SAND LAKE NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

September 1, 1950 to December 31, 1950

PERSONNEL

Clair T. Rollings	Refuge Manager
Harvey K. Nelson	Jr. Refuge Manager
John H. Nowak	Refuge Clerk
Elmer Podoll	Maint. Man (Equip.)
Einar Kaastad	Maint. Man (Gen.)

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Sand Lake National Wildlife Refuge
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I GENERAL

A. Weather Conditions

Weather data are gathered at our official Weather Bureau station located at refuge headquarters. A summary of data gathered during the period September through December is given in table No. 1.

TABLE NO. 1

Sand Lake Weather Data, September - December 1950

MONTH	SNOWFALL		PRECIPITATION		MAX. TEMP.		MIN. TEMP.	
	'49	'50	'49	'50	'49	'50	'49	'50
Sept.	-	-	2.16	.50	88	94	23	31
Oct.	-	1.0	2.10	1.01	78	81	15	23
Nov.	T	2.5	.21	.10	69	71	13	-13
Dec.	2.2 5	8.5	.60	.20	42	49	-22	-29
TOTAL	2.25	12.0	5.07	1.81	88	94	-22	-29

During early autumn at Sand Lake the weather was dry and cool. Very light frost occurred on September 13 but killing frost was not recorded until October 3. Normal autumn weather ended abruptly on November 8 and 9 with the passing of a severe cold front accompanied by snow and sub zero temperature. On the morning of November 10 the lake was frozen solidly and the temperature stood at -6 degrees; a record low for that date.

Rainfall was below normal during September and October. Snow fell early with the earliest arriving with the first killing frost on October 3. Snow 1 to 2 inches deep covered the ground during much of November and December with the heaviest fall occurring on Christmas Day - 7 inches.

Temperatures averaged below normal during most of the autumn season. Several records were set for low readings. During the period November 10 to 13 temperature readings ranged from -6 to -13 during early mornings. Law temperatures continued into December with sub-zero readings recorded nearly 50% of the days during the month. Lowest reading for the period was -29 degrees on December 26.

As of the end of December snow depth averages 6 inches. Fortunately the heavy snow of December 25 was not accompanied by strong wind. Although a few side roads have been closed by snow, no severe snow drifting has occurred to date. Severe

blizzards, so common to this area, were not experienced during this period.

B. Water Conditions

Water levels in Mud Lake and Sand Lake units have been higher than normal during fall 1950 due to release of water into the James River from a reservoir in North Dakota. As of September 1 a very slight flow of water was observed over both Mud Lake and Columbia spillways. The water level held almost constant during September and October and as of freeze-up on November 10 water was exactly at spillway level. Following freeze-up the water began a slow rise due to an increase in the release of water into the upper channel. During November and December from .1 to .3 foot of water flowed over spillways at both of our main units. As of January 1 a gage reading of plus .2 was noted at Mud Lake and plus .15 at Columbia spillway.

Water level in Sand Lake unit was held as near as possible at the newly authorized 1270.30 mark or .7 foot below the old spillway level. Many muddy beaches were exposed making excellent habitat for marsh plants. Planting of food and cover plants is planned on these muddy beaches during the coming year. The lower level maintained in the Sand Lake unit was largely responsible for a marked increase in sago pondweed Potamogeton pectinatus.

Freeze-up of Sand Lake marsh came suddenly and early - nearly two weeks earlier than normal. Practically no freezing occurred on the lake until November 10 on which date it was frozen solid. First ice was 3 to 4 inches thick. The lake never opened up after the original freeze.

II. WILDLIFE

A. Migratory Birds

1. Population and Behavior

a. Whistling Swan: A small flock of 6 whistling swan was observed for a few days in late October. The birds loitered about a small island one half mile south of the Houghton grade. Apparently the birds rarely left the refuge during the short period they were here as they were seen during all hours of daylight, always on the same spot. One swan was observed, together with geese and ducks, near an open waterhole in the ice on November 27. This bird was observed several times during the last days of November. It is possible that this swan was the same individual that we kept overwinter in our "duck hospital" a year ago but we could not get close enough to see whether or not the bird was banded.

b. Geese: The 60,000 geese on Sand Lake Refuge as of October 27 equalled the record fall population established one year ago. Providing more feed and rigidly enforcing the no trespass regulation are largely responsible for the marked increase in our fall goose population. In addition to the increase

in peak population, our geese are staying longer on the refuge each year. Again we attribute this to more feed, made available over a longer period of time, and to our maintenance of Sand Lake Refuge as an inviolate sanctuary.

One hundred fifty Common Canada Geese Branta canadensis canadensis remained at Sand Lake as breeding birds during the past summer. First evidence of the fall migration came with the appearance of 80 White-fronted geese on September 21. Within a few days other species arrived: 8 Snow Geese and 6 Blue Geese on September 25 and 50 Richardson Geese Branta c. hutchinsi and Lesser Canada Geese Branta c. leucopareia on the following day.

For 10 days following first arrivals we noted a gradual increase in our goose flock. Airplane census on October 5 indicated 4,850 geese were on the refuge with Lesser Canada and Richardson's Geese dominant.

With the passing of a cold front accompanied by strong wind and rain on October 7 a pronounced movement of geese into the area was noted. The flock tripled in less than 48 hours. At least 15,000 geese were on the refuge by the evening of October 8. Airplane census on October 16 indicated the greatest increase in our goose flock occurred between October 8 and 16 - a rapid but steady rise from 15,000 to 52,000 birds. Lesser Canada and Richardson's geese comprised 4/5 of the flock.

The seasonal peak in our goose population was reached October 27 when airplane census indicated 60,000 birds were present. At this time the flock was composed of 40,500 Lesser and Richardson, 14,000 Snow, 3,000 Blue, 1,500 White-fronts and 1,000 Common Canada Geese.

Indian summer weather prevailed during the last days of October and the first day of November, followed by strong northwest winds and falling temperature on November 2. The weather change, combined with diminishing food supply, caused a pronounced movement of geese out of the refuge. Airplane census on October 3 indicated 16,000 fewer birds were present than a week earlier, leaving a total of 44,700. White-fronts, Snows and Blues showed the greatest decrease. Only Common Canada (Honker) were more abundant.

The goose flock appeared to maintain a constant number from November 3 to 8. On the latter date a very severe cold front swept down from Canada, causing a sudden freeze during the night of November 9. We awoke on the morning of November 10 to find some snow on the ground and the lake frozen solidly except for a few scattered holes maintained by waterfowl. Airplane census on this date indicated a large portion of our geese had departed; only 3,500 were left. White fronts were all gone and other species except Honkers were markedly reduced. The number of Honkers remained the same as in the previous census.

Airplane counts on November 18 and 28 and December 19 indicated the remaining geese gradually departed following the freeze-up on November 10. Only 1,500 were counted on November 18; 265 on November 28 and 40 on December 19. As of the end of December only 25 or 30 Honkers remain on the refuge. A summary of airplane census figures throughout the period of migration is given in table No. 2.

TABLE NO. 2

SAND LAKE GOOSE FLOCK - BY* AERIAL CENSUS - FALL 1950

DATE	TOTAL POP.	W. FRONT	SNOW	BLUE	LESS & RICH	COM CAN
9/1	150	0	0	0	0	150
10/5	4,850	450	700	200	2,600	900
10/16	52,000	2,000	7,000	3,000	39,000	1,000
10/22	57,000	2,000	11,000	3,000	40,000	1,000
10/27	60,000	1,500	14,000	3,000	40,500	1,000
11/3	44,700	500	8,000	2,000	33,000	1,200
11/10	3,500	0	400	100	1,800	1,200
11/18	1,480	0	198	2	400	880
11/28	265	0	15	0	25	225
12/19	40	0	0	0	0	40

* Airplane census through cooperation with J. H. Stoudt, Flyway Biologist. Plane rental paid by Stoudt and plane was flown by refuge manager C. T. Rollings.

It is noted that the White-fronts appeared first and departed earliest. Common Canada (Honker) were rather late in arriving but lingered much longer than others. Snow, Blue, Lesser and Richardson's Geese arrived and departed at about the same time.

One of the most pronounced changes in our fall goose flock is the increase in the number of Snows and Blues. A few years ago these species were seldom seen during fall but 10,000 were counted during autumn a year ago and 17,000 were recorded last October. Snow and Blue geese make up the bulk of our goose flock in spring when over 200,000 are recorded at peak. If these birds get in the habit of stopping at Sand Lake in the fall we may encounter a real feed problem. The 60,000 geese present this fall consumed all the feed we produced on nearly 700 acres in a period of 3 to 4 weeks. Should our fall goose flock become much larger a revised system of feed production may be necessary.

Feeding habits of our goose flock were studied closely this fall. We were particularly interested in the use made of disced corn. Millet, barley, oats and wheat were consumed early. We began discing down refuge corn on October 15. Geese were quick to find the disced corn and fed avidly on it. In one instance 5,000 geese were observed lighting and feeding in a field of corn three hours after it was disced. Regardless of where the field was located on our refuge, which is about 17 miles long, we found the geese would begin feeding in disced corn a few hours

to a few days after discing. The geese appeared to prefer corn to other feed. It is evident that by proper timing of corn discing operations the movements of geese within our refuge can be controlled. This may become an important management measure in counteracting excessive hunting pressure on some areas.

From daily observations made on our goose flock throughout the season it was clearly evident that our enlarged feeding program (permittee crops in the field) kept the hunter kill of geese down to a minimum until late in October. On October 18 only about 10% of our geese were leaving the refuge to feed. Hundreds of hunters lined the boundary fence near fields where geese were feeding in the refuge. Had more of the geese found it necessary to leave the refuge to feed the kill would have been much higher.

Despite the fact that our geese had nearly 700 acres of grain to eat within the refuge they had nearly cleaned up the supply by November 1. Feeding outside the refuge increased markedly after this date and a corresponding increase in hunter kill occurred. It is evident that proper management of the economic use program is highly important at Sand Lake because only through this program can the increasing goose flock be properly fed and the hunter kill kept from becoming alarmingly high.

c. Ducks: Aerial count indicated our duck population stood at 15,000 as of September 1. Blue-winged Teal were most abundant during the first half of September, reaching their peak on the 25th of the month, and declined rapidly as the month drew to a close. Very few Blue-wings were left as of October 6.

