

**NARRATIVE REPORT**  
**SAND LAKE NATIONAL WILDLIFE REFUGE**  
**1970**

**UNITED STATES DEPARTMENT OF THE INTERIOR**  
**FISH AND WILDLIFE SERVICE**  
**BUREAU OF SPORT FISHERIES AND WILDLIFE**  
**COLUMBIA, SOUTH DAKOTA 57433**

**SAND LAKE NATIONAL WILDLIFE REFUGE**

**COLUMBIA, SOUTH DAKOTA 57433**

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*Bill*

*Photos Bill + Loren.*



# SAND LAKE NATIONAL WILDLIFE REFUGE

## NARRATIVE REPORT

1970

### I. GENERAL

#### A. Weather Conditions

<u>Month</u>	<u>Precipitation</u>			<u>Avg. Max. Temp.</u>	<u>Avg. Min. Temp.</u>
	<u>1970</u>	<u>Normal</u>	<u>Snowfall</u>		
January	1.00	0.77	6.0	13.1	- 8.6
February	0.84	0.63	8.4	28.3	4.1
March	2.59	1.20	14.5	32.5	11.6
April	3.66	2.12	26.2	52.2	32.3
May	2.33	2.24	T	70.9	44.9
June	1.84	4.04	-	83.0	56.2
July	3.11	2.61	-	88.8	58.9
August	0.25	2.16	-	88.0	57.5
September	1.12	1.43	T	78.1	47.7
October	1.25	1.18	6.5	59.2	34.0
November	2.39	0.71	12.2	36.2	21.0
December	<u>0.99</u>	<u>0.63</u>	<u>5.9</u>	<u>25.1</u>	<u>2.5</u>
TOTALS	20.97	19.72	79.7	54.8	30.3

Highest Temperature - 100 on July 18

Lowest Temperature - -36 on January 18

Last Frost - 27° on May 2

First Frost - 30° on September 13

Days of Frost-free Growing Season - 134

Spring Breakup - April 16

Earliest Spring Breakup - March 23, 1963

Latest Spring Breakup - April 23, 1956 and 1965

Snowfall was below normal for the first three months of 1970 with the ground almost clear of snow by the first of April. On April 12, a storm dropped seventeen and one-half inches of snow on the ground, closing most of the roads in the area. A total of 26 inches of snow fell in April but melted quickly as temperatures remained above freezing most of the time.

The last killing frost occurred on May 2 and farming operations began in earnest the latter part of the month. Soil moisture conditions were excellent and both the small grain and corn made a good start.

Small grain crops were damaged by hot, dry winds occurring in June and July. Three inches of rain fell during the last half of July, which helped some of the crops, but did not improve water conditions in the potholes.

An Indian summer existed through September and October, with colder temperatures and fall-like weather coming in November. The high temperature in September was 93°. The first killing frost occurred on September 12, when the temperature dropped to 30°.

## B. Habitat Conditions

### 1. Water

Due to light snow cover and a slow spring breakup, the runoff in 1970 was below normal. A drawdown was made in the Sand Lake Pool to facilitate bank repairs, bridge construction and to control fall goose populations. On June 9, the pool was 2.82 feet below the spillway crest. By July 31, the water had lowered another 2.10 feet and water ceased to flow from the outlet channel. Evaporation during the remainder of the summer reduced the pool to 800 surface acres with an average depth of 6 inches. Low areas which are normally flooded reverted to lush growths of wild millet, smartweed and other moist soil plants. When the pool is re-flooded in the spring of 1971, an abundant food supply will be available for migrating waterfowl.

The stoplogs at the Mud Lake control structure were placed to the top of spillway crest (1288.23'). Spring runoff created that pool at 1288.96 which is .63 feet above spillway crest. Water levels in Mud Lake remained stable until the latter part of June. Between June 30 and August 28, the Mud Lake Pool dropped 1.08 feet. In October, stoplogs were removed from two bays to relieve ice buildup in the spring of 1971. Fall drawdown was not necessary this year as both Sand Lake Pool and Mud Lake Pool are low enough to compensate for normal spring flooding.

## ANNUAL WATER DISCHARGE - SAND LAKE REFUGE

<u>10-year Avg.</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
50,000 Ac. Ft.	27,000 Ac. Ft.	263,000 Ac. Ft.	32,023 Ac. Ft.

2. Food and Cover

High goose populations in the fall of 1969 depleted refuge grain crops, leaving little for deer, pheasants, and other wildlife species. A mild winter followed and mortality of deer and pheasants was low. Yarding did not exist during the winter and few depredation complaints were received.

In April, 26.2 inches of wet snow fell, rejuvenating water levels in outlying marshes and increasing plant growth in upland nesting habitat.

Four hundred acres of DNC (Dense Nesting Cover) were planted on the refuge in 1970. The seed mixture contained 3 lbs. intermediate wheatgrass, 2 lbs. sweetclover and 1 lb. alfalfa. The DNC will provide some nesting cover in the spring of 1971 and should provide optimum nesting habitat by the spring of 1972.

After the geese left in the fall of 1970, there were 2,725 bushels of grain remaining at several locations on the refuge. The grain should be sufficient to carry wildlife species through the winter of 1970-71. Two hundred fourteen acres of rye browse were planted during the summer and used by geese this fall, this will also be available for browse in the spring.

## II. WILDLIFE

### A. Migratory Birds

#### 1. Waterfowl

##### a. Swans

The first whistling swan was sighted on April 2. This species peaked at 50 birds between April 26 and May 2.

During the fall migration, the first whistling swan was seen on October 5. A peak of 250 occurred between November 1 and November 7. The last swans were seen on November 14.

##### b. Geese

#### (1) Spring Migration

Arrival dates: Large Canadas - March 4, Small Canadas - March 10, Snows and Blues - April 4, and White-fronts - April 4.

The first geese observed were small flocks of both large and small Canadas. By April 11, the total population of all geese had reached 164,500. A heavy snow storm occurred on April 12, sending most of the geese back south. A second migrational movement built up to 85,500 birds during the week of April 19 to 25. All but the resident flock of large Canadas had departed by May 10.

#### (2) Large Canada Goose Production

An aerial pair count was made during the middle of May. Vegetation was dense and high, making an accurate pair count almost impossible. It was estimated that there were 20 to 30 active nest. The snow storm in April caused late nesting, but nesting conditions were excellent and production was higher than a year ago. Seventeen broods were seen during late summer and approximately 100 goslings reached flight stage. The table on the following page shows production for large Canada geese for the past 20 years.

## LARGE CANADA GOOSE PRODUCTION

<u>Year</u>	<u>Adult Geese</u>	<u>Number of Broods</u>	<u>Number of Young</u>
1970	200	17	100
1969	180	9	40
1968	160	6	25
1967	160	10	50
1966	150	6	30
1965	200	15	100
1964	150	15	75
1963	200	13	50
1962	170	16	75
1961	180	20	100
1960	160	7	35
1959	160	12	63
1958	150	12	64
1957	262	18	95
1956	150	14	54
1955	100	15	68
1954	130	9	46
1953	?	18	56
1952	105	18	65
1951	?	18	56
1950	100	12	50

(3) Fall Goose Migration(a) Small Canada Geese

The first small Canadas arrived at the refuge on September 21. There were 1,000 scattered throughout the refuge by the opening day of hunting season, October 3. The population peaked at 7,000 on October 28. The small Canadas left the refuge the weekend of November 7.

There was evidence again this fall that this refuge cannot be managed for both small Canadas and blue and snow geese. Despite an abundance of green browse, small Canadas failed to show up in their former numbers. It has been observed that Canadas and snow geese will seldom mix in the same flock. As snow geese invade browse areas used by the Canadas, the Canadas move out.

(b) Snow and Blue Geese

Snow and blue geese began arriving at the refuge on September 22. There were 7,000 on hand for the opening day of goose season, October 3. The buildup was slow this year and a peak of 108,000 occurred on October 20. This is considerably lower than the all-time high of 160,000 in 1969.

To alleviate short-stopping geese and to reduce hunter problems near the refuge, a peak population of not over 100,000 snow geese was desired. Crop reduction and pool drawdown are believed to be largely responsible for the lower population present this fall. It was felt that the lower numbers of geese did reduce hunting problems at the refuge, but it is doubtful if the reduction had much effect on short-stopping. In a large portion of eastern North Dakota and South Dakota, half-day goose hunting is practiced. In both states, numerous small rest areas have been established and a number of state and federal refuges afford protection. Reduction in the fall population at Sand Lake will probably not result in earlier migrations to the Gulf Coast.

A cold front moved into the area on November 7 and all but 900 geese left the refuge that weekend. The Sand Lake drawdown and low water in the Mud Lake Pool were instrumental in the November 14 freezeup of both pools. All geese had left by November 15.

(c) White-fronted Geese

Arrival date - September 9. The peak population was 250 on October 1. Few geese of this species were killed during hunting season as most had moved on south by the opening day of goose season.

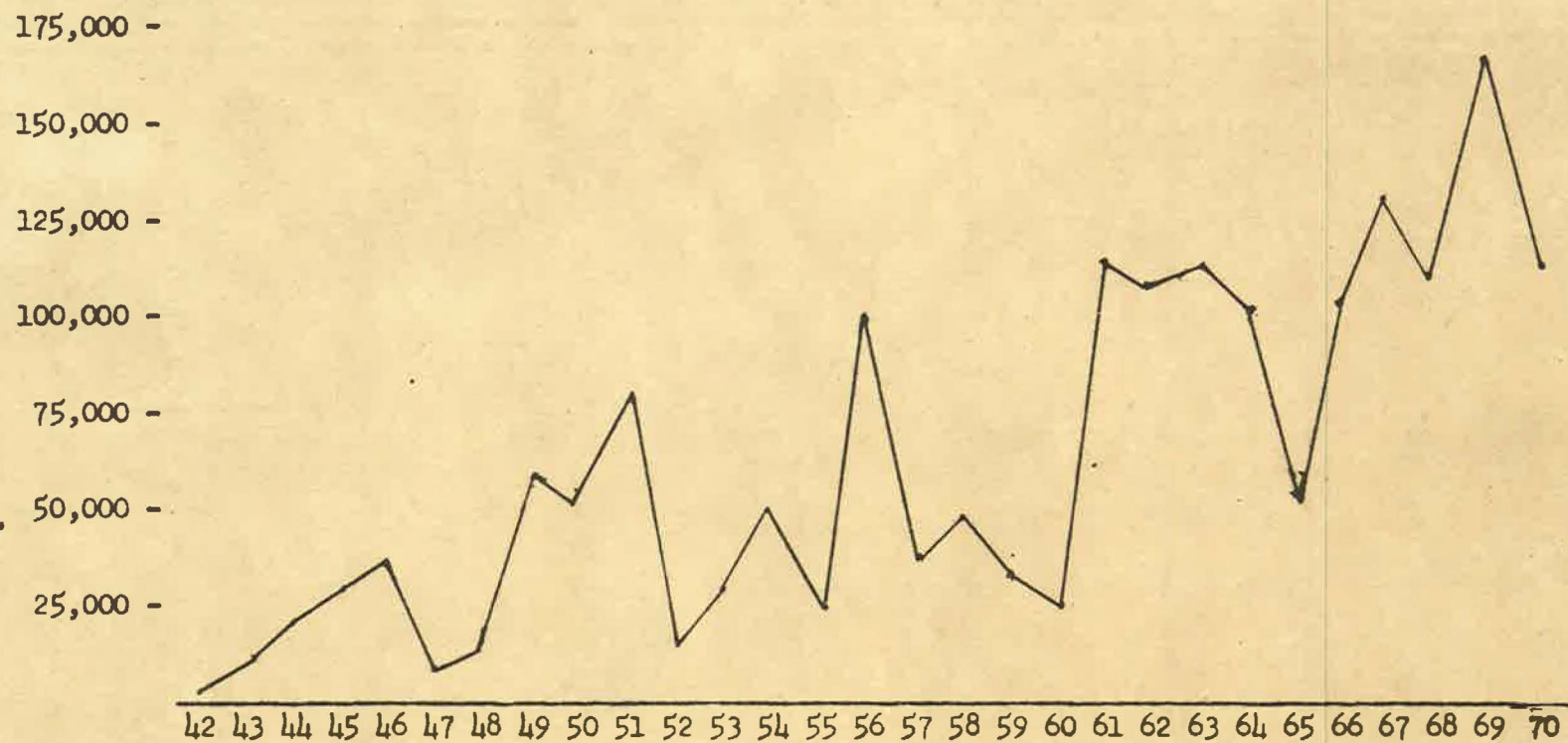
(4) Goose Summary

The table below shows peak numbers of geese on Sand Lake Refuge for the month of October from 1966 through 1970.

