

**PEA ISLAND NATIONAL WILDLIFE REFUGE**

**NARRATIVE REPORT**

**SEPTEMBER 1 TO DECEMBER 31, 1948**

**U. S. DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
MANTEO, NORTH CAROLINA**

PEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

September 1 to December 31, 1948

CONTENTS

	Page
I. GENERAL	
A. Weather Conditions .....	1
B. Water Conditions.....	2
C. Fires.....	3
II. WILDLIFE	
A. Migratory Birds	
1. Population and Behavior.....	2
2. Food and Cover.....	3
3. Botulism, Lead Poisoning and other Diseases.....	3
B. Upland Game Birds.....	3
C. Big Game Animals.....	3
D. Fur Animals, Predators, Rodents, and other Mammals.....	4
E. Predaceous Birds.....	4
III REFUGE DEVELOPMENT MAINTENANCE	
A. Physical Development.....	4
B. Plantings.....	4
C. Collections.....	5
IV. ECONOMIC USE OF REFUGE.....	5
V. FIELD INVESTIGATIONS OR APPLIED RESEARCH.....	5
VI. PUBLIC RELATIONS	
A. Recreational Uses.....	5

CONTENTS CON'T

	Page
VI. PUBLIC RELATIO S cen't	
B. Refuge Visitors.....	5
C. Violations.....	5

NR Forms

Photographs

PEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

September 1 to December 31, 1948

I. GENERAL

A. WEATHER CONDITIONS

The weather during this period was about average. Rainfall was too great in November and not enough in September and October. The only extreme weather experienced was a low of 16 degrees during the night of December 26. Practically all of the local weather prophets--and there are many--were caught off base. A high of 78 degrees was experienced during both the months of October and November. The high of 88 in September compares with a high of 95 in September a year ago.

There have been the usually high sea and sound tides. On several occasions it was only with a great deal of difficulty that one was able to get to and from the refuge. None of the tides did any damage to installations.

The weather data below is taken from the Cooperative Meteorological records of Mrs. Rosa Drinkwater, Manteo, North Carolina. This station is approximately 15 miles from the north end of the refuge.

	Precipitation		Temperature	
	Actual	Depart. from Normal	Maximum	Minimum
September	.96	- 3.15	88	58
October	1.80	- 1.45	78	36
November	6.68	<del>7</del> -3.82	78	40
December	<u>2.30</u>	<u>- 1.79</u>	<u>72</u>	<u>16</u>
TOTAL	11.74	-2.57	Extremes 88	16

During the same period last year the precipitation was 17.82 inches. The normal precipitation is 14.31 inches.

B. WATER CONDITIONS

Rainfall during October was sufficient to cover the South Pond with an inch or two of water, but insufficient to cover all of the sand flats in the North Pond. However, at the end of the period both ponds have a goodly supply of water in them. This is the first time since 1944 that the North Pond has had fresh water in it.

C. FIRES

none

II. WILDLIFE

A. MIGRATORY BIRDS

1. Population and Behavior

Waterfowl and shorebirds were very slow in coming south this fall. A few teal, and pintail were seen in October. But it was near the end of November before any great numbers of birds arrived. Canada Geese also were later in arriving than usually. However, the Snow Geese and Swans appeared at about the same time as last year. Practically all shorebirds were late in migrating. Most of them are due through here in August and September. More shorebirds were seen in November than in any other month.

Black ducks, Pintails, Shovellers, Gadwall, Blue and Green-winged teal were present in about the same numbers as in the previous year. More mallards were seen this year than last. No Baldpates were observed during this period. Canada Geese and Snow Geese have definitely increased. The former has increased by about 25% and the latter by at least 50%.

Large rafts of scaups, with a few Redheads mixed in, were observed in the sound. American Brant have been reported as having been seen but the writer did not observe any. Swans decreased in numbers as also did the Coots.

The Snow Geese have been behaving oddly. As a rule they feed in closely knit flocks. But this year they are scattered all over the refuge from Sand Ridge Ledge near the south end to Oregon Inlet. They can be observed in large flocks, in small family groups, and singly. One was seen for several days with a flock of Canadas. Another was observed contentedly resting in amongst a flock of Herring Gulls. (No wonder some of these odd combinations occur in nature).

No check has been made of their feeding areas, but they no doubt are playing havoc with the Spartina alterniflora.

Among the shorebirds the Semi-palmated and Western Sandpipers the Sanderlins, and Black-bellied Plovers are the most numerous.

Red-breasted Mergansers are present in ever-increasing numbers. During a twenty minute wait for the ferry at Oregon Inlet, it is estimated that 20,000 were observed flying from the sea to the sound.

Herring Gulls are here in about the same numbers as previously. Great Black-backed gulls are increasing while on the other hand Gannets are not as numerous.

Fewer Bald Eagles and Marsh Hawks have been observed this period than during the period a year ago.

2. Food and Cover

The South Pond was completely dry for a short time while large areas of it were dry the greater part of the summer. As a result there was little plant growth in the pond. A species of spike rush is found in the pond proper, with sage pondweed growing in the borrow pits. Excellent stands of smartweed were to be found in the southern part of this pond. Scirpus robustus is to be found along the eastern shore. Large stands of this bulrush also were to be found in the marsh between the ponds and in the North Pond.

The North Pond, which had been covered with salt water for several years is again a fresh water pond. A temporary dike was thrown up at the site of the break of the old dike thus eliminating the opening through which the salt water entered.

It is amazing to see the number of birds using this pond, even though there is no food in the pond proper. The Snow Geese have been feeding extensively on the Spartina alterniflora on the periphery of the North Pond, and the Canadas have been feeding on the Scirpus which grows in a zone a little higher than the Spartina.

Large areas in the sound are covered with a plant growth believed to be Halodule. Both geese and ducks use these areas extensively when the water level is such that it can be reached.

3. Botulism, Lead Poisoning and other Diseases

None

B. UPLAND GAME BIRDS

With the exception of a few mourning doves, no upland game birds have been observed.

C. BIG GAME ANIMALS

None

#### D. FUR ANIMALS, PREDATORS, RODENTS AND OTHER MAMMALS

With the approach of the fall and winter season very few muskrats and otters have been noticed. Considerable numbers of both are present, but it is thought that their numbers are about static. Low water conditions in the South Pond and elsewhere this summer during the dry months, were not conducive to an increase of the muskrat population.

The only other mammal known to be on the refuge is the house cat.

#### E. PREDACEOUS BIRDS

The predaceous birds on this area are limited in number and thus present no problem.

### III REFUGE DEVELOPMENT MAINTENANCE

#### A. PHYSICAL DEVELOPMENT

The work on the dike repair job is continuing. The job is going slowly since the material has to be moved three and four times. To do this with a 1/2 yard machine is time consuming. Approximately 145 feet of dike were built this period. Also during this period an extensive repair job was undertaken, when almost the entire inside of the machine was removed and the various parts worked on.

Sand fence repair and maintenance is also continuing. During the last few months this work has come almost to a standstill due to a lack of funds. Sections of the sand fence, which had previously been built up, have been sprigged. Some brush has been "planted" in the low places of the fence to catch sand and thereby raise the dunes. At this time of the year this meets with good success.

Maintenance of vehicles and boats is a continuing process. Sand and salt play havoc with equipment and painting and repair is constantly necessary.