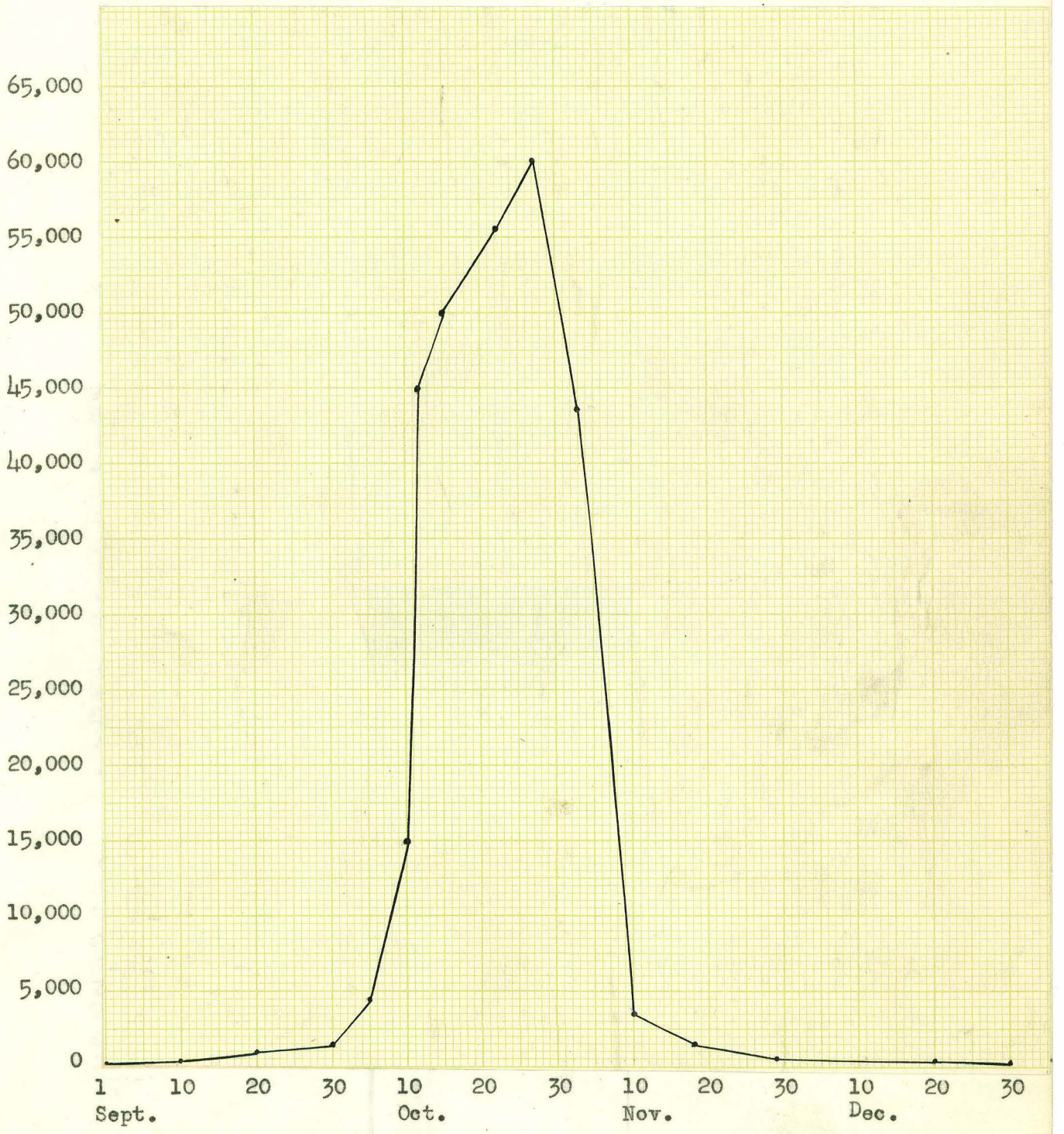
Green-winged Teal, Baldpate, Gadwall, Pintail and Shoveller began to increase appreciably about September 10 and all except the teal reached their peaks the first week in October. All of these species except the Green-wings declined rapidly after October 10 whereas the Green-winged Teal coninued to increase, reaching their peak on November 3.

An abnormally large flight of Canvasback came through Sand Lake this fall - passing quickly through the area. On October 7, 35 Canvasback were noted near the recreation area. By October 20 the population had increased to 4,000 - this represented the peak. Together with the "Cans" came the Redheads and Lesser Scaup. On October 20 the Redheads reached peak population - 1,000 birds. Scaup also passed quickly through the refuge. A few were observed during early October but the peak of the flight was noted on November 8-9; about 6,000 were on the refuge.

Ruddy ducks appeared quite numerous during late October. On November 9 about 2,000 were on the refuge. A few American Goldeneyes and American and Hooded Mergansers were observed late in the season after the lake was frozen over except for a few waterholes. On November 21 about 300 Goldeneyes were recorded for the area. Mergansers were represented by a few individuals of each species.

SAND LAKE REFUGE

GOOSE POPULATIONS DURING FALL MIGRATION - 1950



* Points at date of aerial census

Figure No. 1

The most outstanding feature of the fall duck migration at Sand Lake was the markedly reduced number of Mallards. Abnormally high rainfall plus a delayed harvest and much waste grain in North Dakota kept many Mallards in that state weeks and weeks beyond their usual departure date. Likewise the extremely late season in the Dakotas delayed local corn harvest 3 to 4 weeks. The usually spectacular morning and evening flights of Mallards to and from corn fields near Sand Lake did not occur this fall. Very little corn was harvested locally until the first part of November. The net result was a lack of duck food locally and a super abundance of food in North Dakota and the Mallards lingered in the north as long as possible. Freeze-up came suddenly with the passing of a severe cold front an November 8 and 9. Potholes and lakes from southern Canada and soutward to central South Dakota froze solidly overnight. Birds that were forced out of North Dakota passed right through Sand Lake without stopping. While the storm was passing one could see a continuous flight of ducks and geese high overhead, all moving soutward with the high wind.

Following the early and sudden freeze-up on November 10 some of the Mallards probably moved back from points farther south and others of this species drifted in from the north. This was evidenced by a second build-up of Mallards following the storm and sudden decline of ducks on November 10. Local corn harvest was in full swing during mid-November and although the marsh was almost completely frozen over the birds found abundant food. Snow was very light throughout the month. Mallards kept small pools of water free from ice. The duck population rose rapidly from the November 10 figure of 38,000 to the season high of 81,250 on November 18. Thereafter, continued cold weather plus frequent though light snows, drove the Mallards southward. The duck population (largely Mallard) fell from the season high of 81,250 as of November 18 to 24,000 on November 28 and 10,500 on December 19. As of January 1 only 5,000 Mallards remain. A seasonal summary of the Sand Lake duck population as determined by airplane counts is given in Table No. 3.

TABLE NO. 3

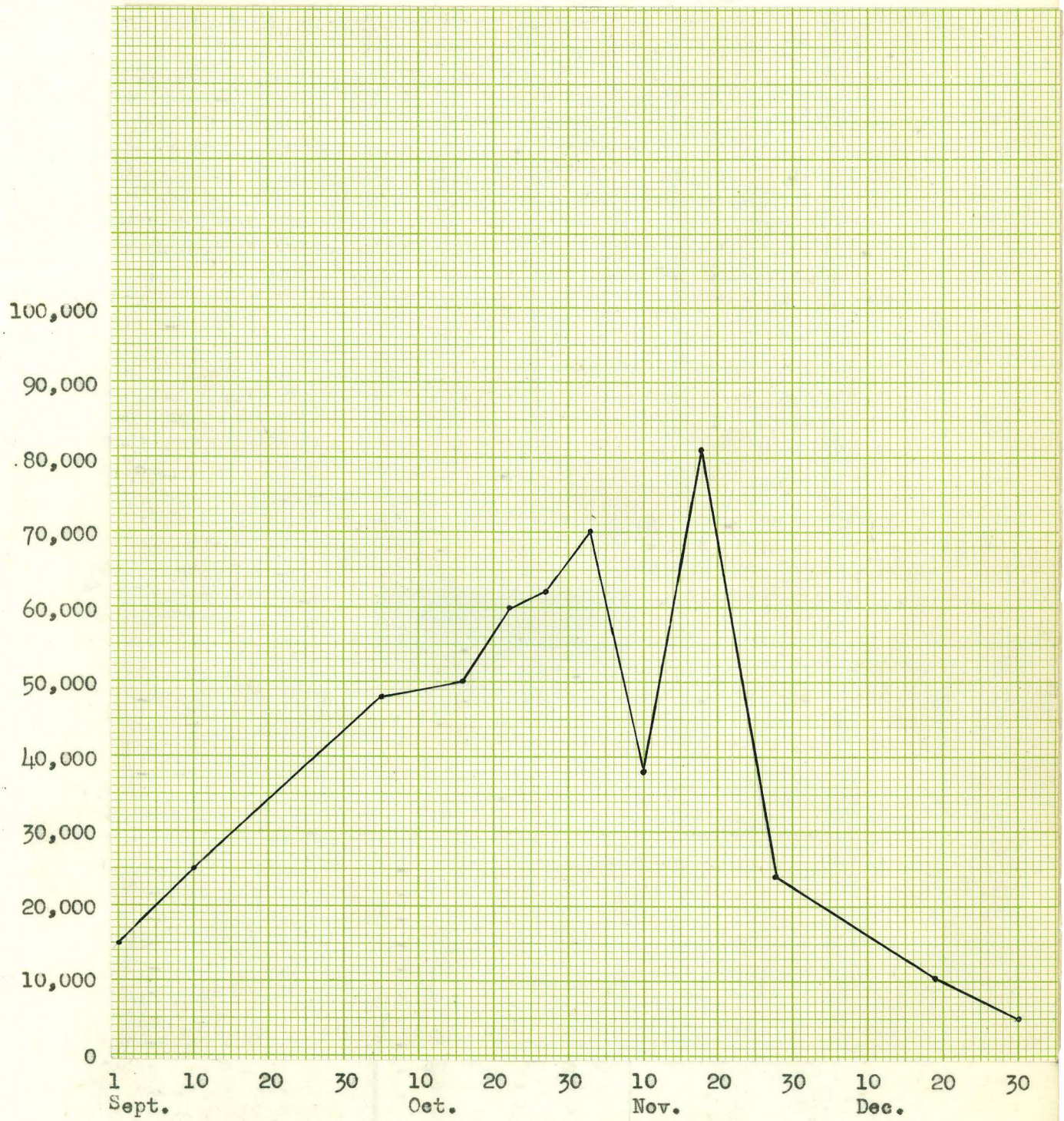
SAND LAKE DUCK POPULATION - BY AERIAL CENSUS - FALL 1950

Oct. 5	48,000	(all species)
Oct. 16	50,000	"
Oct. 22	60,000	"
Oct. 27	62,000	"
Nov. 3	75,000	"
Nov. 10	38,000	"
Nov. 18	81,250	"
Nov. 28	24,000	"
Dec. 19	10,500	"
Dec. 30	5,000	"

The 5,000 Mallards that remain as of January 1 are keeping 2 small water holes open in the ice. Many of the birds are affected by lead shot poisoning. The wintering Mallards are gradually decreasing in number, apparently some leave with the

SAND LAKE REFUGE

DUCK POPULATIONS DURING FALL MIGRATION - 1950
(predominately Mallard, excluding Coot)



*Points at date of aerial census

Figure No. 2

advance of each snow storm. It is doubtful however if many of these birds are able to make the long flight southward to unfrozen water due to the poisoning effects of lead shot consumed.

Of special interest was the recording of an Old Squaw duck just above the Columbia control gate on November 8.

d. Coot: Coot were present in larger than usual number and appeared to linger longer than normal on Sand Lake this fall. The build-up of Coot began early in September. By October 5, 10,000 were on the refuge and this same number was recorded on October 22. The peak population of 10,000 Coots was present until November 3 when a moderate cold front drove many of the birds southward. The severe storm and freeze of November 8-10 reduced the coot flock to a few stragglers.

2. Food and Cover

Despite a spring flood and cold, backward season the supply of both natural and cultivated waterfowl foods was fair to good at Sand Lake during the autumn of 1950. To provide feed for the markedly increased fall goose flock, practically all the feed produced for the refuge by permittees was left in the field - nearly 700 acres of grain in all. The lowering of Sand Lake water level by 8 inches apparently was instrumental in increasing the production of Sago Pondweed Potamogeton pectinatus. The amount of Sago produced this year was at least double that noted during the autumn of 1949. Concentrations of waterfowl were observed feeding on the Sago beds from late summer into October. The larger than usual number of Canvasback and Scaup may have been a direct result of the increased Sago production. Coot, Shoveller and other puddle ducks likewise spent considerable time feeding on the Sago beds. During early fall it was obvious that fewer ducks were feeding in grain fields; due in part to Sago being more abundant than usual in Sand Lake.

The lower water level in the Sand Lake unit has exposed many muddy beaches. It is planned to seed millet and smartweed on these mud flats during the coming season. Use of an aeroplane is contemplated. Several hundred acres can thus be added to our supply of natural foods in Sand Lake.