PEAK NUMBERS OF GEESE IN OCTOBER

<u>Species</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
Small Canadas	10,000	19,200	6,165	9,000	7,000
Snows and Blues	90,000	107,000	100,775	160,000	108,000
White-fronts	400	500	300	200	250

# PEAK FALL GOOSE POPULATIONS



Highest Fall Population - 169,200 in 1969



(c) Ducks(1) Spring Migration

The first spring arrivals of 1970 were 20 pintails on March 2. The peak occurred between March 29 and April 11. There were 42,500 ducks on the refuge by April 3. The majority of these were pintail, scaup and mallard. On April 11, there were 40,300 ducks, 35,000 of which were scaup.

Light snowfall and little rain during early spring left potholes in poor condition for nesting birds. As a result, most of the early-nesting ducks moved farther north.

(2) Production

Duck production was somewhat of a letdown in 1970 after the record production year of 1969. Low water in potholes around the refuge perimeter was probably the main limiting factor. The heavy snow storm in early April improved conditions for late-nesting ducks. The following production figures are projected from a direct count taken on a pre-determined route.

Mud Lake Pool	- 3,063
Sand Lake Pool	- 1,584
Potholes	<u>31</u>
TOTAL	4,678

## FORMULA FOR PROJECTION

$$\frac{\text{Length of Route} \times 5,280' \times \text{Visibility}}{\text{Sq. Ft. per Acre}} = \text{Area}$$

= 43,560

$$\frac{\text{Area}}{\text{Number of Broods seen on Census Route}} = \text{Acres per Brood}$$

$$\frac{\text{Total Acres of Marsh}}{\text{Acres/Brood}} = \text{Total Broods}$$

$$\text{Total Broods} \times \text{Young per Brood} = \text{Total projected production}$$

Drawdown of the Sand Lake pool reduced the projected census acreage by 3,240 acres from that of 1969.

## COMPARATIVE DUCK PRODUCTION - SAND LAKE REFUGE 1963-70

1963	1964	1965	1966	1967	1968	1969	1970
3,696	3,520	4,271	2,619	4,371	4,886	14,908	4,678

Species composition of broods observed during censusing are listed in order of total observations: blue-winged teal, pintail, mallard, ruddy and redhead.



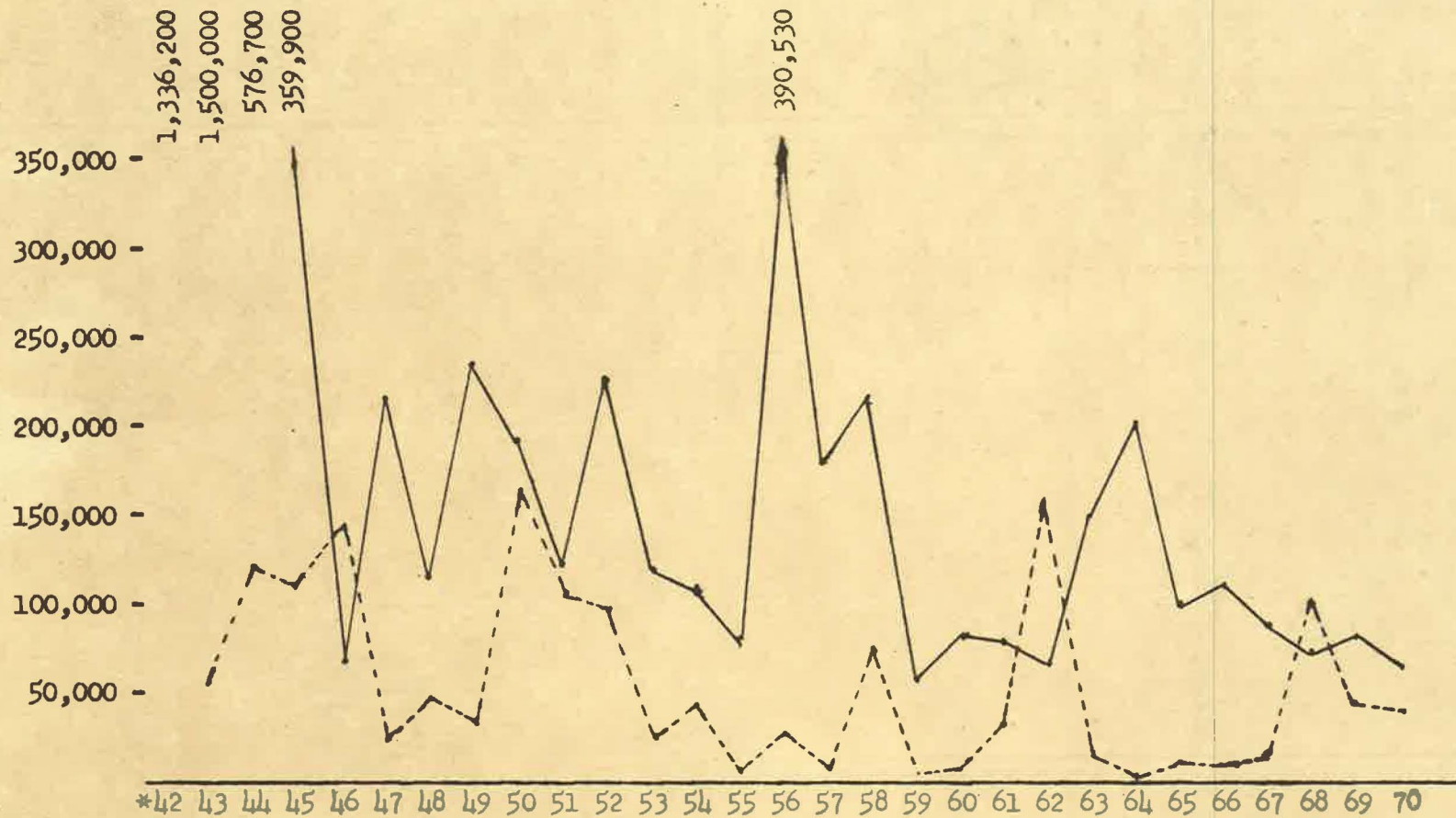
(3) Moulting

Pintails and mallards comprised more than one-half the total moulters using the refuge during the summer. A peak of 10,625 ducks were using the refuge the last week in July.

(4) Fall Migration

By the opening day of duck season, October 3, there were 16,000 ducks on the refuge. The population built up to 37,400 by October 11. An Indian summer prevailed through the remainder of October and the first part of November. Duck numbers remained between 35 and 40 thousand during this period. A cold wave moved into the area on November 12 and a majority of the ducks left, however, 65,000 southbound mallards invaded the refuge the same weekend. All ducks except 350 mallards had left the refuge by November 20. The 350 mallards occupied a small open water area below the Mud Lake dike through the end of the period.

# PEAK SPRING AND FALL DUCK POPULATIONS



Highest Spring Population - 167,150 in 1950

Highest Fall Population - 1,500,000 in 1943

\* Data for Spring of 1942 not available.

Spring - - - - Fall ———

## 2. Other Water Birds

The breeding populations of white pelicans, double-crested cormorants, Franklin's gulls and grebes (Western, eared and pied-billed) were slightly lower than in previous years. Production of pelicans was lower than it has been for several years.

## 3. Doves

The peak mourning dove population was estimated at 3,000. Production was good throughout the area. The hunting season for this species was for 14 days beginning September 1, and hunter success was better than in the past. On September 13, a cool front moved through the area and most of these speedsters left for warmer climes.

## 4. Shorebirds

The large expanses of mudflats and shallow water proved to be quite attractive to birds of this group. Species most commonly observed were: snipe, Wilson's phalarope, avocet, long-billed dowitcher, killdeer, willet and various sandpipers.

## B. Upland Game Birds

### 1. Pheasant

The pheasant situation in South Dakota looks somewhat brighter than in recent years. State officials estimated a statewide increase of 34% in 1970. Observations of broods on the refuge indicate that the population was about one-third larger than a year ago.

South Dakota had a 37 day season, with a three cocks per day limit. Hunting pressure was fairly heavy around the refuge perimeter on opening weekend and most hunters bagged their limits. Hunting remained heavier in this area than in recent seasons because out-of-state waterfowl hunters concentrated on pheasants during the afternoon hours.

Following the refuge deer season, a 7 day pheasant season was held on the refuge. Hunting pressure on the refuge was also heavier than in recent years but success was low due to the heavy cover afforded in large expanses of cattail on mudflats.

### 2. Hungarian Partridge

Two coveys of Huns were seen during the year. Very likely, this is the total refuge population.

### 3. Prairie Chicken

No prairie chickens were sighted on the refuge in 1970.

The traditional early morning trip to the booming grounds in Dickey County, North Dakota failed to locate a single prairie chicken. One prairie chicken was seen while returning to the refuge. (He) was standing in a deserted feed lot five miles east of Hecla, South Dakota. There is some hope, however, as we have acquired several WPAs within ten miles of the booming ground. Part of these areas have good stands of native grass which may help support a remnant population.

### C. Big Game Animals

The deer population has remained quite stable since 1959. At that time, a permit system was adopted by the refuge and data collected during hunting season indicates a stable herd. Approximately 150 to 200 deer use the refuge during the summer and 400 to 500 use it during the winter.

Reproduction was excellent in 1970, with about 90% of does observed having two fawns and sometimes three.

The refuge rifle deer season began on November 28 and ran through December 6. A total of 150 permits were issued and it was estimated that 120 deer were taken. Following the rifle season, the refuge was opened to archery hunting for the remainder of December. Archery hunting in this area is light and it was estimated that only three deer were taken during this season.

### D. Fur Animals, Predators and Other Animals

#### 1. Fur Animals

##### (a) Mink

The mink population has increased little in the past two years. No mink were trapped in the 1969-70 season and no permits were issued for the 1970-71 season. The refuge population is estimated at 125 animals.

