

File

Sand Lake National Wildlife Refuge

Narrative Report

May 1, 1957 to August 31, 1957

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C O N T E N T S

I.	GENERAL	
	A. Weather Conditions	1
	B. Water Conditions	2
	C. Fires	3
II.	WILDLIFE	
	A. Migratory Birds	4
	B. Upland Game Birds	15
	C. Big Game Animals	16
	D. Fur Bearers & Predators	16
	E. Predaceous Birds	18
III.	REFUGE DEVELOPMENT, MAINTENANCE	
	A. Physical Development	19
	B. Plantings	20
	C. Collections	21
	D. Receipts	21
	E. Weed Control	21
IV.	ECONOMIC USE	
	A. Grazing	23
	B. Haying	23
	C. Fur Harvest	24
	D. Timber Removal	24
	E. Other Uses	24
V.	FIELD INVESTIGATIONS	
	A. Waterfowl Populations and Shoreline Grazing Use	25
	B. Artificial Pothole and Level Ditching Study	26
	C. Nesting Studies	27
VI.	PUBLIC RELATIONS	
	A. Public Use	33
	B. Refuge Visitors	33
	C. Refuge Participation	34
	D. Hunting	34
	E. Fishing	34
	F. Violations	34
VII.	OTHER ITEMS	
	A. Easements	35
	B. Items of Interest	36
	C. Credits	38

C O N T E N T S Continued

Form NR-1	39, 40
Form NR-1A	41
Form NR-1B	42
Map of Units for NR-1B	43
Description of Units for NR-1B	44
Acreages of Units for NR-1B	45
Present Value of Units	46
Form NR-2	47
Photographs	End of Report

Sand Lake National Wildlife Refuge

May 1, 1957 to August 31, 1957

I. GENERAL

A. Weather Conditions

A summary of weather data for the period May through August for the years 1955, 1956 and 1957 is given in the table below as recorded at the official weather station located at refuge headquarters.

Sand Lake Weather Data

Month	Precipitation			Max. Temp.			Min. Temp.		
	'55	'56	'57	'55	'56	'57	'55	'56	'57
May	2.3	2.3	4.7	87	83	85	23	24	31
June	4.4	2.5	3.8	85	101	84	42	35	40
July	2.6	2.0	2.6	95	92	94	49	48	56
Aug.	2.6	1.3	5.8	101	94	95	40	38	47
Totals & Extremes	11.8	8.1	16.9	101	101	95	23	24	31

This period was one of record in nearly all categories in that it wasn't as hot, wasn't as cold, we had severe hail and best of all a record rainfall.

May 1957 was one of the wettest of record. The rains along with lower than average temperatures delayed field work up to three weeks. The 4.7 inches of rain was the highest since the record 6.5 inches in May of 1950.

June continued cool and showery. A total of 3.8 inches was recorded as rain fell on 16 different days. Temperatures were below long term means over the entire state. Grasses, grain crops and the like began to have promise of a bumper year.

Crops and range conditions continued to be favorable with rapid growth during the forepart of July. However, some grain yields were reduced by hot south winds of the 8th, 9th, 10th and 11th. These winds with their 90 degree temperatures, while not long lasting, seemed to catch the late planted grain in a tender stage and reduced yields from real high to real good. Subsoil moisture was

still considered adequate, replenished by 2.25 inches of rain the last week. Temperatures the last half of the month were well below normal.

Growth of corn continued rapidly during August as the more than adequate rains continued. An abundance of 5.8 inches of rain was recorded in 14 rains; our heaviest being 2.41 inches on the evening of the 9th. This heavy rain was more than a rain - two inches of it fell in 20 minutes along with golf-ball sized hail stones. The hail was reported over a five square mile area with the headquarters area being in the zone most severely hit. One window in the refuge manager's house was broken, paint on the west side of the house was chipped, carigana bushes were 75% stripped of leaves, branches strewn about and tall grasses laid flat. Fortunately, however, not too many acres of refuge grain crops were damaged. A total of 833 acres were involved with losses ranging up to 70%. Damage to 250 acres of standing corn and grain averaged approximately 25%.

While the 2.41 inches rainfall and hailstorm were occurring in the headquarters area, farm gauges nearby were recording much heavier rains. One farmer claimed his 4-inch gauge ran over in 20 minutes and it rained hard for two more hours! His total estimate was between six and eight inches. Refuge personnel touring the area shortly after the rain let up agreed the rain was in the range of his estimate.

The balance of the month was cooler than normal with frequent rains. As the month closed we actually needed warm clear weather to speed up a good looking corn crop and allow late harvest completion.

To summarize the period it was one of record for a cool, rainy summer. Well above average grain crops were harvested, topsoil and subsoil moisture was plentiful. If a killing frost will not occur before the 10th of September a real good corn crop will be harvested. Accomplishments in all forms of outdoor refuge activities have been hampered by the blessed rains.

B. Water Conditions

The following table shows the water levels at the start and end of the period, and approved levels for the refuge impoundments:

Unit	Start	<u>Elevations for Period</u>		Approved	Deviation
		Maximum	End		
Mud Lake	1272.20	1272.25	1271.22	1271.00*	+0.22
Sand Lake	1270.84	1271.04	1270.22	1270.50**	-0.28

* to be attained by September 1
 ** change effective 6/14

The planned drawdown of the Sand Lake unit to 1270.00 by mid-June was not possible. Above normal rainfall, the inability of the James River channel to handle much water, and our commitments to keep the stream flow within the banks (except during flood stages) prevented the drawdown. High evaporation and transpiration losses in July, however, lowered Sand Lake to 1270.04.

In mid-August the Mud Lake control was opened to start the drawdown to 1271.00 planned for that unit. The plan was to lower it to that level by September 1 to facilitate drying of portions of the marsh for controlled burning and mechanical control of vegetation in late fall. As indicated above we were within 0.22 feet of that goal at the end of the period.

The release of water from Mud Lake raised the Sand Lake level to 1270.22 by the end of the period.

Algae growth did not become as extensive this year as in former years, undoubtedly because of the frequent rainfall and subsequent "freshening" action.

C. Fires

None.

II. WILDLIFE

A. Migratory Birds

1. Population and Behavior

a. Geese

At the beginning of this period, 15,350 Snow and Blue Geese, 2,300 Little Canada Geese and 268 Common Canada Geese were present. By May 11, all of the migrants had left except 262 Common Canadas and two Blues. By July 6, four more Common Canadas and one Snow joined the resident flock. At the close of this period, 270 Honkers, three Snows and three Blues were present.

An aerial survey was made on May 9 in an attempt to locate the nesting sites of the geese. Since no nests were seen on this survey or subsequent aerial counts, we do not know how many of the resident flock actually were paired and attempted to rear young.

On May 15, the first broods were observed along the Houghton Grade north of headquarters. The last brood was seen on July 15. The following table gives the location, number and date first seen of all goose broods observed during 1957

SAND LAKE CANADA GOOSE PRODUCTION - 1957

<u>Date</u>	<u>Brood Size</u>	<u>Location</u>
5 - 15	2	Houghton Grade ✓
"	5	" " ✓
"	6	" " ✓
"	7	" " ✓
"	7	Grazing Unit 16
"	3	South of Houghton Grade
5 - 23	5	Columbia Dam
5 - 27	3	Silo Bay
5 - 27	6	Hanson Point ✓
5 - 28	6	Bay southwest of Site 3 ✓
"	8	" " "
"	6	" " "
5 - 29	8	West of Spurs
6 - 19	4	North of Level Ditching
7 - 1	6	Hanson Point ✓
7 - 1	5	Silo Bay
7 - 3	3	Mud Lake - Hecla Grade
7 - 15	5	Grazing Unit 4
Total	95	

This year, 18 goose broods produced 95 young, an increase of 76 percent over that of 1956 and 58 percent over the 1950 - 1957 average. The average brood size of 5.3 had also increased by 1.4 young over that of 1956 and 1.2 over the eight year average. The following table gives the eight year comparison.

SAND LAKE CANADA GOOSE PRODUCTION

1950 - 1957

<u>Year</u>	<u>Number of Broods</u>	<u>Number of Young</u>	<u>Average Brood Size</u>
1958	12	64	5.3
1957	18	95	5.3
1956	14	54	3.9
1955	15	68	4.5
1954	9	46	5.1
1953	12	42	3.5
1952	18	65	3.6
1951	18	56	3.1
1950	12	50	4.1
Eight year Average	14.5	59.5	4.1

Most of the muskrat houses present during the early spring were destroyed by wind and wave action so that few were available as nesting sites this year. The two artificial islands constructed last winter were not utilized by geese for nesting (see photo section); however, ducks used them late in the period for resting. Inasmuch as our search for nests was unsuccessful, we do not know what type of nesting habitat was used. Probably upland sites were utilized, with some possibility that 'rat houses may have been used.

Five pairs were seen in the captive flock of Canadas. Although they appeared to be establishing territories, no nests were established.

b. Ducks

Approximately 2,600 dabblers and 3,280 divers were present on May 1. Most of these birds moved on north leaving a stabilized population of 1,506 dabblers and 958 divers by May 18. Beginning on about June 22, a buildup to approximately 4,000 ducks occurred by July 1. These were primarily moulting mallards and pintails. By August 10, the blue-wing migration had begun and some local movement of all species to Sand Lake occurred. A ground count on September 4 indicated that 24,960 dabblers and 1,690 divers were present.

On May 16, an aerial survey was made to estimate the number of pairs that were present. The Service aircraft was used, with Pilot-Biologist Irv Boeker at the controls. The census was made by flying each quarter line, with pilot and observer each counting a one-eighth strip on each side, giving 50 percent coverage. At the same time, a ground count covering one-fourth mile strips was made on specific areas to provide a correction factor for birds not observed from the air, to obtain a ratio for number of ducks observed per pair, and to provide a check on species composition. All counts included pairs, plus lone males, assuming that the males represented pairs.

A total of 180 ducks was counted from the air. This was first multiplied by two for total coverage. The 360 was then multiplied by 4.9, the correction factor for birds seen from the ground but not by air, to give a total of 1764 ducks. The ground counts had revealed that there were 1.53 ducks observed for each actual pair (pairs plus lone males). The total of 1764 divided by 1.53 gave a calculated total of 1153 pairs.

The following table shows the estimated number of breeding pairs for 1957, compares that with pairs counts of previous years, and shows estimated broods and an estimation of hatching success.

SAND LAKE PAIRS AND BROOD COUNTS 1953 - 1957

<u>Year</u>	<u>Estimated Number of Breeding Pairs</u>	<u>Estimated Number of Broods</u>	<u>Percent of Production</u>
1958	707	305	43
1957	1153	478	41
1956*			
1955	369	205	55
1954	564	340	60
1953	658	348	53

* No pairs count was made.

As shown by the above data, Sand Lake experienced a considerable increase in breeding pairs this year; however, no comparison can be made with 1956 since no count was made in that year. In comparing breeding pairs with broods produced, the percent of production this year is 27 percent lower than the average of 52 percent for the four years represented.

