

SAND LAKE NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

JANUARY 1, 1953 TO APRIL 30, 1953

PERSONNEL

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# Sand Lake National Wildlife Refuge

January 1, 1953 to April 30 1953

## 1. GENERAL

### A. Weather Conditions

A summary of weather data for the period January through April for the years 1952 and 1953 is given below in TABLE NO. 1.

TABLE NO. 1. Weather Data, January - April 1952 - 1953

MONTH	SNOWFALL		PRECIPITATION		MAX. TEMP		MIN. TEMP	
	'52	'53	'52	'53	'52	'53	'52	'53
Jan	6.0	5.0	1.05	.36	42	43	-29	-15
Feb	8.0	9.0	.81	.38	38	41	-17	-20
Mar	4.5	T	.45	.70	43	58	-17	-5
Apr	-	-	.29	5.65	86	80	21	6
TOTALS & EXTREMES	19.5	14.0	2.60	7.09	86	80	-29	-20

At the beginning of this period, only a trace of snow was on the ground. On the sixth of January 5 inches of snow fell and the temperature dropped from 2° above zero to -19° below, and the first seige of winter was upon us. On January 15th with temperatures at 14° below zero, strong north winds 35-40 mph began blowing the 5 inches of snow around and we had a "good old South Dakota blizzard" lasting for two days, blocking all roads in the northern area of the state. However, once we were dug out of this blizzard, the temperatures moderated and we had a very mild winter.

Eight inches of snow fell on February 10, but with above normal temperatures the snow had all melted by the end of February.

Two inches of snow fell on the 2nd of March but disappeared within a few days. Once again above normal temperatures prevailed during March. Typical March winds were frequent during the month.

April rainfall set a new record at this station with 5.65 inches of rain falling during the month. Over one inch of rain fell the first week in April making conditions ideal for the farmers to plant their small grains. The last week in April 4.55 inches of rain fell making a total of 5.65 for the month. The rains slowed up seeding operations but most farmers agree that these rains were what was needed as most of the sub-soil moisture was gone following the drowth of last summer and fall.



## B. Water Conditions

The Columbia dam remained at below the authorized spillway level of 1271.00 throughout January and February until the middle of March when it began to rise. On March 17 the main channel was clear of ice and on April 2nd all ice was gone from the lake.

Two additional stop-logs were placed in the Columbia dam to hold back as much water as possible and once again fill the lake to capacity. On April 1 the authorized spillway level was reached and the lake is still rising slowly. At the end of the period there was a slight flow over the spillway.

We do not anticipate the lake getting much higher as we had very little run-off in this vicinity and farther north along the James River Valley, no great amounts of snow were reported during the winter. As things look at the present we are having a normal spring run-off.

## II WILDLIFE

### A. Migratory Birds

#### 1. Population and Behavior

a. Swans. There have been more whistling swans on the refuge this year than there have been since 1942. The first migrants were seen on April 1, and a peak population of 114 was present on April 17. The last of the swans were seen on April 29. The population at the beginning of April was made up almost wholly of paired birds. After mid-April, the swans were seen in flocks of 10 to 20 birds. Many of these later birds appeared to be grayer immatures. It can probably be assumed that these later-arriving swans were non-breeders.

b. Geese. Twenty common Canada geese were seen on the refuge on January 1, but were not seen again during the winter months.

The first 12 migrating common Canadas entered the refuge on March 11, flew low over the Service building, and announced the arrival of spring to the busy occupants. This was almost three weeks earlier than last year, and about one week earlier than the average. Their numbers did not increase until the 19th. There were 1200 present on that date. The lake was still frozen over, except for an area at the foot of the Mud Lake spillway, and small strips along the marsh edge.

Snow and blue geese arrived on March 19. The first migrants were seen flying into the refuge just past noon. This was only a few hours after Game Management personnel had flown the refuge and reported no snow-blues in the area. Small flocks of 60-200



c. Fires.

One fire occurred during the period, on April 19. A neighboring farmer was allowed to burn debris on April 16 on refuge hayland, which operates under permit. Apparently this fire was not fully extinguished, and burned underground in peaty debris for the next three days. Then it burst out into the open. Fanned by 35 to 40 mile - an - hour winds, it leaped a 15 foot, water-filled ditch and burned rapidly southward. It was reported shortly after it had begun, and within minutes refuge personnel and tank fire trucks from Hecla and Columbia were on the scene. Although the blaze was being pushed by very strong winds through dense cattail and reeds, the two fire trucks were able to start at the head end of the fire and work upwind, and shortly had it extinguished. Marsh and hayland totaling 120 acres on the refuge, and about 46 acres off the refuge were burned, but neither the soil nor the new vegetation just appearing suffered any ill effects because the ground was very wet. Damage was limited to a few fence posts along the boundary. One pheasant nest was found destroyed, but it later was flooded out anyway by heavy rains. The permittee accepted all responsibility for the blaze, and therefore no financial loss was sustained by the Service.

The spectacle provided entertainment for many people from the surrounding area, who were just returning home from church. Just one more recreational service that the refuge provides for the community!

geese continued to appear throughout the afternoon, and by nightfall it was estimated that there were 2,000 present on the refuge.

Richardson's and white-fronted geese were first noted the following day, March 20.

Goose numbers continued to increase daily, until a peak refuge population of 190,000 geese was recorded on April 6. In addition to these, 41,000 geese were seen along the Crow Creek drainage and at the Putney Slough area to the east. No doubt there were many more geese scattered throughout the area that were not observed during this aerial count. Most of these geese, of course, were snows and blues. Three days later, on April 9, an aerial census revealed that there were only 83,000 geese remaining in this vicinity.

There followed a more or less gradual decline, and at the end of the period, there were approximately 8,000 geese on the refuge, and a small number in surrounding areas. Most of these remaining geese were snow-blues, although there were a few Richardson's. It is believed that many of these hangers-on were immature non-breeders. Most of the common Canadas that were still present were a part of the refuge breeding population. Figure 1 and Table II summarize spring goose populations.

When casting a backward glance at the goose data at our disposal, it appears that the actual peak occurred on about April 1 or 2 in this vicinity. The time that peak numbers occur on the refuge is not necessarily the same at that of the vicinity as a whole because there is a constant shifting of geese between Sand Lake and other water areas nearby. Game Management personnel estimate that there were 350,000 or more geese in the area during the first week in April, an increase of approximately 15% over last year.