##### (b) Muskrat

Musk rats are present on the refuge in small numbers. Present water management practices keep the population at a low level. Drawdown on the two major pools causes freezing to the bottom during winter months. At the end of the year, the total population was estimated at 3,000 animals.

(c) Beaver

Colonies of beaver move up and down the James River. In some years, several colonies use the refuge, but due to low water levels it is believed that most of them have moved to new locations.

2. Predators

(a) Fox

The fox population remained low through the first part of 1970. There were only 25 taken by trappers in 1970, compared to 150 taken in 1969. Production in the spring was good, as numerous sightings have occurred during the summer and fall.

No trapping permits will be issued in 1970. Too many dead sheep (bait) remained on the refuge after the season ended and trappers have been reluctant to remove them after the season. One permit will be issued to an airplane hunter in the spring of 1971.

(b) Raccoon

The raccoon population has remained about the same as previous years. No complaints were received this year, but several refuge employees reported that they had lost most of their sweet corn to the masked bandits. The population for this species is estimated at 175.

(c) Skunk

The combination of heavy snow and spring floods in 1968-69 apparently had adverse effects on the skunk population. In the past two summers a gradual increase has been noted.

(d) Badgers

The badger population has remained about the same for several years. Most of the damage done by this species occurred shortly before freezeup from burrows in fields and on roadways.

3. Rodents

(a) Rabbits

The season on jackrabbits has been closed for the past three years, except for a short season in December of 1969. The population is on the increase in the western two-thirds of the state. A season was set this year lasting from December 16, 1970 to February 16, 1971. The population for this species is estimated at 100.

The Eastern cottontail rabbit also inhabits the refuge in small numbers. This species is not protected by state law, but hunting pressure is light and it is estimated that 150 of this species inhabit the refuge.

(b) Pocket Gophers

Pocket gophers continue to be a problem on refuge agricultural land and grazing units. There is some damage to roads and trails where badgers dig up the gophers. (I guess everyone has to eat.)

E. Predaceous Birds

Snowy owls migrate into the area in early December and leave in late February. Other owls seen during the year were the great horned owl and burrowing owl.

Marsh, sparrow, red-tailed and rough-legged hawks were quite common during the spring and summer, with marsh hawks being most numerous.

Golden eagles were noted on two occasions during the year. The first sighting was one bird on April 5 and the other sighting was on September 10, when 3 were sighted.

No sightings of bald eagles were reported this period.



## F. Other Birds

The following is a list of arrival dates for migratory birds in the spring of 1970.

2/19	Horned Lark	4/12	White Pelican
3/2	Pintail	4/14	Sandhill Crane
3/4	Giant Canada Goose	4/14	Franklin's Gull
3/4	Red-winged Blackbird	4/15	Sparrow Hawk
3/5	Common Crow	4/16	Ruddy Duck
3/6	Western Meadowlark	4/16	California Gull
3/7	Robin	4/16	Ring-billed Gull
3/9	Marsh Hawk	4/17	Purple Martin
3/10	Downy Woodpecker	4/20	Snowy Egret
3/11	Goshawk	4/20	Lesser Yellowlegs
3/11	Red-tailed Hawk	4/20	Hooded Merganser
3/11	Rough-legged Hawk	4/23	Wood Duck
3/13	Slate-colored Junco	4/23	American Avocet
3/16	Yellow-headed Blackbird	4/24	Marbled Godwit
3/16	Field Sparrow	4/25	Red-necked Grebe
3/18	Mallard	4/26	Long-billed Dowitcher
3/21	Herring Gull	4/27	Horned Grebe
3/23	Hairy Woodpecker	4/27	Black-crowned Night Heron
3/26	Common Goldeneye	4/29	Black Tern
3/26	Small Canada Goose	4/30	Willet
3/27	Bohemian Waxwing	5/1	Common Tern
3/30	Blue-winged Teal	5/4	Wilson's Phalarope
3/30	Common Merganser	5/5	Western Grebe
3/30	Common Grackle	5/5	Least Bittern
4/2	American Coot	5/8	Upland Plover
4/2	Great Blue Heron	5/8	Western Kingbird
4/2	Green Heron	5/10	Barn Swallow
4/2	American Bittern	5/10	European Widgeon
4/2	Gadwall	5/10	Myrtle Warbler
4/2	Ring-necked Duck	5/11	Blue Jay
4/2	American Widgeon	5/13	Barrowing Owl
4/2	Redhead	5/13	Yellow Warbler
4/3	Snow Goose	5/13	Magnolia Warbler
4/3	Blue Goose	5/13	Lark Bunting
4/3	Shoveler	5/14	Sora
4/3	Canvasback	5/14	Bobolink
4/3	Lesser Scaup	5/22	Dunlin
4/3	Bufflehead	5/22	Cape May Warbler
4/3	Killdeer	5/22	Spotted Sandpiper
4/4	White-fronted Goose	5/22	Least Sandpiper
4/5	Green-winged Teal	5/22	Baltimore Oriole
4/5	Golden Eagle	5/22	Semi-palmated Plover
4/8	Common Snipe	5/22	Baird's Sandpiper
4/9	Mourning Dove	5/26	Ruddy Turnstone
4/9	Double-crested Cormorant	5/27	Common Egret
4/11	Yellow-shafted Flicker		

Two additions to the refuge bird list were made in 1970. The first addition was made on April 10, when Mr. and Mrs. Lloyd Smith of Minneapolis observed a pair of European widgeon feeding in a shallow portion of Sand Lake with several hundred American widgeon. The second addition occurred when Refuge Clerk Snider observed a Cape May warbler in his yard on May 22. The bird was under observation for about ten minutes and luckily, he had his "trusty Peterson's" close at hand for positive identification.

The refuge bird list was revised and re-printed during the year in the new field checklist format.

#### G. Fish

Very few fish survived the winter of 1969-70. Fall drawdowns in the two major pools are responsible for the high winter kill. Fishing was exceptionally good in water pockets below the refuge in the winter of 1969-70. High water during the summer enhanced good spawning and survival. Most of the fish caught were young of the year Northern pike which measured from 15 to 18 inches in length. The James River below the refuge has been dry this winter with no fish surviving.



### III. REFUGE DEVELOPMENT AND MAINTENANCE

Development work was scheduled primarily from flood damage funds and a small amount squeezed out of maintenance funds.

#### A. Physical Development

##### 1. Road Repairs

Approximately 13.5 miles of patrol road were re-shaped and gravelled. Additional work on the road system planned for 1971 will put the refuge roads in first class condition.

Cost of Construction - \$22,439

##### 2. Bank Stabilization

Part of this work was done by contract. After the Sand Lake Pool was lowered, refuge personnel took advantage of an opportunity and did additional bank protection by force account.

Contract work - 800 feet of bank was sloped and rip-rapped. Additional rip-rap was placed on portions of the bank previously repaired.

Cost of Construction - \$15,093

Force Account - 1,000 feet of bank were sloped and protected near the recreation area. An additional 800 feet were sloped and rip-rapped on the east side of Sand Lake, where erosion was endangering the patrol road.

Cost of Construction - \$10,383

##### 3. Dike Repairs

Rip-rapping and grading required as a result of the 1969 flood was accomplished by force account.

Cost of Construction - \$1,200

##### 4. Pole Shed

In order to store the additional equipment that has been purchased through the wetland program, additional storage was needed. A pole-type storage building 30' X 75' was constructed mostly out of surplus material. The poles were timbers from Army surplus, the covering was surplus corrugated aluminum roofing. Labor and lumber came from refuge funds.

Cost of Construction - \$2,500

## B. Plantings

The planting of 400 acres of DNC was previously mentioned in this report. It might be added that Japanese millet was used as a nurse crop for 40 acres of these plantings and rye was seeded with the remainder. Use of the nurse crop with DNC plantings furnishes additional wildlife food and early nesting cover.

A total of 2,822 acres was farmed this year. Of this total, 809 acres were farmed by the refuge staff. The remaining 2,013 acres were farmed by cooperative farmers. The table below lists crops and yields.

<u>Crop</u>	<u>Acres</u>	<u>Yield/ Acre*</u>	<u>Total Yield*</u>	<u>Used By Waterfowl*</u>	<u>Left Standing*</u>
Barley	815	26.0	20,145	15,625	15,625
Corn	1,152	37.4	43,080	16,975	19,600
Wheat	260	20.0	5,200	0	100
Oats	172	50.0	8,600	0	0
Flax	48	10.0	480	0	0
Millet	10	15.0	150	0	0
Rye Browse	214	N/A	N/A	214 Ac.	214 Ac.
TOTALS	2,671		77,655	32,600	35,325

\* Bushels

In addition to the above, 151 acres of alfalfa were grown on the refuge during the year.

A total of 2,725 bushels of grain was left standing for deer and pheasants. At the end of the period, about two-thirds of this grain remained unused.

## C. Collections

### 1. Dead Birds

The following dead birds were recovered from inside the boundary and donated to the American Legion Hospital, Sioux Falls, South Dakota.

108 geese, 16 ducks and 4 pheasants

### 2. Live Birds, Crippled

The following cripples were recovered from inside the boundary and donated to the institutions named.

63 geese to Como Park Zoo in St. Paul, Minnesota

1 whistling swan and 5 geese to Sioux Falls, S. D. Zoo

## D. Control of Vegetation

### 1. Leafy Spurge

The spurge battle has been a part of our work program for years. It looks as if we may be losing. In the early years, from five to ten spots were treated annually with 2,4-D. This chemical never eliminated the trouble spot, but it did kill the top growth and prevented seeding. In recent years, various formulations of Tordon have been used. This chemical has been much more effective in killing the spurge plants, but over the years, infestation outside the refuge has spread rapidly. This year we treated between 40 and 50 new areas. Even with more effective chemicals, our problem of keeping ahead of leafy spurge is greater than it has ever been.

One of the serious problems in spurge eradication has been that shelterbelts are the most common site for infestation. In the process of killing spurge, at least some trees in the shelterbelts are usually killed or damaged. It appears that we have a choice between trees and spurge.

### 2. Canada Thistle

It has been our conclusion that Canada thistle will be impossible to control on the floodplain of the James River, where water levels fluctuate each year. When extensive flooding occurs, Canada thistle is one of the first invaders on the flooded area. It is our present policy to control Canada thistle near roads, adjacent farmland and on sites readily visible to the public. No control is attempted adjacent to pool areas not visible to the public eye.

## E. Fires

In the process of burning dead rushes for road repairs, one fire went out of control. A band of rushes approximately 100 yards wide and two miles long was burned in early August. Regrowth was rapid and by freezeup the burned area was difficult to detect.

Attempts had been made in the past to burn cattail during August to create openings for waterfowl. These attempts failed, but the combination of a pool drawdown and dry summer weather made a summer burn possible. This area will be checked periodically to evaluate changes in wildlife use.

#### IV. RESOURCE MANAGEMENT

##### A. Grazing

Grazing on the refuge was authorized between May 16 and September 20 at the rate of \$2.91 per AUM. Fifteen permits were issued for a total of 2,922.91 AUMs. Refuge receipts from this source totaled \$8,505.66.