Dispite a late spring flood which prevented cultivating many low fields the refuge share of cultivated crops was about 600 acres. In anticipation of a large flock of geese, practically all of the refuge share was left in the field: 3 acres of oats, 98 acres of barley, 174 acres of millet and 255 acres of corn and 20 acres of wheat. Despite an average yield of refuge grains left in the field (total of about 8,000 bushels) the refuge feed was practically all consumed during the month of October. In addition the geese ate about 100 acres of permittees' corn for a combined total food consumption of about 10,000 bushels of grain. Even fields of standing corn, left for pheasants and other winter residents, were eaten by geese and ducks. Corn stalks were some-

what shorter than normal and the cold weather and backward season combined to produce much soft grain - these factors may have induced the geese to take more standing corn than they ordinarily would have eaten. Disced corn was avidly eaten by geese and ducks. The birds entered some fields of disced corn 3 hours after the corn was knocked down and it appeared that both geese and ducks readily found newly disced corn fields anywhere on the refuge. From the standpoint of preference, disced corn was at the top this fall, especially for all species of geese. In addition to its top ranking preference, corn can be made available at will during the season of greatest need - the hunting season. It is noted that many fields of small grains, cut at harvest time, are entirely consumed by waterfowl before the hunting season opens. Planned location and timing of corn discing operations can be an effective tool in keeping waterfowl (especially geese) away from points of heavy hunter kill. These facts appear to point to an increased use of corn for waterfowl feed at Sand Lake. This will be taken into consideration in future economic use planning.

Most of the waterfowl feeds produced on the refuge were consumed by November 1. The number of waterfowl, especially geese, leaving the refuge for feeding after November 1 increased markedly and hunter kill went up in proportion to the number of birds crossing the boundary fence. It appeared that we could have continued to hold most of the geese within the refuge boundary until cold weather drove them southward if we would have had a few more fields of corn for discing down after November 1. Millet, barley and other small grains provided very attractive feed for ducks and geese early in the fall. Some of the early cut grain sprouted in the winrow thus providing attractive grazing for geese. A certain proportion of our waterfowl grain foods will always be small grains and grazing crops but more emphasis must be placed on corn and other foods that are available during late fall when hunting pressure becomes extremely heavy. For most effective management of our goose flock we must have ample grain foods available for geese and ducks from October 1 till November 15. Although we left all our crop in the field this year the birds cleaned up nearly all feed by November 1. With the possibility of even larger fall goose populations it will be necessary to produce a maximum amount of grain under special permit and should this fail to meet the increasing need we will be forced to hire labor and farm the better feeding areas with refuge equipment. Sand Lake Refuge has become the most important stopping point for geese in the midwest. Hunting pressure is high and will become higher as our goose flock increases. Based upon intensive field investigations during the 1950 hunting season (5,256 hunters interviewed - birds counted, aged and sexed) the number of geese bagged plus cripples lost at Sand Lake was 13,306. We dare not let hunter kill on geese go appreciably higher. The only practical way of preventing increased kill is through provision of an adequate food supply within the refuge and making this food available in the right places at the proper time.

B. Upland Game Birds

1. Population & Behavior

Ring-necked Pheasant: The Ring-necked pheasant population on the refuge has been increasing steadily throughout this period. As of September 1 many of the late broods were only 2-3 weeks of age. With the aid of good weather and an abundance of food even these late broods showed good survival. Since winter condition have decreased food and cover outside the refuge there has been a noted migration into the refuge.

The hunting season in this area opened November 4-14. The daily limit of 2 cocks was obtained with ease by those hunters who ventured off the main roads and worked the cornfields and marsh boundaries. According to South Dakota Game Technicians, the total pheasant kill was below that expected and a surplus of cocks exists.

The estimated pheasant population at Sand Lake Refuge as of September 1 was about 8,000 and this has now increased to about 15,000. The peak winter population last year was approximately 17,000.

Since the last heavy snowfall on December 26, large numbers of pheasants have started working the highways for for grit and for grain spilled by passing trucks. The inevitable result is that highway mortality has increased tremendously. In some instances, 1 dead bird per mile of highway has been recorded. A daily average on the more traveled roads along the refuge boundary during the last week of December was about 1 dead bird per 2 miles.

Hungarian Partridge: Observations of "Huns" were few throughout this period. Three covies totaling about 40 birds have been observed on the refuge. Occasional reports indicate that we have several other covies on the refuge giving a total of about 150 birds. This is a slight increase over a total population of 100 reported previously. Despite the fact that we have what appears to be suitable habitat for Hungarian Partridge, the birds fail to increase appreciably. The trend this year however appears to be more hopeful.

Pinnated Grouse: Three observations of Pinnated Grouse were made during this period by Service personnel during the fall for a total of 24 birds. It is doubtful if the total winter population exceeds 50. No birds were recorded during the summer months so the birds now observed may be winter migrants. The population of Pinnated Grouse in this region of South Dakota is very low.

2. Food & Cover

About 100 acres of standing corn were left in fields bordering shelterbelts to provide winter food for upland game birds, chiefly pheasants. The goose flock did feed upon some of these fields and by the end of the fall migration only about 50 acres remained for upland game. These areas are now used extensively by the pheasants. It may be necessary to feed birds in some areas where the present food supply is depleated so as to prevent depredation on standing corn left by neighboring farmers.

Since the snowfall has been light thus far, most weed seeds are still available. In some areas pheasants have been observed feeding on rose hips Rosa arkansana and seeds of Sumac Rhus Glabra. Many of the trees and shrubs in the shelterbelts such as Snowberry Symphoricarpos Spp., Russian Olive Elaeongus angustifolio, Buffalo Berry Shêphordia argentea and Honeysuckle Lonicero tartarica provide an additional source of food.

The marsh type vegetation at Sand Lake Refuge offers excellent winter cover for upland game. The extensive shelterbelts have now attained large enough size to provide good cover as well as a source of food. In general, the refuge has sufficient cover to protect birds throughout the winter, even against the worst prairie snowstorms. Winter food may become a problem if the pheasant population continues to increase. In the future more standing corn will have to be left for the pheasants in areas where the geese will not be as likely to consume as large a proportion as they did this year. One solution may be to leave goose feed nearer water and away from shelterbelts where pheasants tend to concentrate in winter.

3. Disease - none noted.

C. Big Game Animals

1. Population and Behavior

White-tailed deer continued to increase during the past year. The winter census has not been made at the end of this period but the aerial census during the winter of 1949-50 indicated 103 animals present. Observations indicate that a fair fawn crop was brought off as numerous sets of twins were seen. Including the summer increment, the population is estimated at about 150. Aerial census during the following month will give a more accurate determination.

Three deer were killed by cars on the highway adjoining the refuge. These were turned over to the local State Warden for disposal. One yearling doe was found on the ice at Sand Lake and had apparently dislocated a front shoulder. She was cared for by refuge personnel until the shoulder healed and was then released.

2. Food and Cover

Food and cover conditions appear to be adequate for deer even though much of habitat is of the characteristic prairie type. The animals feed on hayland, small grain crops and corn during the summer and fall as long as such foods are available. During winter months they feed on standing corn, hay stacks and then do considerable browsing in the shelterbelts.

The deer use the dense stands of Phragmites for winter cover as well as farm groves and shelterbelts.

3. Disease

None observed during this period.

D. Fur Animals, Predators, Rodents and Other Mammals

1. Fur Animals

The principal species of fur animals found on Sand Lake Refuge are skunk, raccoon, red fox and badger. Weasel are very scarce. A few coyote have been reported this period.

Muskrat is the only species of importance from the standpoint of habitat control. Usefulness of the muskrat lies in its ability to open up closed stands of emergent vegetation such as Phragmites, River bulrush and Cattail. Due to severe floods the past two springs, a high percentage of the litters were destroyed and the total population remains quite low for an area such as Sand Lake Refuge. Aerial census on November 28 indicated 276 muskrat houses on the entire refuge. Together with the "bank rats" present it is estimated that the total muskrat population is about 3,000. This represents three times the number recorded at the end of the period December 31, 1949. No muskrats are being trapped however as it is believed that the normal breeding population should be about 5,000. If water levels remain more stable this coming spring the population should increase rapidly.

Mink appear to be increasing in numbers. Observation indicate that there is about 1 mink per mile of shoreline or a total population of approximately 75. Trapping permits have been issued to reduce this number to 50 or less so as to prevent heavy predation on muskrats. Thus far 10 mink have been reported trapped this period.

Raccoon, skunk and badger are problem species. Low fur values during past years have caused these species to increase to a point where severe predation on waterfowl and upland game bird nests is feared. A slight increase in long fur prices this year has created a new interest in trapping these species and thus far 15 raccoon, 25 skunk and 2 badger have been taken.

Red fox are common. The total population on the refuge is estimated to be about 25 at this time but during November when there were numerous crippled ducks and geese in the marsh there appeared to be a much higher fox population, perhaps 50 to 75

animals. It is believed that they moved in from surrounding areas to feed on the crippled birds available and when this source of food supply was exhausted they moved out of the refuge. Considerable hunting of fox by airplanes outside the refuge has no doubt reduced numbers considerably too. To date, no red fox have been caught by trappers on the refuge.

2. Predators

After the opening of the waterfowl hunting season, animals such as reaccoon, skunk, badger, mink and fox fed on crippled birds and those suffering from lead poisoning. The majority of these birds would have died from starvation or freezing so predators actually caused very little loss except in the case of some crippled geese that may have survived if caught and placed in the refuge "hospital".

3. Rodents

Many species are in hibernation. House rats and mice became a problem around quarters and storage buildings immediately after the first freezing conditions but poisoned bait has controlled this factor to some extent.

E. Predacious Birds

Great Horned Owls: are common around the refuge. They frequent the farm woodlots and shelterbelts. They no doubt take a few cottontail rabbits and pheasants but no serious problem exists.

Snowy Owls were first observed on November 5 and increased in numbers until there were about 50 birds on the refuge by December 1. This is the largest number of Snowy Owls ever recorded for the refuge. They fed primarily on crippled and lead poisoned ducks until this source of food was exhausted and now frequent the shelterbelts where rabbits and pheasants seek cover. Two observations were made of snowy owls carrying live ducks. In another instance an owl was flushed leaving a live mallard drake on the ice which had most of the flesh on its neck eaten away. Another observation was made of a Snowy Owl attacking a Mallard drake in flight and knocking the duck down on the ice. One owl was flushed from the top of a muskrat house near open water where, upon closer examination, a fresh muskrat carcass was found. Snowy owls apparently will kill and eat any of the smaller mammals as well as waterfowl and upland game birds, depending upon what is available. For the most part, the majority of the birds taken so far have been crippled or sick ducks that would have died anyway.

Two Golden Eagles have been observed the past month. These birds apparently move into the refuge during late fall as they have never been seen during spring or summer months.

American Rough-legged Hawks are common. Both the dark and light phase have been observed.

F. Fish

The principle species are Carp, Bigmouth Buffalofish, Bullhead, Perch, Northern Pike and Suckers.

Myriads of fingerling carp, buffalo and perch fingerlings wer trapped below the Columbia dam. By late September most of these fish had been consumed by White Pelican and Cormorants that fed there.

Good catches of Northern Pike have been taken at the north end of the refuge near the Helca bridge throughout this period. Fish weighing 8-10 pounds were common and the record Northern for the season there was 12 lb., 8 oz.

There appears to be a fair population of northerns in the James River and Sand Lake now. If no winter kill occurs, this species should continue to increase. Carp are very abundant and if the population gets much higher they may have a serious affect on the submerged aquatic vegetation. It is quite difficult to control carp in our marsh area by any means other than allowing winter kill to take its toll. This takes game fish also. Pelicans and cormorant do help to keep the rough fish somewhat under control.