Because it is not possible to pick individual species out of a concentration of 50 to 100 thousand milling geese, the population figures for each species was calculated from a percentage composition sample. Peak population estimates for individual species are found in Table II. These numbers and the total peak figure are under 1952 populations. However, a comparison of use-days by geese shows a 43 percent increase (see Table III). The reason for this can be found, at least in part, in a comparison of the weather over the two springs. In 1952, the birds were arrested south of Sand Lake by a late March snowstorm, and then swarmed in in April. This spring the migration was distributed over a longer period of time. Although there was less water in the vicinity outside of the refuge this year, no increase in refuge use could be attributed to this factor. There are many complicating factors involved.



It is much easier to keep track of goose populations in the fall when they are fewer in number, and they are either on the refuge - or dead. Richardson's and white-fronted geese were usually seen associated with snow-blues while loafing and feeding on corn. Common Canada geese stayed more to themselves in smaller flocks and family groups, and fed in stubble-fields.

c. Ducks. At the beginning of the period there were approximately 6500 mallards and a few black ducks and pintails on the refuge. They used an open water area along the James River channel extending south from the Mud Lake spillway for about one quarter of a mile, and two artesian well ponds. Many of these birds left during the next two weeks, and when the mid-winter waterfowl inventory was taken, 2,000 mallards remained. By mid-February the open water below Mud Lake had been reduced to about one acre, and 800 mallards were still there. These ducks stayed on throughout the remainder of the winter. In the evenings they moved out to feed in outlying cornfields, and were sometimes reported as far away as 25 miles.

Migrating mallards began to appear during the second week in March and approximately 2,000 were present on March 12. An occasional pintail had been seen during the winter, but it was not until March 15 that the first migrants appeared, and a definite pintail movement was noted on March 18.

During the next week, the first lesser scaup, canvasback, redhead, and green-winged teal were seen, and had become abundant by the end of March. The gadwall and baldpate vanguard arrived at the beginning of April. On April 6, the peak pintail, can, scaup, and redhead populations were reached, and the first two blue-winged teal were seen.

A major movement of gadwalls and baldpates into the refuge was noted on April 14, and on April 17 the peak duck population of 19,300 occurred. Pintails still predominated making up 54 percent of the total, with mallards next making up 33 percent of the figure.

A noticeable exodus occurred shortly after April 20, and only 5,200 ducks remained on April 27. Thirty-nine percent of these ducks were blue-winged teal, and scaup were next in abundance. Ruddys were by this time seen frequently. A summary of spring duck populations appears in Table IV and in Figure 2.

Peak populations for each species were in all cases considerably under previous year's, and the total peak duck number was less than 20 percent of last year's. However, the total duck-use figure was almost 50 percent of the 1952 figure. The period of migration was longer, and continual changes in



species composition samples indicated that there was more or less continual movement through the area.

Almost all of the ducks fed exclusively within the refuge, along flooded portions of the shoreline. It was common to see redheads, cans, and scaup feeding with the dabblers in these areas.

It was interesting to note that all of the shovellers seen were paired, from the first observations to the last, with one possible exception. One male was seen more or less by himself, but never was over 100 feet from a certain pair, and appeared attached to it. Possibly this was a case of polyandry, which, according to the literature is common in this species.

Just for the record, we might add that buffleheads were seen occasionally from March 15 until the end of the period, a few American goldeneyes were seen until mid-April, and one cinamon teal was noted on April 27.

d. Water and Marsh Birds. Pied-billed grebes, the first of the grebes to appear, were noted on April 8. Horned grebes and the regal western grebe arrived on April 27, and their numbers were still increasing at the close of the period. A single Holboell's grebe was seen May 5 at the Weismantel grade.

A flock of 25 white pelicans showed up on March 29. At this time S nd Lake was still frozen over, except for some deep open water below Mud Lake and along the marsh edge. There was no increase in population until the middle of April. About 100 were present on the refuge at the end of the period.

The first double-crested cormorants arrived on April 12. The aerial count on April 27 revealed that 300 birds were on the refuge. About 200 of these were seen on the nesting island north of the Mud Lake dike.

Great blue herons were first seen on April 17. Black crowned night herons and American bitterns arrived on April 27, and all of these species were common at the end of the period.

e. Shorebirds, gulls, and terns. One killdeer was seen on March 21, but did not become abundant until the second week in April. Two Wilson's snipe were seen on March 22, but none were seen again until mid-April. Very few of this species have been seen, and apparently are not abundant locally. Mr. Podoll, who has lived on the refuge since boyhood, states that after the market-hunting era they never were common in the area. One greater yellowlegs was seen on March 26, but no more were observed until the end of April. Pectoral sandpipers, avocets, lesser yellowlegs, Bairds sandpipers and both the Hudsonian and