The pairs count species composition for 1957 is as follows:

SAND LAKE PAIRS COMPOSITION - 1957

<u>SPECIES</u>	<u>PERCENT</u>
Mallard	16
Gadwall	11
Am. Widgeon	4
Pintail	3
Blue-wing Teal	20
Shoveler	11
Redhead	9
Canvasback	2
Scaup	12
Ruddy	8
Unidentified	4
Total	100

This year a different method was used to determine the total number of broods present at Sand Lake. In the past, two shoreline brood counts were made and these were expanded by a direct ratio to the total shoreline. The two brood counts usually covered approximately $1/4$ to $1/3$ of the total shoreline.

This year, the brood counts were run as in the past except the length of shoreline was not measured. Instead, the total area observed on each individual count was calculated and then expanded by a direct ratio to the total acreage of similar habitat for Sand Lake. Only marsh and water acreages were considered.

We believe this method is more accurate since it is extremely difficult to determine definite shoreline routes in the large acreages of emergent vegetation. To obtain the area of our samples, the routes covered were plotted and measured on aerial photos.

Counts along roadgrades within plus or minus five days of the actual brood counts were also included; however, in order to reduce any bias involved, the acreage along these roadgrades was added to the sample acreage each time an incidental count was made.

From July 1 - 10, the first brood count yielded 13 broods on a 2583 acre sample. The second count from July 29 - 30 added 75 broods (after eliminating possible duplications) on a 3251 acre sample. Expanding these brood counts to the 10,493 acres of similar marsh and water habitat, a total of 319 broods was calculated. Assuming that we observed only two-thirds of the broods on the two counts, a calculated total of 478 broods of ducks were produced at Sand Lake. It must be admitted that this is an arbitrary assumption, but it is not possible to obtain an accurate correction factor. The marshes at Sand Lake are too extensive to make a beat-out count that would be complete enough to provide a correction factor of value. By using the average brood sizes from Griffith's data, this total represents 3158 young. On the following page is a tabulation of the estimated duck production for 1957.

SAND LAKE DUCK PRODUCTION - 1957

Species	Observed Broods	Observed Young	Observed Brood Size	Observed Species Composition	Calculated Number of Broods	Griffith's Average Brood Size	Total Calculated Young
Mallard	14	95	6.78	15.9	76	6.52	496
Gadwall	11	78	7.09	12.5	60	7.09	425
Am. Widgeon	1	4	4.00	1.1	5	6.36	32
Pintail	13	64	4.92	13.6	65	6.10	396
B-wing Teal	33	228	6.91	37.5	179	6.80	1217
Shoveler	2	16	8.00	2.3	11	6.33	70
Redhead	5	41	8.20	5.7	27	6.31	170
Canvasback	2	12	6.00	2.3	11	6.18	68
Unidentified	7	28	4.00	9.1	44	6.46*	284
Total	88			100.0	478		3158

* Average of above species

According to the data listed on page 11, the 1957 production indicates a 77 percent increase over that of 1956 and a 31 percent increase over the 1950 - 1957 average. Undoubtedly a small part of the increase can be attributed to the shoreline grazing plan which was initiated last year. Other factors causing this increase include utilization of a different method of calculating production, the general increase in waterfowl numbers throughout South Dakota and the movement of some birds to the refuge in early spring when water conditions were not favorable outside. The average brood size this year for all species was 6.2, considerably lower than the average of 7.8 calculated for eastern South Dakota as a whole by State technicians.

The hatch curve for this year indicates that 20 percent of all hatching occurred during July 11 - 15; during 1956, the 20 percent peak was reached during June 23 - 27. Minor peaks were reached during June 6 - 10 and 21 - 25 this year.

The lateness of the hatch this year was due primarily to cool, wet weather that disrupted first nesting attempts. Frequent rains and below normal temperatures occurred from April 18 through May 30.

On the following pages are tables showing brood classification and size of broods observed, a comparison of production for the years 1950 through 1957 and a graph showing the hatching curve for all species of ducks for 1957.

In comparing the breeding pairs species composition data on page 7 with brood species composition data on page 8, some variation is noted. Apparently after the May 9 pairs count was made, there was a further shifting of populations, with additional Blue-wings moving in, and Shovelers, Scaup and Ruddy's moving on north. Ideally, two pairs counts should be made, an early one to get the early nesting Mallards and Pintails, and a later one (mid-May or later) for other species.

See forms NR-1 and NR-1B for additional data on waterfowl. The description of census units shown on NR-1B follows that form.

SAND LAKE DUCK BROOD DATA - 1957

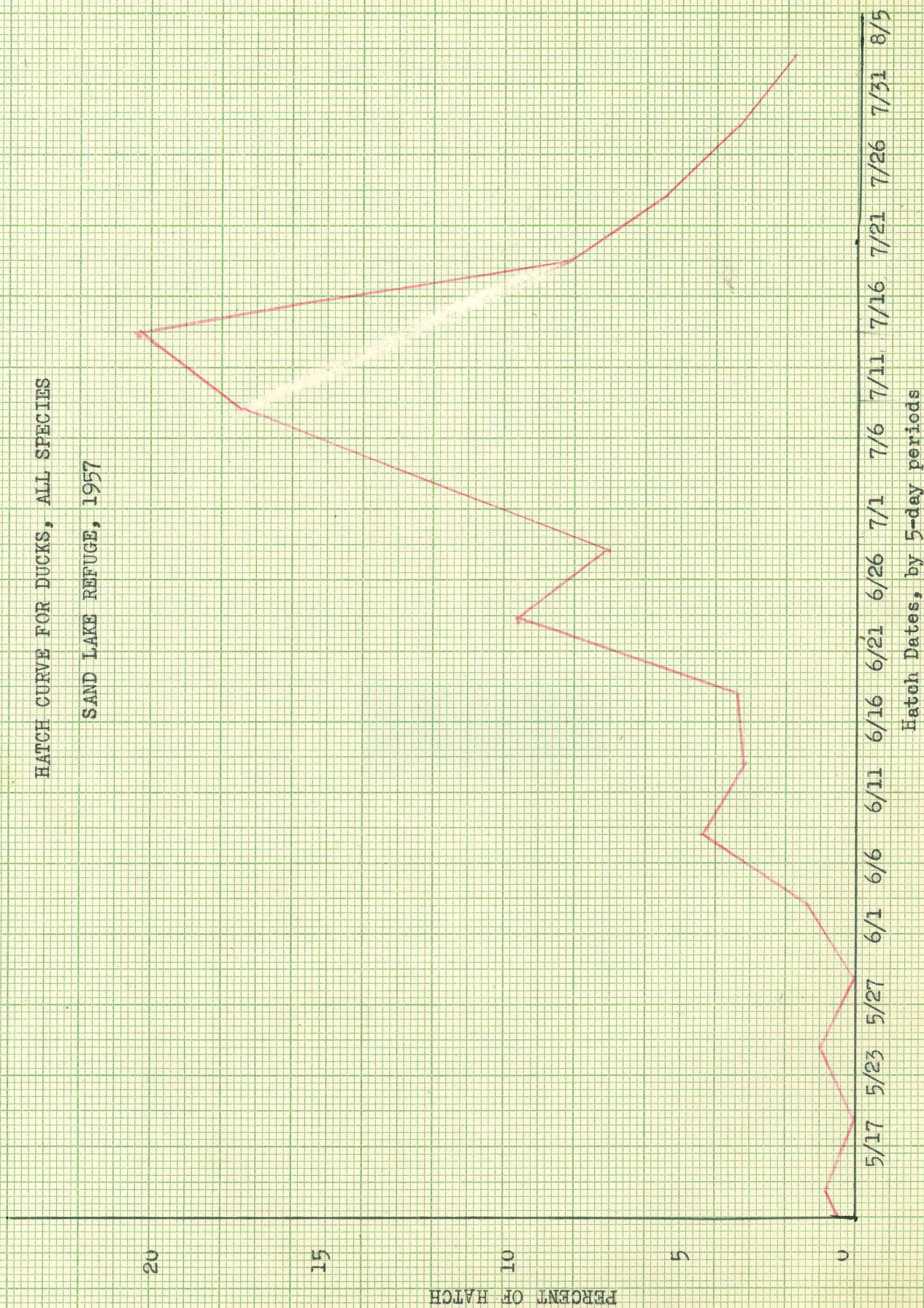
Species	Ia		Ib		Ic		IIa		IIb		IIc		III		Unknown	Total
	Brds	Yng	Brds	Yng	Brds	Yng	Brds	Yng	Brds	Yng	Brds	Yng	Brds	Yng	Brds	Yng
Mallard	1	9	4	36	1	5	1	1	2	16	1	7	4	21		14 95
Gadwall	1	7	3	21	3	21	2	22			2	7				11 78
Am. Widgeon									1	4						1 4
Pintail	1	5	4	21			1	6	3	25			3	11	1	2 13 70
Bl-wing Teal	7	50	6	38	8	58	6	40	4	33	1	4	1	5		33 228
Shoveler	1	8					1	8								2 16
Redhead			4	31					1	10						5 41
Canvasback							1	1	1	11						2 12
Unidentified	1	5					2	6	1	6	1	3			2	8* 7 28
Total	12	84	21	147	12	84	14	84	13	105	5	21	8	37	3	10 88 572

* Estimated

COMPARISON OF SAND LAKE DUCK PRODUCTION, 1950 - 1957

<u>Year</u>	<u>Estimated Number of Broods</u>	<u>Estimated Number of Young</u>
1957	478	3158
1956	276	1784
1955	205	1332
1954	340	2240
1953	347	2360
1952	488	3375
1951	381	2287
1950	510	2760
Eight Year Average	378.1	2409.5

HATCH CURVE FOR DUCKS, ALL SPECIES
SAND LAKE REFUGE, 1957



c. Coots

The coot population has remained near 1100 throughout the period. Very few broods were seen on Sand Lake as has been the case in eastern South Dakota. We estimate that approximately 270 young were produced. A considerable influx of coots occurred near the close of the period increasing the population to 17,400 by September 4.

d. Water and Marsh Birds

Grebes.

The only ones present during the period were Eared, Pied-billed and Westerns. Only a few Eared Grebes nested here. Pied-billed Grebe broods were plentiful, while the Western Grebes had a banner year. We estimate that 500 broods of Westerns were reared this year; last year only about 150 broods were raised. At the end of the period the Western Grebe population was estimated at 3200.

Pelicans and Cormorants.

These birds were again abundant. White Pelicans produced about 300 young and the Double-crested Cormorants about 450 young -- all on two of our islands. The Pelican population was raised considerably by the influx of new birds in August; at the end of the period approximately 12,000 were present. Cormorants numbered about 2500 by September 1.

Hérons and Bitterns.

Both the Great Blue and Black-crowned Night Hérons nest here, though no rookeries have been located. Our last census indicated about 300 of each species seen. One American Egret was observed in August. It was first seen by Mr. Podoll on the 7th, and was seen by Norman and Huenecke on the 8th and 10th. American Bitterns are plentiful. One Least Bittern was observed on July 25 by Huenecke; this constituted a new refuge record.

Shorebirds.

The Killdeer, Upland Plovers and Spotted Sandpipers were the only shorebirds seen commonly throughout the period. The late summer migration started on July 11 when Avocets, Greater and Lesser Yellow-legs, Dowitchers, Baird's and Least Sandpipers appeared. Other shorebirds that have passed through include Marbled Godwits, Pectoral Sandpipers, Willetts, Semipalmated Sandpipers and Wilson's and Northern Phalaropes. The peak of the shorebird migration occurred between July 19 and 25. Of the shorebirds remaining at the end of the period, the Dowitchers were the most abundant.