One factor of outstanding importance is the acquisition of a jeep pickup truck. With its four-wheel drive it is possible to traverse difficult terrain without having to drive like the proverbial bat. It has already shown its mettle and with it one can come and go with greater assurance.

The 1940 Chevrolet pickup and the 1938 1 1/2 ton Ford stake were sold during this period. Both had seen a lot of hard service on the beach.

#### B. PLANTINGS

None

### C. COLLECTIONS

During the month of September 165 pounds of Scirpus robustus seed were collected. This bulrush had an excellent season with a good stand over a large part of the refuge. This seed is on hand and ready for shipment.

### IV ECONOMIC USE OF REFUGE

None

### V. FIELD INVESTIGATIONS OR APPLIED RESEARCH

None

### VI. PUBLIC RELATIONS

#### A. RECREATIONAL USES

The first three months of the period saw numerous folk coming down to Pea Island and vicinity to try their luck at surf fishing. In general the reports of their success were unfavorable.

Others came to the refuge to study bird life. These folk were seldom disappointed.

#### B. REFUGE VISITORS

The following were refuge visitors:

Sept. 2	Edwin W. Ball	Atlanta, Ga
Sept. 14	Kenneth Wilson	Currituck, N. C.
Sept. 29	R. O. Gustafson	Washington D. C.
Oct. 6-8	Richard F. Dittman	Atlanta, Ga
Oct 30-31	Howard A. Miller	Atlanta, Ga
Dec. 14	Roy Ferguson	
	Tom Carter	Washington, N. C.
Dec. 29	R. L. Wolff	Winston-Salem, N. C.

#### C. VIOLATIONS

Considerable time was spent this period patrolling the refuge area. No violations have been observed. One violation was reported. This was when a trawler was anchored in Pamlico sound in the vicinity of the refuge. According to reports a man was placed on shore, and shots fired at geese. This type of hit and run shooting, as well as that from vehicles passing through the area is difficult to control

especially with limited personnel. At times when the writer should have been patrolling, he had to assist in making dragline repairs or obtain parts for the machine or do urgent office work. It is believed that the problem of violations could be solved by employing a laborer\*patrolman.

The service plane equipped with floats has been patrolling in this vicinity during a part of the hunting season. Hunters and sportsman have a high respect for this plane and the work done by the pilot and accompanying enforcement officer cannot be praised too highly.

Respectfully submitted

Paul W. Sturm  
Paul W. Sturm  
Refuge Manager

Date Submitted:

January 4, 1949

Approved:

\_\_\_\_\_

WATERFOWL

Refuge Pea Island

Months of Sept. 1, 1948 to Dec. 31, 1948

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u> Whistling swan	6	11/20/48	56	12/31/48					56
II. <u>Geese:</u> Canada goose	Res.		15,000	12/11/48					17,000
Cackling goose									
Brant									
White-fronted goose									
Snow goose	40	11/23/48	11,600	12/29/48					14,000
Blue goose	7	12/29/48							7
III. <u>Ducks:</u> Mallard	75	11/11/48	75	11/11/48					100
Black duck	Res		2500	12/11/48					3000
Gadwall	Res		200	11/22/48					200
Baldpate	None seen								
Pintail	50/	10/20/48	2000	12/11/48					2000
Green-winged teal	50	10/15/48	400	12/11/48					500
Blue-winged teal	Res		150	11/4/48					150
Cinnamon teal									
Shoveller			250	12/31/48					250
Wood duck			1	11/48					
Redhead			50	12/11/48					100
Ring-necked duck			1	12/31/48					
Canvas-back									
Scaup			8000	12/11/48					8000
Golden-eye									
Buffle-head			500	12/11/48					500
Ruddy duck			500	12/11/48					500
IV. <u>Coots:</u> Mergansers, Red-breasted	3000	11/20/48	20,000	11/22/48					150 50,000

Total Production:

Geese \_\_\_\_\_

Ducks \_\_\_\_\_

Coots \_\_\_\_\_

**SUMMARIES**

Total waterfowl usage during period 97,000

Peak waterfowl numbers 80,000

Areas used by concentrations entire refuge, both land and water

Principal nesting areas this season \_\_\_\_\_

Reported by Paul W. Sturn

Paul W. Sturn, Refuge Manager

**INSTRUCTIONS**

- (1) **Species:** In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) **First Seen:** The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) **Peak Concentration:** The greatest number of the species present in a limited interval of time.
- (4) **Last Seen:** The last refuge record for the species during the season concerned in the reporting period.
- (5) **Young Produced:** Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) **Total:** Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since these data are necessarily based on analysis of the rest of the form.

3-1751  
Form NR-1A  
(Nov. 1945)

MIGRATORY BIRDS  
(other than waterfowl)

Refuge Poa Island Months of Oct. 1 to Dec. 31 194

(1) Species Common Name	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total Estimated Number
	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	
<b>I. Water and Marsh Birds:</b>										
Cormorant, double cr			4	Seen throughout period						4
Heron, Great Blue			30	"						30
Heron, Louisiana			20	"						20
Egret, American			10	Oct. '48						10
Egret, Snowy			40	Oct. '48						40
Bittern, American			2	Nov. '48						2
Grebe, Horned			20	Nov. '48						20
Grebe, Pied-billed			12	Dec. '48						12
Loon, Common			2	Dec. 28, '48						2
Avocet			2	Oct. 2, '48						2
<b>II. Shorebirds, Gulls and Terns:</b>										
Sandpiper, Semi-palmated			500	Nov. '48						1000
Sandpiper, Western			250	Dec. '48						350
Sanderling			100	Dec. '48						150
Yellowlegs			20	Nov. '48						20
Plover, Black Bellied			20	Dec. '48						100
Gull, Herring			5000	Dec. '48						5000
Gull, Gr. Black-backed			20	Dec. '48						20
Gull, Caspian			20	Dec. '48						20
Gannet			100	Dec. '48						100
Killdeer			15	Dec. '48						15

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons:</u> Mourning dove White-winged dove		4	Nov '48		4
IV. <u>Predaceous Birds:</u> Golden eagle Duck hawk Horned owl Magpie Raven Crow	occasionally seen in November and December				
Reported by.....					<b>Paul W. Sturm, Refuge Manager</b>

**INSTRUCTIONS**

- (1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiformes)  
 II. Shorebirds, Gulls and Terns (Charadriiformes)  
 III. Doves and Pigeons (Columbiformes)  
 IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)
- (2) First Seen: The first refuge record for the species for the season concerned.
- (3) Peak Numbers: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned.
- (5) Production: Estimated number of young produced based on observations and actual counts.
- (6) Total: Estimated total number of the species using the refuge during the period concerned.

3-1752  
 Form NR-2  
 (April 1946)

UPLAND GAME BIRDS

Refuge Foa Island Months of Oct. 1 to Dec. 1, 1948

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
<p><b>NOT APPLICABLE TO THIS REFUGE</b></p>										

## INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.\*

- (1) SPECIES: Use correct common name.
- (2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.
- (4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.
- (5) REMOVALS: Indicate total number in each category removed during the report period.
- (6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.
- (7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

\* Only columns applicable to the period covered should be used.