Figure 1  
SPRING GOOSE POPULATIONS  
Sand Lake Refuge

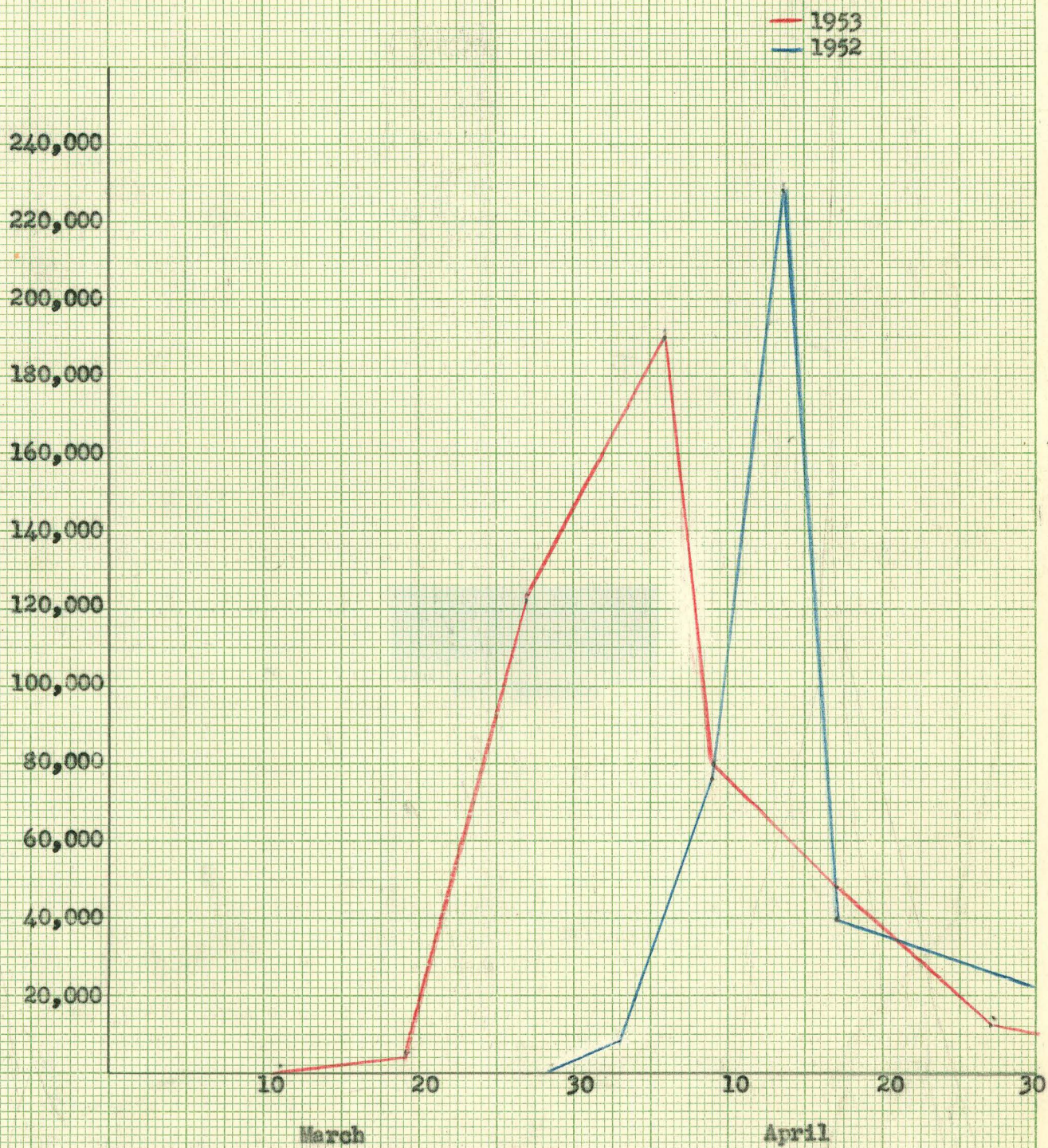




TABLE NO. II

## 1953 SPRING GOOSE POPULATIONS - SAND LAKE REFUGE

SPECIES	3/19	3/27	4/6	4/9	4/17	4/27
Common Canada	1200	3,000	4,200	1,000	600	200
Richardson's		12,000	22,900	8,000	4,800	1,200
White-fronted		1,100	1,900	600	400	100
Blue	1400	74,300	112,700	49,300	29,500	7,300
Snow	600	31,900	48,300	21,100	12,700	3,200
TOTAL GEESE	3200	122,300	190,000	80,000	48,000	12,000



TABLE NO. III

COMPARISON OF USE - DAYS BY WATERFOWL 1952-53  
SAND LAKE REFUGE

COMMON CANADA : RICHARDSON'S : WHITE-FRONTED : BLUE-SNOW : TOTAL GOOSE USE : TOTAL DUCK USE											
1953 :	68,200	:	343,200	:	31,400	:	2,818,000	:	3,260,800	:	491,600
1952 :	56,060	:	237,900	:	25,800	:	1,512,300	:	1,832,000	:	1,048,729
INCREASE:	12,140	:	105,300	:	5,600	:	1,305,700	:	1,428,800	:	- 557,129
% INCREASE:	18	:	31	:	18	:	46	:	43	:	- 53