Gulls and Terns.

Ring-billed Gulls are common, with approximately 40,000 here at the present time. Franklin's Gulls are always the most abundant species in this area. Many nest here, and thousands move into the area in late summer. The "guesstimated" population now is in the neighborhood of 400,000. The morning feeding flights and evening flights when they return to the refuge to roost are quite spectacular. Forster's, Common and Black Terns were all common throughout the period. The largest tern colony exists at the south end of the refuge, near the Columbia Dam; both Forster's and Commons nest in there.

Other Birds.

Since the spring migration carried over into this period, we are listing below the arrivals not reported in the last narrative:

May 13 - Rose-breasted Grosbeak	May 24 - Cinnamon Teal
Gray-cheeked Thrush	Least Sandpiper
Olive-backed Thrush	Red-headed Woodpecker
Wood Thrush	Purple Martin
Veery	Lark Bunting
Least Flycatcher	Barn Swallow
Black-poll Warbler	May 25 - Cliff Swallow
Northern Water-thrush	Catbird
Ovenbird	Olive-sided Flycatcher
Mourning Warbler	Burrowing Owl
Connecticut Warbler	House Wren
Pileolated (Wilson's) Warbler	Goldfinch
May 14 - Black-throated Green Warbler	May 26 - Orchard Oriole
May 17 - Avocet	Nighthawk
May 19 - Ruddy Turnstone	Tree Swallow
May 21 - Yellow-throat	Bank Swallow
May 23 - Baltimore Oriole	May 28 - Black-billed Cuckoo
Redstart	May 31 - Whip-poor-will*
Black and White Warbler	June 1 - Cedar Waxwing
Orange-crowned Warbler	June 5 - Ruby-throated Hummingbird
	July 25 -Least Bittern*

* New refuge records

The Purple Martins departed from the two refuge colonies during the last week in August.

2. Food and Cover.

Aquatic foods were adequate for summer populations of waterfowl. In June it appeared that we would have an excellent crop of Sago; by the end of July, however, it was apparent that something had happened to it. A series of transects in the Sand Lake unit (run for the first time this year with the help of M. C. Hammond from Lower Souris) indicated that the Sago crop was only

about 15 percent of normal. The cause (or causes) of this loss in production are not known. We know that our Carp are not helping the situation any, but believe there must be other factors too.

In the Mud Lake unit the production of pondweed seed was considerably better. No transects were run in this unit, however, and no estimates were made of seed yield.

While aquatic food supplies are adequate for summer populations, they are not adequate for migrant birds. By the end of the fall season most natural food supplies will be depleted. Usually there is little in the way of aquatics left for the spring arrivals. We are beginning to suspect that this might be one of the factors that keeps our nesting population of diving ducks at a low level.

Grain and corn crops are good to excellent this year, and there will be a plentiful supply of this type of food for waterfowl. The acreages of crops left standing for wildlife food include 356 acres of corn, 278 acres of barley, 10 of wheat and 24 of millet. A total of 153 acres of grain and corn will be harvested for feed for birds in our hospital pen and for captive flocks at Sand Lake and other refuges.

With an adequate supply of soil moisture, there should be ample green browse available this year; some fall rye has been planted for browse too.

Nesting and brood cover have been adequate this season.

3. Botulism.

None noted.

4. Lead Poisoning and other Diseases.

Only one dead duck was found this period. An autopsy was performed but nothing abnormal was detected.

B. Upland Game Birds.

1. Populations and Behavior.

Ring-necked Pheasants are abundant throughout this area. State Game Technicians report that reproduction was generally comparable or slightly better than last year in northeastern South Dakota. No brood census was conducted on the refuge, but observations of broods were numerous.

The pheasant season in this area will start on October 26 and will extend through December 1. Bag limits are three and six.

European Partridges are seen occasionally. There may have

been a slight increase this year, although observations were too infrequent to mean much. There will not be an open season on this species in this area. *? Wrong - Oct 26 - Nov 3.*

2. Food and Cover.

Food supplies for upland game are more than adequate. Cultivated crops, weed seeds and fruits of trees and shrubs provide an abundance of summer and fall food. Standing corn on the refuge will provide a source of winter food for the refuge populations.

Cover for upland game is also adequate.

3. Disease.

None noted.

C. Big Game Animals.

1. Populations and Behavior.

White-tailed Deer are the only big game animals on the refuge. No Mule Deer have been seen since the hunting season last December. The observations of White-tail fawns indicate that reproduction this year was good. We estimate that the present deer population is 175 to 200.

There will not be a deer season in this area this year.

2. Food and Cover.

Food and cover conditions are excellent. There should be sufficient grain and corn available to supplement natural foods in the winter months.

3. Disease.

None.

D. Fur Animals, Predators, Rodents and other Mammals.

1. Mink.

A few mink have been observed during the period along dikes and road grades. It is difficult to estimate populations of fur bearers at any time, and especially so during summer months when the vegetative cover is dense. Basing our estimate on last winter's population of 90 animals, we probably have about 200 to 250 mink at the present time. We will recommend unlimited trapping this fall.

2. Muskrats.

These animals were seen frequently throughout the period, and especially during the brood censuses. It appears that there may have been an increase in numbers again this year. We hope that this will be confirmed by the early winter inventory, as a larger muskrat population would be of benefit in our dense marshes. Until the early winter house count is made, we are "guesstimating" the 'rat population at 4000 to 5000. It is planned that muskrat trapping this fall will be confined primarily to dikes and road grades, with limited trapping in areas of higher populations (primarily the Weismantel Grade area).

3. Beaver.

There are four known colonies of beaver on the refuge; the population is probably in the neighborhood of 25 to 30 animals. Some trapping will be necessary this fall to keep the beaver out of the dikes.

4. Weasels.

A few Short-tailed and Long-tailed Weasels are present. Although none have been seen this period, there may be a few Least Weasels. The population of these animals may be around 100 to 150.

5. Skunks.

Striped Skunks may have increased slightly over the number present last year; Spotted Skunks have not been seen. Our skunk population is estimated at 500 to 600.

6. Raccoon.

The 'coon population remains at a fairly high level, reduction is needed. Depredation on nests was known to be high in some areas, and depredation in sweetcorn patches is quite general. It may be necessary to institute a controlled poisoning program to help reduce this species numbers, as trapping will not do it.

7. Badgers.

This species continues to be a nuisance because of damage to roads and trails. We probably have around 125 of this species.

8. Red Fox.

Foxes are too numerous and reduction is needed. Quite a few active dens were located during the summer. We hope that snow conditions next winter will be favorable for aerial hunting, as that seems to be one of the most effective methods of control. There are probably 125 to 150 foxes present.

9. Other Mammals.

Cottontail and White-tailed Jack Rabbits are numerous. Fox Squirrels are fairly common in most shelterbelts. Thirteen-lined Ground Squirrels are abundant, Franklin's Ground Squirrels are seen occasionally. There appeared to be an increase in Richardson's Ground Squirrels this year. Mice are plentiful, with Meadow Mice, Prairie Deer Mice, White-footed Mice and House Mice present. House Rats are not too numerous.

E. Predacious Birds.

Occasional Sharp-shinned and Cooper's Hawks have been observed. A few Red-tailed Hawks nest in this area. During the latter part of August many Red-tails started moving into and through this area. Only a few Swainson's Hawks have been seen. The Marsh Hawk, of course, has been the most common hawk. One Osprey was seen early in May. Sparrow Hawks were common early in the period, and have again started showing up now. No eagles have been observed this period.

Great Horned Owls are present in usual numbers, but Short-eared Owls have not been seen as commonly as last year. Burrowing Owls appeared to be more plentiful this season.

Crows are uncommon in this area; they are not even seen in any large numbers during migration periods.

Loggerhead Shrikes appeared to be more numerous this year than a year ago.

F. Fish.

Again Carp and Bullheads have been the only fish species observed, other than minnows. Carp are too abundant, and have an adverse affect on aquatic vegetation. Fishing was very light this season, with only a few people out for bullheads early in the summer. Probably no more than 150 fisherman-days were expended in this sport.

III. REFUGE DEVELOPMENT, MAINTENANCE

A. Physical Developments.

1. Put up scarecrows in early May in nearby sprouting grain fields to keep geese out.
2. Planted 250 rods of new trees in shelterbelt at Hanson Point area.
3. Built seven and one-half miles of electric fence in grazing units.
4. Installed new drain plumbing, installed disposal field and converted old cesspool to septic tank at Site 3.
5. Filled barrels with dirt and placed over old CCC sewer man-holes as a safety measure.
6. Maintained lawn and trimmed trees and shrubs around refuge buildings.
7. Checked cattle into grazing units.
8. Cleaned out sewer system at headquarters and Site 4.
9. Made periodic wildlife censuses and observations at Sand Lake and the two easement refuges.
10. Went over all refuge areas with SOS representatives in connection with revision of Economic Use Plan.
11. Divided grain crops with permittees.
12. Painted interior downstairs Building 9 and interior Building 17 under informal contract.
13. Disced shelterbelts several times during the summer.
14. Planted 250 rods of new trees in shelterbelt at Hanson Point area.
15. Inspected and serviced surplus Model 12 motor patrol (1942 Model) obtained from Air Force Base at Rapid City.
16. Made and placed tin flashers in fields for blackbird depredations control - not too successful.
17. Pulled approximately 75 telephonepoles from old surplus telephone line.
18. Mounted GOC listening device on office.
19. Moved old boat house, and painted it, to hospital pen for hay storage.

20. Constructed sun shade on TD-14 crawler.
21. Repaired approximately four miles of refuge trail, filling washouts, discing out sod and leveling with motor patrol.
22. Made a portable tank from a 55 gallon barrel to carry diesel fuel in pickups.
23. Cleaned, disced and seeded approximately six acres to grass near site 3.
24. Constructed and painted 12 "prohibitive" signs for Dakota Lake Refuge (No retrieving in refuge, no shooting on right-of-way, etc.) and repainted six recognition signs for Dakota Lake and Maple River Refuges.
25. Sprayed approximately 1800 acres of noxious weeds; spread 1500 pounds of Borascue on Leafy Spurge.
26. Mowed refuge trails and dikes.
27. Cleared brush and rocks from dikes.
28. Reposted Dakota Lake Basement Refuge and put up new signs.
29. Performed periodic servicing, inspections and necessary repair on seven automotive vehicles, three tractors and miscellaneous small equipment.

B. Plantings.

1. Aquatic and Marsh Plants.

None.

2. Trees and Shrubs.

Some replacement planting was done in the field shelterbelt on Hanson's Point in early May. The planting included 270 Russian Olive, 115 Hardy Crab, 35 Harbin Pear, 150 Cottonwood and 150 American Elm.

3. Upland Herbaceous Plantings.

Six acres of ground was worked up around Site 3 and seeded with eight bushels of mixed seeds. About 60 pounds of Brome Grass were ^{used} with the balance a mixture of Millet, Barley, Blue Grass and Rye.

