

ROUTING SLIP

BRANCH OF WILDLIFE REFUGES

DATE: MAY 21 1951

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and

STENOGRAPHERS:

NARATIVE REPORT

REFUGE: MUD LAKE

PERIOD: JANUARY-APRIL, 1951

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MUD LAKE NATIONAL WILDLIFE REFUGE

Narrative Report

January - April, 1951

I. GENERAL

A. Weather Conditions

Following is a tabulation showing a comparison between weather conditions of the period just past, and the same period of 1950:

Month	Snowfall		Precip.		Maximum Temperature		Minimum Temperature	
	1950	1951	1950	1951	1950	1951	1950	1951
Jan.	18.5	.25	None	None	26	36	-36	-37
Feb.	None	5.22	None	None	35	38	-32	-31
Mar.	6.5	14.5	None	None	44	44	-26	-15
April	<u>21.7</u>	<u>.15</u>	<u>.24</u>	<u>1.08</u>	<u>51</u>	<u>65</u>	<u>-4</u>	<u>18</u>
Total	46.7	20.12	.24	1.08	51	65	-36	-37

While regions in the southern part of Minnesota experienced one of the most severe winters in many years, it is apparent that 1951 was quite moderate in this area as compared to 1950.

Periods of sub-zero weather were not as prolonged, nor did temperatures reach the extremes that were recorded in 1950. Snowfall was considerably less.

Within a distance of 30 miles to the east however considerably more snow fell than we received in the Mud Lake vicinity.

Break-up commenced approximately one month earlier than in 1950, although it did take the better part of the month of April to finally clear all pools and ditches of ice.

B. Water Conditions

As of April 1 it appeared that we would not have too great a water problem this year - due to the fact that several of the pools had been drawn down while one of them entered the winter months bone-dry. Mud Lake had been held at slightly below normal throughout

the winter but gates were opened on February 28, and the pool was dropped, so that little water remained, other than a minimum in the borrow pits - it was dropped low enough so that the upstream opening of the Ditch 11 control was exposed.

In spite of this pools commenced to fill by the 10th of April - then with gates open levels continued to rise until we finally attained the highest levels (excepting the 1950 flood) since the writer entered on duty at this station.

The greatest source of supply, of course, has been Thief River and Ditch 11 - other laterals, Webster, and Mud River commenced dropping about April 20th. Ditch 11 and Thief River have continued to pour in a great volume of water, and as of this date (May 1) it appears as if we have hit the crest.

Along with the high water levels we have had three days of steady south and east winds which have proceeded to chop on the dikes to the extent that additional repairs and fills will be required - as per usual.

The only explanation we can offer for the abnormal run-off being experienced is heavier snowfall in the Beltrami country, and the fact that a considerable ditch-cleaning program to the east has resulted in acceleration of the flow into the refuge impoundments - this coupled with the limitations on releasing sufficiently large volumes quickly, and the restricted capacity of the Thief River channel to handle the release (our water cannot get away fast enough) are in our opinion the basic reasons for our water difficulties.

The proposed additional ditch cleaning work to be accomplished in the next several years will definitely aggravate the problem. As we predicted two or three years back - we are going to be in trouble from now on - unless something is done toward increasing the capacity of Thief River channel. Along with this we will need greater release capacity for Green Stump, Mud Lake, and Madsen.

One additional cause for the quicker build-up in Mud Lake is due in part to the heaving of the North and South spillways - the North spillway has not functioned as of this date - and that with water levels

1.7' high - it should have started spilling when Mud Lake levels reached .75' over normal. The south spillway is perhaps from .4 to .7' high, and should start spilling at .25' over normal.

Pools levels as of April 30 compared to one year ago:

	1950	1951
Mud Lake	2.24' high	1.68' high
Green Stump	.5 ' high	6" high
Madsen	2.0 high)	6" high
Headquarters	2.0 high)	.46" high
South	2.0 high)	.5 ' high
East	2.0 high)*	normal
CCC	2.0 high)	.5 ' high
Mud River	2.7 ' high)	1 " high
Webster	2.7 ' high)	1 ' low
Northwest	2.0 high)	1.18' high

* Approximate. Impossible to tell exact levels - no gauges and too much water.

C. Fires

As would be expected the fire hazard this past period has been nil. With most of the refuge area well covered with water, and adjacent farm lands in a very moist condition it would have been impossible for any dangerous hazard to develop. Some burning has been done in and outside of the refuge. Greater troubles have been experienced in obtaining clean burns than in controlling going fires.

II. WILDLIFE

A. Migratory Birds

1. Populations and Behavior

The spell of the long, cold winter was finally broken by the appearance, on April 4, of our first flock of migrant ducks. The following day, mallards, blacks and canvas-backs were also observed, along with the pintails observed the previous day. The remainder of the species reported on the NR form put in their appearance about as expected for a normal migrational pattern. One exception might be the bufflehead which was a week or ten days tardy this year. (See Table #1)

Species	1948		1949		1950		1951	
	Date First Observed	No. for Period	Date First Observed	No. for Period	Date First Observed	No. for Period	Date First Observed	No. for Period
Whistling Swan	4-27	100	4-11	50	4-25	40	4-24	10
Canada goose	3-25	1500	3-31	2200	4-15	800	4-7	700
Mallard	3-19	1300	4-2	11500	4-6	8000	4-5	16000
Black Duck	4-20	100	4-14	50	4-24	50	4-5	100
Gadwall	4-20	2000	4-13	3500	4-25	700	4-16	1500
Baldpate	4-10	4000	4-10	3000	4-26	1500	4-18	2000
Pintail	4-13	2000	4-3	1000	4-18	2000	4-4	4500
G.W. Teal	4-23	50	4-17	50	-	-	4-19	250
B.W. Teal	4-19	2500	4-16	2000	4-19	1500	4-20	6000
Cinnamon Teal	-	-	-	-	-	-	-	-
Shoveller	4-17	200	4-14	500	4-25	500	4-17	350
Wood Duck	4-13	50	4-7	60	4-25	50	4-19	25
Redhead	4-19	400	4-10	1250	-	-	4-25	400
Ringnecked Duck	4-17	2000	4-10	7000	4-21	1000	4-18	10000
Canvasback	4-17	100	4-10	1500	-	-	4-5	350
Scaup	4-17	20000	4-9	13000	4-21	3500	4-10	14000
Goldeneye	4-8	3000	4-4	5000	4-17	3000	4-9	8000
Bufflehead	4-13	1500	4-9	200	4-24	1000	4-20	900
Ruddy duck	4-25	300	4-29	50	-	-	4-29	150
Coot	3-25	2000	4-11	4000	4-19	2000	3-28	1500

Table #1 - Comparison of Arrival Dates and Numbers for the Period for years 1948 - 1951.

As usual, the first arrivals found practically all pools still frozen over and were forced to utilize areas of open run-off water outside the Refuge while waiting for Refuge pools to open up. This was especially true along our north and west boundaries where fairly large concentrations of birds were observed on flooded grain stubble fields. Sufficient spring run-off water had accumulated in our previously drained Northwest and Webster Creek Pools to permit waterfowl utilization only a day or two after the first arrivals were recorded. Although new ice was formed every night until the later part of April, more optimum conditions prevailed with some warmer days resulting in an increase in run-off water depths and the breaking-up of ice fields in the pools.