Figure 2  
SPRING DUCK POPULATIONS  
Sand Lake Refuge

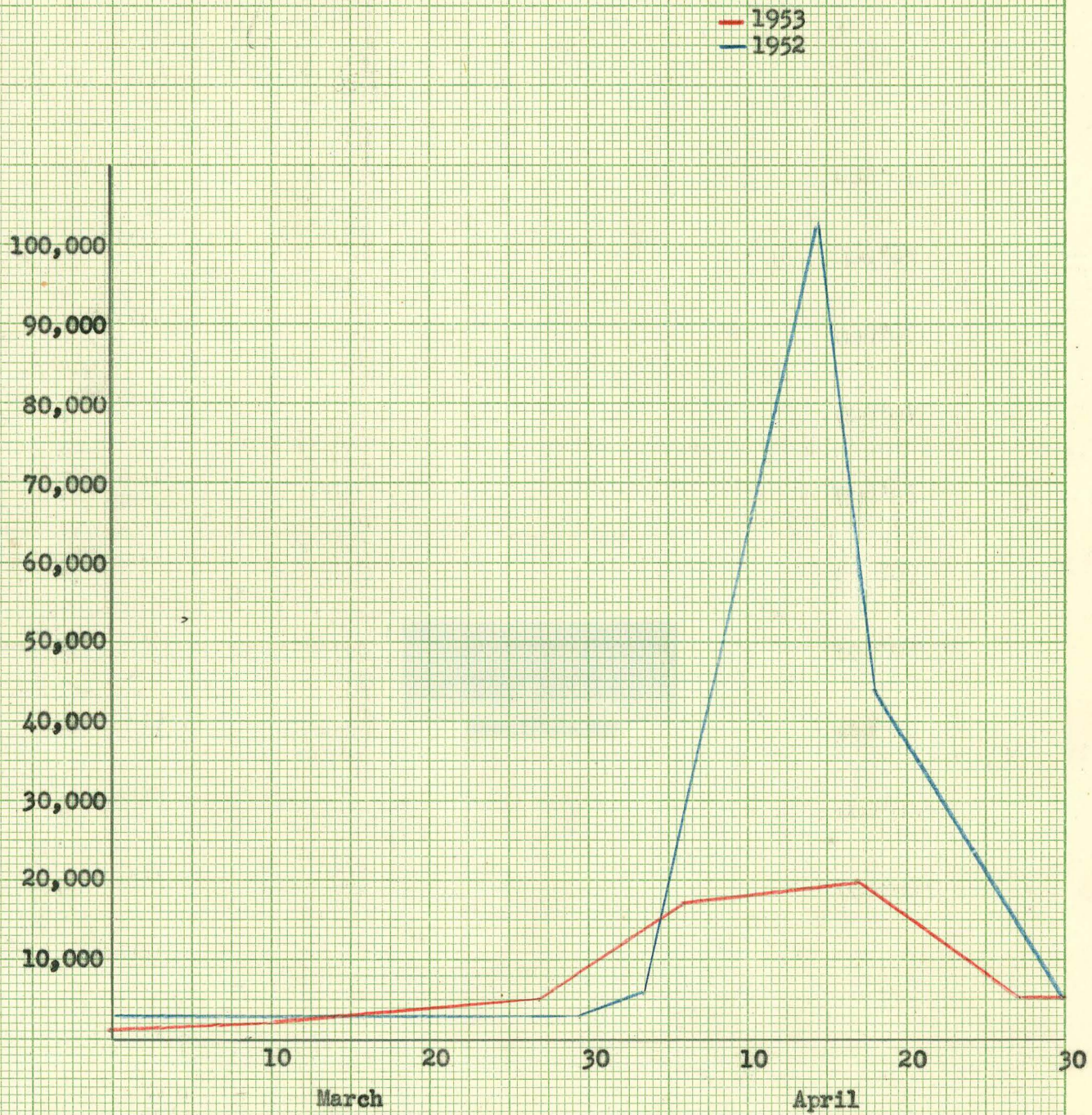




TABLE NO. IV  
SPRING DUCK POPULATIONS 1953

	MARCH 27	APRIL 6	APRIL 17	APRIL 27
Mallard	2,000	3,000	5,900	525
Gadwall		650	725	425
Baldpate		450	725	85
Pintail	2,900	10,000	9,700	465
GW Teal	2	160	180	100
BW Teal		2	350	1,925
Shoveller	4	20	20	40
Redhead	10	650	500	50
Ringnecked			R	P
Canvasback	40	1,000	450	100
Scaup	100	1,500	700	1,175
Goldeneye	10			
Bufflehead	4			2
Ruddy				150
TOTAL ALL DUCKS	5,070	17,432	19,250	5,192
Coot				150

marbled godwits arrived during the last 10 days in April. Many of the other shorebirds should arrive during the first part of May.

Herring and ringbilled gull first arrivals were seen on March 17, and became a prominent feature of the marsh during the last week in March. They could be seen feeding extensively on winter-killed fish along the ice-edge, and perched out on the ice eating imbedded fish exposed after the top ice surface had melted. An occasional Franklin's gull was observed during the last week in March, but it was not until April 22, when a movement of this species was noted, did they become abundant. Common terns have been noticed occasionally.

f. Mourning doves. Mourning doves were first seen on March 30, and they had become abundant by mid-April. One nest with the female incubating 2 eggs was noticed on April 30.

2. Food and Cover. Wintering ducks had no difficulty in obtaining food throughout the period. Corn in fields in the refuge and in the vicinity was readily available because snow cover was practically non-existent throughout the winter.

When migrant waterfowl arrived, much of the refuge corn had been used up by deer and pheasants in areas where they concentrated. In other sections of the refuge, there was still an abundance of this food. Geese browse was adequate from the beginning of the migration period, and millet and barley that had been mowed the previous fall, and left by fall waterfowl, provided additional food.

Approximately 250 bushels of corn remained after the waterfowl had left, and this was picked by refuge personnel and stored in the corn-crib.

There was a heavy winter-kill of carp in Sand Lake this winter, and aquatic vegetation should benefit by the decrease in carp.

The outlook for cultivated waterfowl foods is good this spring. Near record rains during April soaked into the ground, and replenished the supply of soil moisture.

3. Diseases. None noted.

B. Upland Game

1. Population and Behavior

a. Ring-necked pheasant. An aerial count of the refuge pheasant population had been planned, but it could not be carried out because of the lack of snow cover which made the birds difficult to see. A refuge population of 6,000 pheasants was estimated on the



basis of counts of birds in the various concentrations, and consideration of other factors. This is but 75 percent of the 1952 aerial count. Possibly pheasants that move into the refuge during years of heavy snow did not do so this year because of the mild weather. However, the State Game Technician in this area states that pheasant numbers were under those of previous years this past fall and winter throughout the county. No winter blizzard mortality occurred on the refuge, and it was considered negligible by the State Game Technician in off-refuge areas. There were no severe storms, and food was available all winter long. Some pheasants were killed by cars and trucks along roads adjacent to the refuge, but these kills were only a fraction of those of former years of heavy snow. A few of these dead birds were examined, and found to be in excellent physical condition. There has been some question as to whether or not the refuge pheasant population is an un-shot, un-harvested one. Sex ratios during the winter of 1951-52 seemed to indicate this. There were 71 males / 100 females on the refuge compared with 55 / 100 or adjoining lands at that time. This winter though, there were 46 males / 100 females on the refuge. This compares favorably with the ratio of 42 / 100 obtained by South Dakota State personnel for other areas in Brown county. Pheasant trapping and banding was not successful this winter and added nothing to the clarification of pheasant management questions.

b. Hungarian partridge. Flocks of "huns" were seen on numerous occasions until mid February, but were seldom seen thereafter. One pair has been seen at the refuge entrance gate occasionally this spring. Their numbers seem to be fluctuating neither upwards nor downwards.

c. Pinnated grouse. Small flocks of 2 to 4 pinnated grouse were occasionally seen during the winter. In the past it was believed that they moved into the refuge to take advantage of the abundant cover, but may not have done so this year because of mild weather. One of our permittees states that he saw a flock of 40 "chickens" fly into the refuge on February 23, but when questioned closely about their identity, he was not certain whether they had been prairie chickens or sharptails. A prairie chicken booming ground was located just east of the refuge north of Houghton until the middle 40s, but nothing has been heard from that area for a number of years. The Narrative Report of 1940 mentions the fact that "drumming males could be heard almost daily" during April.

2. Food and Cover. Foods were more than adequate. Fall waterfowl populations were less than anticipated, and so there was a plentiful supply of corn and small grains left for upland game this winter. The weather was unusually mild permitting birds to range throughout the refuge and utilize all food sources. Snow cover was non-existent for almost all of the period, and all remaining cultivated crops and weed seeds were available. All of the corn was used up in certain areas by March, and had there been severe weather, some mortality probably would have occurred.

Cover also was plentiful all winter long. Phragmites along the marsh edge was preferred by pheasants, and weed patches and shelterbelts formed supplementary cover.