4. Cultivated Crops.

A total of 2898.5 acres of refuge farm land was cropped this year by share-crop permittees. With the above normal precipitation during the period, all crops have been better than average. Early in

the summer it appeared that bumper crops would be the rule; however, several factors combined to reduce the crops from the excellent level to good. Hot weather occurred during the only dry (relatively) period of the summer, just as small grains were filling. Frequent rains during harvest time reduced grain quality to some degree. The corn crop has had quite a time of it - cool, wet weather in late May got it off to a bad start, but warm weather in late June and July pushed it along well. At the present time cool, wet weather is the rule again, and the corn is at a standstill. As indicated earlier, the corn will probably make it in good shape if frost can hold off until about September 10.

The following is a summary of the 1957 harvest to date (all crops, mainly corn, are not yet harvested):

<u>Crop</u>	<u>Total Acres</u>	<u>Government Share</u>		<u>Del'd to Elevator</u>
		<u>Harvested</u>	<u>Standing</u>	
Alfalfa	490.5	2.0	30.0*	Not in yet
Barley	833.5	49.5	277.8	1312
Corn	983.5	46.8	355.8	Not in yet
Millet	59.5	3.4	23.8	Not in yet
Oats	259.5	42.5		1987
Wheat	221.0	10.5	10.0	280
Fallow	51.0			

Totals	2898.5	154.7	697.4	3579
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* for seed

C. Collections.

None.

D. Receipt of Seed and Nursery Stock.

270 Russian Olives, 115 Hardy Crabs, 35 Harbin Pear, 150 Cottonwoods and 150 American Elms were purchased through the Soil Conservation Service. All trees and shrubs were in good condition and survival to date has been excellent.

E. Weed Control.

A complete summary will be included with the September-December narrative report. A total of 1800 acres of noxious weeds was sprayed in June, July and early August. Most of the spraying was done with the refuge trailer-mounted Boradjet outfit; 180 acres were aerial sprayed. Adverse weather conditions dragged this job out to the point where we thought we would never get done. It appears that to do the job properly under all conditions, it will be necessary to purchase another spray rig to speed up the coverage. All spraying done with refuge funds, personnel and equipment was on grazing or other non-crop land. Weed control is essential in our agricultural land to maintain

crop yields; if we expect the permittees to control weeds on lands under lease, we must control them in adjacent areas. Another consideration is the fact that the local county weed board is a fairly active one, and weed control (at least of the primary noxious weeds) is given quite a bit of attention.

IV. ECONOMIC USE OF REFUGE

Work has been initiated on the revision of the Sand Lake Economic Use Plan. One of the main purposes in the revision will be to incorporate the new shoreline grazing plan (prepared in 1955) with the previous over-all plan. Some changes will be made in the agricultural plan, and upland haying will be largely eliminated.

The assistance of the Soil Conservation Service has again been obtained, and Work Unit Conservationist Don Minehart of Hecla has given us excellent cooperation. In July Don arranged for a team of specialists to tour the refuge with us, and to give us their recommendations on economic use management. The team included a range specialist, soils specialist, agronomist, biologist and the work unit conservationist. The team spent three days on the refuge with us, inspecting each grazing and agricultural unit. Much helpful information has been obtained that will aid us in preparing our revised plan.

A. Grazing.

This year 23 of the 27 units established in the new plan are in use. Nineteen permittees are running 1010 head (not counting calves) on 5412 acres. We expect to utilize around 4500 animal use months of grazing this season.

Following the drouth of last year, grazing capacities were re-figured prior to this year's grazing season, and were reduced in most cases. This reduction in grazing, combined with the above-normal precipitation of this season, has allowed all units to recover satisfactorily from the varying degrees of over-use that occurred on most units last year. We have asked for a two-week extension of the grazing season this year, but have not yet received a reply to the request. Most of our units have good Brome grass stands on the uplands, and the Brome has made excellent growth all season with the ample rainfall. Lowland and wetland sites are generally in excellent condition as far as growth is concerned.

A study has been initiated to evaluate the effect of shoreline grazing on waterfowl production and over-all waterfowl use. A report on this will be prepared at the end of the grazing season, and will be included in the next narrative. The study has been set up tentatively for a five-year period. See Section V for additional comments on this study.

B. Haying.

A total of six permits have been issued for haying this year on approximately 390 acres. Seven units have been taken out of haying use since last year. Of the six units now in use, four will be eliminated after this season. The only upland haying that will be continued will be on two units - the goose pens (portions only) and headquarters area as one, and the recreation area as the other.

C. Fur Harvest.

None.

D. Timber Removal.

None.

E. Other Uses.

One permit was issued for the keeping of approximately 60 hives of bees at 15 cents per hive per year.

One permit was issued to the Brown-Marshall Soil Conservation District for harvesting Brome and Blue Grass seed. A total of 5290 pounds of Brome and 2200 pounds of Blue Grass were taken from the strippers. By the time the seed is dried and cleaned, our share (on the basis of one-third of the cleaned seed) will be about 530 pounds of Brome and 440 pounds of Blue Grass.

V. FIELD INVESTIGATIONS OR APPLIED RESEARCH

A. Waterfowl Populations and Shoreline Grazing Use.

A study project was initiated this year to appraise the effect of shoreline grazing on waterfowl production and over-all waterfowl use. Inasmuch as the season's observations will not be complete until after the fall migration period, comments at this time will be brief.

Eight study areas were set up in grazing units G-6, 11, 16, 17, 18, 19, 22 and 24. Eight control areas were chosen to serve as a basis for comparison. These controls are wild land areas adjacent to the various grazing land study areas.

Each year that the study is in progress (the project will continue for at least five years) population counts will be made of waterfowl using the sample areas during spring migration, breeding season, and fall migration. Tabulated below are the breeding pairs counts made this year:

Grazed					Controls			
Loca- tion	Length of Shoreline	No. of Pairs	No. of Prs/Mi	Yr. 1st Grazed	Loca- tion	Length of Shoreline	No. of Pairs	No. of Prs/Mi
G-19	1.0 mi	7	7.0	1956	A-48*	0.8 mi	1	1.3
G-18	1.9	4	2.1	1956	A-40*	1.8	2	1.1
G-17S _{1/2}	1.3	10	7.7	1957	Conard	1.3	7	5.4
G-16	2.3	13	5.7	1956	G-15**	1.9	4	2.1
G-11	1.7	9	5.3	1957	A-27*	1.0	7	7.0
G-6	1.2	8	6.7	1956	A-12,13*	2.1	12	5.7
G-22	0.8	5	6.3	1956	H-2*	1.0	1	1.0
Totals								
& Avg.	10.2	56	5.5			9.9	34	3.4

* areas designated A & H refer to wild lands adjacent to agricultural and hay lands.

** this area will not be grazed until 1958, and then upland areas only. Shoreline will be ungrazed as a control area for G-16.

The above counts were made during the period May 23 through June 4, at a time when the breeding population should have been stabilized. Pairs and waiting males were counted, divers and coots were excluded as a species that would not be affected by shoreline grazing or non-grazing.

While it is too early to draw any conclusions, there is an indication that the grazed areas received more use by breeding pairs. At the time the counts were made, cattle had been grazing for two weeks (since May 15). In units G-19, 16 and 11, the cattle were confined to the lowland and wetland sites to concentrate the grazing pressure on the densest cover. Of those units that had been grazed

in 1956, G-18 and 16 showed some indication that cattle were beginning to open portions of the shoreline.

A total of seven and one-half miles of electric fence was installed in grazing units this year. These fences were put in in some units to concentrate grazing on lowland and wetland sites; in other units to protect upland areas that were over-grazed last year. From observations made this summer, and from suggestions made by the Soil Conservation Service Range Specialist, further cross-fencing may be necessary.

In placing cross-fences between upland and lowland sites as we did in some units, the lowland sites (with warm-season vegetation predominating) in some cases were over-utilized. The cattle preferred the lowland vegetation to that of the wetlands. Later in the season, when the electric fences were opened up, the upland sites, with cool-season Brome predominating, were still not used a great deal as the vegetation was not as succulent. By mid-August, however, upland sites were used more, and the cattle also started working down into the wetland sites (also cool-season type).

It appears that in some units at least, it will be necessary to cross-fence twice, keeping upland, lowland and wetland sites separated. Where such fencing is put in, the cattle would be placed on the wetland sites early in the season and forced to graze there. Around the middle of June, when the lowland site, warm-season vegetation is making vigorous growth, the cattle would be rotated to that zone. The upland sites would normally not be grazed at all, but would be held as reserve pasturage for dry seasons.

To enable us to better follow the vegetative changes that may take place, a series of 26 line-transects were established in the grazing areas. The transects show the width of the various vegetative zones, and the species of plants in each zone. These lines will be re-mapped at the conclusion to illustrate the predominant shoreline condition and the changes which may take place.

A more complete progress report will be included in the September-December narrative, after the conclusion of the first year of the study.

B. Artificial Pothole and Level Ditching Study.

A study was initiated this year to appraise the effect of the construction of artificial potholes and level ditching on waterfowl production and over-all waterfowl use.

A total of 140 potholes and 6700 lineal feet of ditch have been excavated at Sand Lake in the falls of 1954, 1955 and 1956. In 1954, 95 small potholes, all of uniform size, were excavated in the north end of the refuge, on the west side. In 1955, 4000 feet of ditch were excavated on the west side of the refuge, about one mile north of the Mud Lake Dike. In 1956, 45 potholes, of varying size, shape and spacing and 2700 lineal feet of ditch were excavated in the southeast portion

of the refuge.

Waterfowl use of the study areas will be determined by making bi-weekly counts of the areas from the start of the spring migration until time for breeding pairs counts. Weekly counts will be made during the breeding season. These weekly counts will be supplemented by additional observations to try to determine the daily pattern of use. Bi-weekly counts will again be made from the end of the breeding season until the end of the fall migration. The breeding pairs counts will serve as the main basis for comparison with control areas.

An attempt will also be made to determine the use made by furbearers of the potholes and ditches. Trappers will be requested to keep separate records of any animals taken from these areas.

Vegetative observations will also be made, and records will include:

1. First appearance of submerged aquatics.
2. Approximate period of development for submerged aquatics.
3. Invasion of edges by emergents.
4. Special vegetative control measures carried out (e.g. grazing, mowing, spraying, discing).
5. Photograph of the various developments will be taken to complete the records of vegetative change.

Data accumulated to date have not all be compiled; a progress report will be included with the next narrative.

C. Nesting Studies.

The nesting studies this year consisted of dragging for nests in areas where Blue Grass seed stripping was planned, and of spot checking alfalfa fields after haying operation were completed.

1. Dragging of Areas Prior to Grass Seed Harvest.

In checking for nests in areas to be stripped for grass seed, a rope drag, pulled by two trucks or pickups, was used. The drag consisted of two, 3/8-inch ropes twisted together, to which were tied weights. The weights consisted of pieces of old chain and miscellaneous pieces of scrap metal; weights were spaced about two-feet apart along the 200-foot length of drag.

In dragging upland areas, two pickups could easily pull the drag. When we got into alfalfa fields, however, the growth this year was so dense that two conventional pickups could not make it, so a stake truck and the LWD International were used.