One of the primary reasons for grazing at Sand Lake has been to create short, succulent browse for geese in the fall. With a new policy of stabilizing goose populations at a lower level, large acreages of grassland are no longer needed for goose management. A portion of the grazing units were withdrawn in 1970 and re-seeded to DNC. In the future, the grazing program will be terminated with the grasslands being used for pool development, DNC plantings and native grass seeding.

##### B. Haying

No haying permits were issued this year.

##### C. Fur Harvest

No permits were issued for the 1970-71 season. A small number of predators were taken by trappers in the 1969-70 season. Dead sheep left at bait stations, plus animals trapped after the snow melted and left for several days, created a bad impression on spring visitors. In our thinking, the cure was worse than the disease.

## V. FIELD INVESTIGATION OR APPLIED RESEARCH

### A. Goose Banding

Goose banding was attempted at two sites in 1970. Two 35' X 75', 1 1/4" mesh nets were set up for banding snows and blues. Six 35' X 75', 1 1/4" mesh nets were set up at a different site for lesser Canada geese. Bad weather and poor cooperation from the geese left us quite short of our 1970 quota. Over 500 of the geese were trapped with one late-evening shot in early-November.

#### Summary of Geese Banded at Sand Lake in 1970

<u>Species</u>	<u>AM</u>		<u>AF</u>		<u>IM</u>		<u>IF</u>		<u>Total</u>
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	
L. Canada	23	21.5	24	22.4	28	26.1	32	30.0	107
Snow	100	20.0	112	22.4	138	27.6	151	30.0	500
Blue	38	20.8	31	16.9	53	29.0	61	33.3	183

### B. Dowline Duck Banding

#### 1. Mallards

The two net traps set near the water were used for mallard banding. Shallow water adjacent to the banding site caused some problem, as it was hard to keep pintails from eating up the bait.

	<u>AM</u>		<u>AF</u>		<u>IM</u>		<u>IF</u>		<u>Total</u>
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	
Mallard	433	35.2	433	35.2	190	15.4	172	14.2	1,228

#### 2. Blue-winged Teal

We were asked to band 500 non-flying teal by September 1, 1970. We used 10 swim-in type traps located on five potholes in the area. Ninety percent of the ducks banded came from two of the five potholes. Any future banding will probably be conducted in these two areas.

	<u>AM</u>		<u>AF</u>		<u>IM</u>		<u>IF</u>		<u>Total</u>
	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	
B-w. Teal	88	18.0	38	8.0	229	45.0	144	29.0	499

### C. Dove Banding

The refuge quota in 1970 was 200 doves. The banding was terminated when the quota was reached because of other work programs. Birds were caught in small live traps, which were checked twice daily.

#### D. Age Ratios in Geese

By using several sampling methods, it was indicated that both the small Canadas and snow geese which pass through the refuge had an exceptionally fine production year.

Advance reports received from the breeding grounds predicted good reproduction because of the early breakup and good nesting success. Our data indicates their prediction came true.

##### Age Ratios - Snows and Blues

		<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
<u>Field</u> <u>Count</u>	<u>Number</u> <u>Sampled</u>	19,345	16,299	7,564	8,476	10,893	1,039
	<u>Immatures</u>	26%	46%	21%	24%	38%	56%
<u>Trap</u> <u>Sample</u>	<u>Number</u> <u>Sampled</u>	2,118	1,386	1,447	1,448	1,014	683
	<u>Immatures</u>	49%	58%	19%	34%	58%	99%
<u>Hunters'</u> <u>Bag</u>	<u>Number</u> <u>Sampled</u>	532	948	91	173	966	784
	<u>Immatures</u>	57%	71%	40%	46%	76%	69%

##### Age Ratios - Small Canadas

		<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
<u>Trap</u> <u>Sample</u>	<u>Number</u> <u>Sampled</u>	1,374	1,374	1,371	158	1,272	107
	<u>Immatures</u>	25%	58%	47%	38%	30%	56%
<u>Hunters'</u> <u>Bag</u>	<u>Number</u> <u>Sampled</u>	250	1,400	48	52	120	141
	<u>Immatures</u>	50%	66%	42%	45%	70%	68%

## E. Special Studies

### 1. Band Recovery Data - Small Canada Geese

From the table below, it is evident that a substantial part of the small Canada harvest was in the northern areas in 1967 and 1969. In the fall of 1968, small Canadas passed rapidly through Manitoba and the Dakotas. As a result, a large portion of the population was in Texas and Mexico during the hunting and it was in this area that the heaviest kill occurred.

#### Locations of Indirect Recoveries of Fall-Shot Geese

<u>Recovery Location</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>Total</u>
Manitoba	22	8	32	62
North Dakota	53	20	64	137
South Dakota	27	14	22	63
Nebraska	14	4	3	21
Kansas	17	6	18	41
Oklahoma	21	6	19	46
Texas	38	86	30	154
Mexico	4	20	14	38
Other	<u>19</u>	<u>12</u>	<u>17</u>	<u>48</u>
TOTALS	215	176	219	610

### 2. Blackbird Study

The blackbird population at Sand Lake has continued to dwindle and so has emphasis on the program. No complaints were received this year and only a small amount of bait was purchased by local farmers. Ten years ago, the blackbird problem at Sand Lake was of major concern to both the Denver Wildlife Research Center and the refuge. Through advances made in bird control, farmer education and generous portions of luck, the problem is now of minor concern.

## F. Canada Goose Propagation

The propagation project which got off to a shaky start in 1962 has now become a smooth operating goose factory.

#### Propagation Records

	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
No. of pairs nesting	66	70	89	97
No. of pairs re-nesting	35	41	53	49
No. of eggs laid	482	564	771	837
No. of goslings hatched	344	360	404	458
No. of geese raised to flight	210	350	389	436

We turned the geese out of the winter pen on April 6 this year and gathered the first egg on April 13. The average clutch size for the first clutch was 5.9 eggs. The second clutch averaged 5.4 eggs.

Most of the production to date has been used to re-establish giant Canada geese in western South Dakota. The State has closed all or portions of seven counties to goose hunting in the release area. Last summer, the State of Nebraska also closed Cherry County to assist the program.

#### Disposition of Geese

<u>Year</u>	<u>Number</u>	<u>Release Area</u>
1965	100	Federal Refuges in Mississippi
1966	32	Carr Ranch - Western South Dakota
1967*	140	LaCreek Refuge - Western South Dakota
1968*	275	LaCreek Refuge - Western South Dakota
1968	8	Delvedore Lake - Western South Dakota
1969*	341	LaCreek Refuge - Western South Dakota
1970*	359	LaCreek Refuge - Western South Dakota
1970	6	Shadell Reservoir - Western South Dakota

\* The majority of the geese taken to LaCreek will be held until they reach breeding age, then moved to other areas in western South Dakota.

Results of the program have been quite promising. Last summer, 94 goslings were counted on farm ponds and marshes near release sites in western South Dakota. In addition, approximately 100 goslings were reared on the LaCreek Refuge from previous releases and from pairs escaping the holding pens. This record is quite encouraging, considering that the 1969 and 1970 production from Sand Lake are still being held in holding pens.

Both the States of South Dakota and Nebraska have been encouraged enough with the pilot program to start separate propagation projects in the same area. It seems only a matter of time until the giant Canada goose will be well-established in western South Dakota and Nebraska.



## VI. PUBLIC RELATIONS

### A. Recreational Uses

Bird-watchers and photographers were not as abundant on the refuge as in previous years. Poor weather conditions and a small buildup of waterfowl in the spring were the main factors which limited recreational use by the above groups. Biology classes visiting the refuge included classes from Macalester College, University of Minnesota and South Dakota State University. We were also host for several grade, highschool and Church groups from the local area.

The recreation area was busy throughout the summer even though the swimming beach was closed. The drawdown of the Sand Lake Pool left little water for swimming.

### B. Refuge Visitors

The following is a partial list of visitors who paused at Sand Lake through the year.

<u>Name</u>	<u>Organisation</u>	<u>Purpose</u>
Richard Mickelson	Fed. Housing Admin.	Quarters Survey
Charles MacInnes	Univ. of Western Ont.	Goose Study
Don Flood	Sask. Mus. of Nat. Hist.	Goose Propagation
Charles Griffith	BSFAW	Hunting Problem
Larry Haddock	BSFAW	Visit
Les Blacklock	Twin Cities	Photography
Art Hawkins	BSFAW	Visit
Bill Bair	BSFAW	Visit
Forrest Carpenter	BSFAW	Inspection
Claude Denton	BSFAW	Inspection
John Carlson	BSFAW	Inspection
Forrest Lee	BSFAW	Goose Propagation
R. H. Timmerman	BSFAW	Visit
Tom Kuck	S. D. Game, Fish & Parks	Goose Propagation
Ron Fowler	S. D. Game, Fish & Parks	Game Management
LaVerne Roth	S. D. Game, Fish & Parks	Law Enforcement
Paul Prevett	Univ. of Western Ont.	Goose Study
Lynda Prevett	Univ. of Western Ont.	Goose Study
Don Cunningham	BSFAW	Blackbird Research
Howard Lovrien	BSFAW	Law Enforcement
Ralph Town	BSFAW	Goose Research
Dave Fisher	BSFAW	Law Enforcement
Clair Rollings	BSFAW	Inspection
John Winship	BSFAW	Waterfowl Census
Jim Matthews	BSFAW	Pick up Grain
John Ellis	BSFAW	Goose Problem
Don Hankala	BSFAW	Goose Problem

### C. Refuge Participation

Tours Conducted - 6

Talks to Sportsmen's Clubs and Civic Groups - 21

Radio Programs - 3

Professional Meetings Attended - 12

The office received numerous calls from newspapers, radio and television stations during the fall regarding hunting success and waterfowl populations.

### D. Hunting

#### 1. Waterfowl

##### (a) Ducks

The South Dakota Department of Game, Fish and Parks selected a 60 day season beginning October 3 and closing on December 11. A point system was selected with 100 points as the limit. The following is a breakdown of points per bird.

Redhead, Canvasback, Hooded Merganser, Mallard Hen, Black Duck and Wood Duck - 90 points. Mallard Drake, Pintail Hen and Ring-necked Duck - 20 points. Pintail Drake, Gadwall, Baldpate, All Teal, American Merganser, Red-breasted Merganser, Shoveler, Goldeneye, Bufflehead, Ruddy Duck and Scaup - 10 points.

Duck and goose seasons opened the same day in 1970, relieving opening day pressure on both species. Duck hunting was good early in the season, but did not last long. Hunting pressure drove resident ducks south and mild fall weather kept northern ducks in the north. In early November, several large flocks of mallards came through and there was excellent cornfield shooting for two weeks.

##### (b) Geese

October 3 opened a 65 day goose season which closed on December 16. There were 7,000 geese in the area on opening day. Many hunters that normally line the fence line were out duck hunting. Mild fall weather kept hunters at the refuge until freezeup in mid-November.

For the past nine years, names and addresses have been taken from a random sample of hunters. They are mailed a questionnaire at the end of the goose season. The questionnaires request information on the number of birds killed, species killed, total days hunted and ask for comments on hunting programs.

### 1970 Goose Kill Summary

Number of Questionnaires mailed	552
Percent Returned	64.1
*Calculated total goose hunters in Brown County	3,344
Average number of days hunted per hunter	7.75
Average season goose kill per hunter	6.57
Calculated total goose kill in Brown County	21,970
Calculated kill by species:	
Canada	2,280
Snow and Blue	19,415
White-front	87
	<hr/> 21,970

\* Brown County Duck Stamp sales (4,177 X 61%) plus out-of-county hunters (25.1%) plus hunters under 16 (6.2%) = 3,344.