III. REFUGE DEVELOPMENT MAINTENANCE

A. Physical Development

1. Dakota Lake: The road into the spillway at Dakota Lake Easement Refuge was rebuilt last period. During the first week of September the surfacing was completed and the road graded. (Photo No. 15.)

2. Transfer of Equipment: The well drilling machine in use at Sand Lake Refuge was transfered to Crab Orchard Refuge An FWD 7-ton dump truck and an Oshkosh 7-ton dump truck were transferred from Crab Orchard to Sand Lake

3. A carload of coal (52 tons) was unloaded with the dragline at Columbia and hauled to the refuge headquarters.

4. Bank Sloping: The banks around the refuge headquarters which were badly eroded by floods the past two years were sloped with the dragline and 3/8 yd. bucket. Approximately 1/4 mile of the bank was sloped and rip-rapped. (photos No. 16 & 17.)

5. C.C.C. Foundations: The foundations of 12 former CCC buildings were removed with the use of the 40 Caterpillar and dozer. The entire area was then leveled off. All the foundation material was used to rip-rap the headquarters bank.

6. Rip-rapped bank at Headquarters: The foundation material removed from the old CCC area was used to riprap the bank at headquarters after it was sloped. Additional rock and foundations

material were obtained from local farmers to complete about 1/4 mile of rip-raped bank. All large rocks and sections of concrete were laid by hand where possible. Approximately 820 man hours were expended by refuge personnel and 4 temporary employees. (Photo No. 18)

7. Mud Lake Dike: The major project for this period was the resurfacing of the Mud Lake dike. Approximately 4,000 yards of gravel (30% oversize) were hauled from the Stensland pit, a round-trip of 10 miles. Loading was accomplished by dragline while the fill and surface material on the dike was leveled with the 40 Caterpillar and dozer. Six dump trucks were used. (Photo Nos. 19 and 20).

Seven wage employees were hired to complete this job and work on the Columbia dike.

8. Columbia dam: Approximately 960 cubic yards of dirt fill was moved by D7 Caterpillar and Carryall to fill in washouts on the dike. About 500 cubic yards of pit run gravel were hauled to resurface the Columbia dike and entrance road. An additional 100 cubic yards of oversize gravel and rock was used to fill in washouts and riprap both sides of the Columbia water control structure. (Photo Nos. 21 and 22.)

9. Raised Patrol Road: About 1/4 mile of the patrol road north of Site No. 2 was raised 18" to prevent water from backing into fields during high water periods in the spring. Approximately 600 cubic yards of dirt fill were moved by use of the D7 Caterpillar and carryall. (Photo No. 24.)

10. Maintenance & Repair of Equipment: Considerable work was required to maintain and repair equipment used on the Mud Lake dike and Columbia dam projects. One man worked full time in the shop while the two projects mentioned were underway.

11. Refuge Signs: Boundary markers on Maple River, Dakota Lake and Tewaukon Easement Refuges were checked and replacements made where needed. The entire boundary of Sand Lake Refuge was checked and about 45 new boundary markers and steel posts were put up. Most of these were used to replace signs and posts damaged by flood waters last spring. This posting was completed before the opening of the waterfowl hunting season.

Six wooden signs reading "No Shooting Over Fence - Do Not Enter Refuge" were erected at Corners near the better hunting areas to warn hunters not to enter the refuge to retrieve birds.

In addition to routine office work and other administrative problems that occur with construction projects underway, the Refuge Manager and Jr. Refuge Manager took over patrolling for the entire 45 day hunting season. Game censuses, hunter bag checks, sex-age data on geese and checks on hunter density were also made throughout the entire season. Considerable aid was

received from State Wardens, South Dakota P-R Personnel, Game Management Agents Sutton and Kriebel and Jerome H. Stoudt, Flyway Biologist. A major effort was made to enforce the no trespass law about the refuge and to gather sufficient data to accurately appraise the hunting pressure and hunter kill of the Sand Lake goose flock. Our efforts were rewarded by a healthy respect for the Sand Lake boundary fence. From the 5,256 hunters checked we feel we gathered a fairly accurate picture of hunting pressure and crippling loss and total kill of the Sand Lake goose flock.

B. Plantings

1. Aquatic and Marsh Plants: - none

2. Trees and Shrubs - none

3. Upland Herbaceous Plants - none

4. Cultivated Crops

Thirty permits were in force under which 1,792 acres of cultivated crops were grown on Sand Lake Refuge fields. Crops grown on the 1,792 acres were: Barley 377 acres, Corn 670 acres, Wheat 100 acres, Oats 322 acres, Rye 8 acres and Millet 315 acres. The refuge share amounted to 558 acres yielding on estimated total of 7,964 bushels. All except 80 bushels of barley was left in the field to provide feed for wildlife.

The ducks began feeding on swathed grain and millet in early September. The geese fed heavily on the remaining small grain and corn until November 1; when most of the food had been consumed. Only about 50 acres of standing corn remained for winter pheasant food after the geese left. This is considerable less than the amount anticipated that would remain after the geese moved out.

Average yields were: Barley - 12 bushel per acre, corn 20, Oats 15, Wheat 9, Rye 6 and Millet 9. Even though the season was late, summer rains brought the crops through in fair condition. Rainfall however was below normal. The primary cause of low yields in many cases is believed to be low fertility and soil depletion. A definite soil building program will be recommended in the new Economic Use Plan.

C. Collections

1. Seed: Approximately one bushel of rose hips were collected to be shipped to Waubay Refuge for spring planting.

2. Specimens: Study skins were prepared of the following by the Jr. Refuge Manager for the refuge collection: 1 - raccoon, 1 - White-fronted Goose, 1 - Hybrid Goose (Canada-Blue), 1 - White Pelican, 1 - American Goldeneye.

IV. ECONOMIC USE OF REFUGE

A. Grazing

Three permits for grazing were issued for a total of 695 acres. On two areas grazing was permitted from July 16 to October 31. The third area was opened from August 1 to October 31. Animal use months totaled 285. At $0.50 per AUM, total income from grazing was $142.50.

B. Haying

Twelve permits for haying were issued for a total of 1372 acres of Sand Lake Refuge land. A total of 495 tons of hay was cut giving a total income of $488.12.

Due to high water conditions last spring much of the prairie hay was late in maturing and in many cases yields were below average.

It is questionable as to what affect haying operations have upon waterfowl and upland game birds nesting on Sand Lake Refuge. Further studies will be carried out during 1951 to determine nesting density in uncut hayland and hayland mown in late summer so we will have a definite basis for regulating the amount of land to be opened for haying and the proper time for cutting.

C. Fur Harvest

The Fur Management Plan for Sand Lake Refuge was prepared by the Refuge Manager on September 20, 1950. In accordance with this plan, the removal of skunk, badger, raccoon were permitted for November 1 to December 31. Fox, and Coyote can be taken from November 1 to February 15. There is no state season on any of these species but it is believed that the number of such animals to be removed from the refuge can be taken within the dates given. Mink were trapped from December 1 until February 15 in accordance with state regulations. The number of each species permitted to be removed were: Skunk - 150, Raccoon - 125, Mink - 20, Badger - 35, Weasel - 10, Red Fox - 10 and Muskrat - 0.

To date 15 raccoon, 25 skunk, 2 badger and 10 mink have been reported caught by trappers. Muskrat and mink are divided bewteen refuge and trapper on a 50-50 basis. All other furs are retained by the trapper. No muskrats are being removed this year.

D. Timber Removal - none

E. Other Uses - A permit was issued for placing 170 bee hives on the refuge.

V. FIELD INVESTIGATIONS

A. Progress Report - Sex and Age Ratios

In connection with hunter bag checks, all information possible was gathered on sex and age of geese killed. In addition some geese were sexed and aged at an Aberdeen locker plant as well as some dead birds picked up inside the refuge. The data in Table No. 4 represents 453 geese checked by the Refuge Manager and Jr. Refuge Manager.

TABLE NO. 4

SEX & AGE OF 453 GEESE - SAND LAKE REFUGE - 1950

	A.M.	J.M.	A.F.	J.F.	T.A.	T.J.	T.M.	T.F.	TOTAL
Canada	120	70	88	54	208	124	190	152	342
White-fronted	4	7	3	2	7	9	11	5	16
Snow Goose	16	26	21	24	37	50	42	45	87
Blue Goose	7	4	5	2	12	16	11	17	18
TOTAL*	147	107	117	82	264	189	254	209	453

* 0.72 Juvenile: 1.0 Adult 128 Males : 100 Females

Hunting Pressure & Total Goose Kill

As stated in Section VI - D "Hunting", considerable effort was made to determine the hunting pressure along the refuge boundary and for areas outward to the maximum range of the goose flock. Daily records were kept on the number of hunters in given areas and a daily average of hunters per mile of boundary was established for the entire season. By applying the hunters success figures derived from hunter bag checks, it was felt that the total kill of Sand Lake geese was determined with a fair degree of Accuracy. These data (Table Nos. 5 & 6) indicate that 25,228 hunters killed 13,306 geese during the 45 day hunting season.

Lead Shot Poisoning

After the freeze up on November 9, numerous ducks suffering from lead poisoning were found around the few remaining open water holes. Many of these were too weak to fly and were easily caught. One hundred and twenty five mallards were caught and placed in the refuge "duck hospital" to determine survival rate when adequate food was available. All birds were fed a diet of wheat and barley from November 10 to December 31. As of December 31, 50 Mallards or approx. 40% have survived and appear to be quite healthy now. Highest mortality occurred during the first 20 days after capture. Only 3 birds died between December 10-31. The gizzards of all dead birds which were examined contained lead shot. Not more than 3 shot were found in any one gizzard and not less than one. The majority of the dead birds had decreased to about 1/3 their normal weight and some had no trace of food in their system

except in the gizzard. Droppings from several of those now in the pen appear quite green in color, which is indicative of lead poisoning. These birds apparently have retained some shot in their gizzards but they are eating and gaining weight.

VI. PUBLIC RELATIONS

A. Recreational Uses

The recreation area near the south end of the refuge was used by a few weekend picnicers during early September. This area received the greatest use during the months of June, July and August when local baseball teams held their games there.

The Hecla Recreation Area was used extensively by fisherman from about September 15 to December 25. As many as 200 people were counted some Sundays when fishing was good. During the waterfowl hunting season many hunters fished there between the morning and evening goose flights. After the freeze-up, fishermen continued to angle through the ice. The Hecla Recreation Area is now being sponsored by the Hecla Civic Association which will develope and maintain the area for public use.

Hundreds of visitors stopped by the refuge to watch the geese and ducks during the fall migration. Tours were restricted to areas where feeding or resting birds would not be molested.