In dragging, the two vehicles were about 100 to 125 feet apart, with one as far ahead of the other as the rope would permit. By driving slowly, with the vehicles "staggered", the drivers could

see the rope quite well. The driver in the rear vehicle acted as "chief observer" as he had the best view.

All the dragging was done during the period from June 18 through June 25, approximately one week before the grass strippers started. Most of the dragging was done during morning and late afternoon and evening hours. Some mid-day dragging was done, however, and it seemed to be just as productive for flushing birds as the other hours.

The results of the nest dragging are tabulated on the following page.

RECORD OF NEST DRAGGING, SAND LAKE, 1957

Area Designation	Date	Area, Acres	Cover : Type*	Observation Record			Comments
				Nest & Hen	Hen Only**	Brood	
SE Goose Pen	6/18	10	Bluegrass				
SW Goose Pen	"	14	"	1 Pheasant			Found by dog
NW Goose Pen	"	28	"		5 Pheasants		
N of NW Goose Pen	"	22	"		1 Pheasant		1 deer fawn flushed
NE Goose Pen	"	8	"		1 Pheasant	1 Pheasant	
Headquarters	"	12	"		1 Pheasant		
G-15	6/19	87	"	1 BW Teal	1 Pheasant		Nest 125 yds to water
G-16	"	35	"		1 Pheasant		
Conard Slough area	6/20	16	Natives	1 Mallard	2 Pheasant		Nest 25 yds to water
West of Silo	"	6	Bluegrass				
Hanson Pt. Shelterbelt	"	7	"		1 Pheasant		
Along trail N. Site 2	"	18	"		3 Pheasant		
N. Side Dry Run	"	24	"		1 Pheasant		
S. Side Dry Run	"	18	"	1 BW Teal	1 BW Teal		Nest 50 yds to water
Corners W of A-8	"	16	Goback				
G-6, SW part	6/24	16	Bluegrass	1 BW Teal			Nest 100 yds to water
G-6, N part	"	18	"	1 BW Teal			Nest 100 yds to water
Trail N of Bonzers	"	25	"				
G-2	"	22	Mixed		1 Pheasant	1 Pheasant	1 BW Male
Hecla Rec Area	6/25	15	Mixed				
S & E of Hecla Rec Area	"	16	Bluegrass		1 Pheasant		
E Edges G-10, G-11	"	36	"	1 Mallard			Nest 120 yds to water
Shelterbelt area E-C-10	"	35	"	1 Pheasant	1 BW Teal		Unable to locate duck nest
G-3	"	34	Mixed		1 BW Teal	1 Pheasant	"
Hdq. Landing Strip	6/18	8	Alfalfa				
Hanson Point	6/20	6	Alfalfa	2 Pintail			1 Hen killed by dog.
TOTALS		552		10	22	3	

* - Dominant type vegetation only is listed

** - Search made for pheasant nests many times, but none were ever found

Most dragging done between hours of 8 - 11 AM; 4 - 7 PM; however, some dragging done between 1 and 4 PM. Was just as effective, apparently.

As the data indicates, only ten nests were located in dragging a total of 553 acres; of the ten, eight were duck nests and two were pheasants. Of the two pheasant nests found, one was located by the manager's dog, and only one by dragging. A total of 19 pheasant hens were flushed with the drag, and though a lot of time was spent in nest searching, none was found. Apparently the pheasants run ahead of the drag a long ways before flushing, so that the flushing point means nothing as far as helping to locate the nest. This same lack of success in finding pheasant nests occurred in nest dragging done at Sand Lake in previous years. Three female ducks were also flushed while dragging, and three pheasant broods were found.

To arrive at a total nest figure, we have added nests located, have assumed the hens flushed represented birds with either a nest or brood, and counted the broods as nests. This gives us a total of 35 nests. On the basis of 552 acres dragged, we had a nesting density of 15.8 acres per nest. We believe that with such a low nest density it is not necessary to drag all areas that are to be stripped for grass seed. We believe it will be sufficient to spot check certain areas only.

2. Alfalfa Nesting.

Studies on this phase of nesting consisted only of spot checking with a few of the permittees on numbers of birds flushed while mowing, and of checking four fields after haying operations were completed. All mowing of refuge alfalfa fields was done either with flushing bar equipped mowers or with swathers.

Of the five permittees contacted (we have eighteen permittees), ~~for~~ reported that no birds were flushed, while one reported three pheasants flushed and two other pheasants killed. These reports are tabulated on the following page.

ALFALFA NESTING RECORDS

A. Reports of Four Permittees After Mowing Completed.

Permittee	Acreage	Age of Stand*	Comments	Ag. Unit
R. Bonzer	26	2 Years	No birds flushed.	A-17
G. Dinger	50	3 "	3 Pheasants flushed; 2 other killed.	A-11
G. Pfutzenreuter	52	3 "	No birds flushed.	A-7,9
A. Scott	19	3 "	No birds flushed.	A-24
A. Scott	25	1 "	No birds flushed.	A-27

* - Year seeded with nurse crop not counted.

B. Areas Checked by Refuge Personnel After Mowing Operations* Completed; 6/27 - 7/5/57.

1. PHEASANTS

Area	Acres	Age of Stand**	Active	Hatched	Fate of Nests			Deserted	Unknown
					Destroyed-Predator	Destroyed-Machine			
A-27	15	1 yr.	0	0	0	0	0	0	
A-40***	45	3 "	0	0	0	One dead pheasant found, cause unknown			
A-45	12	2 "	1	0	0	0	0	0	
A-48	15	3 "	0	2	8	2	1	1	

2. DUCKS

Area	Acres	Age of Stand**	Active	Hatched	Fate of Nests			Deserted	Unknown
					Destroyed-Predator	Destroyed-Machine			
A-27	15	1 yr.	0	0	0	0	0	0	
A-40***	45	3 "	0	0	0	0	0	0	
A-45	12	2	2 Gadwall	0	0	0	0	0	
A-48	15	3	0	0	0	0	0	1	

* - A-27 cut with mower with flushing bar; other cut with self-propelled swathers.

** - Year of seeding with nurse crop not counted.

*** - Only 5 acre sample checked; other areas 100% coverage.

As can be seen from the data, no nests were found in two fields, two nests were found in one, and 14 nests were found in one. About all these data do is confuse us. We are unable to account for the high nesting density in A-48 (nearly one nest per acre) and the low nest density in the others.

The indicated high predation rate in A-48 is also questionable. In checking only after haying operations were completed, we could not tell anything about the time predation occurred. Some of the predation may have occurred early in the season, with subsequent re-nesting, or all of it may have occurred after the hay was cut. Unfortunately it was about ten days after haying operations were completed that we checked the field. Of the eight predator-destroyed nests, we believed that most were destroyed by raccoons, with only one or two destroyed by skunks.

There is a definite need for more research on the relationship of alfalfa to nesting. South Dakota game technicians have done some work on it, but we have not yet seen their data. With the use of high speed mowers becoming more common, there is more danger to wildlife than previously. Tractor-mowers have always been bad, but when they start mowing at speeds of 15 miles per hour or more, wildlife has little chance to escape. One change in haying methods that may help some is the increased use of swathers for cutting and windrowing. The swathers cut higher, move slower than the high speed mowers, and the reel will sometimes lift a bird away from the cutter bar. The use of a swather also eliminates one trip over the field with machinery, as raking is eliminated; this will help save some nests. Self-propelled swathers are becoming more common too; this will help as the tractor is eliminated as a "crushing agent" on nests. The swathers may not save too many nests, but more of the birds are saved to re-nest.

We have wondered if the age of the alfalfa stands might be a factor, with more nesting occurring in the older, denser stands. We had thought that there might be more use of three to five-year stands, and correspondingly less use of one and two year stands, and possibly in stands over six years that have started to thin out. Our data this year was too scanty to give us an indication of such possible variation. If this supposition should prove to be true, we could perhaps ease the situation by shortening the period that alfalfa is in the rotation. In connection with this, the use of Brome grass with the alfalfa would be eliminated, as it is necessary to have a longer rotation with Brome to get full benefit from it.

We plan to continue this study next year, and hope to be able to expand it some.

VI. PUBLIC RELATIONS

A. Public Uses

1. Hunting Use.

None.

2. Fishing Use.

Approximately 150 fishermen-days were expended in Bullhead fishing on road grades.

3. Miscellaneous Uses.

As usual there have been quite a number of visitors at Sand Lake. Early in May many people were still coming out to see the goose concentrations. During the rest of the period most visitors merely drove into the headquarters area and out again; a few stopped to climb the tower and look at the geese in the hospital and captive flock pens, and a few came in to obtain information. Use of the Columbia and Hecla Recreation areas was light. An estimated 1500 visitor-days were expended during the period.

B. Refuge Visitors.

<u>Date</u>	<u>Name</u>	<u>Affiliation</u>	<u>Purpose</u>
5/8	R. Meyerding	USGMA, Mitchell	Leave crippled geese
5/8	H. Huntington	State Game Warden	" " "
5/8	G. Peterson	" " "	" " "
5/15,16	I. Boeker	Pilot, Biologist	Aerial photos
5/28	G. Bossenmaier	State Game Technician	Dove banding, marsh Dev.
5/28,9	M. Hammond	Wild.Mgt. Biol. Low. Souris	Marsh Dev.
6/13	E. Zeller	Brown Co. Weed Spec.	Discuss weed control
6/14	D. Minehart	SCS Unit Cons. Hecla	Discuss seed harvest
6/26	Mr.&Mrs J. Findley	Amateur Ornithologist, Soo Falls,	Observations
7/10	K. Dybsetter	Mgr. Tewaukon, N. D.	Transfer equipment
7/15-18	L. Albee	SCS Range Spec. Huron	Inspect Ec. Use phases
"	W. Parmeter	SCS Agronomist, Huron	" " " "
"	V. Moxon	SCS Soils Spec. Aberdeen	" " " "
"	L. Shearer	SCS Biologist, Huron	" " " "
"	B. Sparton	SCS Aide, Hecla	" " " "
"	D. Minehart	SCS Unit Cons., Hecla	" " " "
7/23	D. Gray	Mgr. L. Souris Ref., N.D.	Discuss mutual problems
7/23	M. Hammond	Wild.Mgt. Biol. L.Souris	" " "
7/23	B. Dunham	MRBS, Bismarck	Get Fishing Data
7/26	G. Jonkel	MRBS, Bismarck	General visit
8/1	H. Van Dyke	Engineer, Mpls.	Inspect projects
8/6	K. Dybsetter	Mgr. Tewaukon Ref. N.D.	Procure supplies

8/7	M. Hammond	Wild. Mgt. Biol.	L. Souris	Set up vegetative transects
8/7	C. Lacey	Student Ass't	L. Souris	Inspect artificial water dev.
8/12	S/Sgt. Storer	GOC		Discuss GOC
8/19	Scout troop	Aberdeen		Overnite camp & observations

Frequent visitors too numerous to list above were: USGMA Sutton; State Game Warden Richardson; Permittees; wildlife enthusiasts and "sight-seers".

C. Refuge Participation

5/3/57 - Mgr. Huenecke, Ass't. Mgr. Norman, Maintenance man Krege attended a weed control meeting at Columbia, S. D.. Mr. Huenecke gave a short talk on control practices at Sand Lake.