3-1753  
Form NR-3  
(June 1945)

BIG GAME

Refuge Pea Island Calendar Year 1948

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions	(7) Estimated Total Refuge Population		(8) Sex Ratio	
			Hunting	For Re- stocking	Sold	For Research	Predation	Disease	Winter Loss		Number	Source		At period of Greatest use
Common Name	Cover types, total Acreage of Habitat	Number												
NOT APPLICABLE TO THIS REFUGE														

Remarks:

Reported by Paul W. Starnes

## INSTRUCTIONS

### Form NR-3 - BIG GAME

- (1) SPECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.
- (2) DENSITY: Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated total number of young produced on refuge.
- (4) REMOVALS: Indicate total number in each category removed during the year.
- (5) LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.
- (6) INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.
- (7) TOTAL REFUGE POPULATION: Give the estimated population of each species on the refuge at period of its greatest abundance and also as of Dec. 31.
- (8) SEX RATIO: Indicate the percentage of males and females of each species as determined from field observations or through removals.

Refuge Poa Island Year 194

Botulism NONE Lead Poisoning or other Disease NONE

Period of outbreak \_\_\_\_\_

Period of heaviest losses \_\_\_\_\_

Losses:

	Actual Count	Estimated
(a) Waterfowl	_____	_____
(b) Shorebirds	_____	_____
(c) Other	_____	_____

Number Hospitalized	No. Recovered	% Recovered
(a) Waterfowl	_____	_____
(b) Shorebirds	_____	_____
(c) Other	_____	_____

(a) Waterfowl	_____	_____
(b) Shorebirds	_____	_____
(c) Other	_____	_____

Areas affected (location and approximate acreage) \_\_\_\_\_

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.) \_\_\_\_\_

Condition of vegetation and invertebrate life \_\_\_\_\_

Remarks \_\_\_\_\_

Kind of disease \_\_\_\_\_

Species affected \_\_\_\_\_

Number Affected Species	Actual Count	Estimated
_____	_____	_____
_____	_____	_____
_____	_____	_____

Number Recovered \_\_\_\_\_

Number lost \_\_\_\_\_

Source of infection \_\_\_\_\_

Water conditions \_\_\_\_\_

Food conditions \_\_\_\_\_

Remarks \_\_\_\_\_



3-1756  
 Form NR-6  
 (April 1946)

FISH

Refuge.....Year 1948

Species	Relative Abundance	Sport Fishing		Commercial Fishing		Restocking		Number removed for Restocking
		Man days Fishing	Number Taken	No. of Permits	Pounds Taken	Number Stocked	Area Stocked	
NOT APPLICABLE TO THIS REFUGE								

REMARKS:

B

3-1757  
 Form NR-7  
 (April 1946)

PLANTINGS  
 (Marsh - Aquatic - Upland)

Refuge Pea Island Year 1948

Species	Location of Area Planted	Rate of Seeding or Planting	Amount Planted (Acres or Yards of Shoreline)	Amount & Nature of Propagules	Date of Planting	Survival	Cause of Loss	Remarks
NONE								

TOTAL ACREAGE PLANTED:

Marsh and aquatic.....  
 Hedgerows, cover patches.....  
 Food strips, food patches.....  
 Forest plantings.....





DIRECTIONS FOR PREPARING FORM NR-8  
CULTIVATED CROPS

Cultivated Crops Report Form NR-8 should be prepared on a calendar-year basis for all crops harvested or utilized during the calendar year and submitted with the December 31 refuge report.

Permittee - List each permittee separately. If lands of the refuge are farmed by refuge personnel or hired labor, this should be indicated in the Permittee column.

Permit No. - List the number of the Special Use Permit issued to the individual.

Use or Location - The Unit No. or name specified in the Economic Use Plan should be listed in this column.

Crops Grown - A separate line of the form should be used for each crop grown by each permittee or by refuge personnel. This is important, since if each crop grown by each operator is not specifically enumerated, the report will be of no value for statistical purposes.

Average Yield per Acre - It is important that the average yield per acre of each crop grown by each operator should be shown.

Permittee's Share - Only the number of acres harvested or utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the Bushels Harvested column. It is requested that all crops harvested be reduced to bushels wherever possible, or, as in the case with the harvesting of seed such as that of sweet clover, alfalfa, bromegrass, etc., the total harvested crop in pounds may be shown. Timothy, alfalfa, or other hay harvested by the permittee should be shown on Form NR-10 and should not be shown in the Permittee's Share column.

Government's Share or Return - Harvested - Show the number of bushels harvested for the Government and the acreage from which this share is harvested, both for grain raised by refuge personnel and by permittees. Unharvested - show the exact number of acres of crops allowed to remain unharvested as food and cover for wildlife. An estimate of the number of bushels of grain that is available for the wildlife in such unharvested crops should be shown in the Bushels column.

Compensatory Services, or Cash Revenue - Show other services received by the Government in cooperative farming activities, the number of acres of food strips planted for wildlife, the amount of wildlife crops not otherwise reported that are planted by cooperators for the Service, or the cultivation of wildlife plantations. If the permit is on a fee basis, the total cash revenue received by the Service.

3-1570  
NR-8a

REFUGE GRAIN REPORT

Refuge.....~~Pea Island~~.....

Months of Oct. 1..... thru Dec. 31..... 1948..

(1) VARIETY	(2) ON HAND BEGINNING OF PERIOD	(3) RECEIVED DURING PERIOD	(4) TOTAL	(5) GRAIN DISPOSED OF				(6) ON HAND END OF PERIOD	(7) PROPOSED USE		
				TRANS- FERRED	SEEDED	FED	TOTAL		SEED	FEED	SURP.
<b>NONE</b>											

(8) Indicate shipping or collection points.....

(9) Grain is stored at.....

(10) Remarks.....

NR-8a

REFUGE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)--55 lbs., Corn (ear)--70 lbs., Wheat--60 lbs., Barley--50 lbs., Rye--55 lbs., Oats--30 lbs., Soy Beans--60 lbs., Millet--50 lbs., Cowpeas--60 lbs., and Mixed--50 lbs. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

- (1) List each type of grain separately: Corn, wheat, proso millet, etc. Include only domestic grains; aquatic and other seeds will be listed on NR-9.
- (3) Report all grain received during period from all sources, such as transfer, share-cropping, or harvest from food patches.
- (4) A total of Columns 2 and 3.
- (6) Column 4 less Column 5.
- (7) This is a proposed breakdown by varieties of grain listed in Column 6.
- (8) Nearest railroad station for shipping and receiving.
- (9) Where stored on refuge: "Headquarters grainary", etc.
- (10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.

COLLECTIONS AND RECEIPTS OF PLANTING ST  
ds, rootstocks, trees, shrubs)

Refuge Pea Island Year 194 8

Species	Collections				Receipts		Total Amounts on Hand	Amount Surplus
	Amount	Date or Period or Collection	Method	Unit Cost	Amount	Source		
<u>Scirpus rostratus</u>	165 #	Sept. 1948	hand stripping	67¢ per lb.			165#	165#



3-1760  
 Form NR-10  
 (April 1946)

HAYING AND GRAZING

Refuge Poa Island Year 1948

Permittee	Permit No.	Unit or Location	Actual Acreage Utilized	Animal Use Months	Tons of Hay Harvested	Period of Use From - To	Rate	Total Income	Remarks
None									

Totals:

Acreage grazed..... Animal use months..... Total income Grazing.....  
 Acreage cut for hay..... Tons of hay cut..... Total income Haying.....