B. Refuge Visitors

NAME	TITLE OR AFFILIATION	DATE
C. D. Rainie	Indian Serv. Aberdeen, S. D.	9/8
F. E. Busch	USGS, Lincoln, Neb.	9/26
L. R. Reed	USGS, "	9/26
Mr. Baker	Maint. Man, Valentine Refuge	9/26
Mr. Jenkins	USGS, Huron, S. D.	9/28
J. C. Salyer, III	Chief - Branch of Refuges	9/28
F. C. Gillett	Reg. Supv. "	9/28
F. A. Carpenter	Asst. Reg. Supv. "	9/28
G. Mann	Biologist, Waubay, S. D.	10/1
Mr. Anderson	Maint. Man, Seney Refuge	10/4
W. Pfieffer	State Warden, North Dakota	10/8
G. Hosterman	Chrm. Helca Civic Assn.	10/10
R. Murdy	S. D. Game Tech.	10/11
Mr. Schaver	Retired GMA, Webster, S. D.	10/13
F. A. Carpenter	Asst. Reg. Ref. Supv.	10/14
Dr. & Mrs. Gammel	Ornithologist, Kenmare, N. D.	10/14
Dr. Diegnan	" Smithsonian Inst.	10/14
Dr. Mayr	" Am.Mus.Nat'l. Hist	10/14
L. Glover	GMA, Oklahoma	10/23
L. Moos	SCS, Lincoln, Nebr.	10/24
R. Huxtable	SCS, Aberdeen, S. D.	10/24
P. Lund	SCS, "	10/24
G. Coulter	SCS, Hecla, S. D.	10/24
Elmer Peterson	S. D. Game & Fish Commissioner	11/1

NAME	TITLE OR AFFILIATION	DATE
Ed. Carbon	BR, Bismarck, N. D.	11/1
G. W. Zieman	Editor, S. D. Consv. Digest	11/1
Mr. Warren	RBS, Peirre, S. D.	11/1-3
B. Arrowsmith	Lower Souris Refuge	11/10
D. H. Janzen	Regional Director	11/11
S. Jorgenson	Fed. Aid Supv.	11/11
H. Hensen	GMA, North Dakota	11/11
Art Huey	Regional Enginner	11/21
Mr. Lelander	Const. Foreman, FWS	11/21
F. L. Bramble	Watertown, S. D. Park board	12/16
E. T. Lidner	"	12/16
P. O. Kretschmar	Eureka, S. D. Park Board	12/19
J. H. Stoudt	FWS, Flyway biologist	Frequently
L. C. Richardson	State Warden	"
Everett Sutton	GMA, Aberdeen, S. D.	"
Don Kriebel	GMA, Platee, S. D.	"
Leo Kirsch	S. D. Game Tech.	"

C. Refuge Participation

The Refuge Manager and refuge personnel attended a series of three meetings in local communities on September 13-14 to ascertain local opinions regarding proposed James River flood control projects sponsored by the Corps of Engineers, U. S. Army.

The Refuge Manager and Jr. Refuge Manager attended a meeting of the Groton's Men Club, Groton, South Dakota on October 3. The Refuge Manager gave a lecture on Wildlife Conservation and two Service movies were shown, "Ft. Niobrara Wildlife Refuge" and "Alaska Game and Fur Bearers".

On December 29, the Refuge Manager attended a meeting of the Brown County Farmers Union Association and participated in a panel discussion in regard to the part played by the refuge in county affairs and operation of a National Wildlife Refuge.

Several articles were written by the Refuge Manager for local news papers in regard to the waterfowl population and hunting conditions at Sand Lake Refuge. Two interviews were broadcast by the Aberdeen radio station in regard to hunting regulations and waterfowl movement during the past hunting season.

The Refuge Manager wrote articles that were published in Audubon Field notes and South Dakota Bird Notes during the period covered by this report.

The Refuge Manager visited Lower Souris Refuge, Upham, N. Dakota from September 23-24 and discussed waterfowl depredation problems and control measures used at Lower Souris. Brief stops were also made at Upper Souris Refuge, Foxholm, North Dakota and Sully's Hill Refuge, Fort Totten, North Dakota

Start

D. Hunting

The 1950 waterfowl season opened October 6 and closed November 19. During the season, hunters from nearly every county in South Dakota crowded around the boundary of Sand Lake Refuge to hunt geese. State regulations prevent non-residents from hunting waterfowl in South Dakota so the usual large numbers of out of state hunters was not present. Nevertheless hunting pressure in the vicinity of the refuge was very heavy.

Stop omit

In order to cope with the large number of hunters a definite policy of enforcing refuge regulations was established among refuge personnel, Game Management Agents and State Warden. Prior to 1949 there had been considerable confusion about allowing hunters to enter the refuge to retrieve crippled geese. Allowing them to do so usually resulted in the practice of shooting birds inside the fence before they passed over the boundary. This resulted in more cripples than before, many of which winged their way back to water. Then hunters often spent hours searching for cripples and thus spoiled hunting for others along the line and distrubed feeding or resting birds. During the 1949 hunting season, much publicity by the local radio station and newspapers was given to this problem and hunters were warned they would be apprehended for entering the refuge for any reason. Several apprehensions were made during the 1949 season. This year similar warnings were again publicized by local papers and radio station and additional signs were posted along the better hunting areas warning hunters not to shoot over the fence or enter the refuge. Hunter cooperation was good and the majority of hunters favored strict enforcement of the no trespass law as it resulted in equal hunting opportunities for all along the fence line. More of the birds wer allowed to fly out past the boundary fence before they were shot at. Fewer cripples resulted. A total of 14 trespass cases were turned over to the U. S. Game Management agent at Aberdeen. Eleven convictions were obtained. Three cases are pending.

omit

Start

Hunter bag check were made by the Refuge Manager, Jr. Refuge Manager, Flyway Biologist Stoudt, Game Management Agents and South Dakota P-R personnel. In addition, all private hunting areas in the vicinity of the refuge were given forms to record daily hunting pressure and kill.

As shown in Table 5 a total of 5256 hunters contacted on public and private areas killed 2508 geese or an average of 0.477 geese per hunter day. Crippling losses showed 761 criples for 2219 geese bagged, which is 34% of the kill. A comparison of the goose kill for 1949 and 1950 is shown in table 6.

An attempt was made this year to more occurately determine the total hunting pressure exerted on the Sand Lake goose flock and the total kill. The daily hunting pressure was recorded for portions for the refuge boundary throughout the season.

During 30 of the first 35 days of the season, 4,565 hunters were observed along 367.5 miles of fenceline. This sample gave an average of 12.4 hunters per mile per day. This was considered applicable to 30 miles of refuge boundary for the first 35 days of the season (October 6 to freeze-up on November 9).

Records kept on private hunting areas indicated that 2,733 hunters hunted along 6 miles of boundary for the first 35 days of the season giving a density of 13.02 hunters per mile per day. There are approximately 50 miles of refuge boundary that can be hunted. Thus, 14 miles remain for which incidental observation indicated that the average hunting pressure there was not more than 3 hunters per mile per day from October 6 to November 9. Private hunting records showed an 84% reduction in hunters per mile the last ten days of the season November 9-19, so this percentage reduction was applied to the other areas for the same period. The sampling method indicated that 18,020 hunters hunted along the refuge boundary and up to 1/2 mile outward during the 1950 season. The geese killed per hunter day on private and public shooting areas as indicated by hunter bag checks (Table No. 5) was applied to the total man days of hunting on the respective areas. This shows that approximately 6,590 geese were killed along the immediate refuge boundary up to 1/2 mile outward.

It is known that geese from Sand Lake fed and were killed in areas up to approximately 10 miles West, North and East of the refuge. An attempt was made to determine the hunter density and goose kill for that area from approximately 1/2 mile outside the refuge boundary up to the maximum daily range of the flock. From aerial observations and ground checks by Service personnel, South Dakota P-R personnel and State Wardens, it was estimated that the hunting pressure in this area was about 40% of the hunter density along the immediate refuge boundary and up to 1/2 mile outward. This indicated that an additional 7,208 hunters hunted the area beyond 1/2 mile from the refuge fence during the season. By applying the average success per hunter day as obtained by hunter bag checks, 3,222 geese were killed in the outlying areas.

The data presented in table 6 indicate that 25,228 man-days of hunting placed 9,812 geese in hunters bags. Bag check figures ~~were~~ indicated that an additional 3,494 geese were crippled but not retrieved. Cripples plus bagged birds gave a total goose kill of 13,306 for the 1950 waterfowl season. Approximately 110,000 geese used the refuge during fall migration thus the total kill represents about 12% of the total refuge goose population.

To establish an even more accurate total kill of Sand Lake geese in future years, further study must be made of the hunting pressure and kill on areas 1/2 mile from the refuge boundary outward to the maximum daily range of the flock.

Hunter success dropped slightly this year from 0.51 geese per hunter day in 1949 to 0.447 in 1950. The reduced goose kill can be attributed very largely to a better planned feeding program this year. We were able to hold up to 90% of the geese inside the refuge until our feed ran short about November 1.

Stop (over)

TABLE NO. 5

GOOSE HUNTING DATA - SAND LAKE REFUGE - 1950
(Public & Private Shooting Areas)
HUNTER BAG CHECKS BY SERVICE AND P-R PERSONNEL

	Refuge Personnel	Sutton & Stoudt	S.D. P-R Personnel	Total	Private Area Records	Total Number	Total Per Cent
No. Hunters Interviewed	1934	286	176	2396	2860	5256	
Man Hours Hunted	6768	814	466	8048			
Hours Per Hunter	3.5	2.8	2.7	3.3			
Canada Geese Checked	473	87	24	584	1401	1985	79.15
Snow Geese Checked	105	11	15	131	188	319	12.72
White-Fronted Geese Checked	26	2	2	30	102	132	5.26
Blue Geese Checked	23	0	1	24	48	72	2.87
TOTAL	627	100	42	769	1739	2508	
Unretrieved Geese Reported	239	31	19	289	472	761	
Per Cent of Kill	38	31	45	37	32*	34**	
Geese Per Hunter-day	0.32	0.35	0.239	0.321	0.608	0.477	
Geese Per Man Hour	0.093	0.123	0.090	0.096	--	--	

* Based on 1450 total kill

** Based on 2219 total kill

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TABLE NO. 6

HUNTING PRESSURE AND TOTAL GOOSE KILL AROUND SAND LAKE DURING THE 1950 WATERFOWL HUNTING SEASON

	NUMBER OF HUNTER-DAYS			TOTAL GOOSE KILL				
	Oct. 6-Nov. 9	Nov. 10-Nov. 19	Entire Season	Geese Per* Hunter Day	Geese Killed	Unretrieved* % of kill	Unretrieved Geese	Total Kill
30 miles of boundary sampled								
Av. density per mile per day	12.4	2.0						
Total hunters for period	13,020	600	13,620	0.32	4,358	38	1,656	6,014
6 miles of boundary - private hunting								
Av. density per mile per day	13.0	2.0						
Total hunters for period	2,740	120	2,860	0.608	1,739	32	556	2,295
14 miles of boundary								
Av. density per mile per day	3.0	0.5						
Total hunters for period	1,470	70	1,540	0.32	493	38	187	680
1/2 mile outside refuge boundary up to max. daily range of goose flock. (40% of fence-line density.)			7,208	0.447	3,222	34	1,095	4,317
TOTAL			25,228		9,812		3,494	13,306

* Based on hunter bag check data from public and private shooting. An average of the two was applied to all area over 1/2 mile outside the refuge boundary.

COMPARISON OF 1949 DATA

			18,000**	0.51	9,180	5,820	15,000

** Includes only the immediate refuge boundary and up to 1/2 mile outward.

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Hunter's in general seem well pleased with hunting opportunities around the refuge. The chief complaint is over the large areas controlled by private clubs and commercialization in some cases. The answer to this would be to provide more public shooting areas. At the present time there are 1,120 acres set aside as public shooting areas which border 3-1/4 miles of refuge boundary. In addition hunting is permitted along all public roads bordering the refuge.

Duck hunting is largely incidental to goose hunting along the refuge boundary. Bag check data indicate that 1934 hunters interviewed killed 203 ducks or 0.11 ducks per hunter day. If this figure is applied to 25,228 hunter days it indicates that 2,775 ducks were killed during the 1950 waterfowl hunting season. However, more ducks are killed in feeding areas several miles away from the refuge so the bag check sample from the refuge boundary may not be a true indication as to the total number of dicks killed.

The pheasant season was open from November 4-14th this year. Due to heavy winter kill and poor hatching season the bag limit was only 2 cocks. Birds were quite numerous in the vicinity of the refuge. Hunter bag checks made in cooperation with South Dakota Game Technicians showed that it took the average hunter 2.13 hours to bag a bird in this area. The average number of birds per hunter day was 1.32. Hunting pressure in this vicinity was light and according to South Dakot P-R reports, there is a good breeding population remaining with a surplus of cocks. If winter conditions do not become too severe, a good breeding population should be carried through for next spring. At the present time there is a noticeable increase of pheasants in the refuge. This occurs each winter as the season advances and food becomes more scarce outside the refuge. The shelter belts within the refuge offer excellent winter cover. The present early winter population is estimated at 15,000. The peak population last year was approximately 17,000.