In general, populations of all species of waterfowl increased this year. Most notable gains were shown by the dabblers (Mallards, Pintails, Blue-winged Teal) and Goldeneye. (See Table #1).

A good majority of the migrating birds have continued northward at this writing and remaining birds are actively engaged in the various and sundry tasks concerning the reproduction of their kind. From all appearances, a very good year is in the offing for waterfowl at this station. Relatively high water elevations (mentioned under water conditions) apparently will not hamper nesting activities of dry land nesters to any great extent since adequate dry land areas are available.

A new chapter was started March 11, 1951 in the story of the establishment of a resident goose flock for the Mud Lake Refuge. On that date 78 adult Canada geese were received from the Swan Lake Refuge via truck transport. All 78 geese survived the freezing 700 mile trip and were released at Headquarters in the chicken yard holding pen. Our losses to date have been very slight. One badly crippled goose died the day following their arrival while a second badly wounded bird died four days later. Seven additional geese were received from the Minn. State Conservation Department on March 12, 1951. Eighty geese were pinioned and banded March 16, 1951 under the direction of Pilot-Biologist Glahn. The hot steel bar pinioning technique was employed during the pinioning operation.

The disappearance of three geese before the banding and pinioning operation is cause for some conjecture. The only probable explanation is that three of the supposedly pinioned geese received from the Minn. Conservation Department weren't adequately pinioned and merely flew away.

Upon several different occasions, two and three geese have dropped into the small holding pen with the captive birds. Leg bands have been observed on at least two of these visiting geese and we can hope that they are geese that were banded at this station in the spring of either 1948, 1949, or 1950 as goslings transferred from the Seney Refuge.

Crowded, unsanitary conditions in the holding pen forced the construction of a 12-15 acre temporary goose pen. This pen was completed April 27, 1951 with the assistance of local volunteer labor and the pinioned flock was transferred from the holding pen to the temporary pen the same date. (Completion of the permanent pen is still being delayed due to the inability of the contractor to fill our order for fencing materials). Nesting activities were started by one pair of geese almost as soon as the pinioned birds were released in the temporary pen. Only two other pairs have indicated mating tendencies at this date (May 6, 1951).

We are also encouraged by the occasional appearance of from 6-12 banded geese in the vicinity where goslings were released during the spring seasons of 1948, 1949, and 1950, after transfer from the Seney Refuge. One or two other banded, paired geese have also been observed in the immediate area and it is possible that we may produce from four to six broods of goslings. If so, it will be the first record of that kind in this vicinity for the past forty years.

The fish-eating birds, especially the mergansers and double-crested cormorants are here in about the usual numbers (see NR forms) as in other years. These birds are finding exceptionally good fishing below our controls and spillways on spring-run minnows and larger fish.

Shorebirds are never common at this station during the January-April period and this year was no exception. Observations were recorded on only three

occasions on Yellow-legs. Two greater yellow-legs and one lesser yellow-legs were the only observations recorded during the period.

2. Food and Cover

Very little food was available to waterfowl on the Refuge until the last two weeks of the period. Food was present but unobtainable under the thick layers of ice until run-off waters and stiff winds began to open up the ice fields.

Good use of the cattail, sedge, and phragmites cover was obtained during the more adverse weather conditions prevailing throughout the first three weeks of April. Strong winds, quite often laden with snow, forced most of the dabblers to seek protection. Even the more hardy divers, scaup and goldeneye especially, had a tendency to concentrate near the lee-side of protecting vegetation.

B. Upland Game Birds

1. Population and Behavior

Observations made by Refuge personnel during approximately ninety six miles of deer browse transect coverage, indicate that the populations of our two most common upland game birds (ruffed and sharptail grouse) have not changed to any great extent. Very slight increases might safely be recorded for the above two species if a more definite commitment is desired.

A limited number of observations have been made on Hungarian partridge and it is believed that this comparatively rare bird (to this Refuge) is on the increase. Many periods have passed in the past when not even a single observation was recorded for this species.

No pheasants or prairie chickens have been seen this period, nor have they been recorded the past several periods. It is feared that they have passed to the extinct list as far as this Refuge is concerned.

Some predation by Great Horned Owls has been observed during the winter. Although the extent of this predation is not too great, we are none the less destroying Great Horned Owls when ever possible because of their general destructiveness to all types of small

game.

2. Food and Cover

A relatively mild winter with shallower snow depths than in previous years afforded much easier going for upland game birds. Ruffed grouse, especially, had much better going as the bulk of the snow was drifted in at the edges of woods and thickets, presenting a shallower and more uniform depth in the interior of such places.

Berries and fruiting bodies remained on trees well into the winter as is illustrated by the finding of highbush cranberries, in good palatable condition well into January and February.

3. Disease

No evidence of disease during the period

C. Big Game Animals

Moose

1. Population and Behavior

The aerial census of February came up with a very gratifying increase of the moose population over the 1950 count. Both State and Service personnel were in agreement within a very slim margin of difference. The 1951 count (Service) indicated a (February) moose population of 49 animals, while the State counted 47.

This compares to the 1950 count of 31 moose. The November, 1950 count also showed a total of 33 adults and 14 calves, which indicated a very satisfactory 1950 calf crop in spite of the severe flood conditions.

Moose were again fairly well spread throughout the willow areas. (See map #1) A comparison between the November and February plane counts indicate that "shifts" during that period were common, although it again showed that moose make no effort toward concentrating in any one particular area for the winter months. Nineteen animals were observed on the former "closed" area during the November census, while 22 were in this same area in the February census. Family groups, and singles showed the usual "shift" but it does appear that movements in this period might aver-

age no more than a mile or two.

The Headquarters pool area again wintered three moose - this is the fourth consecutive year that three moose have wintered here - and three of those years the groups has consisted of a cow with twin calves - whether or not it is the same cow is anyone's guess.

Bull moose were still carrying antlers during the February census. One freshly dropped antler was picked up on March 27th - estimated to have been dropped no earlier than March 10-15th.

2. Food and Cover

As determined from the browse survey study accomplished this past month food and cover conditions are improving annually. There has been a vast increase in the quantity of willow browse, although a decrease in aspen was also recorded - due to the lack of aspen sites - and no doubt to drowning out during the 1950 flood.

Moose and deer continue to indicate every sign of complete compatibility - the moose browsing willow from about breast high and upwards to 9 or 10 feet - the deer taking the browse from about eye level and down to approximate snow level.