5/18-19 - Mgr. Huenecke and Ass't. Mgr. Norman attended meeting of the S.D.O.U. at Lacreek Refuge and inspected surplus Air Force equipment at Rapid City, S. Dak.

5/23 - Managers Huenecke and Norman gave talks and a tour of the refuge to a group of eight adults and eight grade school students from the Ellendale, N. Dak. area.

7/21 - Managers Huenecke and Norman attended Brown County Sportsmens Club Meeting in Aberdeen, S. Dak.

7/24 - Mgr. Huenecke gave slide talk and discussion at Kiwanis in Grifton.

7/27-28 Managers Huenecke and Norman attended S. Dak. Wildlife Federation Meeting in Pierre, S. Dak.

D. Hunting.

None.

E. Fishing.

See Section VI, A, page 33.

F. Violations.

None we were aware of.

VII. OTHER ITEMS

A. Easement Refuges.

1. Maple River.

The Maple River Refuge is located about fourteen miles northwest of the north end of Sand Lake, in North Dakota. The easement area includes approximately 1120 acres, of which only about 150 are water area. When water conditions are favorable, it is used a good deal by migrant waterfowl.

At the start of the period, the marsh area was full of water and there was a slight flow over the spillway. By mid-August, however, the marsh water area was reduced to a pond about 50 by 20 yards. At the end of the period, the water in the river was one and one-half feet below spillway level. Despite the above-normal rainfall this year, apparently evaporation and transpiration losses exceeded the inflow. We hope that in the future we will be able to raise the height of the spillway to hold more water.

Waterfowl use was light this year. On June 7 nine pairs of ducks were present, but on August 12 only one brood was seen. Possibly some Mallard and Pintails were already flying then, but at any rate the production was low. A total of 162 ducks were present on August 12.

Some re-posting will be necessary before the start of the waterfowl season, but no other physical development work is needed this year.

2. Dakota Lake.

This refuge lies directly north of Sand Lake, just one mile north of the North and South Dakota boundary. It consists primarily of the James River channel plus narrow strips of land on either side; the total area is 1048 acres. This area, too, receives heavy use during migration periods.

At the start of the period the gauge reading above the spillway was 9.60; by the end of the period it was down to 8.94, about four-tenths of a foot below spillway level.

In our last narrative, we mentioned the diversion of water to be made, by the North Dakota State Game and Fish Department, to the Hyatt Slough area. The diversion ditch was completed and cut through on June 8. Hyatt Slough has considerable water in it now, and should prove to be a good waterfowl management area. The water is taken from the James River below the spillway, so actually has no effect on Dakota Lake. With the amount of precipitation received this year, we could detect no effect on our Mud Lake unit either.

On June 7, no ducks were seen on Dakota Lake from the highway 11 crossing or from the dam; if any were present on the refuge their numbers were small. On July 1 an aerial count revealed only 20 ducks and four Cormorants. On August 8, however, there were about 225 ducks present, as well as a few Cormorants, Pelicans, Great Blue and Black-crowned Night Herons, and a thousand or so gulls. Only two broods were seen on Dakota Lake when checked by boat on July 22.

B. Items of Interest.

1. Trainee Assistance

Mr. Don E. Simpson, Wildlife Management Biologist Trainee, has been with us since June 4th of this period. Much assistance has been received from Don, and information on various biological studies have contributed a great deal to various phases of development.

While his work has been concentrated on grazing use studies, pothole and ditching surveys, practically all phases of refuge management have been studied, including a turn on the lawn mower.

This has been the first time that this type of training and assistance has been available at Sand Lake. The able work of the tall, slow talking, Missouri-born Don Simpson has assured us of the worthiness and need of a repeating program every year.

Mr. Simpson came to us after working with the Predator and Rodent Control Branch and will soon be leaving for a tenure with the Law Enforcement branch.

Our thanks go to Mr. Simpson for a job well done and wishes of good luck in future assignments.

2. Safety.

Since safety is an all important phase of our work, Ted Wahl, Refuge Clerk, suggested that we devote a section to accidents and accident prevention.

During the period two accidents have occurred. The first accident on June 3 involved Mechanic Elmer Podoll. Elmer was attempting to straighten a five foot section of one-half inch reinforcing steel rod which was bent at a 30 degree angle about five inches from one end. He placed the rod on the anvil in the welding room and struck the bend on the rod with a sledge hammer. The five inch piece beyond the bend broke off with the impact of the hammer and struck him in the left eye breaking his glasses and cutting his eyelid and eyeball.

Elmer was taken to a doctor in Aberdeen immediately after the accident for medical attention. Elmer was indeed fortunate; although he lost three days work, he did not lose his sight.

Normally reinforcing steel can easily be bent, but apparently the rod became hardened after it had been bent the first time making it brittle. If Elmer had been wearing goggles at the time, perhaps his eye may not have been injured.

In any case where any metal is to be straightened or bent, safety goggles should be worn by the employee and the metal should be heated to facilitate the operation.

The second accident, on July 6, involved Howard Huenecke. Howard was unloading a horse from the pickup (equipped with a stock rack) along the shore of Sand Lake to make a brood count. For unknown reason, the horse became frightened and reared when Howard was backing it out of the pickup. The horse struck him in the face with on front foot and cut his nose and lips. The horse had become nervous while loading it at headquarters when the halter broke. This incident may have contributed to the horse's nervousness during the unloading operation.

Howard bandaged his injury and then continued with the brood count. Howard went to a doctor in Aberdeen later in the day to obtain medical treatment, but the doctor only looked at the injury, re-banded it and gave him a tetanus shot. His injuries have healed, but he will always have a scar on his nose.

Since the occurrence of the accident, the halter has been replaced and extreme care is being used in connection with the loading and unloading operation.

Last winter, Albert Krege had a close call when he was using practice hand-grenades on duck depredations work. The hand-grenade exploded prematurely in his hand before he was able to throw it. Since the occurrence of this near-accident, all of the hand-grenades have disposed of.

Accident preventative measures include the construction of hand railings for the stairs in the shop, downstairs at Site 4 and upstairs at Site 3; placement of CO₂ fire extinguishers in easily accessible locations in all buildings, the construction of safety signs, the posting of national safety posters, and periodic safety meetings.

The safety signs constructed include a "no smoking" sign which was placed in the refuge elevator and "wear your goggles" signs which were placed in hazard-to-eyes areas in the shop.

During this period, safety meetings were held in which the material in the safety bulletins, and any other safety practice, was discussed with the personnel. Topics discussed are as follows: Motor vehicle regulations and safe driving practices, insurance policies, and their coverage, goggles and eye injuries, safe use of carbon tetrachloride, first aid and artificial respiration, lifting and general

safety precautions. Safety films were obtained whenever possible.

C. Credits.

Sections I, A; III, A; VI, B and C; VII, B were prepared by Mr. Wahl.

Sections II, A, forms NR-1, NR-1b and the description of units for form NR-1b were prepared by Mr. Norman.

Other sections were prepared by Mr. Huenecke

Date September 11, 1957 Submitted by Howard S. Huenecke
Howard S. Huenecke
Refuge Manager

Approved by: _____

Regional Office

WATERFOWL

REFUGE Sand Lake

MONTHS OF May TO August, 1957

(1) Species	(2) Weeks of reporting period									
	Week ending 5/4 : 1	5/11 : 2	5/18 : 3	5/25 : 4	6/1 : 5	6/8 : 6	6/15 : 7	6/22 : 8	6/29 : 9	7/6 : 10
Swans:										
Whistling Trumpeter										
Geese:										
Canada	268	490	262	262	262	262	262	262	262	268
Cackling										
Brant										
White-fronted										
Snow	4900	1360								1
Blue	10450	3390	2	2	2	2	2	2	2	2
Other Little Canada	2300	2800								
Ducks:										
Mallard	500	550	370	370	370	370	370	370	370	2120
Black		150								
Gadwall	200	300	254	254	254	254	254	254	254	430
Baldpate	350		100	100	100	100	100	100	100	150
Pintail	500	450	50	50	50	50	50	50	50	1065
Green-winged teal	50									
Blue-winged teal	450	550	476	476	476	476	476	476	476	620
Cinnamon teal			2	2	2	2	2	2	2	2
Shoveler	550	500	254	254	254	254	254	254	254	370
Wood					3	3	3	3	3	5
Redhead	350	600	206	206	206	206	206	206	206	320
Ring-necked										
Canvasback	940	750	48	48	48	48	48	48	48	170
Scaup	1800	1350	332	332	200	200	200	200	200	130
Goldeneye										
Bufflehead										
Ruddy	180	100	372	372	372	372	372	372	372	450
Other										
Coot:	850	750	750	750	750	750	750	750	750	1020

Int. Dup. Sec.,
Wash., D. C. 37944

WATERFOWL
(Continuation Sheet)

REFUGE Sand Lake

MONTHS OF May TO August, 19 57

(1) Species	(2) Weeks of reporting period								(3) Estimated waterfowl days use	(4) Production Broods: Estimated seen : total	
	11	12	13	14	15	16	17	18			
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	268	268	268	270	270	270	270	270	35,004	18	95
Cackling											
Brant											
White-fronted											
Snow	1	1	1	1	1	1	3	3	43,911		
Blue	2	2	2	2	2	2	3	3	97,020		
Other Little Canada									35,700		
Ducks:											
Mallard	2120	2120	2120	2100	5000	5000	10000	8300	297,640	14	496
Black				10	10	10	15	60	1,785		
Gadwall	430	430	430	500	500	500	650	1100	50,736	11	425
Baldpate	150	150	150	200	250	250	300	800	24,150	1	32
Pintail	1065	1065	1065	1100	1100	1100	1900	1900	88,620	13	396
Green-winged teal				50	50	50	70	1100	9,590		
Blue-winged teal	620	620	620	650	1670	1670	1670	7400	139,104	33	1271
Cinnamon teal	2	2	2	2	2	2	2	2	210		
Shoveler	370	370	370	400	400	400	450	4300	71,806	2	70
Wood	5	5	5	5	5	5	5	5	385		
Redhead	320	320	320	350	350	350	350	900	41,804	5	170
Ring-necked											
Canvasback	170	170	170	200	200	200	200	90	25,172	2	68
Scaup	130	130	130	100	100	100	100	50	40,488		
Goldeneye											
Bufflehead											
Ruddy	450	450	450	450	250	250	250	650	45,738		
Other Unidentified										7	284
Coot:	1020	1020	1020	1100	1100	1100	1100	17400	229,110		

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans	0		
Geese	211,715	17,918	95
Ducks	837,228	26,650	3,158
Coots	229,110	17,400	270
Total	1,278,053		

SUMMARY
Principal feeding areas South of and up to 1/2 mile north of Welemontal Grade; 1 mile south of A up to 3 mi north of Houghton Grade.
Principal nesting areas Hanson Point to Houghton Grade; Mud Lake Dike to Four Mile Grade
Reported by E. Duane Norman

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 LakeMonths of May to August 1957

(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>										
Eared Grebe			30	8/10-20						
Western Grebe			3200	8/15-31					1100	
Pied-billed Grebe			500	7/10-8/31						
White Pelican			12000	8/20-31					300	
Double-crested Cormorant			2500	8/20-31					450	
Great Blue Heron			300	8/15-31						
Black-crowned Night Heron			300	8/15-31						
American Bittern			100	8/10-31						
American Egret	1	8/7			1	8/10				
II. <u>Shorebirds, Gulls and Terns:</u>										
Killdeer			500	8/10-31						
Spotted Sandpiper			400	"						
Greater Yellowlegs			200	7/25-8/10						
Lesser Yellowlegs			300	"						
Pectoral Sandpiper			150	7/25-8/1						
Baird's Sandpiper			100	"						
Dowitcher			2500	"						
Avocet			50	"						
Marbled Godwit			150	"						
Ring-billed Gull			40000	8/15-31						
Franklin's Gull			400000	"						
Forster's Tern			400	8/1-20						
Common Tern			600	"						
Black Tern			300	"						

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons:</u> Mourning dove White-winged dove		Less abundant than a year ago.			
IV. <u>Predaceous Birds:</u> Golden eagle Duck hawk Horned owl Magpie Raven Crow Red-tailed Hawk Swainson's Hawk Marsh Hawk	Common Uncommon Common - movement into area augmented breeding population in August. Occasional Common				
Reported by				H. S. Buenecke	

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.