E. Fishing

Fishing success picked up noticeably about September 15 along the James River and local anglers concentrated at the recreation area south of the Hecla bridge. On some Sundays 200 people were observed in that area. The fishing pressure continued until about December 25. It is estimated that 3500 people fished along 1/2 mile of the James River at the north end of the refuge during this period.

Northern Pike was the chief species caught, many of which weighed 8 to 10 pounds. The record catch so far this year is a 12 lb. 8 oz. Northern. A few perch and bullheads were caught off the bridges and along the roads passing through the refuge.

F. Violations

Considerable effort was made to stop refuge trespassing and shooting over the fence. Splendid cooperation was obtained from State Wardens, GMA and local landowners. The following is a list of the violations recorded as occuring in the vicinity of Sand Lake Refuge.

NAME	VIOLATION	DISPOSITION, FINE & COST
Gallagher, W. H.	Improperly plugged gun	Pending Federal Court
Litschewski, P. J.	" " "	" " "
Lowenstein, Phil	Late shooting	$25.00 - $7.30*
Hopkins, Russel	Improperly plugged gun	$25.00 - Federal court
Koch, Harold	Hunting without stamp	" "
Engstrom, Don	Trespass on refuge	" "
Nordquist, L. D.	Improperly plugged gun	" "
Brady, Fred	Trespass on refuge	" "
Graves, Marvin	Late Shooting	$75.00 - $7.30*
Albrecht, Walter	" "	$25.00 - Federal Court
Evans, J. W.	Improperly plugged gun	" "
Brown, C. M.	Late Shooting	$25.00 - $5.30*
Boos, H. B.	" "	" " *
Beglinger, Bert	Improperly plugged gun	$25.00 - Federal Court
Bunker, Kay	" "	" "
Wiederich, E.	" "	" "
Shimitz, Joe	Trespass on refuge	" "
Sweber, G.	" "	" "
Gefre, P. J.	Hunting inside refuge	" "
Sommer, Ralph	" "	" "
Schnabel, Leo	" "	" "
Rook, Delbert L.	Improperly plugged gun	Pending Federal court
Forseth, F. A.	Trespass on refuge	$25.00 - Federal Court
Holt, Duane	Hunting inside refuge	" "
Melius, Lyle	" "	" "
Armstrong, T. J.	Trespass on refuge	" "
Phillips, Wm.	" "	Pending Federal court
Schliesman, W. E.	" "	" "
Curran, John	" "	" "
Nilson, H. L.	" "	" "
Eccarins, G.	" "	" "
Wattier, P.	" "	" "
Ash, Cye	" "	" "
Worden, F. R.	Improperly plugged gun	" "
Nieger, Don	Trespass on refuge	" "
Olson, Cliff M.	Improperly plugged gun	" "

* State Court

VII OTHER ITEMS

A. Items of Interest

1. Collection of Crippled Geese: Near the close of the waterfowl hunting season and after freeze-up, a great deal of time and

at cost of $4.80 (approx) per bird based on avg. rate of $4.60 per hr.

effort were spent catching crippled geese. These birds were placed in the refuge "hospital" and those surviving will be used as decoy flocks on other refuges. In all, 68 geese were caught, 63 of which have survived to date. In addition, 125 lead poisoned Mallards were poked up for experimental purposes.

Excellent cooperation was received from South Dakota P-R personnel and Jerome Stoudt, Flyway Biologist in carrying out this project. About 180 man hours were expended, part of this included time spent on Saturdays and Sundays.

2. John N. Nowak, Refuge Clerk is being transferred to the Seney Refuge to Replace Leo Von Wald.

3. An Old Squaw duck, female in winter plumage, was observed on November 8 by Refuge Manager Rollings at the Columbia dam. This is another "first" for the refuge.

4. The 3-Rollings are the proud owners of a "New Ford V8".

5. Social events for the period for refuge families included a Thanksgiving Day dinner by the Podoll's, a "Lutafisk Supper" by the Kaastad's and a Christmas party by the Rollings.

6. Refuge Manager Rollings has completed about 500 feet of personal 8mm colored movies relating a season activity at Sand Lake Refuge with special emphasis on Sand Lake Refuge. geese.

7. Two hybrid geese were picked up during the past hunting season. These were identified as a cross between a Canada species and Blue goose. One specimen was sent to the Museum of Natural History, University of Minnesota where identification was varified as that of a Canada-Blue cross. The other specimen was prepared as a study skin for the refuge collection.

B. Photographs

All photographs were taken with personal camera and film by the Manager and Jr. Refuge Manager.

C. Easement Refuges - District No. 5

L. Maple River: The area was visited on October 2. All damaged or missing boundary signs were replaced. The dam appeared to be in good condition. Water was about 6" below spillway level.

Waterfowl observed were: 100 Ruddy ducks, 75 Blue-winged Teal, 80 Pintail, 125 Mallards, 15 Gadwall, 20 Baldpate and 125 coots.

2. Tewaukon-Clouds Lake:

The boundary of the entire area was covered on October 4. All damaged and missing boundary signs were replaced. The Lake Tewaukon dam and spillway were in good condition. Repairs made last period on the spillway and control gate stopped all leaks in the rubble masonry.

Waterfowl noted were: Clouds Lake - 1500 Mallards, 100 Pintails; White Lake - 140 Mallard, 25 Blue-winged Teal; Lake Tewaukon - 260 Ruddy duck (70% makes), 400 Shoveller, 11 Redhead, 15 Mallard, 20 Gadwall and 10 Coot.

The area was patrolled during the weekend of October 21-22. About 45 hunters were observed in the area. Waterfowl were plentiful but there was little movement outside the refuge boundary. Observations included approximately 9,000 Mallards, 1500 Blue and Snow Geese, 50 Canada Geese, 200 Ruddy ducks, 500 pintail (predominately males) 200 Lesser Scaup and a few Redhead, Gadwall and Blue-winged Teal. Four white-tailed deer and about 40 pheasants were observed in the vicinity of the cabin.

A general reconnaissance of the Tewaukon area was made on December 13. The refuge hay crop was measured. Marsh and lake were frozen completely and no waterfowl were observed.

3. Dakota Lake

All missing or damaged boundary signs were replaced on October 3. Approximately 100 geese and 500 ducks were observed.

The area was patrolled frequently during the waterfowl hunting season. A few geese frequented the area throughout the season., most of which came from Sand Lake Refuge and fed in fields adjoining Dakota Lake. Hunters confined their activity to the marsh adjoining the southwest corner of the refuge. From hunter bag checks made in this area, Mallards were the main species killed. Excellent cooperation was received from the North Dakota State Warden, Walter Pfieffer, in patrolling the Dakota Lake Refuge.

Fishing was good throughout the summer months at the Dakota Lake dam. Catches of Northern pike weighing up to 10 pounds were observed. Since mid-October very little fishing activity has been noted in the area.

4. Storm Lake & Lake Elsie

Not visited during this period. Patrol of these areas was carried out by North Dakota State Wardens in connection with their regular work.

* * *

Prepared by Clair T. Rollings & Harvey K. Nelson.

January 8, 1951

Clair T. Rollings
Refuge Manager

Approved: _____

W A T E R F O W L

REFUGE Sand Lake MONTHS OF September to December, 1950

(1) Species	(2) First Migrants Seen		(3) Peak Concentration		(4) Last Migrants Seen		(5) Young Produced		(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
1. Swans:									
Whistling swan	6	10/26	6	10/26	1	12/1			10
2. Geese:									
Canada goose (com)			1,200	11/3					2,000
Cackling goose									
Brant									
White-fronted goose	80	9/21	2,000	10/16	50	11/5			4,000
Snow goose	10	"	14,000	10/27	15	11/28			25,000
Blue goose	5	"	3,000	10/16	2	11/18			6,000
Lesser & Richardson	50	9/26	40,500	10/27	25	11/28			80,000
3. Ducks:									
Mallard			81,000	11/18					150,000
Black Duck			200	11/19	5	11/15			300
Gadwall			4,000	10/10	25	11/1			8,000
Baldpate			3,000	"	10	11/5			5,000
Pintail			8,000	"					15,000
Green-winged teal			4,000	11/ 3	25	11/8			7,000
Blue-winged teal			10,000	9/25	10	10/22			20,000
Cinnamon teal									
Shoveller			5,000	10/1	25	11/5			10,000
Wood duck									
Redhead	100	10/7	1,000	10/20	10	10/30			2,000
Ring-necked duck									
Canvas-back	25	10/7	4,000	10/20	2	11/8			4,000
Scaup	20	10/9	6,000	11/9	200	11/20			10,000
Golden-eye	30	11/21	300	11/21	25	11/23			500
Buffle-head	5	10/14	50	11/21	5	11/25			100
Ruddy duck			2,000	11/9					
Old Squaw			1	11/8	1	11/8			1
4. Coot:			10,000	10/15	100	11/8			20,000

Form NR-1

3-1750
(June 1949)

(over)

SUMMARIES

Total Production:

Geese_____

Ducks_____

Coots_____

Total waterfowl usage during period 368,911

Peak waterfowl numbers 199,257

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.

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 analysis of the rest of the form.

61355

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

MIGRATORY BIRDS
(other than waterfowl)

Refuge Sand Lake Months of September to December 1950

(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. Water and Marsh Birds:										
Pied-billed Grebe					20	11/8				1,500
Western Grebe					5	11/1				2,000
Double-Crested Cormorant					50	11/8				6,000
Great Blue Heron					4	10/15				150
Blk-crn Night Heron					100	"				1,000
American Bittern					2	10/19				200
White Pelican			8,000	9/2	2	11/8				8,000
II. Shorebirds, Gulls and Terns:										
Killdeer						10/15				1,500
Western Willet					2	10/1				100
Lesser Yellow Legs					30	10/15				4,000
Greater Yellow Legs					5	"				4,000
Avocet					18	10/18				500
Wilson's Phalarope					12	10/15				500
Marbled Godwit					2	10/15				2,000
Ring & Herring Gulls					25	10/20				5,000
Franklin's Gull					250	11/1				200,000
Black Tern					15	10/15				500
Wilson's Snipe					2	10/8				100
Golden Plover					4	10/1				100
Black-bellied Plover					8	10/15				200
Long-billed Dowitcher					25	"				7,000

(over)

(1)	(2)		(3)		(4)		(5)		(6)
III. Doves and Pigeons:									
Mourning dove			1000	9/1	6	11/4			1200
White-winged dove									
IV. Predaceous Birds:									
Golden eagle	2	11/1	2						5
Duck hawk									
Horned owl									20
Magpie									
Raven									
Crow									5000
Snowy Owl	1	11/5	50	12/1					50

Reported by.....

INSTRUCTIONS

(1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
II. Shorebirds, Gulls and Terns (Charadriiformes)
III. Doves and Pigeons (Columbiformes)
IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)

(2) First Seen: The first refuge record for the species for the season concerned.

(3) Peak Numbers: The greatest number of the species present in a limited interval of time.

(4) Last Seen: The last refuge record for the species during the season concerned.

(5) Production: Estimated number of young produced based on observations and actual counts.

(6) Total: Estimated total number of the species using the refuge during the period concerned.

3-1752
Form NR-2
(April 1946)

UPLAND GAME BIRDS

Refuge Sand Lake Months of September to December, 1940

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked Pheasant	8,000	.53							15,000	
Hungarian Partridge	1,000 (ideal) 8,000 (total)	6.6							150	
Pinnated Grouse	5,000	100.							50	Birds apparently migrate into this area during the winter months as none were observed during the summer months.