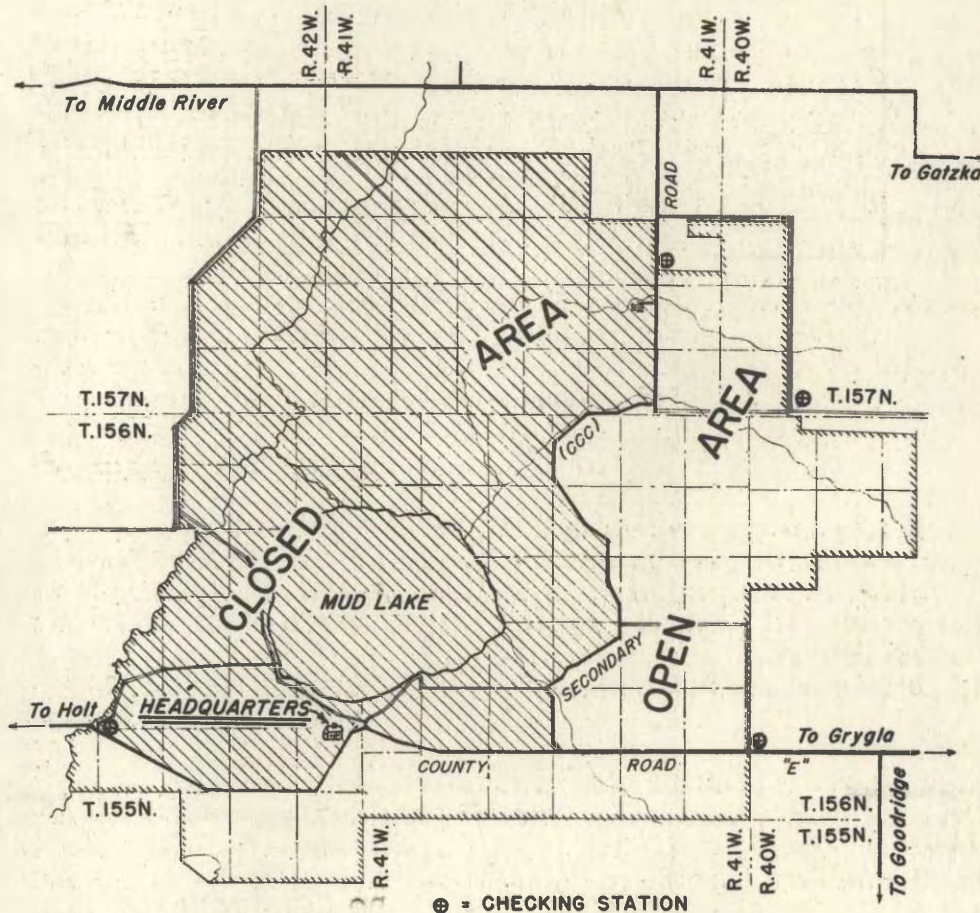
Willow continues to be the "manna" for this area - the more it is browsed the more it sprouts.

The eventual optimum moose population to be sustained is at present in the undetermined stage. We are in the process of working up all population, mortality, and browse survey data, and expect to come with a reasonable recommendation within a month or two.

3. Disease

Not one moose casualty has been observed during the past year - and this after covering more than 100 miles on snowshoes, and almost daily field checks while in the course of deer trapping, and other outside studies, and maintenance, and patrol activities.

MUD LAKE NATIONAL WILDLIFE REFUGE



Location of Individual Moose

RIFLE HUNTING REGULATIONS - FOR TAKING OF DEER ON OPEN
PORTION OF MUD LAKE REFUGE

ALL HUNTERS HUNTING WITHIN THE BOUNDARIES OF THE OPEN PORTION OF MUD LAKE REFUGE MUST COMPLY WITH THE FOLLOWING SPECIAL REGULATIONS:

1. Possess a State big game license for the 1949 season.
2. Comply with all State laws in connection with the hunting of deer.
3. Entrance on open refuge lands will not be permitted before 6:00 a.m. of each day of season.
4. Hunting will not commence before sunrise, and must cease at sunset.
5. All hunters must be out of refuge by 6:00 p.m. of each day.
6. All hunters must deliver the livers of deer taken on the Refuge to the checking stations for examination.
7. Random selection of 100 hunters will be made, and each will be provided with a container for collecting approximately 1 quart of stomach contents.
8. Hunters should not remove ear tags from any deer taken until checked through checking stations.
9. All entry and exit from refuge lands must be made through authorized checking stations.
10. All hunters must agree to the weighing of deer carcasses, and the examination of teeth and antlers of any deer taken on refuge lands, before leaving the refuge area.
11. Extreme caution, by each hunter must be taken to avoid possibilities of accidental shooting of other hunters - MAKE SURE OF YOUR TARGET.
12. Extreme caution should be taken by each hunter to avoid the shooting of moose - minimum penalty is \$100.00 fine plus loss of gun.
13. It is proposed to remove up to 600 deer from refuge lands - hunting on refuge lands will automatically cease upon attaining that number.

YOUR COOPERATION WILL BE APPRECIATED.

Deer

1. Populations and Behavior

The aerial big game count for this past year showed that the deer population no more than held its own over one year ago. It might be mentioned that we predicted this following the 1950 flood, when a very definite loss of deer was observed.

The 1950 count was recorded at 850 deer, while the 1951 count totaled 864. It is possible that a few more deer wintered outside of the refuge boundaries - due to a comparative mild winter and reasonable snow depths.

As usual the deer were spread throughout the entire "upland" area of some 30,000 acres. As usual no evidences of "yarding" was observed, and again as usual deer continued to show much shift and movement throughout the entire winter period.

2. Food and Cover

As mentioned in the discussion on moose willow has continued to increase in production, and deer again depended on this brush species for their food staple. Further detailed browse surveys also indicated extensive usage of golden-rod, aster, and other annuals. Use of thistle and nettle was rather surprising, but as stomach analyses indicated high use of these two annuals in early November we are not concerned as to the possibilities of its consumption as a "stuffing" food. Apparently it is simply an attempt to spread out the usual fare - as it is taken during the time of year when there is easy access to numerous other annuals - other herbaceous plants, clovers, alfalfa, etc.

Lack of deep snows made it possible for the deer to navigate more freely than usual, and as a result even the runty fawn specimens found it easy going, and experienced little trouble in obtaining sufficient food.

3. Disease

A number of animals were handled in the traps - all were weighed, and frequent field observations corroborated past years observations to the effect that

the Mud Lake deer herd is in excellent physical condition. There was no evidence of disease in any of the animals observed.

The most extensive winter coverage yet made on the area revealed a new "low" in winter losses. One runty fawn was found - this animal dying in late winter, and an example of nature's harsh method of disposing of physical misfits. The only other mortality known was the large male deer killed by a transient timber wolf - newspaper write-up in appendix.

Miscellaneous

All data gathered over the past five years has been summarized in the form of a Big Game Management Plan, and we have progressed sufficiently so that we hope to submit this plan within the next month or two.

D. Fur Animals, Predators, Rodents and Other Mammals

1. Fur Animals

Mink

Mink sign and observations prior to last fall's trapping season indicated a good take was in the offing for trappers but trapping results did not bear this out. Only 29 mink were taken. Very poor results when one considers the comparison between that and the 68 taken the previous year and considered a new low for mink trapping taken at that time. Mink sign throughout the winter, following the trapping period in December, remained scarce until the first part of April. At that time tracks and other sign became more abundant until the period from 4-5 to 4-25. During this latter period, mink were very commonly observed roaming the spoilbanks and ditchbanks in search of prey.

