

Narrative Report Routing Slip

Mr. Salyer _____

~~Mr. Lakermecht~~ COA

Mr. Crawford _____

Administrative Services

~~Miss Baum~~ _____

Operations

~~Mr. Fermanich~~ _____

Mr. Heran TRR

Public Use

Mr. ~~Dunham~~ PAAD

Mr. Kubichek _____

Mr. Stollberg BPS

Resource Management

~~Mr. Torrey~~ Law

Mr. Hickok DMT

Wildlife Management

Mr. Banks B

Mr. Stiles _____

Mr. Goldman Jay

Refuge MUD LAKE

Period Jan - Apr 1960



COVER PICTURE

Canada geese are among the earliest spring migrants. The breeding pairs come first. This pair has staked out their nesting territory⁴will vigorously repel intruders. In this case they have adopted a burnt-over island. Burned areas are often found to be attractive to Canada geese. Photo by Dill. M.L. #193-16.

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

MUD LAKE NATIONAL WILDLIFE REFUGE

HOLT, MINNESOTA

Narrative Report

January, February, March, April

1960

Personnel

Herbert H. Dill..	..	..	..	..	..	..	..	Refuge Manager
E. Marvin Mansfield..	..	..	..	..	..	..	..	Wildlife Biologist (Management)
Gary G. Hofmaster..	..	..	..	..	..	..	..	Assistant Refuge Manager (Tr.)
James M. Thompson..	..	..	..	..	..	..	..	Refuge Clerk
Oliver T. Davidson	..	..	..	..	..	..	..	Wildlife Aid
Daniel C. Wehmeyer	..	..	..	..	..	..	..	Maintenance Man
Oscar A. Christenson	..	..	..	..	..	..	..	Automotive Mechanic
Don R. Perkuchin	(temporary from 4/1)	..	..	..	..	..	..	Wildlife Aid
Carl A. Burrell	(temporary from 4/24)	Wildlife Aid
Lyle Blahauvietz	(temporary)	Laborer

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NARRATIVE REPORT

January - April, 1960

I. GENERAL.

A. WEATHER CONDITIONS.

Weather conditions this past period were uncomfortable. Precipitation was normal for all practical purposes. Temperatures were cold and very chilling; in fact, continually cold. Despite there being no records of extremes the persistently low temperature was reflected in furnace fuel consumption which strained our allotment seriously.

There were three periods of snow with rain in April. A snow in late April brought eight inches down on us. This snow lasted two days and was more snow than we had received the previous three months.

B. HABITAT CONDITIONS.

1. Water.

Again this year, the spring breakup was gradual. Runoff was moderate but entirely adequate for water management within the pools. Water in the ditches commenced trickling April 4th. By April 12th, both Ditch 11 and Thief River Controls had been opened wide. They remained open to the close of the period. Outlet controls in Green Stump and Madsen were partially opened. As was the case last year, only the smaller pools on the upper end of the system went to spillway level.

Ice persisted in Mud Lake pool until April 23rd. However, by April 16th more than half the ice had disappeared. Frost in the pool bottoms lingered much longer. On May 15th there still remained 18 inches of frost in the ground. No doubt, this had an important bearing on growth of flora and fauna within the pools, which is notably slow at Mud Lake in April and early May. In comparing notes with Lower Souris for example, we are consistently a week to ten days behind in growth of vegetation, hatching of first broods, etc.

Table No. 1 Precipitation and Temperature Recordings. Readings prior to April, 1957 were taken from the records of the weather station at KTRF Radio Station at Thief River Falls, Minnesota. Readings taken since April, 1957 are from records of weather station at Mud Lake Refuge.

	1960	1959	1958	1957	1956	5-Year Average
Month	Precipitation	precipitation	precipitation	precipitation	precipitation	precipitation
January	.42	.25	.35	.37	1.11	.50
February	.11	.41	.16	.25	.36	.26
March	.23	.35	.19	.50	1.21	.50
April	1.29	.25	.50	1.24	.92	.84
Totals	2.05	1.26	1.20	2.36	3.60	2.10

Temperatures:

	High - Low		High - Low		High - Low		High - Low		High - Low		5-Yr. Extremes High - Low	
Month	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
January	39	-28	32	-36	41	-17	28	-34	29	-27	41	-36
February	36	-21	35	-37	56	-28	33	-24	33	-32	56	-37
March	42	-23	50	-16	53	7	54	-14	40	-24	54	-24
April	69	8	71	18	78	4	77	16	56	10	78	4