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.

Form NR-3

BIG GAME

Refuge Sand Lake Year 1949

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions		(7) Estimated Total Refuge Population as of Dec. 31	(8) Sex Ratio
Common Name	Cover types, total Acreage of Habitat	Number	Hunting	For Re-stocking	Sold	For Research	Predation	Disease	Winter Losses	Number	Source		Percentage
White-tailed Deer	Marsh and wooded upland 12,000	50									Aerial census for the winter has not been made yet.	190	

INSTRUCTIONS

Form NR-3 - BIG GAME

(1) SPECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.

(2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.) exclusive of fenced herds. Detailed data may be omitted for species occuring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) YOUNG PRODUCED: Estimated total number of young produced on refuge.

(4) REMOVALS: Indicate total number in each category removed during the year.

(5) LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.

(6) INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.

(7) TOTAL REFUGE POPULATION: Give the estimated population of <u>each species</u> on the refuge as of December 31.

(8) SEX RATION: Indicate the percentage of males and females of each species as determined from field observations or through removals.

3-1755
Form NR-5
(April 1946)

DISEASE

Refuge Sand Lake Year 194 50

Botulism	Lead Poisoning or other Disease
Period of outbreak	Kind of disease Lead Poisoning
Period of heaviest losses	Species affected Mallard
Losses: Actual Count / Estimated	Number Affected: Species / Actual Count / Estimated
(a) Waterfowl	700 / 3,000
(b) Shorebirds	
(c) Other	
Number Hospitalized / No. Recovered / % Recovered	Number Recovered 51 (in hospital sample of 125 birds)
(a) Waterfowl	Number lost 74 - or 60% lost
(b) Shorebirds	
(c) Other	Source of infection lead shot consumed with food.
Areas affected (location and approximate acreage)	Water conditions
Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.	Food conditions
	NOTE: Accurate data was kept on 125 lead poisoned mallards caught and placed in the refuge hospital.
Conditions of vegetation and invertebrate life	Remarks Examination of several birds out of the flock of about 10,000 remaining on December 20 revealed that each was suffer from lead poisoning. The green coloration of the excrement on the ice around waterholes used by the ducks remaining in-
Remarks	

indicated that approximately 50% were suffering from lead poison. In that event nearly 5,000 lead poison ducks or more may be affected.

Form NR-6

FISH

Refuge Sand Lake Year 194 50

Species	Relative Abundance	Sport Fishing		Commercial Fishing		Restocking		Number removed for Restocking
		Man days Fishing	Number Taken	No. of Permits	Pounds Taken	Number Stocked	Area Stocked	
Carp	Abundant							
Bigmouth Buffalofish	common							
Sucker	few							
Bullhead	abundant							
Perch	abundant							
Crappie	few							
Blue Gill	few							
Northern Pike	common	3500	1750					

REMARKS:

3-1758
Form NR-8
(April 1946)

CULTIVATED CROPS

Refuge Sand Lake Year 1950

Permittee (If farmed by refuge personnel, so indicate)	Permit No.	Unit or Location	Crops Grown	Avg. Yield per Acre	Permittee's Share		Government's Share or Return				Compensatory Services, or Cash Revenue
							Harvested		Unharvested		
					Acres	Bu. Harvested	Acres	Bu.	Acres	Bu.	
Dennert, S.	18960	21,22,37, 39 & 40	corn	20	30	600			20	400	
			millet	9	40	360			60	560	
			oats	18	100	1800			-	-	
Dinger, G.	17211	15	Barley	12	95	1140			-	-	
	11719	20 & 34	millet	9	-	-			40	360	
			corn	20	43	860			47	740	
			oats	18	35	630			-	-	
Herseth, R.	13221	29,30 & 31	millet	9	10	90			15	135	
			wheat	9	40	360			12	108	
	18696	42	corn	20	15	300			12	108	
			millet	9	-	-			15	135	
			barley	12	20	240			-	-	
Hinderks, J.	18698	38	NON - USE								
Jones, Wm.	11017	1	barley	12	13	156			-	-	
			wheat	9	26	234			-	-	
			corn	20	10	200			20	400	
			oats	18	10	180			10	180	
Kenny, J.	13245	32a	NONE-USE								
Koch, H.	18695	13	millet	9	8	72			4	36	
	RO#3-76	12	non-use								
Koch, W.	RO#3-85	9 & 10	no crop								

Summary of Crops Grown:	Crop	Acreage	Permittee's Share		Government's Share				Total Revenue
					Harvested		Unharvested		
			Acres	Bushels	Acres	Bu.	Acres	Bu.	$

DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS

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

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

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

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

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

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

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

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

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

3-1758
Form NR-8
(April 1946)

CULTIVATED CROPS

Refuge Sand Lake Year 194

Permittee (If farmed by refuge personnel, so indicate)	Permit No.	Unit or Location	Crops Grown	Avg. Yield per Acre	Permittee's Share		Government's Share or Return				Compensatory Services, or Cash Revenue
							Harvested		Unharvested		
					Acres	Bu. Harvested	Acres	Bu.	Acres	Bu.	
Koch, W.	RO#3-85	11 & 14	corn	20	40	800			32	640	
			barley	12	20	240			20	240	
			oats	18	45	810			-	-	
Lahman, F.	13238	7 & 33	barley	12	20	240			10	120	
			corn	20	10	200			5	100	
Mitchell, E.	11307	28	oats	18	14	252			2	36	
			millet	9	-	-			5	45	
Pfutzenreuter, G.	13243	16 - 19	corn	20	52	1040			6	120	
			barley	12	23	276			-	-	
	16213	43	barley	12	-	-			25	300	
			oats	18	6	108			-	-	
Richardson, H.	18699	45	corn	20	-	-			6	120	
			millet	9	-	-			10	90	
	17370	36	barley	12	7	84			-	-	
Sieman, F.	17209	6	barley	9	11	99			4	36	
			corn	20	24	480			11	220	
Scott, A.	13220	32	millet	9	15	135			25	225	
			wheat	9	2	18			8	72	
			barley	12	11	132			8	96	
			corn	20	27	540			8	160	
Scott, F.	17210	7 & 8	corn	20	27	540			6	120	
			millet	9	35	315			-	-	
			barley	12	11	132			6	72	

Summary of Crops Grown:

Crop	Acreage	Permittee's Share		Government's Share				Total Revenue
				Harvested		Unharvested		
		Acres	Bushels	Acres	Bu.	Acres	Bu.	$

DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS

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

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

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

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

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

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

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

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

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

3-1758
Form NR-8
(April 1946)

CULTIVATED CROPS

Refuge Sand Lake Year 1940

Permittee (If farmed by refuge personnel, so indicate)	Permit No.	Unit or Location	Crops Grown	Avg. Yield per Acre	Permittee's Share		Government's Share or Return				Compensatory Services, or Cash Revenue
							Harvested		Unharvested		
					Acres	Bu. Harvested	Acres	Bu.	Acres	Bu.	
Severin, A.	11993	35	oats	18	18	324			-	-	
			corn	20	-	-			9	180	
			millet	9	6	54			3	27	
	17214	44		non-use							
Seiber, W.	13242	3	millet	9	12	108			6	54	
	18697	41		none-use							
Spurr, C.	13239	25	corn	20	8	160			4	80	
	NO#3-27	26 & 27	barley	10	12	120	8	80	-	-	
			Rye	6	12	72			-	-	
Tollefson, B.	17216	5	wheat	9	12	108			-	-	
			oats	18	44	792			-	-	
			barley	12	36	432			25	300	
			corn	20	65	1300			46	920	
			millet	9	15	135			15	135	
Wells, H.	18100	23	oats	18	47	846			3	54	
			corn	20	12	240			25	500	
Wilke, G.	13240	4	corn	20	52	1040			10	200	
			millet	9	-	-			16	144	

Summary of Crops Grown:

Crop	Acreage	Permittee's Share Acres	Permittee's Share Bushels	Government's Share Harvested Acres	Government's Share Harvested Bu.	Government's Share Unharvested Acres	Government's Share Unharvested Bu.	Total Revenue $
Corn	670	415	8300			255	4900	
Millet	315	141	1269			174	1586	
Oats	322	319	5742			3	54	
Wheat	100	80	810			20	180	
Barley	377 1784	279	3291	8	80	98	1164	

DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS

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

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

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

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

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

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

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

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

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

3-1570
NR-8a

REFUGE GRAIN REPORT

Refuge Sand Lake Months of Sept. thru Dec. 1950.

(1) VARIETY	(2) ON HAND BEGINNING OF PERIOD	(3) RECEIVED DURING PERIOD	(4) TOTAL	(5) GRAIN DISPOSED OF TRANS-FERRED	SEEDED	FED	TOTAL	(6) ON HAND END OF PERIOD	(7) PROPOSED USE SEED	FEED	SURP.
Barley	4091	80	4171	128		245	373	3798		1798	2000
Wheat	1864		1864	200		25	225	1639		639	1000
Oats	1630		1630					1630		530	1100
Shelled Corn	218		218	140		30	170	48		48	- - -
Ear Corn	1500		1500					1500		500	1000
								8615			

(8) Indicate shipping or collection points Columbia, South Dakota

(9) Grain is stored at Site No. 2 Elevator

(10) Remarks

NR-8a REFUGE GRAIN REPORT

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

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

(1) List each type of grain separately: Corn, wheat, proso millet, etc. Include only domestic grains; aquatic and other seeds will be listed on NR-9.

(3) Report all grain received during period from all sources, such as transfer, share-cropping, or harvest from food patches.

(4) A total of Columns 2 and 3.

(6) Column 4 less Column 5.

(7) This is a proposed breakdown by varieties of grain listed in Column 6.

(8) Nearest railroad station for shipping and receiving.

(9) Where stored on refuge: "Headquarters grainary", etc.

(10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.

3-1760
Form NR-10
(April 1946)

HAYING AND GRAZING

Refuge Sand Lake Year 1950

Permittee	Permit No.	Unit or Location	Actual Acreage Utilized	Animal Use Months	Tons of Hay Harvested	Period of Use From - To	Rate	Total Income	Remarks
				GRAZING					
Mitchell, E.	RO#3-323	1	320	150		7/16 to 10/31	.50	75.00	
Crawford, G.	17218	3	175	60		8/1 to 10/31	.50	30.00	
Scott, P.	17219	4	200	75		7/16 to 11/15	.50	37.50	
				HAYING					
Bruns, L.	18752	15N	280		79.53	7/16 to 2/28	1.00	79.53	
Dinger, G.	18735	19	120		21.48	"	"	21.48	
Gerdies, H.	18736	14 & 15S	180		29.35	"	"	29.35	
Herseth, C.	18737	6	150		71.44	"	"	71.44	
Herseth, R.	18738	2, 3 & 4	225		106.78	"	"	106.78	
Mitchell, E.	18753	8	100		30.00	"	.75	22.50	
Sieman, F.	18739	7	80		39.20	"	1.00	39.20	
Koch, H.	18740	16S	50		22.55	"	"	22.55	
Pearson, H.	18741	16N	40		16.86	"	"	16.86	
Scott, A.	18742	9 & 10	100		55.05	"	"	55.05	
Tumby, O.	18743	5	40		17.08	"	"	17.48	
Vitense, R.	18744	20	7		5.90	"	"	5.90	

Totals:

Acreage grazed 695 Animal use months 285 Total income Grazing 142.50

Acreage cut for hay 1372 Tons of hay cut 495.22 Total income Haying 488.12

3-1758
Form NR-8
(April 1946)