In general, it is felt that our mink population is greater than that indicated by trapping returns. A greater initiative by trappers to work the more inaccessible areas would no doubt increase their take considerably.

More definite information on the movements and numbers of this animal will be known following the study to be carried out this coming summer and fall by a graduate student from the University of Minnesota.

Muskrats

Nine muskrat trappers, under permit, took 5,949 muskrats during the special season from Dec. 1-31, 1950. This total was just 51 rats short of the 6,000 quota originally set following the pre-trapping season house count. The very common occurrence of rats this spring following the break-up indicates a plentiful surplus for breeding and reproductive purposes. Perhaps a greater number of rats could well have been taken during the trapping season considering the damage they do to certain sections of dike.

Beaver

No beaver trapping permits were issued last fall or this spring. Our estimated beaver population of from 90-110 animals is not sufficiently large to necessitate a removal program and the trouble they cause to controls and drainage ditches is nil. On the contrary, a few dams are so located in back-area sloughs that they are beneficial rather than detrimental.

The beaver listed on NR-4 were taken in May, 1950 (after the annual report of fur harvest) and consequently would be shown on NR forms for this period although they were trapped nearly a year ago.

Skunks

The skunk population is down considerably from that of one year ago. Constant removal "when possible" has resulted in at least 100 of these predators being removed within the last year. Fifteen have been removed by the writer while enroute to and from the Headquarters site. Still more have been removed by State Warden Liemandt while on the area.

Although total skunk numbers are now down somewhat, some additional control work might be advisable considering the competition between dry-land nesters and this predator. Grass covered spoilbanks, ditch banks, and hay meadows are used by several species of waterfowl for nesting and loafing sites, and it is these same areas that skunk are most commonly observed.

Weasel

Only four weasel were taken during the recent trapping season. A new low when compared with the previous trapping season when 20⁴ were taken. Not too much "sign" was noted during the previously mentioned 96 miles walked in connection with the deer browse survey. It is the general concensus of opinion among personnel at this station that the population of this predator is very low. This should increase our nesting survival percentages somewhat.

Red Fox

Another "decrease" may be recorded for this species. Only one was taken by predator trappers during the season. A total of only five were observed during the two "100% coverage" big-game census flights in November and February. An occasional animal has been seen in the Northeast corner of the Refuge but other than that, evidence of their presence has not been common.

Coyote

The coyote, like the red fox are not numerous enough to be considered detrimental to other forms of wildlife on the area. An occasional coyote was observed during the winter and early spring months but such observations were much more the exception than the rule. One deer kill was reported by plane hunters but verification of this was impossible because of the distance and remoteness of the region.

Timber Wolf

One deer kill was known to have been the result of an attack by a timber wolf. As far as can be determined, this wolf was in transit through the Refuge and took what he could get on the way through. (See appendix for news release and more detail.)

Black Bear

It is doubtful that bear now inhabit the Refuge. The last known evidence of their presence was the one shot in the fall of 1949.

Badger

Badger may be increasing slightly, as was stated in the last Narrative Report. None have been seen as yet this spring although some activity around dens has been noted.

Raccoon

Raccoon numbers are definitely on the increase. Many were observed during the period 2-26 to 3-12 and their sign is commonplace along ditch banks and dike roads. Such an increase may result in considerable destructiveness to waterfowl nesting attempts when consideration is extended to the type of denning activity employed by the majority of raccoons on this area. The scarcity of den trees promoted the 'coons well known adaptability to the extent that most of them are located in bank dens in spoilbanks and ditchbanks. As was mentioned before, such locations are favored nesting sites for many species of waterfowl.

Bobcats

No sign of this predator during the period although we know they are in the area. Five were taken by one predator trapper during the period.

This animal, like the fox and coyote, may be increasing very slightly, but definitely not in numbers great enough to cause concern.

Rabbits

Snowshoe rabbits are still increasing as reported in past narratives. Although they are fairly abundant in certain areas, no serious competition exists between them and deer for the various browse species.

At least twenty snowshoe rabbits were trapped during the deer tagging period and destroyed. Many more tripped the trigger mechanism of the traps but were able to burrow out and escape. Needless to say, they were a nuisance around trap sites and caused many lost trap nights.

Cottontail rabbits are not common. An occasional one is observed during the winter months and one was unfortunate enough to be found in a tripped deer trap.

Porcupine

Porcupine damage has been observed in the spruce-tamarack timbered areas around Whiskey Lake and south of Kelly Ridge. All animals observed (5) were destroyed when discovered but this will certainly not offset their apparent population increase. Greater control measures will be initiated in the event that the extent of porcupine damage warrants additional attention.

E. Predacious Birds, Including Crows, Ravens, and Magpies

Ravens were a common sight all through the winter months. Flights of from 12-15 birds were observed during the February big game census flight. As has been reported in recent narrative reports for this period, the raven population is still increasing. It might be stated at this time, however, that it is not definitely known whether or not they nest on the Refuge.

Magpies were also numerous during the winter. We are fairly sure that this bird does not nest on the area. A great majority of them disappeared about the last of March and the last observation was recorded on the 20th of April.

Great Horned Owls are residents on the Refuge. The population of this predatory bird remains more or less stable - perhaps increasing very slightly. They continue to prey upon muskrats as well as other available rodents and cause some losses in our upland game birds. (See Upland Game Birds)

Snowy Owls went unobserved until 4-~~30~~¹⁸-51 and it is believed that the four birds noted were only migrating northward and stopped off for a short stay at the Refuge. They were out of the area again by May 2, 1951.

Marsh Hawks made their first appearance this spring on the fifth of April. Within a week they were a fairly common sight as they hunted over the marshes and meadows. At this date most migrating

birds have passed on through the refuge and those remaining have begun nesting operations.

Both Bald and Golden eagles were in evidence the first and second weeks in April. Approximately two dozen Golden eagles and from eight to twelve Bald eagles were present during that period. Although one or two Golden eagles usually are around the Refuge during the summer, no evidence of their nesting here has ever been recorded.

F. Fish

An abundance of minnows, as well as fingerling and larger northern pike were observed in the run-off waters below controls, spillways, and in ditches. These in addition to several species of rough fish made their way into Refuge waters via the outlet and diversion ditches. The deep solid freeze of all Refuge waters normally results in a winter kill of practically all fish in the area.

III. REFUGE MAINTENANCE - DEVELOPMENT

A. Physical Development

Goose Pen

Work on the construction of the 145 acre goose pen continued on into January. The dragline was operated into the winter months with the hopes of completing the majority of the dike work. All was completed with the exception of the extreme north-east corner, which should be no more than a week's job in good weather.

Well drilling commenced in February. The machine was rented from a local well-driller, and was operated by Messrs. Forder and Davidson until Mr. Davidson left on annual leave. The local driller took over at this point (116 feet down) and completed the well at a total depth of 209 feet - and donated his services.

It was hoped that the dike materials would be in satisfactory condition for placing the fence, but a long dragged out spring prevented this. In order to get the geese out of their poultry-run quarters behind the barn it was believed most necessary to

erect a temporary pen of limited size.

A pen of approximately 12-15 acres in size was fenced - in spite of frost, mud and rain, and the geese were moved out as of April 27th.