Refuge Record of Extremes Since 1946

Month	High - Date		Low - Date	
January	41	1958	-37	1951
February	56	1958	-37	55&59
March	75	1946	-33	1948
April	78	47&58	- 8	1954

	High		Low	
Month	Precip - Year		Precip - Year	
January	1.85	1950	.16	1958
February	.85	1949	.0	1950
March	1.21	1956	Tr.	1954
April	2.17	1950	.0	1947, '49 '53, '55

Frost boils caused severe damage to our trails which was aggravated by heavy traffic in connection with the predator study. A number of small breaks in the dikes occurred along the frost line which were promptly repaired. CCC control structure washed out on one side but was saved by prompt filling and tamping. Aside from this, no major damage was experienced.

2. Food and Cover.

As was the case last year, there was enough runoff to permit flooding the pool margins in early April. Ice-cores in the centers of the pools accelerated this flooding and helped set the table for waterfowl. Hundreds of acres of soft stemmed bulrush were flooded in Green Stump (see NR for May to August, 1959) which fruited well last fall. A secondary benefit from such flooding was that skunk and 'coon dens, which were observed to be occupied last September, were filled with water in April!

The spring feeding program was continued and expanded. Oats and barley were mixed and broadcast on the ice with a tractor-seeder. A total of 1340 bushels of this mixture was spread in March. In addition 120 bushels of corn were fed; 105 bushels on dike roads and 15 bushels on the ice. See map for locations of feed areas.

Observations of these areas again showed intensive use. No bottom samples were taken, but the degree of duck use this year based on the experience of the past two years when bottom samples were taken indicated 100% utilization. The corn on the dikes received heavy use from geese until located by the ducks. This was ear corn but all species had no difficulty in eating it. Mallards, pintails, gadwalls, and widgeon fed on the corn. All species except the ruddy duck used the grain in the water.

It is planned to enlarge the program next year. Enough feed should be provided to completely satisfy the demand during this critical period - usually the first three weeks in April.

Food for resident game birds and mammals was abundant. Weather conditions were favorable so that ample food supplies were available. The snow reached a depth of only 12 - 14 inches in the woods and there was little heavy crusting. Travel by all species was unrestricted. This was especially noticeable with deer. While they are numerous on the refuge, the numbers sighted along the roads were much less than last year when heavier snow restricted easy travel. Last year in March, it was the usual thing to see 20 animals between the west gate and headquarters. This year, one or two was the limit in spite of a refuge population of over 800.

FEED AREAS

<u>Area</u>	<u>Type Grain</u>	<u>Bushels Fed</u>	<u>Potential Use-Days</u>
1.	Barley & Oats	490	47040*
2.	" "	270	25920
3.	" "	290	27840
4.	" "	290	27840
5.	Corn	15	1920**
6.	"	30	3840
7.	"	35	4480
8.	"	15	1920
9.	"	15	1920
10.	"	10	1280
<u>Total</u>		<u>1460</u>	<u>144,000</u>

* based on 7 ounces/duck day and 42 lbs./bu.

** based on 7 ounces/duck day and 56 lbs./bu.

II WILDLIFE.

A. MIGRATORY BIRDS.

Table on the next page lists the various arrival dates for waterfowl. A comparison with the past 14 years is shown for most species.

All species were approximately on schedule. The cold, late season failed to delay nest beginnings; Canada geese and mallards took up territory soon after they arrived early in April.

The accompanying map shows the locations of 22 pairs of Canadas. These free-fliers were observed more than once at the same location and are believed to be nesting. In addition, 13 pairs of wing-clipped Canadas were placed in the Dahl grove pen. This represents a net increase (from 1959) of 18 pairs from all sources. (See Section V) Undoubtedly some were missed. The outlook for production of Canada geese is the best it's been since the inception of the goose project in 1950.

Total use by all species of waterfowl occurred mainly from April 10th to the end of the month. We apparently are holding our own on mallards and gadwalls. It is likely that blue-winged teal and shovellers will drop this year with prairie potholes to the south of us brimming with water. Divers are present in good numbers with an encouraging number of redheads. Coots are abundant (33,550) but may or may not nest in numbers.

