Safety

Monthly safety meetings were held at the end of every month. Topics for discussion included operation of chain saws, defensive driving, proper procedures for applying pesticides and handling of dangerous chemicals.

Pea Island has not had a lost time accident since January 21, 1958. Total man hours worked since that time amount to 113,892.

Date:

8/11/77

Submitted by:

J.F. Williams, Jr.

Approval:

Thomas A. Sullivan

Estimate area manager 8/25/77

REPRODUCTION PROHIBITED