3-1750
Form NR-1B
(December 1956)

UNITED STATES
DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

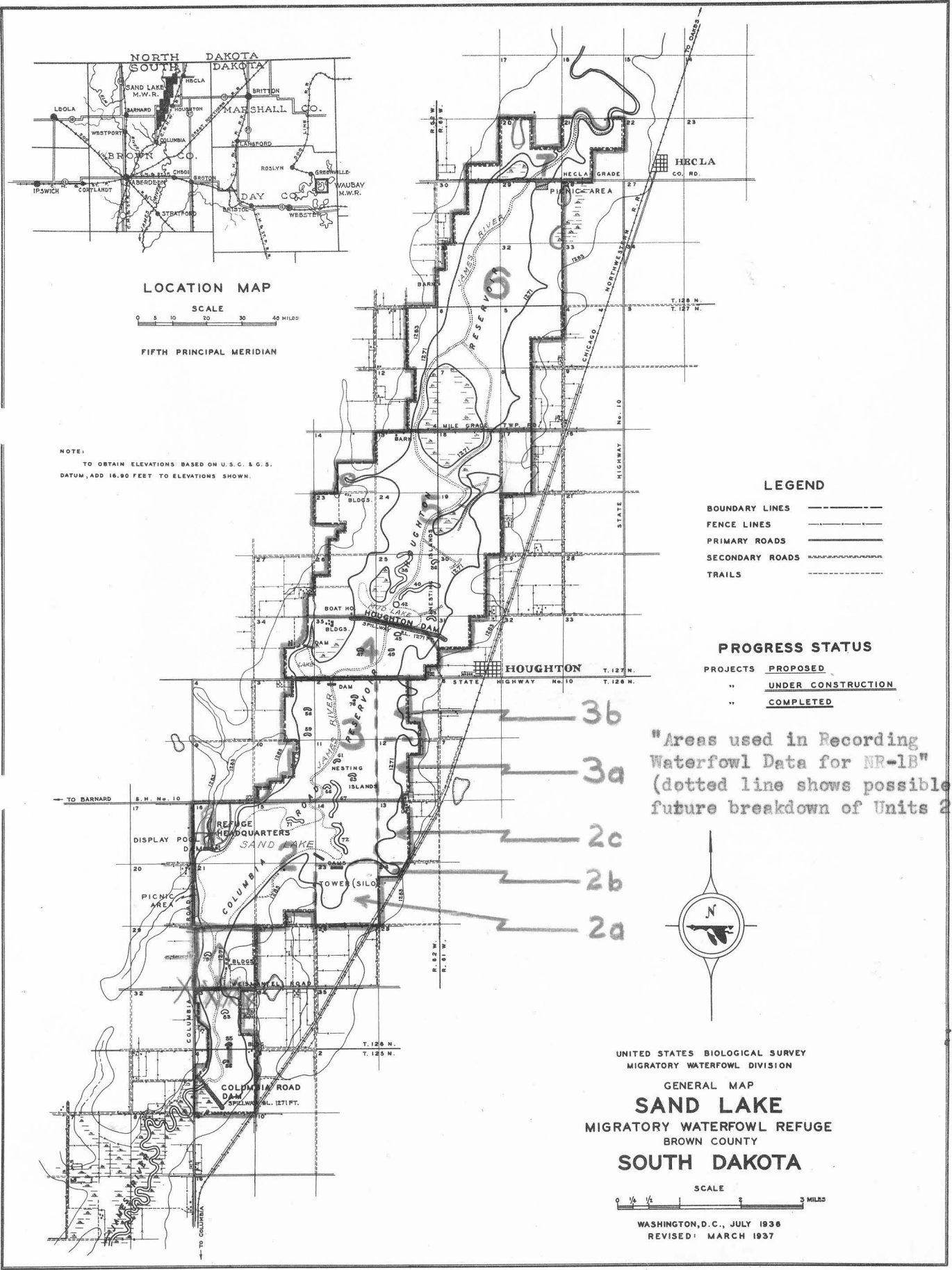
WATERFOWL UTILIZATION OF REFUGE HABITAT

Refuge Sand Lake For 12-month period ending August 31, 1957

Reported by K. D. Norman Title Ass't Refuge Manager

(1)	(2)		(3)	(4)	(5)	
Area or Unit	Habitat			Breeding		
Designation	Type	Acreage	Use-days	Population	Production	
1	Crops	339	Ducks	662,355	327	448
	Upland	229	Geese	569,606	10	5
	Marsh	393	Swans	0	0	0
	Water	643	Coots	110,787	100	160
	Total	1604	Total	1,342,748	437	613
2	Crops	899	Ducks	2,095,035	550	752
	Upland	751	Geese	1,309,383	8	30
	Marsh	183	Swans	5,511	0	0
	Water	1305	Coots	64,404	14	17
	Total	3138	Total	3,474,333	572	799
3	Crops	133	Ducks	414,492	145	197
	Upland	390	Geese	566,151	6	25
	Marsh	398	Swans	0	0	0
	Water	2306	Coots	32,670	66	20
	Total	3227	Total	1,013,313	217	242
4	Crops	77	Ducks	175,257	198	272
	Upland	288	Geese	364,240	14	20
	Marsh	170	Swans	0	0	0
	Water	721	Coots	77,085	86	55
	Total	1256	Total	616,582	298	347
5	Crops	914	Ducks	4,112,290	707	969
	Upland	1294	Geese	3,648,429	4	11
	Marsh	1255	Swans	1,300	0	0
	Water	2543	Coots	45,383	86	10
	Total	6006	Total	7,807,402	797	990
6	Crops	682	Ducks	775,790	350	480
	Upland	2215	Geese	767,821	4	4
	Marsh	1648	Swans	0	0	0
	Water	657	Coots	277,637	92	5
	Total	5202	Total	1,821,248	446	489
7	Crops	0	Ducks	152,685	29	40
	Upland	751	Geese	97,635	4	0
	Marsh	187	Swans	0	0	0
	Water	50	Coots	39,009	60	3
	Total	1081	Total	291,329	93	43

(over)



-44-

Waterfowl Habitat At Sand Lake Refuge (NR-1B)

In order that the waterfowl use-days could be better calculated, Sand Lake was divided into seven units. Since the terrain characteristics, habitat types and management practices are uniform throughout the refuge, the unit boundaries are geographical subdivisions, primarily for the ease of censusing. However, there is a possibility that units two and three will be further subdivided depending on future use. These areas have been indicated within the dashed lines on the accompanying map.

The open water areas at Sand Lake encompass 8225 acres. The major submerged aquatic plants found in the open water are Sago Pondweed (Potamogeton pectinatus) and Clasping-leaved Pondweed (P. Perfoliatus). Some Water Milfoil (Myriophyllum exalbesens) is also present. In the areas where pondweeds are found, the beds cover up to 50 percent of the area. Approximately 40 percent of the area of the open water zone contains submerged aquatic plants. Floating aquatics, the duckweeds (Lemna trisulca and L. minor), are abundant in some areas.

The marsh area, consisting of the shallow-growing emergent vegetation, the wet meadow areas and the clumps of emergents within the open water, contains 4234 acres. The more abundant plants found in this area are Phragmites (Phragmites maximus), Common Cattail (Typha latifolia), Narrow-leaved Cattail (T. glauca), Hardstem Bulrush (Scirpus acutus), Softstem Bulrush (S. validus), River Bulrush (S. fluviatilis), Prairie Cord Grass (Spartina pectinata), Slough Grass (Beckmannia syzigachne), River Grass (Echinochloa festuacea), Foxtail Barley (Hordeum jubatum), and numerous sedges (Carex spp.) and Rushes (Juncus spp.). Beginning at the upland-lowland transition zone, the cordgrass type extends from 60 to 90 feet in width to the Phragmites type which is from 50 to 80 feet wide. The cattail-bulrush type, from 20 to 50 feet wide, extends from the Phragmites type to the open water zone. The density of all vegetation varies from 50 to 75 percent.

The upland area, 5948 acres, is dominated by Kentucky Bluegrass (Poa pratensis) and Smooth Brome (Bromus inermis). Crested Wheatgrass (Agropyron cristatum), Quackgrass (A. repens), Bluestem Wheatgrass (A. smithii), Big Bluestem (Andropogon gerardi) and Canada Wild-Rye (Elymus canadensis) are also quite common.

The upland area contains 1733 acres of pasture land in which bluegrass, smooth brome and quackgrass predominate. The grazing in these pastures is being controlled so that there will be a moderate utilization of approximately 35 to 40 percent of the current year's growth at the close of the grazing season.

The upland area also contains 2240 acres of strictly wildland (non-use by domestic animals) areas. The vegetation in this area parallels that within the pasture lands.

The following table summarizes the breakdown of the habitat types within the unit boundaries:



HABITAT AT SAND LAKE REFUGE

<u>Unit</u>	<u>Crops</u>	<u>Upland</u>	<u>Marsh</u>	<u>Water</u>	<u>Total</u>
1	339	229	393	643	1604
2	899	751	225	1668	3543
3	133	390	356	1943	2822
4	77	288	170	721	1256
5	914	1294	1255	2543	6006
6	682	2215	1648	657	5202
7	0	781	187	50	1018
<u>Total</u>	<u>3044</u>	<u>5948</u>	<u>4234</u>	<u>8225</u>	<u>21451</u>

The following are possible future subdivisions of units 2 and 3. These acreages have been included in the above figures.

<u>Unit</u>	<u>Crops</u>	<u>Upland</u>	<u>Marsh</u>	<u>Water</u>	<u>Total</u>
2	555	363	118	1545	2581
2a	229	216	50	72	567
2b	9	42	15	8	74
2c	106	130	42	43	321
3	63	134	229	1736	2162
3a	70	74	63	119	326
3b	0	182	64	88	334
<u>Total</u>	<u>1032</u>	<u>1141</u>	<u>581</u>	<u>3611</u>	<u>6365</u>

Present value of each unit. (NR-1B)

Unit one is one of the better duck production areas on the refuge. It is used primarily during the spring and fall migrations for feeding and resting.

Unit two is probably second in the overall waterfowl feeding use, but is a less important production area because it contains deeper, more open water.