It is believed that the geese can be placed in the permanent pen by July 1, providing we get some percentage of luck with weather, dike repairs, etc.

Maintenance

Dikes and Control structures

Attempted repair of break in Mud River dike, but failed - entire dike riddled by muskrats.

Removed stop-logs and operated gates in accordance with approved levels.

Removed beaver dam from ditch in CCC pool.

Removed snow from dike tops and spillways.

Burned about 5 miles of dike to facilitate mowing and blading.

Accomplished 12 miles road blading.

Buildings

Cleaned out warehouse in preparation for constructing living quarters for graduate student, and Student Assistant.

Spring cleaning of grounds, with gathering up of all scrap, and old "metal", completed survey, prepared informal bids and sold to local buyer.

Spring cleaning of building interiors.

Cleaned sewage lines on two occasions.

Equipment

Jeep - new U-joint, generator overhaul, speedometer cable, 5,000 mile and safety check-up.

Ford pickup - fuel pump repair, plus 5,000 mile and safety check-ups.

Int. pickup - point & condensor, plus 5,000 mile and safety check-ups.

Int. dump - new door glass, plus 5,000 mile and safety check-ups.

Reo stake dump - 5,000 mile & safety check-ups.

Farmall tractor - complete motor overhaul - new rings, bearings, valves, etc.

Power maintainer - installed new fuel transfer pump.

Dragline - new cables, new grease lines, new bucket hooked up and complete motor overhaul.

Power lawn mower - motor overhaul, and new paint job.

Light Plant (1500 KV) new fuel pump installed.

Repaired and refinished one flat bottom ~~bottom~~ boat.

Repaired deep well pump.

Repaired well-rig to place in use.

Miscellaneous

Trip to Swan Lake Refuge (Missouri) and made delivery of 75 geese to Mud Lake.

Trip to Arrowwood Refuge, and made delivery of 187 bushels mixed grain for feeding geese.

Trip to Norris Camp on property surveys, and pick up property.

Cut, sawed and delivered 3.6 cords wood to refuge buildings.

Controlled burning on 900 acres of marsh and uplands - in preparation for farming, haying on old unused areas, and also for facilitating dike maintenance.

Salvaged 116 feet of pipe for use in goose pen well - had to pull from ground.

Trip to Norris Camp for snow plow, and scrap lumber.

Pointed 100 posts for use in goose pen.

Trip to Crookston for repairs.

Constructed two hoppers for goose pen - also gravel troughs.

Constructed 7 new stop-logs for Green Stump auxiliary, and two for Headquarters.

Shipped out 472 lbs. sweet clover seed for Sand Lake.

Shipped out 120 lbs. sweet clover seed to Horicon.

Restrung telephone lines following windstorm.

Repaired 3 equipment shed doors.

Completed aerial big game census.

B. Plantings

1. Aquatics and Marsh Plants

Nothing accomplished.

2. Trees and Shrubs

None planted.

3. Upland Herbaceous Plants

None planted.

4. Cultivated Crops

Nothing accomplished

C. Collections

1. Seed and other Propagules

None

2. Specimens

None

D. Receipts of Seed and Nursery Stock None

IV. ECONOMIC USES

A. Grazing

No grazing permits were issued during the period. Several permits have been issued since the close of the period covered by this Report and will be included in the May-August Narrative. Indications, however, are that better utilization of grazing areas will be attained this year since high waters probably will not be a limiting factor as they were last year.

B. Haying

As with grazing, no haying permits were issued during the period. Several permits were issued, however, at the start of this period and they, also, will be covered in the May-August Narrative.

C. Fur Harvest

A total of \$6,440.71 was received for the sale of the Refuge share of pelts following the special trapping season in December. This figure nearly

doubles that of last year although a very low number of mink and weasel were trapped as compared to the number taken last year.

The eight beaver listed on NR form 4 were taken last May, as previously mentioned, but are included in this report since this will be the first submission of the annual report of fur harvest since the beaver were trapped. (See appendix for details on number and type of pelts trapped, monetary returns, etc.)

D. Timber Removal

One permit was issued for the removal of fire wood during the period. This is only a very small scale project, at most, and only three or four cords have been removed up until the present time. Such permits are issued at the rate of \$.50 a cord.

E. Beekeeping

None

V. FIELD INVESTIGATION OR APPLIED RESEARCH

A. Progress Report

Deer Trapping and Tagging

A total of 23 deer were trapped, tagged and weighed. This is some less than were handled in 1950. It is believed the mild open winter, plus very poor bait were the main factors in our failure to trap more deer. Nevertheless the project was profitable - it will give us that much more opportunity to determine more about dispersal of the herd. We also were fortunate in trapping a number of deer tagged in former years.

A brief summary:

	<u>Number</u>	<u>Average Weight</u>
Buck fawns	11	80.0
Doe fawns	3	70.0
Adult bucks	1	185.0
Adult does	8	137.0

A detailed report has already been forwarded to the State and Regional offices.

Browse Surveys

A total of 496 sample plots were taken during the months of December, January, and February. These studies were made in an attempt to determine the early winter food habits, and extent of browsing pressure on the willows, and annuals.

Commencing in late March, and on through the first week in April a total of 1012 browse sample plots were taken - this is considerable more than ever taken before, and in our opinion provided the best information to date on the browse situation.

Summarized data very definitely indicated under-browsing on the area - also showed widespread useage on annuals - a definite increase in the available willow, balsam poplar and red osier dogwood.

Browse Clipping Studies

A number of plots were clipped in an effort to determine the actual volumn of available browse in the deer wintering range. The plots were classified in accordance with the Aldous survey method, and data obtained then applied to final results of the regular browse survey - finally coming up with reasonable sounding weight data, and an additional means of determining carrying capacity of the Refuge.

Mortality Surveys

These were run in conjunction with the winter and early spring browse surveys, and added up to the fact that winter losses this past winter were practically non-existent. A total of 83.7 miles of transect lines were used to compute the total winter loss figures.

Big Game Management Plan

Every effort has been taken toward completion of our management plan during this past quarter. Data obtained over the past five years has finally been corraled, and the report is nearing the completion stages. We have perhaps gone into a little extra detail in preparation of the report, but believe it justified due to the general controversy over the proper control of the herd, and also due to the fact that the very valuable moose herd plays an important

part in all considerations.

Canada Goose Project

A total of 75 geese, as mentioned, were transferred from the Swan Lake Refuge in March. The State Conservation Department also has given us an additional seven (7) birds. Losses to date have been light, and we now have a total flock of 79 birds - all of them in the 15 acre temporary pasture.

All geese were banded and pinioned before placing in the larger pen.

We have also observed frequent appearance of several pairs of mated geese (still here as of May 2nd), some bearing leg bands. Several of these actually lit in the poultry run with the large flock on numerous occasions. We are of the opinion that these birds are geese which were originally brought in as goslings, either in 1949 or 1950.