TIMBER REMOVAL

Refuge \_\_\_\_\_ Year 194

Permittee	Permit No.	Unit or Location	Acreage	No. of Units Expressed in B.F., ties, etc.	Rate of Charge	Total Income	Reservations and/or Diameter Limits	Species Cut
None								

Total acreage cut over \_\_\_\_\_ Total income \_\_\_\_\_

No. of units removed B. F. \_\_\_\_\_ Method of slash disposal \_\_\_\_\_  
 Cords \_\_\_\_\_  
 Ties \_\_\_\_\_  
 \_\_\_\_\_

Handwritten text, possibly a signature or name, located in the upper left quadrant of the page.



---

Handwritten text, possibly a signature or name, located in the lower middle section of the page, below a horizontal line.



An excellent stand of  
smartweed in the South  
Pond

Pierced-plank landing  
mat over one of the dikes



Juncus sod was planted along  
berm to prevent wave action.  
This produced excellent re-  
sults.



Spartina was planted here  
to control wave action.  
This has not proven to  
be satisfactory.





North Pond with a good  
head of fresh water. This  
is the first time that this  
pond has been fresh since  
1944. (Note dragline in  
circle, two miles to the  
north of truck.)

TEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

MAY 1, 1948 TO AUGUST 31, 1948

U. S. DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

WANTEO, NORTH CAROLINA

PEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

MAY 1, 1948 TO AUGUST 31, 1948

CONTENTS

	Page
I. GENERAL	
A. Weather Conditions.....	1
B. Water Conditions.....	1
C. Fires.....	2
II. WILDLIFE	
A. Migratory Birds	
1. Population and Behavior.....	2
2. Food and Cover.....	3
3. Botulism and other Diseases.....	3
4. Fur Animals.....	3
III. REFUGE DEVELOPMENT MAINTENANCE	
A. Physical Development.....	3
B. Collections.....	4
IV PUBLIC RELATIONS	
A. Refuge Visitors.....	4
B. Violations.....	5
V. OTHER ITEMS.....	5
NR Forms 1, 1a, 2, and 3a	
Photographs	

PEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

May 1 to August 31, 1948

I. GENERAL

A. WEATHER CONDITIONS

The weather data for this report is taken from the Cooperative Meteorological records of Mrs. Rosa Drinkwater, Manteo, North Carolina. This station is approximately twenty miles north of the refuge.

	Precipitation			Temperature	
	Actual	Normal	Depart. from Normal	Maximum	Minimum
May	3.14	3.52	- .38	86	51
June	.70	5.30	- 4.60	95	56
July	7.21	6.26	+ .95	98	66
August	<u>1.84</u>	<u>5.47</u>	<u>- 3.63</u>	95	56
TOTAL	12.89	20.55	- 7.66	Extremes 98	51

This compares with a rainfall of 11.39 inches for the same period last year and 27.72 inches for the same period in 1946.

B. WATER CONDITIONS

As indicated above the rainfall during the month of June was less than one inch. This was insufficient to maintain the water level in the fresh water pond. Thus by the end of the month the flats were completely dry with water only in the borrow pits.

During the month of July 7.21 inches of rain fell at Manteo, North Carolina. It is believed that less than half that amount fell at the refuge. However there was enough to cover the pond temporarily with 2-3 inches of water. Due to extremely warm weather this lasted only a short time. Thus during the greater part of this period, the pond was dry or almost so.

The last break in the dike of Pool # 2 was closed on August 19. Since that time there has been no rain and the water in the borrow pits has a high saline content.

C. FISHES

None

## II. WILDLIFE

A. MIGRATORY BIRDS1. Population and Behavior

At the beginning of this period between 300-400 Canada Geese were using the refuge. Most of them departed during the early part of the period. Only 25 remained during the summer. (It may be of interest to know that approximately the same number remained on Portsmouth Island, south of Okrasocks and about 70 miles south of the refuge. One nest containing 11 eggs was found there).

Black ducks and Gadwall remained all summer. Also two Blue-winged teal were seen quite frequently. Observations indicate that there has been a decrease in both black duck and Gadwall reproduction from that of the previous year. It is estimated that 125 Black Ducks and 75 Gadwalls reached maturity during this breeding season. Only one brood of eight Blue-winged teal was observed. They finally dwindled down until at the end of the period no young were observed. It is believed that this brood is the same one which was hatched from a nest built within five feet of a well travelled road. An inspection showed that thirteen eggs were hatched from this nest.

A number of Black Duck nests were found between the telephone line and the sand fence along the beach. In other words all were on relatively high ground.

Red-breasted mergansers were seen as late as July. All other species of waterfowl departed during the first two weeks of this period.

Some shorebirds were seen during the entire period. Most of them migrated northward during the previous period. To date no big flights of birds have been seen on their southward journey. Those seen were mostly Semi-palmated sandpipers, Semipalmated plovers, yellowlegs, ruddy turnstones, sanderlings, willet, red-backed sandpipers, and dowitchers. A few curlews were seen as were also four marbled godwits, and four black-necked stilts. Two of the latter were seen during the greater part of the period.

Royal and Common terns, Black Skimmers, Laughing gulls, Black-crowned, Louisiana, and Little Blue Herons, Snowy Egrets and a few Least terns nested on the refuge. Royal terns and Skimmers nested extensively on various islands northwest of Oregon Inlet.

## 2. Food and Cover

In spite of the lack of rainfall there was an excellent growth of vegetation. Large stands of Scirpus americanus and robustus, various species of smartweed, an excellent growth of Spartina alterniflora are to be found. Sago pondweed and muskgrass are to be found in Pool # 1. The sand flats of this pool are covered chiefly with a species of spikerush. The greater part of the Black ducks, Gadwalls, geese, dowitchers, as well as some other shorebirds used this pond almost exclusively in spite of the low water levels. The southern and eastern margins of this pool have excellent stands of smartweed. One species growing over four feet tall is the best growth of smartweed ever seen by this writer.

It is believed that eel grass is coming back in good quantities. Large windrows of this grass have been observed washed up along the shore of the sound. Intermingled with the eel grass is Ruppia maritima and Halodule sp?

## 3. Botulism and Other Diseases

None

## 4. Fur Animals

On one occasion seven otter were seen playing in the borrow pit of Pool # 1. Sign of otter can be seen at many places on the refuge.

Muskrats can be seen almost daily, especially during the early morning or late evening hours when they are feeding. Most of them are also concentrated in the South Pool.

### III REFUGE DEVELOPMENT MAINTENANCE

#### A. PHYSICAL DEVELOPMENT

A total of 305 feet of dike were built during this period. This work was done during the last three months of the period. Work was suspended for a period of over three weeks due to failure to obtain clutch parts for the dragline. All of the completed dike has been sprigged. In spite of the dry weather the grass shows signs of being alive and growing. The dragline has been moved to the last break in the dike and a temporary dike built. Final closure was made on August 19. Thus we need only rain and an absence of violent storms to give us another fresh water pond. Since this is the season of

hurricanes and violent storms, every effort has been made to strengthen the temporary dike. We now have a berm of about three feet plus a stock pile of about 6 feet. At the point we are now working it will require at least three casts before the dike is completed.

Considerably sprigging was done on the sand fence east of Pool # 2 but the lack of rainfall prevented the growth of a large part of the grass planted.

The refuge boat Redhead II has been copper painted and the cab, deck and hull also painted.