Unit three provides the nesting habitat for the bulk of the geese produced at Sand Lake. During the summer months, geese occupy this area at all times and it also provides a resting area for the early Honker arrivals.

Unit four is another of the better duck producing areas; however, it receives light use by migrating geese probably because of the nearness of a heavily traveled highway.

Unit five receives heavy use by geese during the migration periods in that it is the first area in which the feed is first utilized and first consumed. Not only is it the best feeding area, but it is also a good duck producing area.

Unit six is considered to be the third most important goose resting and feeding area, especially by snows and blues, but is only a fair production area.

Unit seven receives little use at any time during the year.

We anticipate very little change in the resting and feeding use in these areas in the future; however, production may vary as a result of the controlled grazing program. Several years of observation and study will be required to evaluate the effects of this program.

UPLAND GAME BIRDS

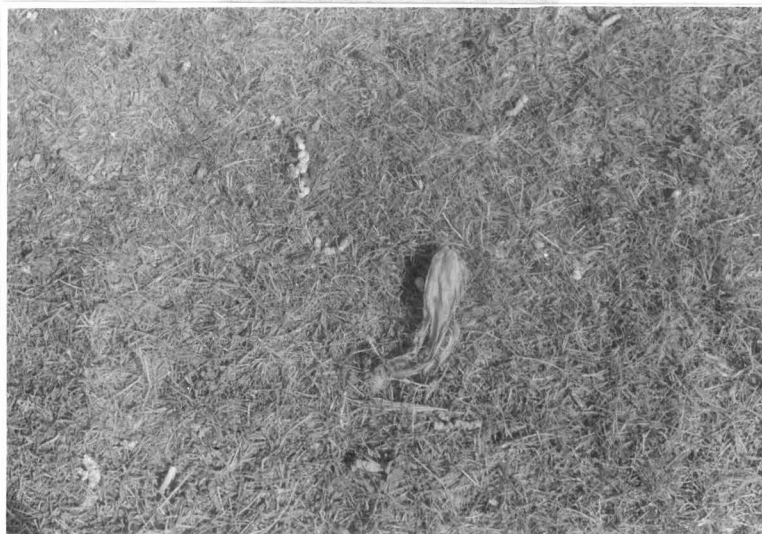
1613

Refuge Sand Lake Months of May to August, 19457

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'd.	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked Pheasant	Marsh fringe, Upland grassland, cropland - 10000									Production and population data not adequate - See text
European Partridge	Upland meadow, fields 4,000									Production and population data not adequate - See text



Overgrazing by cattle? No, just full utilization of a pasture by geese during the spring migration. This portion of a pasture had the appearance of a newly mowed lawn; only the grass growing through the roll of barbed wire in the right center of the picture remained ungrazed.



This shot was taken parallel to the ground so that the abundance of goose droppings could be shown. The object in the center of the photo is a corn husk.



This is one of the two rock islands constructed last winter on the ice, in hopes that the geese who have nested in the general area in past years would select them for their nesting this year. It appears that our hopes were in vain; however, numerous mallards did use them for resting purposes.



SD-SD-781

This photo shows one of the electric cross-fences put into operation this year. The purpose of these cross-fences was to encourage shoreline grazing by the cattle to make openings in the dense vegetation. The cattle were confined to the lowland and wetland sites for two months and then were allowed to graze throughout the entire pasture. If necessary, in order to prevent overgrazing of the upland, the cattle will again be confined to the lower sites this fall.



SO-SOL-782

In early May we replanted four rows of trees in the shelterbelt on Hanson's Point. In the above photo, the men on the planter are getting instructions from Ted Yde of the Brown-Marshall SCS District. Elmer Podoll is on the tractor.



SO-SOL-783

This photo shows the planter in operation. Four rows were planted, containing Harbin Pear, Hardy Crab, Cottonwood, American Elm and Russian Olive. Each tree or shrub was planted approximately five feet apart.



50-50L-784

During last winter, Elmer Podoll constructed a stock rack for our International four-wheel drive pickup which is shown in the above photo. A horse was obtained from a neighboring farmer on a no-rent basis, and has been used for checking potholes and ditches, checking grazing units and counting cattle. The rack tail-gate serves as the loading ramp.

The outfit as shown was also used to check for nests in alfalfa fields after mowing or swathing was completed. The top of the cab, enclosed as it is by part of the rack, made a fairly good observation stand, though somewhat uncomfortable. One man drove the pickup while the other watched for nests, eggs or egg fragments. The observer here is Don Simpson, Wildlife Management Biologist, Trainee.



SO-SOL-785

This spring, prior to our road construction work, Elmer Rodoll constructed a cab for the TD-14, so that the operator would be more comfortable on a hot day. The method of attaching the cab shown above is not the most satisfactory way since the independent movement of the dozer lift arms causes the supporting poles of the cab to break loose from the top.



In July, specialists from the SCS toured the refuge with the refuge personnel to make their recommendations on land-use. In the above photo, Les Albee, Range Specialist (third from the right) gave his recommendations on the stocking rate of this pasture. Others pictured above are Robert Sparton, SCS Aide; LeRoy Shearer, Biologist; Howard Huenecke, Refuge Manager; Walt Parmeter, Agronomist; Don Minehart, District Agent; and Don Simpson, Wildlife Mgt. Biologist Trainee. Robert Moxon, Soils Specialist, was not present when the photo was taken.

SO-SOL-786



SO-SOL-787

In the above photo, Walt Parmeter (second from the left) is discussing the differences in soil fertility and soil structure of the wildland with that of the adjacent cropland. The information received on this tour has since greatly facilitated plant identification and will help in future land-use planning.

Office Memorandum • UNITED STATES GOVERNMENT ^R *on*

TO : Refuge Manager, Sand Lake Refuge
Columbia, South Dakota

DATE: Sept. 24, 1957

FROM : Acting Assistant Regional Director
Minneapolis, Minnesota

SUBJECT: Narrative Report - May to August, 1957

You may be aware that the refuge narrative reports are circulated throughout various branches and the "front office" of the Regional Office. We found your recent report most interesting and informative. It is obvious that the report was carefully prepared, as it is an excellent example of the type of narrative report we like to receive.

F. C. Gillett
F. C. Gillett



cans are included in the group. In the left foreground can be seen several nests, which hold up to five cormorants. Nests are construct-

habits to pelicans. The two birds often nest in the same area and intermingle. (American-News Photo)

A DISNEY FEATURE AT SAND LAKE

Water Birds Call Marshes Home

By **RON LOCKWOOD**

American-News Staff Writer

DAKOTANS who travel to the ends of the nation seeking glimpses of birds such as those seen in Walt Disney features need go no further than Sand Lake refuge.

Currently flocks of pelicans and cormorants are nesting in the game refuge.

Howard Huenecke, refuge manager, K. Duane Norman, assistant manager, and Don Simpson, wildlife biologist, who has worked in Minnesota and Indiana before coming to Sand Lake, pointed out the nesting areas and feeding lots of the birds.

Pelicans are large white birds with black wing tips. They are easily seen gliding over the green, billowy marshes of the refuge. Over 900 pelicans have been nesting on the shallow waters and islands of the refuge since April 15 when they arrived from the South.

CLUMSY ON LAND

Although pelicans are clumsy and queer looking birds when on land, they are expert and graceful birds when airborne. They are in to travel in "V" formations in straight lines. An interesting part of their flight is the way each bird synchronizes its flight with the others.

The White Pelican specie, as it is officially known, breeds from southern Canadian provinces southward to northern South Dakota, northern Wyoming, northern Utah, and in southern California and on the Texas Coast.

In another month and a half, the birds will gather with others which will wing their way to northern Florida, the Gulf Coast, southern California, the Florida Keys and Panama. Six thousand birds will gather at Sand Lake Refuge alone.

The favorite food of the pelican, of course, is fish. I hunted along the control dam behind which are many fish (mostly carp) where pelicans gather to feed. After carefully creeping up on them to watch and take some candid shots, I was chagrined to have them wing their way to other parts of the refuge.

PELICAN ISLAND

The birds are colonial nesters, who prefer isolated islands in shallow water, so Simpson suggested that we go to Pelican Island, north of old Sand Lake. With Norman, we made our way to the island in an aluminum flat-bottom boat powered with an air-thrust motor. Because of shallow water, algae and other marine life growing in the murky water, this type of boat was used. A large double bladed fan drove the boat through the marshes without becoming entwined with the water growth.

Reaching Pelican Island, we found it covered with large birds whose average weight is 15 pounds.

huge wing span, flopped their way farther away from the island. Only young cormorants remained on the island with their parents situated about 100 yards away.

The nearness of the pelicans evidenced the fact that they have an overall length of 60 inches and an average wingspan of nine feet.

Howard Huenecke stated that pelicans feed primarily on rough fish, salamanders, and tadpoles. Contrary to many fishermen's beliefs, they generally are not detrimental to sport fishing. This is

one of the few species of birds that engage in cooperative and coordinated feeding. Locating a school of fish, the pelicans surround them and form a line, driving the fish to shallow water where they scoop them up in their bills. In driving the school of fish, they beat the water with their wings and maintain a surprisingly even line to prevent escape of their prey.

Another interesting fact about the white pelican is its method of feeding the young. The adult

will gorge itself on fish or other aquatic food, then, when it is partially digested, the food is regurgitated into the front end of the pouch and the young birds then thrust their bills and heads into the pouch of the parent and take the food.

PELICAN GIVES UP

Simpson noted a pelican several days ago that was trying to digest a 10-pound carp. After much trial, the bird gave up and the fish and bird separated company.

In contrast color wise, another bird is very prominent at Sand Lake. It is the double crested cormorant. It is a large black bird with a long tail and neck. At close range, two curly black crests can be seen on the head. The overall length of the bird is 32 inches and it has an average weight of five pounds.

When flying, (in long strings or gooselike formation), their outstretched necks are held above the horizontal — this is one way of telling them from geese.

The cormorant breeds in Newfoundland, northern Ontario, central Saskatchewan and the Alaskan peninsula southward to the Bahamas and southern Lower California. Sand Lake presently has 1,200-1,500 of these birds.

Pelicans and cormorants are much the same and consequently can be seen nesting together at Sand Lake.

Huenecke reported that production of young is around 200-400 pelicans and 500-800 cormorants.

NEST IN 2 AREAS

The birds nest at Sand Lake primarily in two areas — on the island just south of State Highway 10, and north of Mud Lake Dike.

On the island south of State 10 there have been as high as 90 pelican nests and 400 cormorant nests in one season.

With both these species, incubation starts as soon as the first egg is laid. Cormorants usually have two eggs and pelicans range from two to three eggs. Because of this, one nest may have two or three young of different ages. You may see three pelicans in nest; the youngest completely new, the oldest starting to feather out.

Switching briefly, Sand Lake officials have noted that you pheasant flocks are becoming more and more prevalent. They are at the age of learning to fly. indications are there will be a pheasant population this year last.



THREE YOUNG CORMORANTS, ABOUT 1½ weeks old, wait expectantly in their reed nest on Pelican Island, in the Sand Lake Game Refuge, for food which their parents are out gathering. A sharp, hooked bill equips the cormorants for tearing up their food, which consists largely of fish, frogs and other aquatic fare. (American-News Photo)