3. Diseases. None noted.

C. Big Game Animals.

1. Population and Behavior.

The refuge white-tailed deer population is estimated to be 200 animals. On February 17 an aerial census was made, and 174 deer were counted. Snow cover was light, and the deer were bedded down in phragmites and difficult to locate; thus 200 deer seems to be a reasonable population figure. This is slightly under the fall estimate of 225, but the animals are possibly more widely dispersed locally due to the open winter. The present figure probably represents the actual refuge population unaffected by deer that may move in during more severe winters. The deer were found in small concentrations scattered throughout the refuge.

On the basis of this count, it is believed that there will be more than 300 animals on the refuge this fall. Past experience indicates this is a higher population than can be sustained without crop damage and over-browsing of shelterbelts, and a removal of some of these animals will be necessary.

2. Food and Cover. Corn formed the staple winter food, and a plentiful supply remained after fall waterfowl had left. There was only a small amount of browsing on shelterbelts. No doubt the extent of shelterbelt browsing depends much on the availability of corn as well as total numbers present.

Phragmites formed the preferred cover, particularly in the northern half of the refuge. Refuge shelterbelts, of course were also used extensively.

3. Disease. None noted.

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

1. Fur Animals.

a. The refuge muskrat population has hit an all-time low. Very few muskrat houses were observed last fall, and bank dens were made uninhabitable by extremely low water levels. Apparently many of these rats moved out of the refuge area down the James River channel. No muskrats have been seen at all this spring by any of the refuge personnel. Neither have any dead muskrats washed up on shore. The number of muskrats has declined almost continuously since the early 1940's, and although various theories have been advanced as to the reason, it is difficult to ascribe the demise of this species to definite factors. The deposition of silt in the upper marsh units had reached a substantial proportion; There is between four and five feet of silt in many places in the marsh as a result of the record floods of 1950 and 1952. It is inevitable that silting in both the Sand Lake and Mud Lake units will hasten the aging and subsequent deterioration of marsh habitat.



b. Mink are abundant, and 36 were removed during the past fall and winter trapping season. They have been seen quite often during the period. One mink was seen fishing along the edge of the ice at the Mud Lake dike. A freshly killed, partly eaten 7 pound carp was found hauled up on the ice 10 feet from the water's edge, evidently caught by a mink.

c. Sixty two striped-skunks and 97 raccoon were taken during the trapping season, but more than ample breeding stock remains. Raccoon were active throughout much of the winter. One spotted skunk was seen during the period.

d. Badgers are abundant enough to be a nuisance although they no doubt do considerable good by helping to keep the ground squirrel population in check.

e. Red fox were seen only occasionally during the winter. Two red foxes were seen on the refuge during the aerial deer count. Airplane fox hunters had very little success in this vicinity. The lack of snow cover is probably partly responsible, although it is believed that the numbers of this species are under previous years.

2. Predators. Mink, fox and raccoon fed on some of the weaker ducks early in January, although it is believed they had very little net effect on the population.

3. Rodents and other Animals. Rats and mice in buildings were successfully controlled with warfarin.

White-tailed jack rabbits and cottontails were abundant, although no excessive browsing on shelterbelt shrubs was noted.

#### E. Predaceous Birds.

Snowy Owls were seen occasionally. It is believed that there were only tow on the refuge this winter. This species was last seen on March 3.

Great-horned owls were seen and heard quite frequently.

Two golden eagles were present on the refuge until the middle of January. They were in the Silo Bay area, and no doubt fed on lead poisoned ducks that were using a small open water area until the second week in January, when it froze up. One golden eagle was seen migfating through the refuge during mid-March.

Two or three rough-legged hawks were present during the winter. One prairie falcon was seen occasionally during January and February.

Marsh hawks, both males and females, were seen throughout the period.

Red-tailed hawks and pigeon hawks appeared at the beginning of April.

#### E. Fish.



A quite heavy kill of fish was evident in Sand Lake when the ice disappeared. The fish washed up onto the west shore, and a sample of 751 was counted. The frequency of occurrence of the five species found is as follows:

<u>SPECIES</u>	<u>% OF SAMPLE</u>
Carp - <u>Cyprinus carpio</u>	69
Northern black bullhead - <u>Ameiurus melas</u>	20
Yellow perch - <u>Perca flavescens</u>	6
White sucker - <u>Catostomus sp</u>	2
Northern pike - <u>Esox lucius</u>	3
	<u>100</u>

Many of the carp weighed more than 10 pounds; and a few weighed 15 pounds or over, but most of them weighed less than 5 pounds. The bullheads were almost all about 8 inches long, and all perch were 6 inches in length or less. The northern pike found were 20 to 24 inches long.

It has been obvious of late that all of the carp, were not exterminated, and no doubt a certain number of the other species also survived in the deeper water within parts of the James River channel. The reduction in carp should benefit the growth of aquatic vegetation, for a short time at least.

An interesting sight occurred below the Columbia dam at the end of April. Carp in the James River below the spillway were seen leaping up the thin sheet of water flowing over the stoplogs, some times jumping out of the water two and one-half feet. None were seen to make it to the top, although if the flow had been greater, some no doubt would have been able to get "footing" enough to enter Sand Lake. At any rate, this source of carp infestation was blocked this spring.

#### C. Fur Harvest.

One trapping permit was issued to Clare H. Johnson of Columbia for the removal of surplus fur-bearers. The following table summarized fall and winter trapping activities:

<u>SPECIES REMOVED</u>	<u>TRAPPERS AV. PRICE/PELT</u>	<u>REFUGE SHARE AV. PRICE/PELT</u>
Mink - 36	\$20.00	\$15.63*
Skunk - 62	1.00	--
Weasel - 5	2.00	--
Raccoon - 97	2.75	--
Badger - 10	--	--
Muskrat - 5	--	*

\* Average of nine pelts. Price for additional pelts not received yet.



The top price that our trapper received for mink was \$28.50, and a few 'coons sold for as high as \$5.00. At any rate, more than \$600.00 was added to the community income as a result of the removal program.

Most of the animals were taken by the first week in January, because many of the marsh areas became inaccessible after that time.