In connection with the construction of the goose pen it might be mentioned that a number of local clubs have promised help in actual construction work. To date one of the local merchants accompanied Mr. Forder on the long trip to Swan Lake, and aided in taking delivery of the geese. A crew of 25 volunteer laborers were all set to help put up the 15 acre temporary pen on April 26th - a snowstorm prevented work, but refuge personnel commenced work on Monday following, and four of the locals showed up on Friday and helped finish it up so that the geese were transferred on late Friday afternoon.

We are expecting a considerable number of local club members to "donate" when we can commence the 145 acre pen.

Mr. Johnson, Refuge Clerk, has accepted the Assistant Scoutmasters position for the local Holt Troop. He is maneuvering for help in tree planting, and other seeding, also help for locating duck nests - we believe we can obtain good results from use of the Scout Troop from Holt. The Thief River Scout Troop is also expecting to donate help in similar projects.

VI. PUBLIC RELATIONS

A. Recreational Uses

None with exception of public use on County Road to observe deer, waterfowl, and other wildlife - occasional moose, rats, and beavers. Also public coming into headquarters site to look at captive geese. Tower at headquarters site also available to public.

B. Refuge Visitors

See page 25.

C. Refuge Participation

Mr. Johnson showed two films, "Pacific Halibut Fishing", and "Shell Fishing" at the Newfolden Sportsmen Club meeting on January 4th. Attendance was approximately 50.

Mr. Hunt spoke at a general meeting on flooding problems at Thief River Falls on February 26. Messrs. Carpenter and Dougal of the Regional Office were in attendance, along with Mr. Cowan of the St. Paul Army Engineers office. Attendance was over 100, and some rather spirited discussions were included.

Mr. Mangus spoke at the Penn. Co. Sportsmen Club meeting on Mar. 12, at Thief River Falls. The talk was on the Mud Lake Goose project, and attendance was estimated at over 60. Promises of volunteer help for constructing the goose pen were obtained.

D. Hunting

None this period.

E. Fishing

None this period with exception of some illegal dip-netting below the controls.

F. Violations

None this period with exception of above. We have been checking the area regularly, and from all signs the fishing has not been a regular occurrence. Otherwise no reports on spring shooting, or illegal deer traffic during the early winter months.

Name	Date	Residence or Station	Purpose	Length of Stay
J. Liemandt	1/13	T. R. Falls, Minn.	Warden-Law Enforcement	3 hours
Mr. Thompson	1/13	Karlstad, Minn.	Mover-Moving Secondary	2 hours
J. Liemandt	1/22	T. R. Falls, Minn.	Warden-Patrol	4 hours
R. Glahn	1/30	Lower Souris Refuge	Aerial big game count	2 days
J. Liemandt	2/2	T. R. Falls, Minn.	Checking on deer	4 hours
H. Peterson	2/14	Norris Camp	Property transfer	3 hours
K. Peterson	2/19	Thief Lake Refuge	Water release	2 hours
J. Liemandt	2/22	T. R. Falls, Minn.	On patrol	5 hours
F. Carpenter	2/26	Mpls. R.O.	Flood meeting in TRF	9 hours
R. Dougal	2/26	Mpls. R.O.	Flood meeting in TRF	9 hours
Mr. Cowan	2/26	Army Eng. St. Paul	Flood meeting in TRF	9 hours
R. Farms	3/6	T. R. Falls, Minn.	PR Biologist-Deer	2 hours
L. Magnus	3/6	Big Fork, Minn.	PR Biologist-Deer	2 hours
L. Magnus	3/8	Big Fork, Minn.	PR Biologist-Deer	4 hours
R. Farms	3/8	T. R. Falls, Minn.	PR Biologist-Deer	4 hours
R. Hanson	3/14	Plummer, Minn.	Purchase Dodge pickup	2 hours
H. Davidson	3/15	Holt, Minn.	Drill goose pen well	3 hours
S. Bjertness	3/15	Grygla, Minn.	Beaver troubles	2 hours
R. Glahn	3/15	Lower Souris Refuge	Pinioning geese	5 days
R. Farms	3/21	T. R. Falls, Minn.	PR Biologist-deer browse	4 hours
J. Liemandt	3/21	T. R. Falls, Minn.	State Warden-deer browse	4 hours
D. Lawrence	3/26	T. R. Falls, Minn.	SCS-Boy Scout Co-op.	1 hour
Dr. Beers	3/26	U. of Minn.	Grad. mink study	4 hours-overnite
Mr. Priewert	3/26	U. of Minn.	Grad. mink study	4 hours-overnite
Dr. Beers	3/27	U. of Minn.	Grad. mink study	6 hours
Mr. Priewert	3/27	U. of Minn.	Grad. mink study	6 hours
J. Liemandt	4/3	T. R. Falls, Minn.	Law enforcement	2 hours
K. Peterson	4/5	Thief Lake Refuge	Water release	2 hours
A. Carlson/L. Sagstuen	4/16	Holt	Scrap metal sale	2 hours
J. Liemandt	4/23	T. R. Falls, Minn.	Warden-illegal fishing	3 hours
R. Farms	4/23	T. R. Falls, Minn.	PR-deer browse	3 hours
10 farmers	4/20-4/30	Holt vicinity	high water in river	1 hour each
50 people	3/15-4/30	Vicinity	See geese	$\frac{1}{2}$ hour each
300 people	3/15-4/30	Vicinity	See deer and ducks	$\frac{1}{2}$ -3/4 hr. on public road.

VII. OTHER ITEMS

A. Items of Interest.

Nothing

Sections II, A, B, D, E, F.

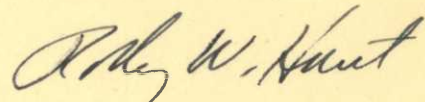
IV, A, B, C, D, E.

NR forms, all prepared by Mr. Mangus.

Pictures taken by Mr. Mangus.

Dated Submitted: May 9, 1951

Respectfully submitted,



Robley W. Hunt
Refuge Manager

Date: May 11, 1951

Approved: 

Title: Regional Director

MUD LAKE NATIONAL WILDLIFE REFUGE

Holt, Minnesota

March 2, 1951

NEWS RELEASE !

In recent years timber wolves have appeared in the Mud Lake area as only occasional winter transients. On the nite of February 28, a single wolf crossed the Mud Lake dike (from the east) pulled down an adult buck deer, and then took on a 20 pound male raccoon - all in one night, and in an area of less than 1 acre.

Tracks, patches of hide and fur, carcasses of the deer and raccoon, blood splattered snow, broken willow brush, developed the story as follows:

The wolf apparently was in the usual loping gait to within 100 feet of the deer - he then turned on the speed, and pulled down and killed the deer within 60 feet of the spot where they first met. The wolf did not kill this animal for sport as left front shoulder, both hind quarters, and much of the paunch had been eaten. Large sections of ribs, had been taken, and the deer carcass had been turned completely over.

Upon leaving the deer the wolf traveled only 130 feet, met the raccoon, and a real life and death battle resulted - with the coon giving the wolf a tremendous battle before finally succumbing.

At least seven separate "fighting rings" were located (in an area of about .1 acre). In each spot the coon had fought it out with the wolf and left patches of hide, fur, and pools of blood in each case.