In 1970, several changes were made to reduce crippling loss of geese along refuge boundaries. The first plan to reduce the crippling loss was presented at a public hearing in Aberdeen on March 31, 1970. Local sportsmen objected to the plan and it was not put into operation. A modified plan was used and accepted by most goose hunters.

Sixty, three-man blinds were constructed 60 yards apart inside two and one-half miles of refuge boundary. A sixty to seventy yard wide retrieving zone was established in front of the blinds. There was no charge for the blinds and they were used on a first-come, first-served basis. Township roads adjacent to the blinds were closed to hunting by the refuge and adjacent landowners.

Approximately 1,800 hunters which used the blinds during the season bagged 1,500 geese. Crippling losses were considerably lower on the refuge this year than a year ago. This resulted from a lower kill, retrieving zones and road closures which eliminated some of the worst firing lines.

A majority of the hunters contacted in the field favored the new blind and retrieving program. Comments received on the kill questionnaires showed 56 hunters favored blind hunting and asked for an expansion of the program, nine hunters did not favor the blinds or did not want an expanded program.

Future plans call for more blinds and retrieving zones to be established in areas with high hunter concentrations. However, before more blinds can be constructed, the township roads must be closed by an enforceable law. In the 1970 season, three hunters were cited for hunting on closed roads. One case was dismissed by the judge on the grounds "you can't charge a person with violation of a non-existent law". The other two cases were not filed by the State's Attorney. Hunters were cooperative in most cases and did not attempt to hunt from roads which were closed to hunting.

## 2. Pheasants

Pheasant season opened on the refuge on December 7 and closed on December 13. Vehicles were not permitted on the refuge, which cut down the number of hunters, as most South Dakotans prefer to hunt from cars. Two hundred hunters used the refuge and harvested one hundred pheasants. The harvest was sixty-six percent higher than in 1969.

## 3. Deer

The rifle season opened on November 28 and closed on December 6. Archery season opened December 7 and closed on December 31. The entire refuge, with the exception of closed areas around residences, was open to hunting.

There were 150 permits available and all were taken. A total of ninety-one deer were aged and sexed and hauled out by refuge personnel. Approximately twenty to thirty deer were carried out by hunters who shot them close to roads. Total harvest is estimated at 111 to 129. All hunters are required to send age and sex data to the South Dakota Department of Game, Fish and Parks. To date, the results have not been forwarded to the refuge.

There were very few archery hunters at the refuge and only three kills were reported.

Age and Sex Composition of 91 Deer Taken on Sand Lake in 1970

Sex	Age						Unknown	Total
	<u>1/2</u>	<u>1 1/2</u>	<u>2 1/2</u>	<u>3 1/2</u>	<u>4 1/2</u>	<u>5 1/2</u>		
Male	19	19	4	10	2	2	2	58
Female	<u>14</u>	<u>6</u>	<u>11</u>	<u>2</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>33</u>
TOTAL	33	25	15	12	2	2	2	91

1970  
8370  
success  
refuge from  
state records

An unusually large number of fine bucks were taken on the refuge this fall. Thirty-nine of the ninety-one checked were antlered deer. Several of the animals qualified and were accepted in the State-sponsored trophy club.

Comparative Age Data (by percentage) 1961-1970

Age	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
<u>1/2</u>	50	60	44	49	43	37	51	37	36	36
<u>1 1/2</u>	14	13	22	21	23	26	20	26	26	27
<u>2 1/2</u>	16	<del>10</del>	12	12	13	14	9	21	21	16
<u>3 1/2</u>	11	4	17	9	11	18	11	13	12	13
<u>4 1/2</u>	9	12	5	9	10	5	9	3	5	2



**ANNUAL**  
**MONTHLY RECREATIONAL USE REPORT**

Refuge name  
**Sand Lake, NWR**  
State  
**South Dakota**

State  
Code **41**  
(1-2)

Congressional  
District Code **01**  
(3-4)

Refuge  
Code **397**  
(5-7)

Report Yr. **1967**  
Period **7**  
(8-11)

(Card Columns). . . . . (12-13) (14-18) (19-25)			
ACTIVITY	Code	VISITS FOR THE MONTH	
		Total Number	Total Hours
Hunting: Big Game	01	<b>420</b>	<b>2,300</b>
Upland Game	02	<b>200</b>	<b>400</b>
Waterfowl	03	<b>1,210</b>	<b>5,450</b>
Other Migratory	04		
Other	05		
Bow X	06	<b>20</b>	<b>120</b>
Fishing: Salt Water	07		
Warm Water	08	<b>745</b>	<b>1,690</b>
Cold Water	09		
Environmental Education	10		
Wildlife Photography	11	<b>50</b>	<b>190</b>
Wildlife Observation	12	<b>1,920</b>	<b>3,210</b>
Conducted Programs	13		
Field Trials	14		
Wildlife Trails	15		
Wildlife Tours/Routes	16	<b>150</b>	<b>500</b>
Visitor Contact Stations	17	<b>320</b>	<b>75</b>
Camping (wildlife related)	18	<b>50</b>	<b>1,200</b>
Picnicking (wildlife related)	19	<b>480</b>	<b>500</b>
Wildlife Interpretive Center	20	<b>75</b>	<b>30</b>
Off-Site Programs X	21	<b>6,690</b>	<b>139</b>

(Card Columns). . . . . (12-13) (14-18) (19-25)			
ACTIVITY	Code	VISITS FOR THE MONTH	
		Total Number	Total Hours
On-Site Programs X	22	<b>155</b>	<b>10</b>
*Miscellaneous Wildlife	23	<b>970</b>	<b>445</b>
Swimming	24	<b>50</b>	<b>100</b>
Boating	25		
Water Skiing	26		
Camping	27		
Group Camping	28		
Picnicking	29	<b>380</b>	<b>760</b>
Horseback Riding	30		
Bicycling	31		
Winter Sports	32		
Fruit, Nut and Vegetable Collecting	33		
*Miscellaneous Non-Wildlife	34		
Peak Load Day	35	<b>170</b>	
Actual Visits	36	<b>7,020</b>	
Fee Area Use	37		
Number of Fee Areas	38	(14-18)	
Fee Collections	39	\$	
Collection Costs	40	\$	



### **E. Violations**

During routine patrols, refuge personnel made four violation reports. One was turned over to LaVerne Roth, State Game Warden, who prosecuted it through Municipal Court in Aberdeen. The other three were road shooting cases and, to date, prosecutions have not been made.

### **F. Safety**

Periodic safety meetings were held during the year. All personnel were instructed on the proper use and safety requirements of new equipment received. Roll bars and seat belts were installed on tractors and personnel were instructed on their use.

Refuge personnel were encouraged to use safety shoes and the availability of safety glasses was discussed. Water tanks were made available on equipment used for applying anhydrous ammonia. Water quickly neutralizes ammonia gas and a readily available supply could prevent injury from accidental spillage.

Safety reflecting shields were purchased and are being installed on all field equipment traveling on public roads.

There were fifteen employees working at the refuge during the summer and no lost-time accidents occurred during the year.

### **G. Transport Operations**

The intra-regional transport was busy in 1970, traveling 21,790 miles.

#### **January**

D-6 Cat from Sency NWR to Ottawa NWR

Truck from Ft. Leonard Wood, Mo. to LaCreek NWR

#### **February**

Road Grader from Rice Lake NWR to Crescent Lake NWR

#### **April**

Grain Elevator and Aluminum from Sand Lake NWR to Ft. Niobrara NWR

Lumber from Mark Twain to Ft. Niobrara NWR

#### **July**

Lumber from Mark Twain NWR to Ft. Niobrara NWR

Lumber from Mark Twain NWR to DeSoto NWR

Lumber from Mark Twain NWR to Devils Lake Wetland Office

#### **October**

Road Grader from Ft. Leonard Wood, Mo. to Sherburne NWR

Road Grader from Ft. Leonard Wood, Mo. to Arrowwood NWR

Dragline from Ft. Leonard Wood, Mo. to Squaw Creek NWR

Road Grader from Ft. Leonard Wood, Mo. to Squaw Creek NWR

Road Grader from Ft. Leonard Wood, Mo. to Mark Twain NWR

TD-20 tractor from Ft. Leonard Wood, Mo. to Mark Twain NWR

October (cont.)

TD-18 Tractor from Mark Twain to Mark Twain  
Road Grader from Ft. Leonard Wood, Mo. to Sand Lake NWR

December

Road Grader from Ft. Leonard Wood, Mo. to Agassia NWR  
Pay Loader from Ft. Leonard Wood, Mo. to Agassia NWR  
Road Grader from Ft. Leonard Wood, Mo. to Squaw Creek NWR  
Road Grader from Ft. Leonard Wood, Mo. to Muscatatuck NWR  
Road Grader from Ft. Leonard Wood, Mo. to Union Slough NWR  
Road Grader from Ft. Leonard Wood, Mo. to Devils Lake Wetland Office

Two road graders and one tractor are still scheduled for moving.  
These transfers were held up by cold weather and poor road conditions.



## VII. OTHER ITEMS

### A. Dakota Lake Easement Refuge

Probably as a result of making the Sand Lake Refuge less attractive to geese, record concentrations were found on the easement area. On October 20, the population was 10,000. The flock gradually decreased until departure on November 7.

Geese hunting near the refuge was well above average. A firing line developed several times along State Highway 11. One Sunday afternoon, approximately 90 hunters were observed on one-half mile of fence line. A small cemetery, which was not included in the refuge, was a favorite hunting spot early in the season. Some hunters even used the grave markers as blinds. In mid-season, the cemetery board closed the area.

Surely no one anticipated future goose hunting at this refuge when it was acquired. The boundary is poorly conceived and the subject of frequent disputes. One problem that has not been fully resolved concerns a landowner who transports hunters across refuge land to non-refuge land for hunting purposes.

### B. Audubon Story

Many of the personnel who will read this report are familiar with Dr. Glen Sherwood's article in the November issue of the Audubon magazine titled "Carnage At Sand Lake". The story has had mixed reactions, depending largely on the reader's personal interests. There has been little argument with his figures, although the numbers for total kill and crippling losses may be somewhat high. The chief objection seems to be that some descriptions such as "the sound of lead passing through wing feathers or ripping into flesh" probably condemned hunters for things beyond their control. One man commented, "All hunters aren't that bad, even at Sand Lake!"

The story did generate a lively stream of correspondence at all levels of the Bureau. It is a bit gratifying to know that people are still interested in the resource and in what the Bureau is doing.

On the beneficial side, local hunters and sportswriters have been much more receptive to changes in hunting regulations and refuge management since the article appeared. The old line, "everything is fine, don't make any changes", is losing support.

We admire Sherwood's courage for entering this arena and know he speaks from deep personal convictions. However, in our opinion, all hunters don't fall into his vivid description of geese slaughterers; however, if the shoe fits, we hope they will soon be interested in a new style.

### C. Credits

Most of this report was written by Assistant Manager Lawhorn. The remainder was written by Schoonover. Manager Schoonover and Clerk Snider edited the report. The NR Forms were completed by Lawhorn and Schoonover. The pictures appended were exposed by Schoonover, Herzberger and Hemen and were developed by Lawhorn and Schoonover. Typing was done by Snider.