### III Refuge Development and Maintenance

#### A. Physical Development.

1. Complete overhauls were performed on Jeep pickup, I-19216, Continental engine, and the Well pump.
2. 5,000 mile check-ups were made on Jeep pickup and 1948 International, I-19217.
3. A new ceiling of sheetrock (fireproof) was put in the shop and welding room.
4. The air compressor was moved from the welding room to the upstairs, directly overhead.
5. A new steel frame welding table was built by Mr. Podoll.
6. Two boats were completely scraped, cracks and holes filled with boat glue and painted.
7. Basement walls in Weismantel duplex were sloughing as a result of dirty aggregate used by original builder (private). They were stripped, metal lath installed and plastered with cement and sand. The basement is 28' x 34' by 8 1/2' high.
8. A well pit was dug into the south wall of the basement at Site #2 and an electric pump and pressure tank installed.
9. Picnic tables at the Columbia recreation area were rebuilt and the area cleaned up.
10. A new 1953 Chevrolet pickup was received to replace the 1946 International which was sold on bids.
11. A foundation and new floor was poured in the garage at Site #2. This garage was one of the buildings moved from Towaukon Refuge last fall.
12. The walls in the office were painted.

#### B. Plantings.

##### 1. Aquatic and Marsh Plants.

None this period.



2. Trees and Shrubs.

None this period.

3. Cultivated Crops.

Farming was well underway at the close of the period. Although rains during April slowed down operation, the farmers were glad to have the much needed moisture.

IV ECONOMIC USE OF REFUGE

A. Grazing.

None this period.

B. Haying.

None this period.

C. Other Uses.

A permit for an additional 150 bee hives was issued to Nail Johnson of Hecla, South Dakota, making a total of 300 bee hives on the refuge. One colony in the north end of the refuge and the other in the south (Silo Bay area.)

V FIELD INVESTIGATIONS

A. Skunks.

In the narrative report for May - August, 1951 a summary of predatory animals trapped during the period 1936-1950 showed that the skunk had received the most attention. A total of 1,208 were trapped. A review of the literature indicated winter trapping is probably selective to males. Because skunks are believed to be polygamous, winter trapping would then have no effect on the population.

To test this theory, a record was kept on 62 skunks trapped last winter; 28 were females!

We include this mainly for the sake of the record, for last winter being a mild one, probably accounts for more females being taken.

B. Experimental Fox Control - Pivalyl.

On January 19, one pivalyl station was established on the refuge to try to determine its effectiveness in controlling fox populations. Two quarters of horse meat were injected with the chemical, and staked securely to the ground in a stubble field close to the marsh edge by Predator and Rodent control personnel.



The station was checked periodically throughout the winter by refuge personnel, but very little activity was noted around the treated baits until early in March. At that time warm weather had thawed out the meat completely. Fox sign was found about the poisoned meat, and it is possible that raccoon and badger fed on it some, but no definite sign of these two species was found.

When the poisoned meat was taken up on March 27, it weighed only 23 pounds, and almost all that was left was bone. Thus 50 to 75 pounds of meat had been eaten. However, there was no evidence found that the Pivalyl had caused the death of any animal.

It is possible, though, that some animal was killed, and the carcass not found.

Pivalyl works much the same as Warfarin, and it would be necessary for an individual to feed on the poisoned meat for a period of time. It is reasonably safe to use in the vicinity of dogs and cats if their owners are informed of the symptoms of poisoning, such as bleeding at the rectum, and a generally unhealthy condition. Its effect can be counteracted by injections of vitamin K.

## VI PUBLIC RELATIONS

### A. Recreational Uses.

Very little ice fishing was done at the Hecla Recreation Area this period. Those who did try their luck had very little success.

With the arrival of the migrant waterfowl, amateur photographers, school groups, ornithologists and sportsmen groups from throughout the midwest visited Sand Lake to observe the spectacular goose flight.

### B. Refuge Visitors.

<u>NAME</u>	<u>TITLE OR AFFILIATION</u>	<u>DATE</u>
J. Donald Smith	Pilot-Biologist, Mpls, Minn.	1-15/1-16/53
Noble Buell	Pred. & Rodent Control, Mitchell, SD	1-19-53
Mike Fretz	" " " Oakes, N.D.	1-19-53
F. M. Bramble	Pres. Watertown, S. D. Park Board	1-27-53
Ed. Littner	Caretaker " " "	1-27-53
Nelius B. Nelson	Ref. Mgr., Arrowwood Refuge	1-27-53
John Connors	Ref. Mgr., Ft. Niobrara Refuge	2-26-53
Louis Smith	S. Dak. Game Warden	3-26-53
Bob & Geo. Cleff	Aberdeen, S. D. Photographers	3-29-53
Mr. & Mrs. Hillhouse and party.	Mpls. Minn (Observe birds)	4-6-53
Loren Boyde	U. S. GMA Winona, Minnesota	4-6-53
Mr. & Mrs. Wm. Luwe	Mankato Minn. (Observe birds)	4-6-53
Bob Hanlon & senior class	Mankato High School	4-6-53
Mr. & Mrs Forrest Lee	St. Paul, Minn. Photograph birds	4-9-53



<u>NAME</u>	<u>TITLE OR AFFILIATION</u>	<u>DATE</u>
Ross Hanson	U. S. GMA, Rochester, Minn.	4-9-53
Roe Meyer	U. S. GMA, South Dakota	4-9-53
Clair T. Rollings	Ass't. Reg. Refuge Supervisor	4-9/4-10-53
Dwain W. Warner & Class	University of Minnesota	4-19-53
Helen & Boyd Lein	Minneapolis Bird Club	4-19-53
Alva Morrison	Boston, Mass. Photograph Geese	4-17-18-19-53
Clarence B. Randall	Pres. Inland Steel, Chicago, Ill.	4-19-53
Mr. & Mrs. V. Schurr	St. Paul, Minnesota	2-25-53
L. C. Richardson	S. Dak. State Warden	Frequent
Erling Podoll	S. Dak. Game & Fish Technician	"
Everett Sutton	U. S. GMA, South Dakota	"
Jerome Stoudt	Flyway Biologist	"

An additional 500 or more visitors were at the refuge during the spring waterfowl migration period to observe the goose flight.

#### C. Refuge Participation.

The following meetings were attended by refuge personnel during the period.

Brookside School (Rural teachers) Aberdeen, S. Dak:	Film "Behind the Flyways" by Dill
Kiwanis Club, Aberdeen, S. Dak. :	Slides and talk by Dill
Lakeview School	: Slides and talk by Dill
Columbia American Legion Club	: Film "Gunning the Flyways" by Dill
Leola American Legion	: Dill gave talk and showed slides
Mens Club - Aberdeen, S. Dak.	: Sutherland gave talk and showed slides
Rural Teachers at N.S.T.C.	: Talk and slides by Dill
Columbia, High School	: Mud Lake Refuge movie and talk by Dill

#### D. Hunting.

None this period

#### E. Fishing.

Some ice fishing at the Hecla recreation area with very poor luck.