The pickups are in constant need of paint. Although the roads have been dry and most of the driving has been on the inside road, they continue to rust.

On August 3 Pilot-Biologist Ball and Biologist Baldwin arrived with the intent of spraying cattail, locust and mimosa. Difficulties were encountered due to adverse wind and weather conditions and other factors. However at this writing it appears as if the cattail definitely has been effected by the 2-4-D. Results on the locust are spotty due no doubt to the difference in elevation of the dike and berm and also due to the shape of the dike. The mimosa does not appear to have been effected.

During July a total of 653 birds were banded with the assistance of Messrs. Harry T. Davis of the N. C. State Museum, Mr. Jay Johnson also fo the museum and John Grey of Charlottesville, Va. The birds banded were of the following species:

Laughing gulls	323
Royal terns	325
Louisiana Heron	1
Common terns	2
Boat-tailed grackles	2

**B. COLLECTIONS**

Scirpus robustus seed is being collected at the end of the period. A full report of same will be included in the next report

**IV. PUBLIC RELATIONS**

**A. REFUGE VISITORS**

May 6, 1948	Howard A. Miller	Regional Office
	Richard E. Griffith	Central Office
	William P. Baldwin	Regional Office
June 21-23	William P. Baldwin	" "

July 12-15	Harry T. Davis	Director, N. C. State Museum Raleigh, North Carolina
	Jay Johnson	"
	John Grey	Charlottesville, Virginia
Aug. 3-5	William P. Baldwin	Regional Office
Aug. 3-6	Edwin W. Hall	" "
Aug. 5	Jack Dermid	N. C. Wildlife Resources Com. Raleigh, N. C.
Aug. 9	Stuart Critcher	"

In addition to the above, numerous fishermen, sightseers, bird students, amateur photographers etc, etc, came down to the refuge.

#### B. VIOLATIONS

None

#### V OTHER ITEMS

During this period a total of 27 Canada Geese were caught and shipped to the Parker River N. W. Refuge in Massachusetts. Most of these geese were caught while they were moulting. During this period they are flightless but nevertheless are capable of considerable speed asst aided by flapping their wings. Although most of them can fly again now they take off for the taller vegetation at the first sight of the pickup.

Date Submitted:

September 7, 1948

Approved:

\_\_\_\_\_

Respectfully submitted:

Paul W. Sturtevant

Refuge Manager

**WATERFOWL**

Refuge Pea Island

Months of May 1, 1948 to August 31 1948

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u> Whistling swan									
II. <u>Geese:</u> Canada goose Cackling goose Brant White-fronted goose Snow goose Blue goose			360	5/1/48	25	8/31/48			25
III. <u>Ducks:</u> Mallard Black duck Gadwall Baldpate Pintail Green-winged teal Blue-winged teal Cinnamon teal Shoveller Wood duck Redhead Ring-necked duck Canvas-back Scaup Golden-eye Buffle-head Ruddy duck	Resident " " Resident		400 110	5/1/48 8/20/48	3	5/24/48	12 9	126 78	250 150
IV. <u>Coots:</u>					35	5/10/48			35

Total Production:

Geese None

Ducks 300

Coots None

**SUMMARIES**

Total waterfowl usage during period 400

Peak waterfowl numbers 300

Areas used by concentrations Fresh water pond

Principal nesting areas this season Fresh water areas

and higher ground immediately west of sand fence bordering  
seam

Reported by \_\_\_\_\_

**Paul W. Sturm, Refuge Manager**

**INSTRUCTIONS**

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since these data are necessarily based on an analysis of the rest of the form.

3-1751  
Form NR-1A  
(Nov. 1945)

MIGRATORY BIRDS  
(other than waterfowl)

Refuge Poa Island Months of May 1, 1948 to August 31, 1948

(1) Species  Common Name	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total Estimated Number
	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	
<b>I. Water and Marsh Birds:</b>										
Heron, Great Blue	Observed throughout period									50
" , Louisiana		"						5	50	75
" , Black-crowned		"						1	200	300
" , Little Blue	2	5/9/48	40	July					20	30
Egret, Snowy			500	July-Aug.					100	500
" , American	4	5/24/48	75	8/10/48						100
Grebe, Pied-billed	Observed occasionally throughout period									
Rails, Clapper	"	"	"	"	"	"				
Sora	"	"	"	"	"	"				
<b>II. Shorebirds, Gulls and Terns:</b>										
Sandpiper, Red-backed			300	5/15/48						400
Sandpiper, Semi-palmated	Throughout period		1000	May						1500
Sanderling			500	May						300
Plover, Semipalmated			100	8/17/48						200
Turnstone, Ruddy			50	8/17/48						50
Willet	Throughout period									300
Yellowlegs, Gt. and Lesser										50
Dowitcher			300	May	150	8/15/48				400
Gulls, Laughing			2000	8/10/48				500		2500
Gulls, Herring			300	8/30/48						300
Terns, Royal			500	7/1/48				500		500
Terns, Least			250	6/10/48				50		250
Terns, Common			500	8/10/48				100		500
Terns, Cabots	2	7/13/48								2
Stilt, Black-necked			4	8/5/48						4
Stilt, Black			500	8/10/48				100		500

(1)	(2)	(3)	(4)	(5)	(6)
<b>III. <u>Doves and Pigeons:</u></b> Mourning dove White-winged dove	<b>Seen occasionally throughout period</b>				
<b>IV. <u>Predaceous Birds:</u></b> Golden eagle Duck hawk Horned owl Magpie Raven Crow	<b>Mostly fish crews seen throughout period</b>				
				Reported by..... <i>Paul W. Sturm</i>	

**Paul W. Sturm, Refuge Manager**

#### INSTRUCTIONS

- (1) **Species:** Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiformes)  
II. Shorebirds, Gulls and Terns (Charadriiformes)  
III. Doves and Pigeons (Columbiformes)  
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)
- (2) **First Seen:** The first refuge record for the species for the season concerned.
- (3) **Peak Numbers:** The greatest number of the species present in a limited interval of time.
- (4) **Last Seen:** The last refuge record for the species during the season concerned.
- (5) **Production:** Estimated number of young produced based on observations and actual counts.
- (6) **Total:** Estimated total number of the species using the refuge during the period concerned.

3-1752  
 Form NR-2  
 (April 1946)

UPLAND GAME BIRDS

1613

Refuge Pen Island Months of May 1 to Aug. 31, 1948

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
	NONE									

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.\*

- (1) SPECIES: Use correct common name.
- (2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.
- (4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.
- (5) REMOVALS: Indicate total number in each category removed during the report period.
- (6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.
- (7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

\* Only columns applicable to the period covered should be used.