The bona fide timber wolf is difficult to trap, but a number of sets have been made, and plane hunting will be resorted to if it appears the animal might decide to remain in the refuge area in order to obtain an easy living on the wintering herd of some 860 deer and 49 moose.

NEWS RELEASE

LOCAL GOOSE FLOCK RECEIVES SETBACK

The attempts at providing better goose hunting in this locality, as well as increasing the over-all goose population in general - by establishing a nesting goose flock on the Mud Lake National Wildlife Refuge, has received another setback.

Banding returns from last fall's waterfowl hunting season show that five of the recently banded Mud Lake goose flock were killed before or during the trip southward. This figure represents approximately 6% of the total number of geese introduced into the Refuge since the flock was started in June, 1948. While the figure of 6% represents the number of geese known to have been killed, it does not include the unreported kills of banded birds, nor the many others normally lost by crippling and subsequent death, predation, and from the many other hazards to which geese are subjected during their annual migration to the South.

Much interest has been displayed by people in this area toward the project of establishing a nesting goose flock on the Mud Lake Refuge, from both aesthetic and hunting viewpoints. Many local people, hunters especially, are aware of the fact that young geese must twice make the difficult migrational trip southward and return before they are physiologically capable of reproducing their kind by nesting and the rearing of young goslings. This fact has resulted in hesitation on the part of some informed local hunters to shoot geese which they feel may be part of the Mud Lake flock since they readily realize that by refraining from shooting these geese the first few season, they will have good goose hunting in years to come. On the other hand, some hunters can not resist the temptation to bag a goose whenever the opportunity is presented. This fact was further illustrated when it was learned that three of the banded Mud Lake geese were shot from a comparatively tame flock by hunters while hunting near Refuge boundaries during the recent waterfowl season.

Of the remaining two banded geese known to have been killed, one was reported taken from an area near Badger, Minn., while the other fell victim to a hunter near Lake Arthur, Louisiana.

NEWS RELEASE !

Goose Pen Construction

Construction work on the 150 acre goose pen at Mud Lake Refuge has proceeded despite the winter weather. Fence posts were cut and delivered to the Refuge early in Dec.; dragline work on ditching and building up the road and fence base continued throughout December, and into Jan. Well drilling commenced in February, and it is expected that water will be obtained momentarily.

Excellent co-operation has been given by several local residents in the various phases of work connected with the project:

Mr. Louis Sagstuen, local Holt merchant donated 6 days of his time and made the long trip to Missouri and aided in completing the transfer of the geese from the Swan Lake National Wildlife Refuge to Mud Lake - at his expense.

Mr. Hilmer Davidson, local well-driller had donated considerable time in helping out on the well drilling, and has made available the use of his equipment at reduced costs.

A number of individuals in the local Sportsmen Clubs have pledged help at such time as actual fence construction can be commenced.

These contributions toward successful establishment of the Mud Lake goose-rearing project have been appreciated no end by Refuge personnel and the Fish and Wildlife Service.

The present National emergency has resulted in considerable reduction of funds and materials, and all such contributed services have helped assure increased goose populations, and therefore improved goose hunting in this general area.



1. Mud River Dike - scene of similar troubles in the past. Proximity of cattail growth and deep borrow pit makes the dike an ideal site for housing purposes. Arrow points to present break.



2. Initial attempts at stopping break in dike caused by muskrat burrowing. Frozen condition of dike makes it nearly impossible to stop such a break.



3. View of opposite side of dike showing "spring" caused by pressure of flow through the break.



4. The D-6 cat was used as a last resort. Fill was obtained from unfrozen surface of dike.



IN REPLY REFER TO

5. Results of two days work!



6. The dragline was put into use after ice broke up sufficiently to permit fill to be obtained.



IN REPLY REFER TO

7. Results of dragline work.



8. High waters pouring over South Mud Lake spillway. Depth and powerful flow makes operations beyond this point difficult.



9. & 9a. Porcupine damage on spruce and tamarack in the Whiskey Lake area.



/20. Controlled burning of dikes and road grades to facilitate maintenance - under watchful eye of Refuge Clerk Johnson.



11. Muddy, unsanitary conditions of holding pen which held the 79 captive Canada geese. Condition of pen forced transfer to temporary 12-15 acre pen.



12. One of "visiting" geese (mentioned under Waterfowl) shown as it was flushed from flock of captive geese.



13. Deer in rugged, remote bog area in Whiskey Lake area.



14. Snow covered grounds were common up until the last of April - and this an early Spring.



15. Moose calf - approximately 10 months old. Shaggy from spring shedding. The cow was standing in the thicket on the left when this picture was taken. Difficult and sometimes hazardous to approach much closer.

WATERFOWL

Refuge Mud LakeMonths of January to April 194 51

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u>									
Whistling swan	2	4-24	No peak		2	4-26	-	-	10
II. <u>Geese:</u>									
Canada goose	4	4-7	300	4-24	Still	present	-	-	700
Cackling goose	None	observed							
Brant	None	observed							
White-fronted goose	None	observed							
Snow goose	None	observed							
Blue goose	None	observed							
III. <u>Ducks:</u>									
Mallard	95	4-5	11,000	4-18/4-26	Still	present	-	-	16,000
Black duck	2	4-5	50	4-16/4-20	Still	present	-	-	100
Gadwall	3	4-16	700	4-22/4-30	Still	present	-	-	1,500
Baldpate	3	4-18	900	4-22/4-30	Still	present	-	-	2,000
Pintail	50	4-4	3,000	4-6/4-15	Still	present	-	-	4,500
Green-winged teal	16	4-19	175	4-20/4-21	Still	present	-	-	250
Blue-winged teal	4	4-20	4,500	4-28/4-30	Still	present	-	-	6,000
Cinnamon teal	-	-	-	-	-	-	-	-	-
Shoveller	2	4-17	200	4-26/4-30	Still	present	-	-	350
Wood duck	4	4-19	No peak		Still	present	-	-	25
Redhead	20	4-25	250	4-26/4-30	Still	present	-	-	400
Ring-necked duck	16	4-18	8,000	4-28/4-30	Still	present	-	-	10,000
Canvas-back	5	4-5	200	4-27/4-29	Still	present	-	-	350
Scaup	1	4-10	9,000	4-26/4-30	Still	present	-	-	14,000
Golden-eye	3	4-9	6,000	4-18/4-20	Still	present	-	-	8,000
Buffle-head	1	4-20	450	4-26/4-29	Still	present	-	-	900
Ruddy duck	30	4-29	150	4-30	Still	present	-	-	150
IV. <u>Coots:</u>	1	3-28	300	4-24/4-30	Still	present	-	-	1,500

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese --

Ducks --

Coots --

Total waterfowl usage during period 66,725

Peak waterfowl numbers 45,175

Areas used by concentrations Open & runoff water areas of N. West, Mud River, Hqs., CCC, Madsen and Green Stump pools.