#### F. Violations.

None this period.



## VII OTHER ITEMS

### A. Items of Interest. VIP'S

1. Alva C. Morrison, an Investment Banker from Boston, Mass. heard of the goose flight through Sand Lake and flew to South Dakota to see it. He rented a car to get around and photograph the geese. He had more photographic equipment with him than many photo shops carry. Also Clarence B. Randall, President of Inland Steel, spent a weekend here photographing geese. This was the second year he has visited Sand Lake.

2. A number of female raccoon reproductive tracts were collected, with the aid of the share trappers, and sent to Dr. Llwellyn at the Patuxent Research Refuge to assist him in his study of raccoon reproduction.

3. Through the courtesy of Bob Perry, Fire Chief at Frederick, S. Dak., the refuge staff was invited to attend a meeting of the Brown County Fire Protective Association April 16. At this meeting we were voted into the organization on the strength of our intention to buy a small pump and tank plus the half dozen back-pumps and hand tools we now have. No obligation was involved except that of the usual verbal reciprocal agreement in case of a fire in the neighborhood.

This was an exceptionally fortuitous event, for on April 19 we had the first fire on the refuge in years, and, sure enough, two well equipped pumpers showed up from Columbia and Hecla. They proceeded to put out a relatively small fire that would have been mean to handle had we tackled it alone.

### 4. Easement Refuges, District No. 5.

Dakota Lake was visited several times in April. Water was barely flowing over the dam on April 6 and April 17; by April 27 it had stopped. The area is covered with Sand Lake when aerial surveys are made. Because it lies only 2 miles north of Sand Lake, separate records for waterfowl are not maintained.

Cloud's Lake and Lake Tewaukon were visited May 2, 6 and 9. Particular attention was given to the repairs made to the outlet dam in Lake Tewaukon which had been accomplished last fall. These were found to be O. K. but approximately 4 inches settling was observed in the rip-rap apron on the up stream side. Tapping revealed some hollow spots that, as yet, haven't washed out.

Water in the lake was estimated to be eight inches below spillway on May 2; there is no gage.

Good use was made of food left in the fields, particularly by geese. About 12,000 geese of all species (blues, snows, Canadas) were reported on the refuge in April by residents of the area.



The usual small breeding population of ducks is present minus the large numbers of pintails that stopped last year when there were numerous shallow puddles as a result of run-off. Of particular interest was an observation made May 6 on Cloud's Lake: Three species of grebes were found together along the east shore - pied-billed, horned and eared! There were three pairs.

Ten male pheasants were observed on territory May 6 from Olaf Lee's farm to the outlet dam.

Lake Elsie was visited May 6 and we were informed by locals that the lake was to be re-opened for fishing May 16. It was closed last year. Very few birds were present on the lake which seemed to be slightly below average May water levels. The gravel-washing plant was in operation on the west side and there is every indication that this area received extremely heavy public use - especially for boating, swimming and fishing. The recognition sign needs painting.

Storm Lake was visited May 7. This is a much more productive area than the foregoing Lake Elsie. i. e. from the standpoint of waterfowl. However, it is situated virtually in "the lap" of the town of Milnor. It was very depressing to note that the city dump - (on the refuge, of course) ground afforded the only good nesting cover for pheasants. Here a trash fire was burning that had escaped and threatened to burn out the adjoining marsh. The fire was brought under control by backfiring along the road.

Fifty blue-wings were seen, most of which were paired but not on territory. There was a scattering of scaup and two pairs of canvasbacks. In previous years brood counts on Storm Lake have indicated good production. Water levels on May 7 appeared about normal.

Maple River Refuge enjoyed its usual heavy spring use by geese. However, detailed information is lacking. We had requests for two local photographers for permission to work there this spring, and they reported a "heavy flight" of blues and snows. On May 7 we stopped in there and found the river flowing 2/3 bank full. This was mostly the result of heavy rains in early May. At this stage of the visit, tire trouble intervened, and we did not have time to walk into the spillway. A visit to Maple River is planned for the week of May 11 when a survey will be made of all easement refuges. This will be reported in our next narrative report.

#### G. Photographs.

All photographs were taken by Dill and Sutherland.

Credits: VII and editing - H. Dill  
II, V - D. Sutherland  
I, III, VI R. C. Pratt

Submitted by

*Herbert H. Dill*  
Herbert H. Dill

Approved: Regional Office

May 11, 1953



SD -SDL-579



The "hot-iron" technique for pinioning geese: Articulation at the wrist is located exactly. The red-hot tool is applied with hammer. There is little bleeding; however, it is well to use a small amount of coagulant, especially with snow geese, which invariably will peck and worry any wound.

SD-SDL-580



SD-SDL-581







SO-SOL-622

Captive honkers and crabs in the hospital pen.  
The regal Canada's survey the situation from atop  
a bale of alfalfa. The two young blues are slowly  
attaining adult plumage.



SO-SOL-623

This denizen of the shelter belts wintered well.





SD-SOL-504



SD-SOL-505

Distant views of portion of the flock of 80,000 snow-blues that used the south end of Sand Lake this spring; 231,000 geese were on hand in April when these pictures were taken.





SO-SOL-500



SO-SOL-501

"rful" fertilizer as the result of winter kill:  
suckers, black bull heads, yellow perch and  
hern pike.





SD-SDL-527

Last year's prohibition on knocking down corn was partly responsible for a surplus in the field this spring.



SD-SDL-528

About 1/5 of this corn went into the bellies of our unwanted boarders - the blackbirds. The blackbird does his dirty work when the corn is still in the milk stage, opening up the ends of the husks.





SD-SOL-670

A well pit was made for the new electric pump at the Weismantel sub-headquarters. Messers Podoll and Krege.



SD-SOL-671

Two bonnie lassies inspect a 14 1/2 pound carp which they found on the shore of Sand Lake near headquarters.