3-1570  
NR-8a

REFUGE GRAIN REPORT

Refuge Fox Island Refuge

Months of May 1 thru Aug 31, 1948

(1) VARIETY	(2) ON HAND BEGINNING OF PERIOD	(3) RECEIVED DURING PERIOD	(4) TOTAL	(5) GRAIN DISPOSED OF				(6) ON HAND END OF PERIOD	(7) PROPOSED USE		
				TRANS- FERRED	SEEDED	FED	TOTAL		SEED	FEED	SURP.
<b>Corn</b>	<b>none</b>	<b>140 #</b>	<b>140#</b>			<b>140 #</b>	<b>140 #</b>	<b>none</b>			

- (8) Indicate shipping or collection points Manteo, North Carolina
- (9) Grain is stored at \_\_\_\_\_
- (10) Remarks Obtained locally. Used for feeding game impounded for shipment to Region 8

NR-8a

REFUGEE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)--55 lbs., Corn (ear)--70 lbs., Wheat--60 lbs., Barley--50 lbs., Rye--55 lbs., Oats--30 lbs., Soy Beans--60 lbs., Millet--50 lbs., Cowpeas--60 lbs., and Mixed--50 lbs. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

- (1) List each type of grain separately: Corn, wheat, proso millet, etc. Include only domestic grains; aquatic and other seeds will be listed on NR-9.
- (3) Report all grain received during period from all sources, such as transfer, share-cropping, or harvest from food patches.
- (4) A total of Columns 2 and 3.
- (6) Column 4 less Column 5.
- (7) This is a proposed breakdown by varieties of grain listed in Column 6.
- (8) Nearest railroad station for shipping and receiving.
- (9) Where stored on refuge: "Headquarters grainary", etc.
- (10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.



LAUGHING GULLS CIRCLING OVER  
NESTING ISLAND



LAUGHING GULL NEST



SPRIGGING NEW DIKE WITH SPARTINA  
PATENS



SPRIGGING NEW DIKE WITH SPARTINA  
PATENS



IMMATURE SNOWY EGRET  
ON NEST



GADWALL NEST IN JUNCUS-  
SPARTINA MEADOW ASSOCIA-  
TION

PEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

JANUARY 1 TO APRIL 30, 1948

U. S. DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

MANTEO, NORTH CAROLINA

PEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

JANUARY 1 TO APRIL 30, 1948

CONTENTS

	Page
I. GENERAL	
A. Weather Conditions.....	1
B. Water Conditions.....	1
II. WILDLIFE	
A. Migratory Birds	
1. Population and Behavior.....	2
2. Food and Cover.....	3
3. Botulism.....	3
4. Lead Poisoning.....	3
5. Big Game Animals.....	4
6. Fur Animals.....	4
III. REFUGE DEVELOPMENT MAINTENANCE	
A. Physical Development.....	4
B. Plantings, Collections, Receipts of Seed.....	5
IV. ECONOMIC USE OF REFUGE.....	5
V. FIELD INVESTIGATION OR APPLIED RESEARCH.....	5
VI. PUBLIC RELATIONS	
A. Recreational Uses.....	5
B. Refuge Visitors.....	6
C. Violations.....	6
VII. OTHER ITEMS.....	<u>6</u>
HIGHLIGHTS OF THE YEARS ACTIVITIES	
Narrative Report Forms 1, 1A, 2, and 4	

PEA ISLAND NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

January 1 to April 30, 1948

I. GENERAL

A. WEATHER CONDITIONS

"This has been the worst winter in years" or "Never saw so much rain during the winter months". These and others were some of the comments frequently heard this past season. However, if the records covering a period of many years is examined, it can be shown that no records for extremes in either precipitation or temperature have been set.

The weather data for this report is taken from the Cooperative Meteorological records of Mrs. Rosa Drinkwater, Manteo, North Carolina. This station is approximately twenty miles north of the refuge and it is the belief of the writer that there is considerable variance in the precipitation as recorded in Manteo and that which actually fell on Pea Island.

The actual and normal monthly precipitation and the maximum and minimum temperatures for this period are as follows:

	Precipitation		Maximum Temperature	Minimum Temperature
	Actual	Normal		
January	2.52	3.36	67	15
February	1.75	3.81	77	23
March	1.52	3.54	79	31
April	<u>1.42</u>	<u>3.53</u>	87	36
Total Precip	7.24	14.24	Extremes 87	15

B. WATER CONDITIONS

Another indication that the rainfall on the refuge was greater than that recorded at the weather station at Manteo is the fact that Pool # 1 was consistently above the five foot level during the months of February and March. Our files indicate that this has never occurred previously in spite of greater recorded precipitation at the weather station. Not even the heavy rainfall during January 1947, which was almost three inches above normal for the month, was able to bring the water level up to the five foot mark.

The water level during the first three months of this year was too high for good feeding conditions. Swans, ruddies, buffleheads and coots could be seen almost daily but is was seldom used, except during April, by geese and other ducks found on the refuge. With the lowering of the water level quite a number of different species are using this pond at present.

The entire area of Pool # 2 had been covered with water (salt) until late in February when we had an exceptionally high tide from the sound. This seemed to have cut a channel in the creek leading to the break in the dike. Consequently when the water receded it drained all of the pool with the exception of the water in the borrow pits. Since that time the sand flats in the center of the pool have not been covered. Until the time of this high tide this pool was frequented by many birds.

The heavy rainfall kept the area between Pools # 1 and 2 covered with a few inches of water during January, February and the greater part of March. As a result many birds used this area during this period.

### C. FIRES

None

## II. WILDLIFE

### A. MIGRATORY BIRDS

#### 1. Population and Behavior

To those passing through the refuge the Snow Geese hold the greatest attraction. It has been estimated that a total of 6500-7000 used the refuge. This winter they arrived a little later ~~than~~ and departed about a week earlier than the previous year. The last snow geese were reported on February 19. It will be noted that his species showed an increase over last year.

Canada Geese were also believed to have increased with about 10,000 using the refuge at their peak. Since they are scattered over the entire area in small groups, it is much more difficult to get an accurate estimate than is the case with the Snow Geese. An aerial survey was not made during the height of the waterfowl season. The press of other duties and rough weather prohibited this. In regard to the latter the writer is very allergic to flying when the weather is rough.

In regard to the duck population there has been a decline in most species. Blacks, Pintails, Green-winged Teal and Bufflehead were seen in goodly numbers but Canvasbacks, Shovellers, Baldpates, although frequently seen, appear to have declined considerably. Most of the Pintails, Buffleheads, Ruddies, and Shovellers had gone north by the end of February. At this writing Black ducks can be seen in pairs over most of the refuge. Gadwalls and Blue-winged teal and occasionally a bufflehead will be seen.

The last northward migration was on April 21 on a stiff southerly wind. Throughout the day the Canada Geese were discussing the journey. The following day all but perhaps 350-400 of the 2000 estimated to have been on the refuge, had headed north.

During the months of March and April many shore and wading birds stopped in to rest on their trip north. Some remain unidentified but among the most noticeable were the Red-backed Sandpipers, Sanderlings, Yellowlegs, Dowitchers, Semi-palmated sandpipers, Semipalmated Plovers, Snowy Egrets, Least Sandpipers, Cormorants and a few Hudsonian Curlews. Estimates of their numbers are listed on subsequent NR forms.

With the northward migration of the Great Black-backed gulls, the Laughing gulls arrived. Royal and Least Terns can be seen almost daily. Snowy Egrets and Louisiana Herons are a common sight.

Clapper rails are frequently heard but seldom seen. One sora was seen on April 29 in the marsh west of Pool # 2.

After an absence of a couple of months eagles and ospreys are again common.

2. Food and Cover

As previously mentioned water levels in Pool # 1 were too high for satisfactory feeding conditions. Canada Geese frequented the entire marshland of the refuge. On the other hand the snow geese used the area north of Pool # 1 (Marsh) and Pool # 2 extensively. On no occasion were they seen or reported in Pool # 1 or south thereof. Green-winged teal, shovellers, pintails and blacks preferred Pool # 2 and the marsh between the pools. Ruddies and coots fed mostly in Pool # 1.