CULTIVATED CROPS

Refuge Lake Zewaukon Year 1950

Permittee (If farmed by refuge personnel, so indicate)	Permit No.	Unit or Location	Crops Grown	Avg. Yield per Acre	Permittee's Share		Government's Share or Return				Compensatory Services, or Cash Revenue
							Harvested		Unharvested		
					Acres	Bu. Harvested	Acres	Bu.	Acres	Bu.	
Lee, Olaf	17213	C-1	barley	25	27	675			13	325	
Thornberg, B.	17212	C-2	barley	25	20	500			10	250	
Skroch, T.	17215	C-3 & 4	barley	25	40	1000			20	500	
			millet	15	10	150			5	75	
			oats	30	27	810			13	390	

Summary of Crops Grown:

Crop	Acreage	Permittee's Share Acres	Permittee's Share Bushels	Government's Share Harvested Acres	Government's Share Harvested Bu.	Government's Share Unharvested Acres	Government's Share Unharvested Bu.
Barley	130	87	2175			43	1075
Millet	20	15	150			5	75
Oats	43	30	810			13	390
	193						

Total Revenue $

DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS

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

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

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

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

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

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

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

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

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

3-1760
Form NR-10
(April 1946)

HAYING AND GRAZING

Refuge Lake Tamaukon Year 1950

Permittee	Permit No.	Unit or Location	Actual Acreage Utilized	Animal Use Months	Tons of Hay Harvested	Period of Use From - To	Rate	Total Income	Remarks
				GRAZING					
Skroch, T.	18746	G-2	50	49		7/16 to 11/30	.50	24.50	
				HAYING					
Gelinske, J.	18745	B-1	30		12.14	7/16 to 2/28	1.00	12.14	
Skroch, T.	18747	B-3 & 4	15		4.37	"	"	4.37	
Thornberg, B.	18748	B-2	15		34.22	"	"	34.22	

Totals:

Acreage grazed 50 Animal use months 49 Total income Grazing 24.50

Acreage cut for hay 60 Tons of hay cut 50.73 Total income Haying 50.73

WATERFOWL

Refuge Tonawkon - Clouds Lake Months of September to December 1950

(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. Swans:									
Whistling swan									
II. Geese:									
Canada goose Rich.			50	10/22					500
Cackling goose									
Brant									
White-fronted goose									
Snow goose			1300	10/22					2000
Blue goose			200	"					300
III. Ducks:									
Mallard			9000	10/22					18,000
Black duck									
Gadwall									1000
Baldpate									500
Pintail			500	10/22					2000
Green-winged teal									500
Blue-winged teal									1500
Cinnamon teal									
Shoveller			400	10/4					2500
Wood duck									
Redhead									500
Ring-necked duck									
Canvas-back									300
Scaup			200	10/22					1500
Golden-eye									
Buffle-head									
Ruddy duck			260	10/4					2000
IV. Coot:									1000

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 34,100

Peak waterfowl numbers 11,910

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.

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

2338

WATERFOWL

Refuge Dakota Lake Months of September to December 194 50

(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. Swans:									
Whistling swan									
II. Geese:									
Canada goose Can.									100
Cackling goose									
Brant									
White-fronted goose									
Snow goose			600	10/15					2000
Blue goose			150	"					500
Richardson's			750	10/22					3000
III. Ducks:									
Mallard			1500	10/22					10,000
Black duck									
Gadwall									500
Baldpate									500
Pintail									2000
Green-winged teal									500
Blue-winged teal									2000
Cinnamon teal									
Shoveller									500
Wood duck									
Redhead									
Ring-necked duck									
Canvas-back									
Scaup									500
Golden-eye									
Buffle-head									
Ruddy duck									200
IV. Coot:									500

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 22,000

Peak waterfowl numbers 3,000

Areas used by concentrations South half of refuge

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.

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

2338

WATERFOWL

Refuge Maple River Months of September to December 1950

(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. Swans:									
Whistling swan									
II. Geese:									
Canada goose Com.									50
Cackling goose									
Brant									
White-fronted goose									
Snow goose									
Blue goose									
Richardson's									250
III. Ducks:									
Mallard									2000
Black duck									
Gadwall									100
Baldpate									150
Pintail									
Green-winged teal									500
Blue-winged teal									1000
Cinnamon teal									
Shoveller									
Wood duck									
Redhead									
Ring-necked duck									
Canvas-back									
Scaup									
Golden-eye									
Buffle-head									
Ruddy duck									400
IV. Coot:									500

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 4,950

Peak waterfowl numbers _____

Areas used by concentrations 2 potholes at northeast end of refuge

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.

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

2338

REFUGE Lake Elsie

WATERFOWL

MONTHS OF _____ to _____, 19___

(1) Species	(2) First Migrants Seen		(3) Peak Concentration		(4) Last Migrants Seen		(5) Young Produced		(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
1. Swans:									
Whistling swan									
2. Geese:									
Canada goose									
Cackling goose									
Brant _____									
White-fronted goose									
Snow goose									
Blue goose									
3. Ducks: *									
Mallard									5000
Black Duck									
Gadwall									500
Baldpate									500
Pintail									2500
Green-winged teal									
Blue-winged teal									3000
Cinnamon teal									
Shoveller									500
Wood duck									
Redhead									100
Ring-necked duck									
Canvas-back									100
Scaup									500
Golden-eye									
Buffle-head									
Ruddy duck									500
4. Coot:									1000

* Based on reports of local warden

3-1750
(June 1949)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese_____

Ducks_____

Coots_____

Total waterfowl usage during period 14,200

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.

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 analysis of the rest of the form.

61355

WATERFOWL

REFUGE Stony Lake MONTHS OF September to December, 1950

(1) Species	(2) First Migrants Seen		(3) Peak Concentration		(4) Last Migrants Seen		(5) Young Produced		(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
1. Swans:									
Whistling swan									
2.* Geese:									
Canada goose (com.)									50
Cackling goose									
Brant									
White-fronted goose									
Snow goose									250
Blue goose									
Richardson's Goose									250
3. Ducks:									
Mallard									5000
Black Duck									
Gadwall									
Baldpate									
Pintail									3000
Green-winged teal									
Blue-winged teal									2000
Cinnamon teal									
Shoveller									500
Wood duck									
Redhead									3000
Ring-necked duck									
Canvas-back									3000
Scaup									2000
Golden-eye									
Buffle-head									
Ruddy duck									100
4. Coot:									1000

* Estimated populations from reports of local warden

Form NR-1

3-1750
(June 1949)

(over)

SUMMARIES

Total Production:

Geese_____

Ducks_____

Coots_____

Total waterfowl usage during period 20,150

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.

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

61355

SD-SDL-511

NO. 1: Oct. 1950 - Fishermen caught many Northern Pike weighing 8 to 10 lbs. at the Neola Recreation Area.

SD-SDL-512

NO. 2: Oct. 1950 - 200 fishermen were counted at one time on the Neola Recreation area - 3500 used the area during the period.

SD-SDL-513

NO. 3: 10/10/50 - Snow and Blue Geese gather at one of their favorite resting spots - Silo Bay.

SD-SDL-514

NO. 4: 9/50 - Small grain is swathed and left in the field for Geese and Ducks to feed on - 600 to 900 acres of all grains are consumed by waterfowl each fall at Sand Lake.

SD-SDL-515

NO. 5: 10/50 - Disced corn proved to be one of the favorite goose feeds. The flock feeding in this 10 acre field numbered about 15,000.

SD-SDL-516

NO. 6: 10/50 - Canada and Snow Geese feeding on disced corn. By proper timing of corn discing the goose flock movements were manipulated to best advantage.

SD-SDL-517

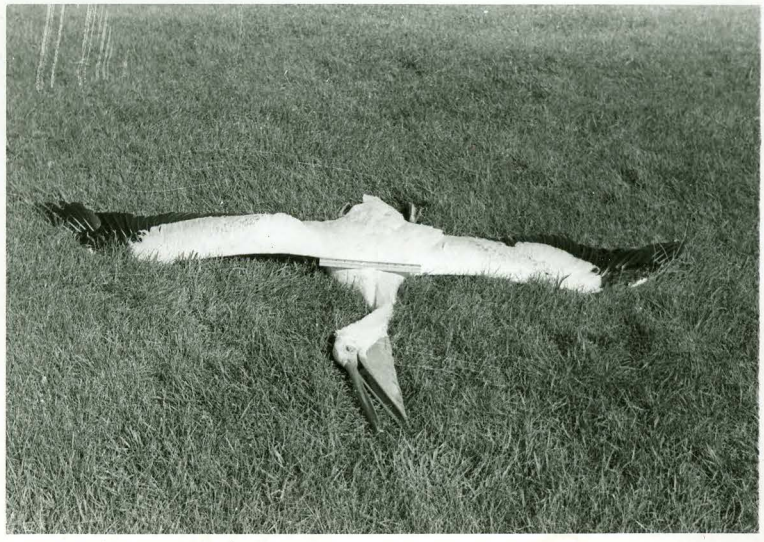
NO. 7: 10/50 - As many as 1,000 goose-hunters line up along our 52 miles of boundary fence creating a tremendous patrol problem.

SD-SDL-518

NO. 8: 10/50 - When weather conditions are right hunters get many geese near Sand Lake Refuge.

SD-SDL-519

NO. 9: 11/50 - The daily limit of geese and ducks in S. D. Our field investigations showed a kill of 10,000 geese plus 3,000 cripples for a total kill of 13,000 geese adjacent Sand Lake.



SD-SDL-520

NO. 10: 10/50 - Some hunters even mistake Pelicans for Snow Geese. This bird had a 7 foot wing spread.

SD-SDL-521

NO. 11: 11/50 - After freeze-up as many crippled geese and ducks are captured as possible. Harvey Nelson & Leo Kirsch.

SD-SDL-522

NO. 12: 11/50 - Crippled geese are placed in our "duck hospital". Artesian well provides open water all winter. Geese are distributed for decoys in spring. J. Stoudt and Leo Kirsch.

SD - SDL - 523

NO. 13: 11/50 - Yearling White-tailed deer dislocated shoulder while crossing ice on Sand Lake.

SD - SDL - 524

NO. 14: 12/50 - Three weeks of feed and rest in refuge barn repairs damaged shoulder. Deer ready for release.

SD-SDL-525

No. 15: 9/50 - Over 400 yeards of oversize gravel were hauled on Dakota Lake dike to repair flood damage. E. Kaastad on blade.

SD-SDL-526

NO. 16: 9/50 - Sloping eroded bank in front of headquarters. E. Podoll operating dragline.

SD-SDL-527

NO. 17: 9/50 - Eroded bank at headquarters before and after sloping. E. Podoll operating dragline.

SD-SDL-528

No. 18: 9/50 - More than 1/4 mile of eroded bank at HQ was sloped and rip-rapped with broken founiation material and fieldstone. Harvey K. Nelson inspecting.

SD-SDL-529

NO. 19: 10/50 - E. Podoll operating Unit dragline to load oversize gravel on Oshkosh at refuge gravel pit.

SD-SDL-530

NO. 20: 10/50 - Spring (1950) flood damage required hauling over 4,000 yards of rock and gravel on Mud Lake dike. Clair Bollinge watching operations. E. Kaastad near tractor, FWD dump truck and 40 Cat.

SO-SOL-531

NO. 21: 9/50 - 1/4 mile of Columbia dike was brought up to grade with 1,000 yards of dirt and surfaced with 500 yards of gravel. John Nowak on D7-Scraper and Harvey Nelson at level.

SO-SOL-532

No. 22: 11/50 - 35 loads of heavy rock and gravel riprap were placed on the approaches and wing-walls of our newly constructed Columbia control gate to prevent erosion.

SD-SOL-533

NO. 23: 10/50 - Weismantle Grade, badly damaged by spring flood (1950) is repaired and resurfaced.

SD-SOL-534

NO. 24: 10/50 - To prevent flooding of a good agricultural field within the refuge, 1/4 mile of patrol road was raised with 600 yards of dirt. John Nowak operating the D7-Scraper Unit.