The accompanying bar-graph shows that total use by all species of waterfowl was nearly identical to last years record. There were some pronounced changes in use by areas which are easily accounted for: Thief Bay apparently took up the slack for Webster which is in drawdown; much of the use in CCC was due to grain fed there from agricultural sources; Madsen has been on the downgrade and is scheduled for drawdown next fall; partial drawdown in South pool exposed bars and islands which proved highly attractive until the food ran out.

Form NR1a lists notes on arrivals of other waterbirds, shorebirds and doves.

Table No. 2. Distribution of arrival dates from 1946 thru 1958. (Numbers indicate previous years. X indicates this year.)

Species	17-21	22-26	27-31	1-5	6-10	11-15	16-20	21-25	26-30	Total Years Rec'd
Canada Goose	2	3	4x	2	2	1				15
Mallard	3	1	2	7	1x					15
Pintail	1		4	4x	2	2	1			15
Goldeneye		3	2	2	4x	1	2			15
Scaup			2	1	5x	2	2	2		15
Ringneck				4	4x	1	4	1		15
Bufflehead			1	2	1	4	3x	3		15
Gadwall			1	1	3	3x	4	2		15
Widgeon				2	6	x	5		1	15
Shoveler			1	3	2x	2	4		1	14
Canvasback				2	2	3	4	1x	1	14
Wood duck				1	3	3	4	1		12*
Black				4	2	1	3x	1		12
Greenwing Teal			1	1	2	3x	3	2		13
Bluewing Teal			1		3	2x	7	1		15
Redhead					3	2x	4	4		14
Ruddy Duck								4x	5	10
Whistling Swan					2	4x	3	3	1	14
Coot		1	1	1	2	5x	2	2		15

* no record this year.