Submitted by:

Date: \_\_\_\_\_

\_\_\_\_\_  
Refuge Manager  
Title

Approved, Regional Office:

\_\_\_\_\_  
Regional Refuge Supervisor

Date: \_\_\_\_\_

3-1750

Form R-1

(Rev. March 1953)

WATERFOWLREFUGE Sand Lake NISMONTHS OF January TO April, 19 70

(1) Species	Weeks of reporting period <sup>(2)</sup>									
	1/4 1	1/11 2	1/18 3	1/25 4	2/1 5	2/8 6	2/15 7	2/22 8	3/1 9	3/8 10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada									2	12
<del>XXXXXX</del> L. Canada										6
Cackling										
Brant										
White-fronted										
<del>XXXX</del> and King										
<del>XXXX</del>										
<del>XXXX</del> TOTAL GEES									2	18
Other										
Ducks:										
Mallard										50
Black										
Gadwall										
Baldpate										
Pintail									20	50
Green-winged teal										
Blue-winged teal										
Cinnamon teal										
Shoveler										
Wood										
Redhead										
Ring-necked										
Canvasback										
Scaup										
Goldeneye										
Bufflehead										
<del>XXXX</del> Ruddy										
<del>XXXX</del> TOTAL DUCKS									20	100
Other										
Coot:										

3-1750a

Co. NR-1

(Rev. March 1953)

WATERFOWL  
(Continuation Sheet)REFUGE Sand Lake NWRMONTHS OF JanuaryTO April, 1960

(1) Species	(2) Weeks of reporting period								(3) Estimated waterfowl days use	(4) Production Broods: Estimated seen: total	
	3/15 11	3/22 12	3/29 13	4/5 14	4/12 15	4/19 16	4/26 17	18			
Swans:											
Whistling			20	30	30	20	50		1,050		
Trumpeter											
Geese:											
Canada	25	300	350	700	200	200	150		13,573		
<del>XXXXXX</del> L. Canada	20	200	5,000	23,000	200	300	1,500		211,582		
Brant											
White-fronted			500	500	90				7,350		
Snow and Hine			10,000	110,000	35,000	85,000	2,000		2,114,000		
<del>XXXX</del>											
<del>XXXX</del> TOTAL GESE	45	500	15,850	161,200	35,150	85,500	3,650		2,346,505		
Ducks:											
Mallard	50	250	10,000	1,700	1,000	1,000	1,000		105,350		
Black											
Gadwall			100	650	800	200	600		16,150		
Baldpate			100	150	75	50	75		3,150		
Pintail	50	300	15,000	2,000	1,200	800	1,000		142,940		
Green-winged teal			10	50	350	100	300		5,670		
Blue-winged teal			10	100	300	300	1,500		15,470		
Cinnamon teal											
Shoveler			150	300	300	300	400		10,150		
Wood											
Redhead			150	600	800	100	200		15,050		
Ring-necked			100	100	350	50	80		4,760		
Canvasback			175	150	150	10			3,395		
Scaup			16,000	35,000	20,000	1,000	500		507,500		
Goldeneye		2	60	50	100				1,120		
Bufflehead			8	12	80	50	10		1,120		
Ruddy											
<del>XXXX</del> TOTAL DUCKS	100	552	42,163	40,862	25,505	3,970	5,705		832,839		
Coots:			50	500	1,000	500	1,700		54,250		
					(over)						

	(5) Total Days Use	(6) Peak Number	(7) Total Production	SUMMARY
Swans	<u>1,050</u>	<u>50</u>	<u>0</u>	Principal feeding areas <u>Refuge and neighboring areas</u>
Geese	<u>2,165,505</u>	<u>164,200</u>	<u>0</u>	<u>fields and shallow lake areas</u>
Ducks	<u>832,839</u> <u>54,250</u>	<u>42,163</u> <u>3,700</u>		Principal nesting areas <u>N/A</u>
Coots	<u>1,700</u>	<u>1,700</u>		
				Reported by <u>Lyle J. Schoenover, Refuge Manager</u>

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

- (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) Weeks of Reporting Period: Estimated average refuge populations.
- (3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.
- (4) Production: 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.
- (5) Total Days Use: A summary of data recorded under (3).
- (6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.
- (7) Total Production: A summary of data recorded under (4).



WATERFOWL

REFUGE Sand Lake NWR

MONTHS OF May To August, 1970

(1) Species	Weeks of reporting period <sup>(2)</sup>									
	5/1 1	5/11 2	5/18 3	5/25 4	6/1 5	6/8 6	6/16 7	6/22 8	6/29 9	7/6 10
<b>Swans:</b>										
Whistling										
Trumpeter										
<b>Geese:</b>										
Canada	200	150	150	150	150	150	150	150	250	265
Cackling L. Canada	100									
Brant										
White-fronted										
Snow & Blue	2,000									
Blue										
<del>Other</del> <b>TOTAL GEESE</b>	2,300	150	150	150	150	150	150	150	250	265
<b>Ducks:</b>										
Mallard	650	650	650	650	750	1,500	2,500	2,750	3,100	3,150
Black										
Gadwall	300	400	600	600	525	650	650	650	700	700
Baldpate		50	150	150	150	150	100	100	280	280
Pintail	800	875	875	1,000	850	1,000	2,000	2,350	2,610	2,800
Green-winged teal	150	150	150	150	25	150	150	150	300	300
Blue-winged teal	4,000	1,500	2,000	2,000	1,000	2,000	2,050	2,100	2,300	2,310
Cinnamon teal										
Shoveler	300	1,000	1,000	2,000	400	700	500	500	550	500
Wood										
Redhead	50	50	50	50	100	150	200	200	320	320
Ring-necked										
Canvasback										
Scaup	800	150	100	100	250	100	100	100	180	190
Goldeneye										
Bufflehead		10	10	15	25	10				
Ruddy			200	350	200	150	350	300	350	350
<del>Other</del> <b>TOTAL DUCKS</b>	7,050	4,835	5,785	6,065	4,275	6,550	8,600	9,200	10,720	10,930
<b>Coot:</b>	1,000	650	700	700	650	800	600	600	600	600



3-1750a

Cc . NR-1

(Rev. March 1953)

WATERFOWL  
(Continuation Sheet)REFUGE Sand Lake NWRMONTHS OF MayTO August, 19 70

(1) Species	(2) Weeks of reporting period								(3) Estimated waterfowl days use	(4) Production Broods: Estimated seen: total	
	7/13 11	7/20 12	7/27 13	8/3 14	8/10 15	8/17 16	8/24 17	8/31 18			
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	265	265	265	265	300	300	300	300	28,175		
Cackling <del>Lesser</del> Canada									700		
Brant											
White-fronted											
Snow & Blue									14,000		
Blue											
<b>GROSS Total Geese</b>	<b>265</b>	<b>265</b>	<b>265</b>	<b>265</b>	<b>300</b>	<b>300</b>	<b>300</b>	<b>300</b>	<b>42,875</b>		
Ducks:											
Mallard	3,150	3,100	3,150	6,800	7,500	8,100	9,000	9,050	163,400		
Black							150	150	2,100		
Gadwall	700	700	700	800	625	700	700	710	79,870		
Baldpate	280	200	200	200	100	100	120	125	19,145		
Pintail	2,800	2,700	2,710	3,000	4,300	5,000	7,300	7,300	351,890		
Green-winged teal	300	200	150	150	250	300	300	300	25,375		
Blue-winged teal	2,320	2,400	2,400	2,600	2,800	3,100	3,250	3,200	303,310		
Cinnamon teal											
Shoveler	500	525	525	610	550	600	650	675	77,595		
Wood	30	30	30	32	30	28	30	35	2,135		
Redhead	380	310	310	310	225	250	270	270	26,285		
Ring-necked					30	30	30	30	840		
Canvasback					35	35	35	35	980		
Scaup	200	80	80	80	50	50	50	30	18,830		
Goldeneye									490		
Bufflehead											
Ruddy	350	370	370	370	375	400	400	300	36,295		
<b>GROSS TOTAL DUCKS</b>	<b>10,950</b>	<b>10,615</b>	<b>10,625</b>	<b>14,952</b>	<b>16,870</b>	<b>18,690</b>	<b>22,285</b>	<b>22,210</b>	<b>1,408,540</b>		
Coots:	600	600	600	800	725	800	850	850	89,075		
					(over)						

	(5) Total Days Use	(6) Peak Number	(7) Total Production	SUMMARY
Swans	0	0	0	Principal feeding areas <u>Refuge and surrounding grain fields,</u>
Geese	12,875	2,300	150	<u>lake shorelines and emergent vegetation.</u>
Ducks	1,408,540	22,285	4,678	Principal nesting areas <u>Mad Lake and periphery and adjacent</u>
Coots	89,075	1,000	0	<u>uplands.</u>
				Reported by <u>Lyle J. Schoenover, Refuge Manager</u>

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

- (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) Weeks of Reporting Period: Estimated average refuge populations.
- (3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.
- (4) Production: 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.
- (5) Total Days Use: A summary of data recorded under (3).
- (6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.
- (7) Total Production: A summary of data recorded under (4).

3-1750

Form -1.

(Rev. March 1953)

WATERFOWL

REFUGE

Sand Lake NWRMONTHS OF September TO December, 19 70

(1) Species	Weeks of reporting period <sup>(2)</sup>									
	9/7 1	9/14 2	9/22 3	9/29 4	10/5 5	10/12 6	10/19 7	10/26 8	11/2 9	11/9 10
Swans:										
Whistling					30	100	110	150	250	50
Trumpeter										
Geese:										
<del>EMERALD L. CANADA</del>	300	300	300	300	300	300	300	300	250	50
Cackling			200	500	1,500	3,000	5,000	7,000	6,000	150
Brant			50	250		50				
White-necked			500	7,000	35,000	65,000	100,000	50,000	30,000	900
<del>XXXX</del>										
<del>XXXX TOTAL GESE</del>	300	300	1,050	8,050	36,800	68,350	113,300	57,200	44,250	1,100
Other										
Ducks:										
Mallard	9,000	9,100	9,150	9,200	9,100	31,000	49,000	29,000	33,000	65,000
Black	150	150	100	150	70	250	200	175	100	100
Gadwall	700	725	400	550	600	1,000	800	100	150	100
Baldpate	120	20	20	50	20	400	400	150	300	20
Pintail	7,300	4,000	4,700	4,800	3,200	2,500	2,000	500	1,000	50
Green-winged teal	300	20				150	200			
Blue-winged teal	3,250	400	100	50	100	800	300	100		
Cinnamon teal										
Shoveler	650	725	600	600	650	600	200	150	300	
Wood	30	20				75	30			
Redhead	200	250	300	325	350	300	300	110	500	
Ring-necked	30	30	50	50	70	65	70	100	80	
Canvasback	35	35	30	30	35	35	85	40	20	
Scaup	50	10	45	45	45	200	100	250	350	500
Goldeneye										
Bufflehead	400	300	185	200	100					
<del>XXXX TOTAL DUCKS</del>	22,285	15,785	15,700	16,070	14,360	37,385	53,780	30,975	35,820	65,770
Other										
Coot:	800	850	1,000	1,050	1,000	1,500	1,500	900	500	