Principal nesting areas this season -

Reported by L. H. Mangus

INSTRUCTIONS

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

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

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

MIGRATORY BIRDS
(other than waterfowl)

Refuge **Mud Lake**

Months of **January** to **April** 194**51**

(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:										
Great Blue Heron	1	4-5	50	4-30	Still	present				75
American Mergansers	9	4-9	300	4-12/4-20	Still	present				1,100
Red-winged blackb.	1	4-13	4,000	4-26/4-30	"	"				5,000
Hooded Mergansers	2	4-13	50	"	"	"				125
Pied-billed Grebe	2	4-20	250	4-30	"	"				300
Blk Crown Night Heron	1	4-25	10	4-30	"	"				25
D. Crested Cormorants	20	4-29	60	4-30	"	"				80
R. Breasted Mergan.	2	4-28	20	4-30	"	"				35
Y. Headed Blackb.	2	4-29	200	4-30	"	"				300
Horned Grebe	6	4-30	30	4-30	"	"				30
Holboells Grebe	2	4-19	200	4-30	"	"				300
II. Shorebirds, Gulls and Terns:										
Herring Gull	1-	4-11	2,000	4-23	"	"				3,000
L. Yellow legs	1	4-12	6	4-30	"	"				15
Franklin's Gull	20	4-24	6,000	4-30	"	"				7,000
Ringbilled Gull	6	4-24	2,000	4-23	"	"				3,000
Killdeer	1	4-24	30	4-30	"	"				50
Common tern	1	4-27	70	4-30	"	"				100
Tree Swallows	75	4-29	500	4-30	"	"				1,000
Bank Swallows	15	4-30	100	4-30	"	"				100

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. Doves and Pigeons:					
Mourning dove					
White-winged dove					
IV. Predaceous Birds:					
Golden eagle	1	4-13	15	4-16/4-20	still present 20
Duck hawk					
Horned owl	Resident				60-70
Magpie	Present at beginning of period		2	4-20	50
Raven	"	"	1	4-21	80
Crow	2	3-26	500	4-18	still present 900
Marsh Hawk	2	4-5	150	4-25	200
Bald Eagle	2	4-8	8	4-18/4-22	1 4-21 10
Red-tailed Hawk	2	4-10	25	4-18	still present 45
Sparrow-hawk	1	4-25	10	4-26/30	" 20
Night hawk	2	4-25	5	4-27	" 8
Snowy Owl	5	4-18	8	4-30	1 4-30 20
Reported by L. H. Mangus					

INSTRUCTIONS

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

UPLAND GAME BIRDS

1613

Refuge Mud Lake

Months of Jan. to April, 1945

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'd.	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ruffed grouse	Willow, aspen hardwood groves approx. 5,000 acres								300-350	Line transect method of census. Approx. 95 miles of line walked.
Sharptail grouse	Approx. 20,000 acres upland								350-375	Same
Prairie Chicken	Same									Possibly none present
Ringnecked pheasant	Same									Possibly none present
Hungarian Partridge	Same								15-20	

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

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

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

3-1754
Form NR-4
(June 1945)

SMALL MAMMALS

Refuge Mud Lake

Year ending April 30, 1951

(1) Species	(2) Density	(3) Removals						(4) Disposition of Furs						(5) Total Popula- tion
Common Name	Cover Types & Total	Acres Per Animal	Hunting	Fur Harvest	Predator Control	For Re- stocking	For Re- search	Share Trapping			Total Refuge Furs Shipped	Furs Donated	Furs Destroyed	
	Acreage of Habitat							Permit Number	Trappers Share	Refuge share				
Mink	Approx. 20,000 acres marsh and water			16				T-7603	8	8				
				9				T-7602	4.5	4.5				
				4				T-7601	2	2				
				29					14.5	14.5				
Weasel	Same			4				T-7603	1	3				
				0				T-7602						
				0				T-7601						
Raccoon	Approx. 30,000 acres marginal and upland			2				T-7602	2	0				80-90
Bobcat	"				5			T-7602	5	0				20-25
Skunk	"			18				Refuge personnel						

* List removals by Predator Animal Hunter

* List removals by Predator Animal Hunter

REMARKS:

Reported by _____

INSTRUCTIONS

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

- (1) SPECIES: Use correct common name. Example: Striped skunk, spotted skunk, short-tailed weasel, gray squirrel, fox squirrel, white-tailed jackrabbit, etc. (Accepted common names in current use are found in the "Field Book of North American Mammals" by H. E. Anthony and the "Manual of the Vertebrate Animals of the Northeastern United States" by David Starr Jordan.)
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- (3) REMOVALS: Indicate the total number under each category removed since April 30 of the previous year, including any taken on the refuge by Service Predatory Animal Hunter. Also show any removals not falling under headings listed.
- (4) DISPOSITION OF FUR: On share-trapped furs list the permit number, trapper's share, and refuge share. Indicate the number of pelts shipped to market, including furs taken by Service personnel. Total number of pelts of each species destroyed because of unprimeness or damaged condition, and furs donated to institutions or other agencies should be shown in the column provided.
- (5) TOTAL POPULATION: Estimated total population of each species reported on as of April 30.

REMARKS: Indicate inventory method(s) used, size of sample area(s), introductions, and any other pertinent information not specifically requested.

3-1754
Form NR-4
(June 1945)

SMALL MAMMALS

Refuge Mud Lake

Year ending April 30, 51

(1) Species	(2) Density	(3) Removals	(4) Disposition of Furs									(5) Total Popula- tion	
Common Name	Cover Types & Total Acreage of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	For Re- stocking	For Re- search	Share Trapping			Total Refuge Furs Shipped	Furs Donated	Furs Destroyed
								Permit Number	Trappers Share	Refuge share			
Muskrat	Marsh and water approx. 20,000 acres		726					1-7612	363	363			
			681					1-7604	341	340			
			666					1-7605	333	333			
			670					1-7606	335	335			
			670					1-7607	335	335			
			670					1-7608	335	335			
			673					1-7609	337	336			
			691					1-7610	346	345			
			502					1-7611	251	251			
			5,949						2976	2973	2973	\$5,722.89	
Beaver	Marsh and Water Approx. 20,000 acres		7					1-4759	3.5	3.5			
			5					1-4757	2.5	2.5			
			7					1-4756					
			7					1-4758	4	3			
Special season May 1-20, 1950			19					10	9	9	\$208.67		
												80-95	

* List removals by Predator Animal Hunter

* List removals by Predator Animal Hunter

REMARKS:

Reported by _____

INSTRUCTIONS

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

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(5) TOTAL POPULATION: Estimated total population of each species reported on as of April 30.

REMARKS: Indicate inventory method(s) used, size of sample area(s), introductions, and any other pertinent information not specifically requested.

3-1754
Form NR-4
(June 1945)

SMALL MAMMALS

Refuge Mud Lake

Year ending April 30, 1951

(1) Species	(2) Density	(3) Removals						(4) Disposition of Furs					(5) Total Popula- tion	
Common Name	Cover Types & Total Acreage of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	For Re- stocking	For Re- search	Share Trapping			Total Refuge Furs Shipped	Furs Donated	Furs Destroyed	
	Permit Number							Trappers Share	Refuge share					
Badger	30,000 acres up- land				None									20
Coyote					2			T-7603	2					15
Fox					2 2 4			T-7603 Refuge	2 personnel 2					20

* List removals by Predator Animal Hunter

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REMARKS:

Reported by _____

INSTRUCTIONS

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