300

250

200

150

100

50

Use-days in thousands

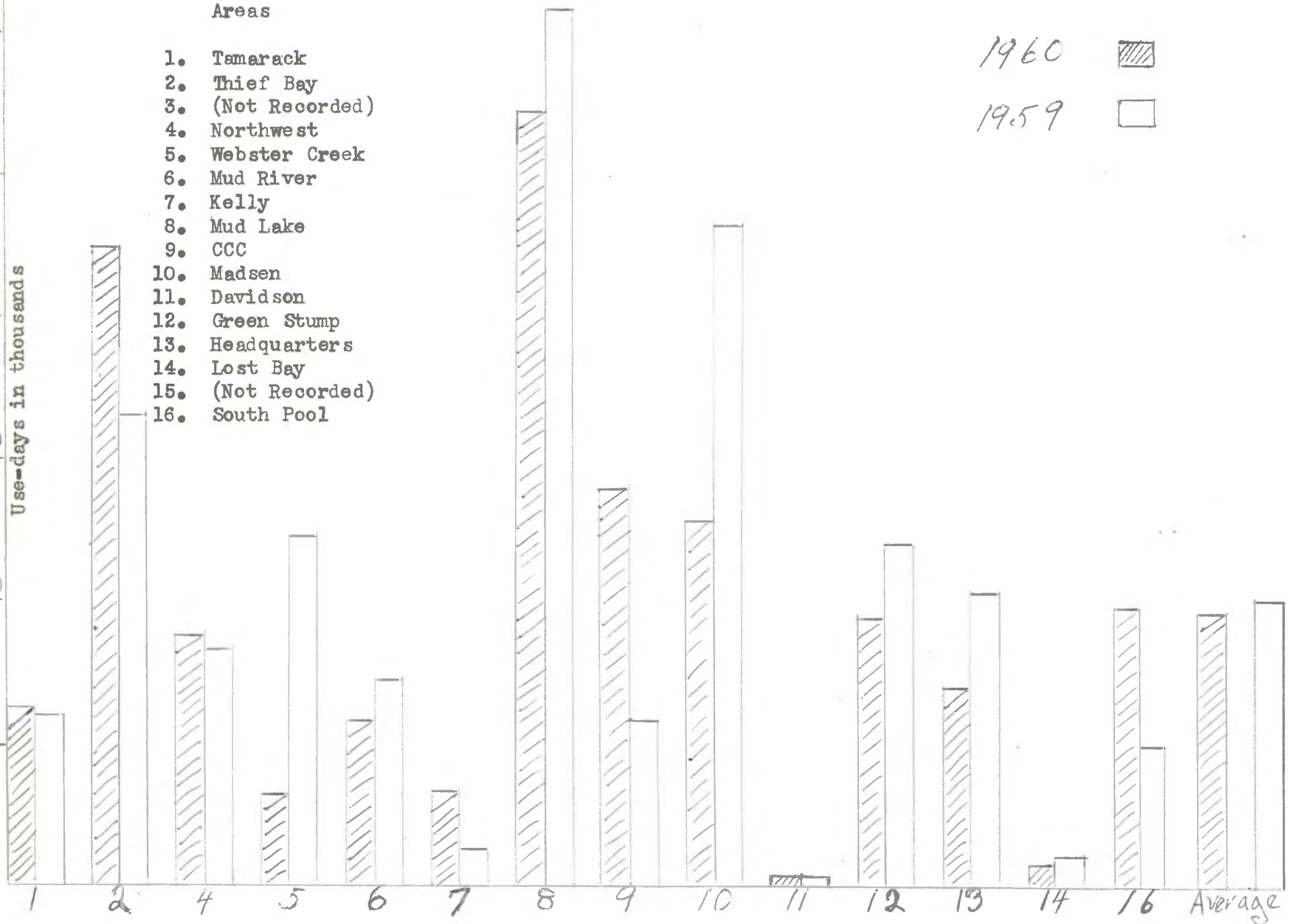
Areas

1. Tamarack
2. Thief Bay
3. (Not Recorded)
4. Northwest
5. Webster Creek
6. Mud River
7. Kelly
8. Mud Lake
9. CCC
10. Madsen
11. Davidson
12. Green Stump
13. Headquarters
14. Lost Bay
15. (Not Recorded)
16. South Pool