3-1750a

Cc NR-1

(Rev. March 1953)

WATERFOWL  
(Continuation Sheet)REFUGE Sand Lake NWRMONTHS OF September TO December, 1970

(1) Species	(2) Weeks of reporting period								(3) Estimated waterfowl days use	(4) Production Broods: Estimated seen : total
	11/16 11	11/23 12	11/30 13	12/7 14	12/14 15	12/21 16	12/28 17	18		
Swans:										
Whistling									1,810	
Trumpeter										
Geese:										
Canada	20								18,140	
<del>INTERMEDIATE L. Canada</del>									163,150	
Brant										
White-fronted									2,150	
Snow and Blue	250								2,132,550	
<del>XXXX</del>										
<del>XXXX TOTAL GESE</del>	270								2,316,790	
Ducks:										
Mallard	300	400	400	400	350	350	350		1,785,700	
Black									10,115	
Gadwall									15,875	
Baldpate									12,600	
Pintail									210,350	
Green-winged teal									4,490	
Blue-winged teal									15,700	
Cinnamon teal										
Shoveler									11,115	
Wood									1,225	
Redhead									19,195	
Ring-necked									1,700	
Canvasback									2,485	
Scaup									11,595	
Goldeneye										
Bufflehead										
Ruddy									8,295	
<del>XXXX TOTAL DUCKS</del>	300	400	400	400	350	350	350		2,173,220	
Coots:									63,700	
					(over)					



	(5) Total Days Use	(6) Peak Number	(7) Total Production	SUMMARY
Swans	<u>4,830</u>	<u>250</u>	<u>113,300</u>	Principal feeding areas <u>Corn fields on the refuge</u>
Geese	<u>2,316,790</u>	<u>108,000</u>	<u>65,770</u>	<u>and in neighboring corn fields.</u>
Ducks	<u>2,173,220</u>	<u>63,000</u>		Principal nesting areas _____
Coots	<u>63,700</u>	<u>1,500</u>		
				Reported by <u>Lytle J. Schoenover, Refuge Manager</u>

INSTRUCTIONS (See Secs. 7531 through 7534, Wildlife Refuges Field Manual)

- (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) Weeks of Reporting Period: Estimated average refuge populations.
- (3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.
- (4) Production: 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.
- (5) Total Days Use: A summary of data recorded under (3).
- (6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.
- (7) Total Production: A summary of data recorded under (4).

3-1751

Form NR-1A

(Nov. 1945)

MIGRATORY BIRDS  
(other than waterfowl)Refuge Sand Lake NWRMonths of January to April 19570

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. <u>Water and Marsh Birds:</u>										
<del>Western Grebe</del>										
White Pelican	3	4/12								
Double-Crested Cormorant	10	4/9								
Great Blue Heron	1	4/2								
B-c. Night Heron	5	4/27								
II. <u>Shorebirds, Gulls and</u>										
<u>Terns:</u>										
Killdeer	1	4/4								
Ring-billed Gull	15	4/16								
Franklin's Gull	20	4/14								

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons:</u> Mourning dove White-winged dove	5  4/9				
IV. <u>Predaceous Birds:</u> Golden eagle Duck hawk Horned owl Magpie Raven Crow Marsh Hawk Sparrow Hawk Snowy Owl	1  Winter Resident   1 3/5 1 3/4 1 4/15 Winter Resident				
Reported by <u>Lyle J. Schoonover, Refuge Manager</u>					

#### 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.



(Nov. 1945)

**Sand Lake NWR**  
**Refuge**.....

Months of May to August 1956

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons</u> : Mourning dove White-winged dove		3,500 August			
IV. <u>Predaceous Birds</u> : Golden eagle Duck hawk Horned owl Magpie Raven Crow		30 August 45 August			
Reported by <u>Lyle J. Schoonover, Refuge Manager</u>					

#### 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.

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

MIGRATORY BIRDS  
(other than waterfowl)

Refuge Sand Lake NWR

Months of September to December 195 **70**

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. <u>Water and Marsh Birds:</u>										
White Pelican			900	Sept.						
B.-C. Cormorant			1,000	Sept.						
Great Blue Heron			80	Sept.						
B.-c. Night Heron			90	Sept.						
Cattle Egret			100	Sept.						
Western Grebe			200	Sept.						
Sandhill Crane			50	Sept.						
II. <u>Shorebirds, Gulls and Terns:</u>										
Franklin's Gull			1,500	Sept.						
Killdeer			100	Sept.						
Common Tern			50	Sept.						
Black Tern			75	Sept.						

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons:</u> Mourning dove White-winged dove		3,000	Sept.		
IV. <u>Predaceous Birds:</u> Golden eagle <del>Duck hawk</del> Horned owl <del>Northern</del> <del>Harporhynchus</del> Crow		3 40 50	Sept. Sept. Sept.		
Reported by.....					

#### 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.

3-1750b  
Form NR-1B  
(Rev. Nov. 1957)

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
WATERFOWL UTILIZATION OF REFUGE HABITAT

Refuge Sand Lake NWR

For 12-month period ending August 31, 1970

Reported Lyle J. Schoonover

Title Refuge Manager

(1) Area or Unit Designation	(2) Habitat Type      Acreage		(3) Use-days	(4) Breeding Population	(5) Production
<b>Unit #1</b>	Crops	1,560	Ducks	2,849,459	
	Upland	1,620	Geese	2,850,040	
	Marsh	1,450	Swans	859	
	Water	4,765	Coots	147,802	
	Total	9,395	Total	5,848,160	
<b>Unit #2</b>	Crops	1,603	Ducks	3,332,920	
	Upland	4,352	Geese	3,720,090	
	Marsh	3,200	Swans	2,690	
	Water	2,235	Coots	128,523	
	Total	11,390	Total	7,184,223	
<b>Unit #3</b>	Crops	None	Ducks	4,320	
	Upland	None	Geese	None	
	Marsh	100	Swans	None	
	Water	100	Coots	None	
	Total	500	Total	4,320	
<b>Total</b>	Crops	3,163	Ducks	6,182,379	
	Upland	5,972	Geese	6,570,130	
	Marsh	5,050	Swans	3,549	
	Water	7,100	Coots	276,325	
	Total	21,285	Total	13,036,703	
	Crops		Ducks		
	Upland		Geese		
	Marsh		Swans		
	Water		Coots		
	Total		Total		
	Crops		Ducks		
	Upland		Geese		
	Marsh		Swans		
	Water		Coots		
	Total		Total		
	Crops		Ducks		
	Upland		Geese		
	Marsh		Swans		
	Water		Coots		
	Total		Total		

(over)

## INSTRUCTIONS

All tabulated information should be based on the best available techniques for obtaining these data. Estimates having no foundation in fact must be omitted. Refuge grand totals for all categories should be provided in the spaces below the last unit tabulation. Additional forms should be used if the number of units reported upon exceeds the capacity of one page. This report embraces the preceding 12-month period, NOT the fiscal or calendar year, and is submitted annually with the May-August Narrative Report.

- (1) **Area or Unit:** A geographical unit which, because of size, terrain characteristics, habitat type and current or anticipated management practices, may be considered an entity apart from other areas in the refuge census pattern. The combined estimated acreages of all units should equal the total refuge area. A detailed map and accompanying verbal description of the habitat types of each unit should be forwarded with the initial report for each refuge, and thereafter need only be submitted to report changes in unit boundaries or their descriptions.
- (2) **Habitat:** Crops include all cultivated croplands such as cereals and green forage, planted food patches and agricultural row crops; upland is all uncultivated terrain lying above the plant communities requiring seasonal submergence or a completely saturated soil condition a part of each year, and includes lands whose temporary flooding facilitates use of non-aquatic type foods; marsh extends from the upland community to, but not including, the water type and consists of the relatively stable marginal or shallow-growing emergent vegetation type, including wet meadow and deep marsh; and in the water category are all other water areas inundated most or all of the growing season and extending from the deeper edge of the marsh zone to strictly open-water, embracing such habitat as shallow playa lakes, deep lakes and reservoirs, true shrub and tree swamps, open flowing water and maritime bays, sounds and estuaries. Acreage estimates for all four types should be computed and kept as accurate as possible through reference to available maps supplemented by periodic field observations. The sum of these estimates should equal the area of the entire unit.
- (3) **Use-days:** Use-days is computed by multiplying weekly waterfowl population figures by seven, and should agree with information reported on Form NR-1.
- (4) **Breeding Population:** An estimate of the total breeding population of each category of birds for each area or unit.
- (5) **Production:** Estimated total number of young raised to flight age.



3-1750~  
Form 1 1C  
(Sept. 1960)

## Waterfowl Hunter Kill Survey

Refuge ~~Swamp Lake~~ ~~WMA~~Year 1967 

## 10-day periods

[illegible]



### INSTRUCTIONS

- (1) The first week of hunting begins with opening day and ends at the close of hunting 6 days later. Successive weeks follow the same pattern.
- (2) The goal is to survey a minimum of 25 percent of refuge hunters each week and to record data only from those who have completed their day's hunting. This information should be collected during each day of the week and in each area hunted in relative proportion to the hunter effort expended. When the 25 percent goal cannot be achieved, particular care should be taken to collect representative data.
- (3) Record the total number of hours the hunters spent hunting on the refuge.
- (4) List waterfowl species in decreasing order of numbers bagged. Sample entry: Mallard (61), Pintail (36), Redhead (16), Gadwall (11), Widgeon (6), Coot (4), Canada Goose (3), Green-winged Teal (1).
- (5) Record total numbers of waterfowl bagged.
- (6) Record total numbers of waterfowl reported knocked down but not recovered.
- (7) Total of Columns 5 and 6.
- (8) Estimate the total number of hunters who hunted on the refuge during the week, including hunters checked (Column 2).
- (9) Kill sample projected to 100 percent.  $\text{Column 9} = \frac{\text{Column 8}}{\text{Column 2}} \times \text{Column 7}.$

3-1752  
Form NR-2  
(April 1946)

UPLAND GAME BIRDS

Refuge Sand Lake NWR

Months of January to April, 19 70

(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 observed	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked Pheasant	10,000 acres of marsh fringes and upland	33.3							300	
European Partridge	4,500 acres of cropland and meadows	225							20	
Prairie Chicken	4,500 acres of cropland and meadows									No observations this period.

## 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.

3-1752  
Form NR-2  
(April 1946)

UPLAND GAME BIRDS

Refuge Sand Lake NWR

Months of May to August, 1970

(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 observed	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked Pheasant	10,000 acres of marsh fringes and upland.	12.5							800	
European Partridge	4,500 acres of cropland and meadows	450.0								
Prairie Chicken	4,500 acres of cropland and meadows									No observations this period

## 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.

3-1752  
Form NR-2  
(April 1946)

UPLAND GAME BIRDS

Refuge Sand Lake NWR

Months of September to December, 19 70

(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 observed	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked Pheasant	10,000 acres of marsh fringe and upland.	12.5				100			800	
Gray Partridge	4,500 acres of cropland and meadows	150				30			30	
Prairie Chicken	4,500 acres of cropland and meadows									No observations this period

## 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.



3-53  
Form NR-3  
(June 1945)

BIG GAME

Refuge Sand Lake NWR

Calendar Year 1970

(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		At period of Greatest use	As of Dec. 31	
White-tailed Deer	12,000 acres of shelter belts, cropland, and marsh	180	112						15		170	190	

Remarks: \* Includes Road Kills.