Both Canada Geese and Snow Geese as well as ducks fed in the sound during low water. What they have been feeding on is not known since the writer has seen very few signs of vegetation in the sound adjacent to the land areas. During the first week of April a species of vegetation was washed up on the shore all the way from the overnight cabin to Oregon Inlet. Although identification was not positive, it appears that it may be Eelgrass. If this is the case, there must be an abundance of it somewhere. About a week later quite a bit of it was found on the ocean side.

3. Botulism

None

4. Lead Poisoning and other Disease

Upon his arrival at Pea Island, the writer heard many tales about Canada Geese dying. He was told how he would be able to drive up and down the roads and fill up pickups full. He is happy to report that parasitism this year was not serious. After a lot of effort, he did find 12-15 in a

4\*

weakened condition. Also in searching the marsh perhaps 30-40 carcasses were found. Some of these no doubt died of lead poisoning and old age rather than of parasitism. In order to remove any dead or dying geese from the public view considerable time was spent checking the roads and marshes.

5. Big game Animals

None

6. Fur Animals

Muskrats are frequently seen, especially in Pool # 1. Both muskrat and otter sign is in evidence over the greater part of the refuge.

Mr. Douglas E. Wade, Naturalist, and party of six students from Dartmouth College, Hanover, New Hampshire, made an intensive survey of muskrat houses, dens, and feeder houses in Pool # 1. They found 64 bank dens, 80 houses, and 52 feeder houses. Their report regarding the estimated numbers is not completed but it will give us some idea of their numbers.

### III. REFUGE DEVELOPMENT MAINTENANCE

#### A. PHYSICAL DEVELOPMENT

During the first three months covered by this report excellent progress was ~~made~~<sup>made</sup> on the dike project. During this period 405 feet of dike were built and completely sprigged. There were no major breakdowns, which in itself is somewhat of a miracle. However it is regretted that it must be reported that no progress was made during the month of April. The dragline operator decided to work for himself and at this writing no reliable operator has been found. The big obstacle in finding an operator is that they are limited to a 40-hour work week. The operator we had will during the summer months work 60-70 hours a week with everything over 40 hours at time and a half. It is believed, however, that we will be able to resume operation within a week or ten days.

Sand fence repair is continuing. Good results have been obtained with planting brush in some of the low places. Several of these have now built up three or more feet. Grasses have also been planted in order to hold what we have. The sand fence enclosing Pool # 2 is greatly in need of repair work.

Pierced plank landing mat was finally obtained to lay over the one remaining ramp. The mat has been placed in position and since it is heavier than that previously put down, it is believed to be very satisfactory.

All the sign posts (refuge Markers) have been painted. Work has begun on cleaning the refuge buildings preparatory to painting them. Copper painting Redhead II is next on the list. It also will be painted both outside and inside.

One of the biggest jobs is keeping the pickups painted. The Chevrolet pickup I-17153 is rusting out very badly. On places it is impossible to sandpaper it since by doing so there would be nothing left to paint. It has been rusting from underneath and from the inside. Considering that this vehicle has been used in sand and salt water for eight years, it has done remarkably well.

During January, February and part of March the roads were continually full of water. It is at times amazing that the vehicles used on the beach run at all.

The Ford Stake I-17291 is still being used. The motor is in fair condition but everything else is about gone. This has been a handy truck to have around and will be missed when it is gone. It has not been off the beach this period since it is not in condition to drive on and off the ferry or on the highways.

Ford pickup I-17289 is in good condition except the brakes. The rear tires of this pickup as well as those on the Chevrolet have been replaced with 4-ply tires. The difference between a 4-ply and a 6-ply tire on the beach is amazing. It is hoped that eventually all 6-ply tires can be replaced with 4-ply tires.

The State of North Carolina is now inspecting all motor vehicles. The International Pickup I-17276 passed the inspection. The Chevrolet did not pass. The Fords were not inspected because they have no brakes. We have until January 1, 1949 to get the vehicles in shape or else take them off the road.

#### B. PLANTINGS, COLLECTIONS, RECEIPTS OF SEED AND NURSERY STOCK

None

#### IV ECONOMIC USE OF REFUGE

None

#### V. FIELD INVESTIGATION OR APPLIED RESEARCH

As mentioned above Mr. Douglas E. Wade and party of six students from Dartmouth College visited the refuge. They were with us from March 28 to April 1. They made studies of various phases of plant and animal life.

#### VI. PUBLIC RELATIONS

##### A. RECREATIONAL USES

During the latter part of March and April visitors were again trying their luck at surf fishing. Many arrived too early for good fishing. During the last two weeks of April it has been improving.

## B. REFUGEE VISITORS

Official visitors to the refuge during this period were Messrs. James Silver, Richard F. Dittman from the Regional Office, Atlanta, Thomas M. Carter, Law Enforcement Agent, Washington, N. C. and Roy Ferguson, Pilot-Law Enforcement Agent.

Mr. Douglas E. Wade, J. A. Gustafson, James Schwedland, Bert Hiceck, Bill Schaldack, Jay Haft, and Frank Stern from Dartmouth College, Hanover, New Hampshire visited the refuge from March 28 to April 1. They made their headquarters the overnight cabin on the refuge. Their object was to make a study of the flora and fauna of the area.

## C. VIOLATIONS

With only a few hunting days during this period and bad hunting weather a part of the time, no arrests were made and no violations seen or reported. A flight per float plane up the outer banks by Thomas M. Carter and Roy Ferguson shortly after the season closed frightened everyone out of any post-season hunting.

## VII. OTHER ITEMS

The past four months have been very interesting. The Snow Geese added a great deal of color. Then soon after they departed other migratory birds arrived from the south---old friends that one remembers from the previous fall. It is during the winter months that the wind and water, sea and sound, tide and time seem to be having things pretty much their own way---often much to the dismay of the refuge manager. This is especially true when they start playing havoc with the dikes and sand fences which require an endless amount of time and energy. These forces also help to avoid monotony in driving. After passing over a road one never knows if it will be passable or even in the same place several hours later.

But then one finally sees a few green sprigs of grass here, a few more there, until one finally realizes that it is these relatively small plants with their entangled root systems that assist us more than anything else to oppose the wind and water. How they are able to survive after being battered by the wind, covered with sand, and washed by the water is one of the wonders of nature. We try to assist them but it often seems as if what we do as being rather insignificant with what they are able to do without assistance.

Date Submitted:

May 3, 1948

Approved:

Respectfully submitted,

*Paul W. Stern*

Refuge Manager

## HIGHLIGHTS OF THE YEARS ACTIVITIES

The dike repair job, which is the biggest project at the present time on Pea Island Refuge has made progress during the year. At times the work has been going very slowly. This is partly due to the fact that a small machine is being used, to frequent breakdowns, and to the number of casts (in some cases up to five) before the dike is completely built. Since the beginning of the year--Jan. 1948--no major repairs were needed. We did, however lose a good operator and to date none has been found to replace him.

During the year boats and buildings have been painted and kept in repair. Motor vehicles require constant repair work and spot painting. Some of it is getting old and constant usage in salt and sand is beginning to tell.

Refuge signs have been painted. New posts put in where needed and new posts and signs placed in strategic positions.