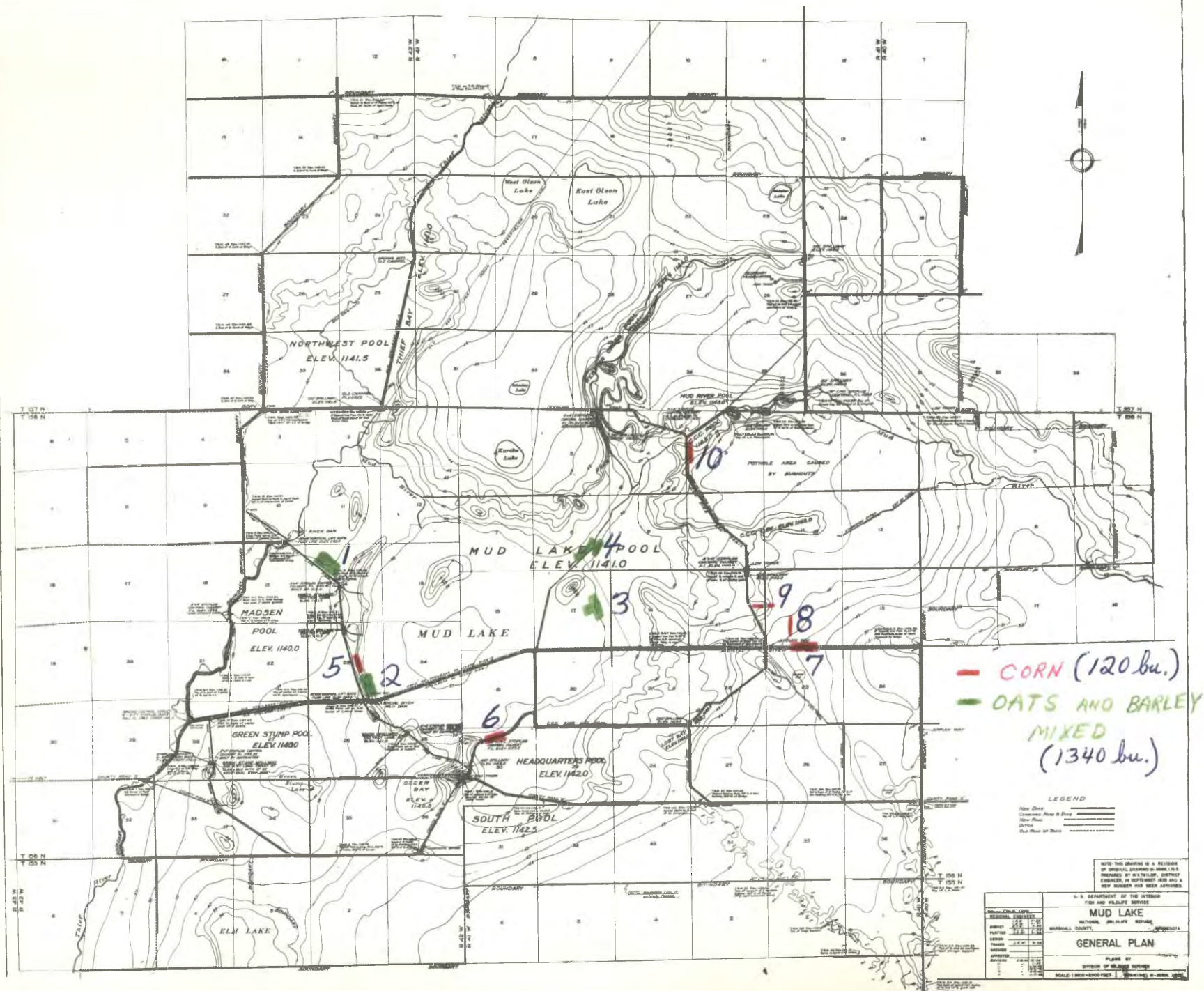
1960



1959

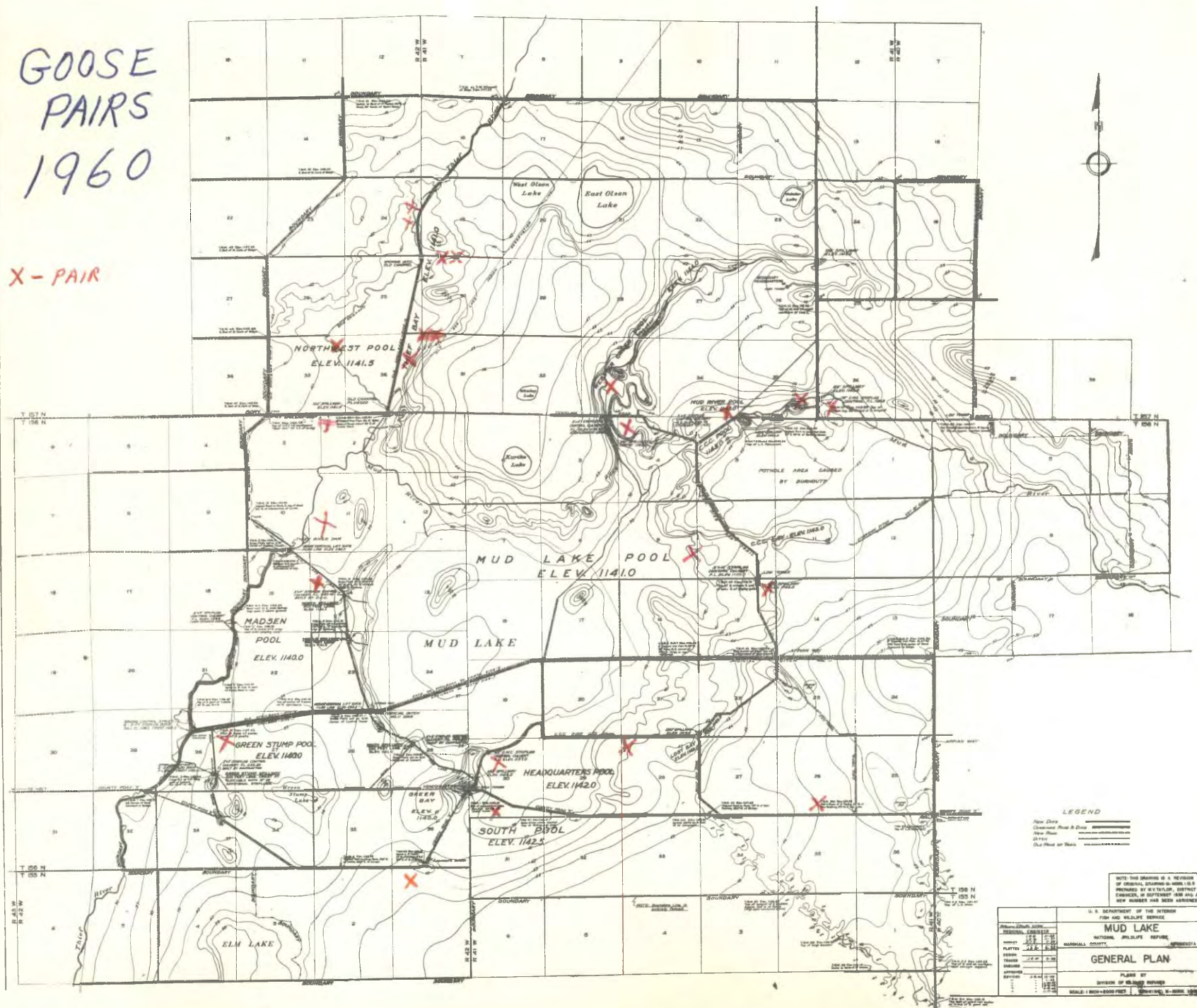


Waterfowl Use-days by Areas (April, 1960)



GOOSE
PAIRS
1960

X - PAIR



LEGEND
New Data
Contour Line & Spot
New River
Old River
Old Road or Trail

NOTE: THIS DRAWING IS A REVISION
OF GENERAL DRAWING G-1000-1-1-1
PREPARED BY R. L. TAYLOR, DISTRICT
ENGINEER, IN SEPTEMBER 1958 AND A
NEW NUMBER HAS BEEN ASSIGNED.

U. S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE	
MUD LAKE	
NATIONAL WILDLIFE REFUGE	
MARSHALL COUNTY, MINNESOTA	
GENERAL PLAN	
PLANS BY	
DIVISION OF WILDLIFE SERVICE	
SCALE: 1:500-000 FEET	
DRAWING G-1000-1-1-1	

B. UPLAND GAME BIRDS.

Ruffed grouse are reported to be at a high in this part of the state. We haven't noted any change on the refuge over the last year. Perhaps it's because our really good habitat is limited. Much of the area where ruffed grouse are found must be classed as marginal. It can be said they are fairly numerous. On the other hand, in the timber along the south side of Thief Lake (4 miles north of Mud Lake), we heard ruffed grouse drumming almost continuously during parts of April. On a hunt up there last fall, 19 grouse were flushed by three men in four hours.

The reports on sharptails from neighboring farmers are encouraging. The refuge population appears to be about the same as last year when 125 were reported. In fact, more sharp-tails have actually been observed near our agricultural fields at Dahl Grove than for several years.

One pinnate was reported near the SW corner of the refuge in February.

Two groups totaling approximately 20 gray partridges were seen. One hen pheasant spent the winter (again) at headquarters where she took advantage of the feeders in the goose pens. Two male pheasants were taken in the live traps in connection with the predator study (baited w/eggs!).

A careful watch was kept for spruce grouse but none were seen. After observing some of these grouse this winter east of the refuge, we are not entirely sure we could spot them. They are rather hard to identify until one gets up close. Hence, a small population at Mud Lake could easily be missed.