Reported by Lyle J. Schoonover, Refuge Manager

# 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.

116008

3-1754  
Form NR-4  
(June 1945)

SMALL MAMMALS

Refuge Sand Lake NWR

Year ending April 30, 1970

(1) Species	(2) Density		(3) Removals					(4) Disposition of Furs					(5) Total Popula- tion	
Common Name	Cover Types & Total Acreage 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				
Mink	5,000 acres Marsh	60												18
Muskrat	5,000 acres Marsh	1.25												188
Beaver	5,000 acres Marsh	500												16
Weasel	5,000 acres Marsh	200												13
Raccoon	5,000 acres Marsh	29		55					5					28
Skunk	7,000 acres of pasture and wildland	35		55					5					28
Badger	7,000 acres of pasture and wildland	233		3					3					3
Red Fox	7,000 acres of pasture and wildland	140		25					25					30

\* List removals by Predator Animal Hunter

\* List removals by Predator Animal Hunter

REMARKS:

Reported by Lyle J. Schoonover, Refuge Manager



## INSTRUCTIONS

Form NR-4 - SMALL MAMMALS (Include data on all species of importance in the management program; i. e., 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, short-tailed weasel, gray squirrel, fox squirrel, white-tailed jackrabbit, etc. (Accepted common names in current use are found in the "Field Book of North American Mammals" by H. E. Anthony and the "Manual of the Vertebrate Animals 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 furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottom land 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) REMOVALS: Indicate the total number under each category removed since April 30 of the previous year, including any taken on the refuge by Service Predatory Animal 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 refuge share. Indicate the number of pelts shipped to market, including furs taken by Service personnel. Total number of pelts of each species destroyed because of unprimeness 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), introductions, and any other pertinent information not specifically requested.

DISEASE

Refuge Sand Lake NWR Year 1970

Botulism

Lead Poisoning or other Disease

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	_____	_____

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 No disease noted this year

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

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

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

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

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

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

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

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

Remarks \_\_\_\_\_

NONAGRICULTURAL COLLECTIONS, RECEIPTS, AND PLANTINGS (1)

Refuge Sand Lake NWR

Year 19 70

	Collections and Receipts (Seeds, rootstocks, trees, shrubs)						Plantings (Marsh - Aquatic - Upland)						
Species	Amount (Lbs., bus., etc.)	(2) C or R	Date	Method or Source	Cost	(3) Total Amount on Hand	Location of Area Planted	Rate of Seeding or Planting	Amount Planted (Acres or Yards of Shoreline)	Amount and Nature of Propagules	Date	Survival	Cause of Loss
						No Hedges gr. Stensland C & R Eichler Hemlock Moss P.	Tract 57 Tract 5 Tract 53 + 56 Tract 90 Tract 57 Tract 81	6/ Acre 6/ Acre 6/ Acre 6/ Acre 6/ Acre 6/ Acre	40 Acres 100 Acres 120 Acres 70 Acres 30 Acres 20 Acres	360/ DMC 600/ DMC 720/ DMC 120/ DMC 180/ DMC 120/ DMC	Late Summer and Early Fall.		
									380				

- (1) Report agronomic farm crops on Form NR-8  
(2) C = Collections and R = Receipts  
(3) Use "S" to denote surplus

Total acreage planted:

Marsh and aquatic \_\_\_\_\_  
Hedgerows, cover patches 400  
Food strips, food patches \_\_\_\_\_  
Forest plantings \_\_\_\_\_

Remarks: • 6/ DMC equals 3/ Intermediate Wheatgrass, 2/ Sweet  
Clover, and 1/ Alfalfa.

DMC Seeding was initiated to increase duck nesting and upland  
game habitat.



1970

CULTIVATED CROPS - HAYING - GRAZING

Refuge Sand Lake NWR

County Brown

State South Dakota

Cultivated Crops Grown	Permittee's		Government's Share or Return				Total Acreage Planted	Green Manure, Cover and Water- fowl Browsing Crops Type and Kind	Total Acreage
	Share Harvested		Harvested		Unharvested				
	Acres	Bu./Tons	Acres	Bu./ Tons	Acres	Bu. /Tons			
Barley	144	3,600	46	920	625	15,625	815		
Corn	562	22,480	100	4,000	400	19,600	1,152		
Wheat	249	4,980	6	120	5	100	260		
Oats	166	8,300	6	300			172		
Flax	48	480					48		
Millet			10	150			10		
								Eye Brow	214
								Fallow Ag. Land.	

No. of Permittees: Agricultural Operations 17 Haying Operations 0 Grazing Operations 15

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	Grazing	Number Animals	AUM'S	Cash Revenue	ACREAGE
Alfalfa	302	151	-	1. Cattle	1,512	2,922.91	8,505.46	6,325 137.
				2. Other				
				1. Total Refuge Acreage Under Cultivation				2,822
Hay - Wild				2. Acreage Cultivated as Service Operation				809



DIRECTIONS FOR PREPARING FORM NR--8'  
CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared on a calendar-year basis for all crops which were planted during the calendar year and for haying and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State.

Cultivated Crops Grown - List all crops planted, grown and harvested on the refuge during the reporting period regardless of purpose. Crops in kind which have been planted by more than one permittee or this Service shall be combined for reporting purposes.

Permittee's Share - Only the number of acres 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. Report all crops harvested in bushels or fractions thereof except such crops as silage, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

Government's Share or Return - Harvested Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. Unharvested Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under Bushels Unharvested column.

Total Acreage Planted - Report all acreage planted, including crop failures.

Green Manure, Cover and Waterfowl Grazing Crops Specify the acreage kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

Hay - Improved - List separately the kinds of improved hay grown. Annual plantings should also be reported under Cultivated Crops, and perennial hay should be listed in the same manner at time of planting

Total Refuge Acreage Under Cultivation Report total land area devoted to agricultural purposes during the year.

REFUGE GRAIN REPORT

Refuge Sand Lake NWR

Months of January thru December 19470

(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.
Seed Barley	700	700	1,400		700		700	700	700		
Shelled Corn	3,000	4,000	7,000	1,000		1,000	2,000	5,000		5,000	
Feed Barley	1,500	120	1,620			620	620	1,000		1,000	
Wheat	100	120	220			100	100	120		120	
Millet	500	150	650	200			200	450		450	
Rye	700		700		700		700	0			
Oats		300	300	300			300	0			

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

(9) Grain is stored at Government owned elevator at Site #2.

(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.

ANNUAL REPORT OF PERSTICIDE APPLICATION

**Sand Lake Refuge**

Proposal Number

Reporting Year

**1, 2, 3 and 4**

**1970**

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
June	Quackgrass and Pigeongrass	Refuge Corn Fields	100	Atrazine 80%	100%	1/2 Acre	Water 20 Crop Oil 1 Gal.	Boom Spray
June	Red Thistle and other Broadleaves	Small Grain Fields	400	2,4-D Dimethyl Amine Salt	300%	3/4 Acre	Water 10	Boom Spray
June	Red Thistle	Grasslands	200	2,4-D Dimethyl Amine Salt	200%	1/2 Acre	Water 10	Broadjet Ground Sprayer
June	Leafy Spurge	Grasslands	100	Tordon 212	300%	3/4 Acre	Water 10	Broadjet Ground Sprayer

10. Summary of results (continue on reverse side, if necessary)



Lush stands of smartweed and wild millet growing on mud flats resulting from the drawdown of the Sand Lake pool. These plants will supply abundant food for ducks and other birds in the spring of 1971. SD-SDL 1169





South part of the bank damage near the Columbia Recreation Area.  
A large part of the damage occurred in the spring of 1969.

SO-SOL-1170



North part of the bank damage near the Columbia Recreation Area is being inspected by Refuge Manager Schoonover.

SO-SDL-1171





A view of the south portion of the damaged area after repairs were completed.  
Considerable savings were made by force account work in the dry lake bed.

50-50L-1172



A new employee, trained by Bob Arrowsmith from the Necedah NWR,  
repaired bank damages on the east side of the Sand Lake Pool.

50-SDL-1173



Another section of the new fill was protected by small rock on the upper portion of the slope and by large field stone on the lower slopes. SD-SOL-1174



As an experiment, old tires bound in 8' X 10' mats were used to protect the upper portion of the repaired bank.

SD-SOL-1175





Firing lines on the refuge boundary created safety problems on public roads and an excessive loss of dead and crippled geese in the fall of 1969. SD-50L-1176



Use of decoys was very effective by hunters using refuge blinds. Many singles and doubles were drawn out of flocks feeding close by. Crippling loss was considerably lower in areas where blinds were used.

SD-SDL-1177



A pair of well-satisfied hunters getting ready to leave after a day's hunt. A large percentage of the hunters interviewed were pleased with the new blind setup. 50-50L-1178





Large flocks of blues and snows resting on Mud Lake Pool. The peak population of 108,000 in 1970 was considerably lower than the peak of 160,000 in 1969. SD-SDL-1179



Geese using mud flats left exposed by the drawdown of the Sand Lake Pool. 50-50L-1180  
These areas proved to be very popular with both geese and ducks.



Refuge personnel seeding rye for fall and spring goose browse. A total of 214 SD-SDL-1181  
acres of browse was seeded. Rye plantings are used primarily by Canada geese.





Area Biologist Ralph Town collecting eggs from giant Canada goose propagation flock. Shelters help protect geese and eggs from hail storms. A total of 436 goslings were raised to flight stage. SD-506-1182



Artificial nesting platforms constructed from reject fiberglass tank ends. These were used by geese and ducks on the refuge display pool. Ganders usually rest on the platform while the hen is incubating. 50-50L-118



Additional equipment purchased through the wetland program made it necessary to construct this 35' X 75' pole shed. Most of the material was obtained through military surplus. 50-506-1184

UNITED STATES GOVERNMENT

# Memorandum

TO : Manager, Sand Lake NWR

FROM : Asst. Regl. Refuge Supvr., Twin Cities (RF)

SUBJECT: Comments on 1970 Narrative Report

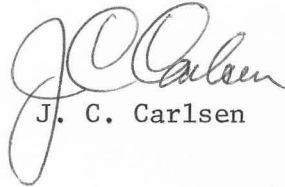
DATE: February 23, 1971

At first glance, the Sand Lake report is impressive because of its cover, content and excellent picture section. Upon further examination, we are even more impressed by the substantial amount of work accomplished in 1970. Your involvement in flood damage repairs would have been substantial, in itself; but the goose hatching, wetland development and hunting management were also major programs. You and your staff are commended for a banner year.

Do we know enough about small Canada goose management to draw conclusions? There have been some rather major changes in refuge utilization by different species over the past fifteen years. Perhaps the situation should be explored in greater detail with the Area Biologist.

The termination of permittee grazing is fine as long as it is properly phased out. We have seen these management efforts ebb and flow, and the need for cyclic disturbance is apparent. We do not want to burn all our bridges behind us. You should evaluate the force account farming operation of 809 acres in view of the present de-emphasis of goose numbers.

Our congratulations and thanks for a most productive and efficiently managed year.

  
J. C. Carlsen



5010-108

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