All four of the ramps over the dikes now have landing mat on them. The road between the dikes is in very poor conditions. One still hears faint murmurs of a paved road down the beach but nothing definite.

Considerable work has been done on the sand fence, especially the section enclosing Peel # 2. At the beginning of winter a high ocean tide would overflow and flood the road. These places and others were repaired. However, the sand fence requires a great deal more work before it will withstand a storm tide.

Before, during, and after the hunting season the refuge was patrolled daily. It is believed that constant patrol prevented violations. Patrols by float plane, if continued next season, will throw a big wrench into the violation machinery.

Parasitism was not considered serious this season. The writer was asked to trap geese for transfer to the Parker River Refuge in Massachusetts. It was thought catching the weakened geese would be the solution but it wasn't that simple.

And lastly, the writer who was transferred to Pea Island from S. Marks to replace Charles M. Parker, finds that the sand has slightly more respect for him than in the beginning. How he will make out with the mosquitoes and greenheads is not known. He still has not solved the problem of how to get everything done within the time allotted. But when driving down the beach and watching the forces of nature at work, one realizes that they have been at it a long time--the wind against the water or sometimes with it, the grasses and other plants seemingly against both of them. At times one of them takes a beating but slowly makes a comeback. It is these things that help one to realize that it is only by constant plugging away that the desired results are obtained.

MIGRATORY BIRDS  
(other than waterfowl)

... Pen Island ... Months of Jan 1 to April 30 1948

	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
birds:										
-Cr			400	3/20/48	400	4/30/48				400
			4	3/48	2	4/26/48				6
			4	3/48	2	4/26/48				10
... Mt.			9	1/10/48	1	4/30/48				15
	2	4/12/48	25/	4/30/48	15	4/30/48				25
					1	2/17/48				
			50	4/48	12	4/26/48				60
			20		4	4/26/48				50
			10	4/48	1	4/30/48				10
			200	4/48	15	4/30/48				500
			Frequently heard, seldom seen		1	4/29/48				
					1	4/29/48				
	50	3/30/48	250	4/8/48						250
and										
	200	3/48	1000	4/20/48						1000
ked	12	1/9/48	3000	4/24/48						3000
			300	4/30/48						300
			300	4/24/48						300
ked			4000	1/9/48						4000
			100	2/17/48	1	4/26/48				200
	3	3/28/48	600	4/24/48						600
					2	3/10/48				
			100	4/30/48	20	4/30/48				150
			25		2	4/26/48				25
					5	4/26/48				
			1000	3/48	50	4/8/48				1500
			15	3/48	2	4/30/48				
ted			10	4/48						

...-too far away to identify (over)

5000

(1)	(2)	(3)	(4)	(5)
III. <u>Doves and Pigeons:</u> Mourning dove White-winged dove			2	2/25/68
IV. <u>Predaceous Birds:</u> Golden eagle Duck hawk Horned owl Magpie Raven Crow ( <u>mostly</u> <u>Cervus ossifragus</u> )		20	2	4/30/68

Reported by *Paul*

Paul W. Star

#### INSTRUCTIONS

- (1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and order. Avoid general terms as "seagull", "tern", etc. In addition to the form, other species occurring on refuge during the reporting period should piate spaces. Special attention should be given to those species of loc significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiif  
 II. Shorebirds, Gulls and Terns (Charadriiformes)  
 III. Doves and Pigeons (Columbiformes)  
 IV. Predaceous Birds (Falconiformes, Strigiformes  
 Pas
- (2) First Seen: The first refuge record for the species for the season concerned.
- (3) Peak Numbers: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned.
- (5) Production: Estimated number of young produced based on observations and actual count
- (6) Total: Estimated total number of the species using the refuge during the period

UPLAND GAME BIRDS

Refuge Poa Island Months of Jan 1 to April 30, 1948

(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Species types, total percentage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
<b>NOT APPLICABLE TO THIS REFUGE</b>									

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.\*

- (1) SPECIES: Use correct common name.
- (2) DENSITY: Applies particularly to those species considered in removal programs (hunts, etc.). Detailed data may be omitted for species occurring in small numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager giving the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the number of cover types. Cover types should be detailed enough to furnish the necessary information but not so much as to obscure the general picture. Examples: swamp, upland hardwoods, reverting agriculture land, bottomland hardwood, grass prairie, etc. Standard type symbols listed in Wildlife Management Manual No. 7 should be used where possible. Figures submitted should be based on observations and counts on representative sample areas. Survey method, date, size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.
- (4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include other species if available.
- (5) REMOVALS: Indicate total number in each category removed during the report period.
- (6) TOTAL: Estimated total number using the refuge during the report period. This includes resident birds plus those migrating into the refuge during the period.
- (7) REMARKS: Indicate method used to determine population and area covered in survey. Include other pertinent information not specifically requested.

\* Only columns applicable to the period covered should be used.

SMALL MAMMALS

Refuge Pan Island Year ending April 30, 1948

(2) Density		(3) Removals					(4) Disposition of Furs					(5) Total Popula- tion
Cover Types & Total Decrease of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	For Re- stocking	For Re- search	Share Trapping			Total Refuge Furs Shipped	Furs Donated	Furs Destroyed
							Permit Number	Trappers Share	Refuge share			
Marsh												Est 500
"												Est 500
Predator Animal Hunter												

## INSTRUCTIONS

Form NR-4 - SMALL MAMMALS (Include data on all species of importance in the management program: muskrats, beaver, coon, mink, coyote. Data on small rodents may be omitted except for estimated total population of each species considered in control operations.)

- (1) SPECIES: Use correct common name. Example: Striped skunk, spotted skunk, white-tailed weasel, gray squirrel, fox squirrel, white-tailed jackrabbit. (Accepted common names in current use are found in the "Field Book of American Mammals" by H. E. Anthony and the "Manual of the Vertebrates of the Northeastern United States" by David Starr Jordan.)
  - (2) DENSITY: Applies particularly to those species considered in removal programs. Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to provide the desired information but not so much as to obscure the general character of the area. Examples: spruce swamp, upland hardwoods, reverting agriculture land hardwoods, short grass prairie, etc. Standard type symbols from Wildlife Management Series No. 7 should be used where possible. Data submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
  - (3) REMOVALS: Indicate the total number under each category removed since April of the previous year, including any taken on the refuge by Service Predator Hunter. Also show any removals not falling under headings listed.
  - (4) DISPOSITION OF FUR: On share-trapped furs list the permit number, trapper's share, and the number of pelts shipped to market, including furs taken by refuge personnel. Total number of pelts of each species destroyed because of loss or damaged condition, and furs donated to institutions or other agencies should be shown in the column provided.
  - (5) TOTAL POPULATION: Estimated total population of each species reported on as of April 30.
- REMARKS: Indicate inventory method(s) used, size of sample area(s), introduced species, and any other pertinent information not specifically requested.

SMALL MAMMALS

Refuge Pan Island Year ending April 30, 1948

(2) Density		(3) Removals					(4) Disposition of Furs					(5) Total Popula- tion	
Cover Types & Total Decrease of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	For Re- stocking	For Re- search	Share Trapping			Total Refuge Furs Shipped	Furs Donated		Furs Destroyed
							Permit Number	Trappers Share	Refuge share				
Marsh				No removals								Est	500
"				No removals								Est	500
Predator Animal Hunter													