C. BIG GAME ANIMALS.

Snow cover averaged about eight inches in the woods and never exceeded 12 inches. There was little crusting and travel by deer and moose was unrestricted.

The aerial census was made February 11th & 12th by Pilot-biologist Art Brazda and Marv Mansfield. The estimated total population of deer (white-tails) was 808 which is the highest recorded since 1952 (844). This indicates that the population has more than doubled the 13-year low of 325 in 1958.

It is true that conditions (i.e. snow cover) for counting were better this year than in 1958. Even so further liberalization in hunting regulations is indicated for this fall.

A total of 110 moose were counted which compares with peak years of 1955 (105) and 1956 (130).

The east and northeast portions of the refuge received the most use by deer and moose. Some heavy browsing was noted on dogwood. But there was no yarding and forage was abundant.

Moose seem to have become well re-established in this part of the state. All animals observed were in excellent condition. A die-off was reported in the eastern part of the state, but no disease has been found here.

D. FUR ANIMALS, PREDATORS, RODENTS & OTHERS.

The aerial muskrat house count, which was flown last November, was considered adequate, so no winter count was made. The spring muskrat population appears even lower than last year's. Very few animals are seen. Again last winter, frost penetrated the pools to a depth of four to five feet. Snow cover was light which means that survival probably was poor.

Mink continue to be commonly seen. This seems a little unusual, for they ordinarily parallel muskrats in abundance. Nine mink were live trapped in connection with the predator study. They often run across the road in front of cars and occasionally become casualties along the county road.

Beaver are more numerous than last year but do not constitute a problem as they did in 1958. Refuge trappers removed 32 this spring. Average price for 14 of these was \$7.36 as paid by a local buyer.