## WATERFOWL

Refuge Sand LakeMonths of Januaryto April19 53

(1) Species		(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
Common Name		Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for period
I.	<u>Swans:</u> Whistling swan	40	4-1	114	4-17	Still present				
II.	<u>Geese:</u> Canada goose	12	3-11	4200	4-6	Still present at end of period				68,200
	<del>Cackling</del> goose	2	3-20	22,900	4-6	" " " "				343,200
	Brant									
	White-fronted goose	2	3-20	11,900	4-6	6	4-19			
	Snow goose	73	3-19	54,000	4-6	Still present at end of period				31,400
	Blue goose	250	3-19	107,000	4-6	" " " "				846,400
III.	<u>Ducks:</u> Mallard	Winter Resident		5,900	4-17	Still present				
	Black duck	Winter Resident		10	4-17	"				
	Cadwall	1	3-30	725	4-17	"				
	Baldpate	5	4-2	725	4-17	"				
	Pintail	Winter Resident		10,000	4-6	"				
	Green-winged teal	2	3-24	180	4-17	"				
	Blue-winged teal	2	4-6	1925	4-27	"				
	Cinnamon teal	1	4-28	1	4-28	1	4-28			
	Shoveller	2	3-21	40	4-27	Still present				
	Wood duck									
	Redhead	2	3-24	650	4-6	Still	Present			
	Ring-necked duck	20	4-12	30	4-9	"	"			
	Canvas-back	4	3-22	1000	4-6	"	"			
	Scaup	18	3-22	1500	4-6	"	"			
	Golden-eye	5	3-23	10	3-27					
	Buffle-head	3	3-15	6	4-19	2	4-27			
	Ruddy duck	3	4-19	150	4-27	Still	Present			
	Am. Merganser	1	3-12	200						
IV.	<u>Coot:</u>	2	4-11	Peak not reached		Still	present			

491,600



### SUMMARIES

Dates waterfowl counts made Mar. 19, 27 April 6, 9, 17, 27

Percent of waterfowl area covered 100%

Dates brood counts made \_\_\_\_\_

Percent of area covered in brood counts \_\_\_\_\_

Total production:

Geese \_\_\_\_\_

Ducks \_\_\_\_\_

Coots \_\_\_\_\_

Total waterfowl usage during period 3,752,400

Peak waterfowl numbers 207,400

Areas used by concentrations Mud Lake, Silo Bay,  
South End, Houghton Grade area.

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

Reported by D. Sutherland

### INSTRUCTIONS

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

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



3-1751

Form NR-1A  
(Nov. 1945)MIGRATORY BIRDS  
(other than waterfowl)Refuge Sand Lake Months of January to April 1953

(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>										
Western Grebe	8	4-27								
Pied-billed Grebe	1	4-8								
White Pelican	25	3-29								
Double-Crested Cormorant	2	4-12								
Great blue heron	1	4-17								
Black-Crowned Night Heron	4	4-27								
American Bittern	1	4-27								
Eared grebe	20	4-27								
II. <u>Shorebirds, Gulls and Terns:</u>										
Killdeer	1	3-21								
Upland Plover										
Greater Yellowlegs	1	3-26								
Lesser Yellowlegs	5	4-29								
Avocet	2	4-27								
Willet	1	4-27								
Vairds Sandpiper	4	4-19								
Pectoral Sandpiper	4	4-5								
Hudsonian Godwit	5	4-19								
Marbled Godwit	1									
Wilson's Snipe	2	3-22								
Common Terns	2	3-24								
Franklin's Gull	1	3-23								
Herring Gull	3	3-17								
Ring-billed Gull	2	3-17								

(over)

(over)



(1)	(2)		(3)	(4)		(5)			(6)
III. <u>Doves and Pigeons:</u> Mourning dove White-winged dove	1	3-30							
IV. <u>Predaceous Birds:</u> Golden eagle Duck hawk Horned owl Magpie Raven Crow Marsh Hawk American Roughleg Snowy Owl Red-tailed Hawk. Prairie Falcon	Winter Winter Winter Winter Winter Winter Winter Winter Winter 1 Winter	Resident Resident Resident Resident Resident Resident Resident Resident Resident 3-26 Resident							
Reported by						Dale E. Sutherland			

#### 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.

## UPLAND GAME BIRDS

Refuge Sand Lake

Months of January to April, 1953

(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 specificoally requested. List introductions here.
Ringnecked Pheasant	Marsh fringe & adjacent upland 10,000 acres	1.7			462/1002				6,000	
Hungarian Partridge	Upland Meadow and fields 4,000 acres	36.4							110	
Pinnated Grouse	Upland meadow 51,000 acres	20							50	
Sharptailed Grouse	" "	<del>One observation of 40 "grouse" by local farmer See text</del>								See text



## 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.



SMALL MAMMALS

Refuge Sand Lake

Year ending April 30, 1953

(1) Species	(2) Density	(3) Removals	(4) Disposition of Furs								(5) Total		
Common Name	Cover Types & Total Acreage of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	Fur Re- stocking	Fur Re- search	Share Trapping		Total Refuge Furs Shipped	Furs Donated	Furs Destroyed	Popula- tion
								Permit Number	Trappers Share				
Muskrat	Marsh, 5000 A	5		5						5			1000
Beaver	Marsh & upland 5000			—									?
Mink	Marsh 5000 A	12.5		36				T	18	18			40
Weasel	Marsh & upland	200.0		5					5				55
Striped SKUNK	10,000												
	Marsh, field, meadow	40		62					62				440
	10,000												
Red Fox	Marsh edge & upland 8,000	800		1					1				10
Badger	Field & meadow 8,000			10					10				90
Raccoon	Marsh & upland	890		97					97				400
	10,000 A	250											

\* List removals by Predator Animal Hunter

\* List removals by Predator Animal Hunter

REMARKS:

Reported by

Dale E. Sutherland



# 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 unprime-ness 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.



# WATERFOWL

Refuge Basement Refuge Months of January to April 19 53

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for period
I. <u>Swans:</u> Whistling swan									
II. <u>Geese:</u> Canada goose Cackling goose Brant White-fronted goose Snow goose Blue goose									
III. <u>Ducks:</u> Mallard Black duck Cadwall Baldpate Pintail Green-winged teal Blue-winged teal Cinnamon teal Shoveller Wood duck Redhead Ring-necked duck Canvas-back Scaup Golden-eye Buffle-head Ruddy duck									
IV. <u>Coot:</u>									



### SUMMARIES

Dates waterfowl counts made \_\_\_\_\_

Percent of waterfowl area covered \_\_\_\_\_

Dates brood counts made \_\_\_\_\_

Percent of area covered in brood counts \_\_\_\_\_

Total production:

Geese \_\_\_\_\_

Ducks \_\_\_\_\_

Coots \_\_\_\_\_

Total waterfowl usage during period \_\_\_\_\_

Peak waterfowl numbers \_\_\_\_\_

Areas used by concentrations \_\_\_\_\_

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

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

### INSTRUCTIONS

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

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