Marv^W Ansfield made a special flight in March to get a count on foxes at den sites. Fresh snow made conditions good for counting. A total of nine foxes was calculated for the entire refuge based on the sample area checked. This seems low but suggests that foxes are not numerous enough to be a problem.

E. HAWKS, EAGLES, OWLS, CROWS, RAVENS AND MAGPIES.

Again this winter American rough-legged hawks were common. Redtails came early in April and drifted thru in usual numbers. A bald eagle appeared at the aerie March 9th. A pair was there April 6th. It is not known exactly when incubation commenced; however, it was in progress at the close of the period. A red-shouldered hawk was seen April 11th. The first sparrow hawks were noted April 7th and one duck hawk April 29th(adult) near headquarters.

Great horned owls continued to make a nuisance of themselves at the goose pen and five were pole-trapped. Short-eared owls were seen in April.

Crows came thru en masse early in April and wrought havoc to the eggs in Don Perkuchin's dummy nests (predator study). They also fed extensively on dead fish. By the end of the period, most had gone. The last magpies were seen about April 15th. A few ravens and turkey vultures appeared at the close of the period.

F. OTHER BIRDS.

Some rather unusual bird observations were: screech owl at the north goose pen February 1st, golden eagle on the south boundary February 12th, a bluejay at Ditch 11 March 9th, Canada jay at headquarters March 20th, and an American pipit on Tamarack dyke April 18th. Pine grosbeaks and red polls were common this winter. At the feeder we had as many as 13 chickadees, plus downey and hairy woodpeckers.

G. FISH.

There was the usual heavy winter kill of sticklebacks and fat head minnows which provided much gull and crow food this spring. Minnow populations appear adequate for grebes, however. No game fish observed.

H. REPTILES.

Nothing to report.

I DISEASE.

Nothing to report.

III REFUGE DEVELOPMENT AND MAINTENANCE.

A. PHYSICAL DEVELOPMENT.

A pole and post project was conducted from January through March. The ford tractor was adapted to load logs and a sleigh was built for getting them out (see photo). The project resulted in over 2,000 fence posts (to be used for refuge fencing); poles for a corral in G-5 and timbers for nesting islands.

A long-deferred painting project was carried out at Quarters No. 1. The hallway and one bedroom (plus closets) were completely refinished and painted two coats during the Regional Conference. The trim in one bedroom and the baseboard in the bathroom were painted in Quarters No. 4 by Marv Mansfield.

Refuge recognition signs were brought in and redone. New frames were built for two of these.

Constructed 15 duck nest boxes plus 31 cubbies for Conibear traps.

Hauled gravel and rock for Thief Bay spillway and repair of Green Stump spillway.

Made emergency repairs to outlet sewer line from Quarters 3&4.

Rebuilt fence at Dahl grove goose pen i.e. along north side. Repaired fence in other goose pens.

Hauled and spread about 1500 bushels of grain - spring feeding.

Hauled load of barbed wire from Arrowwood and equipment from Sand Lake. Hauled geese from Mason, Michigan to Rice Lake and Mud Lake.

Hauled bridge plank from Thief River Falls for bridge repair at secondary.

The Land Use Plan was completed (and approved) during the period. Final report (1959) on the predator study was completed in January.

The usual equipment repairs and overhauls were carried out.

B. SAFETY.

Five safety meetings were held during the period. Two of these covered fire suppression, one safe equipment operation, one danger of monoxide poisoning and one (in two installments) reviewed

radiological monitor training received at Sand Lake by Mansfield and Hofmaster.

Of interest was the action we secured relative to safe operation of the school bus. The driver was in the habit of pulling into headquarters to load and unload, and then backing onto the highway to turn around.

The station safety board discussed the matter and moved to suggest to the driver that he turn around in the service court rather than as he had been doing. The suggestion was ignored, so it was taken to the superintendant of schools. Following this, the driver was called in and the situation discussed in more detail. This resulted in his arranging to make his turn-around in the service area thus eliminating the safety hazard.

C. PLANTINGS.

Individual conferences were held with all farming and grazing permittees relative to planning for 1960 activities. The virtual elimination of haying raised no serious objections from these people.

1. Aquatics and Marsh Plants.

None.

2. Trees and Shrubs.

None.

3. Upland Herbaceous Plants.

None.

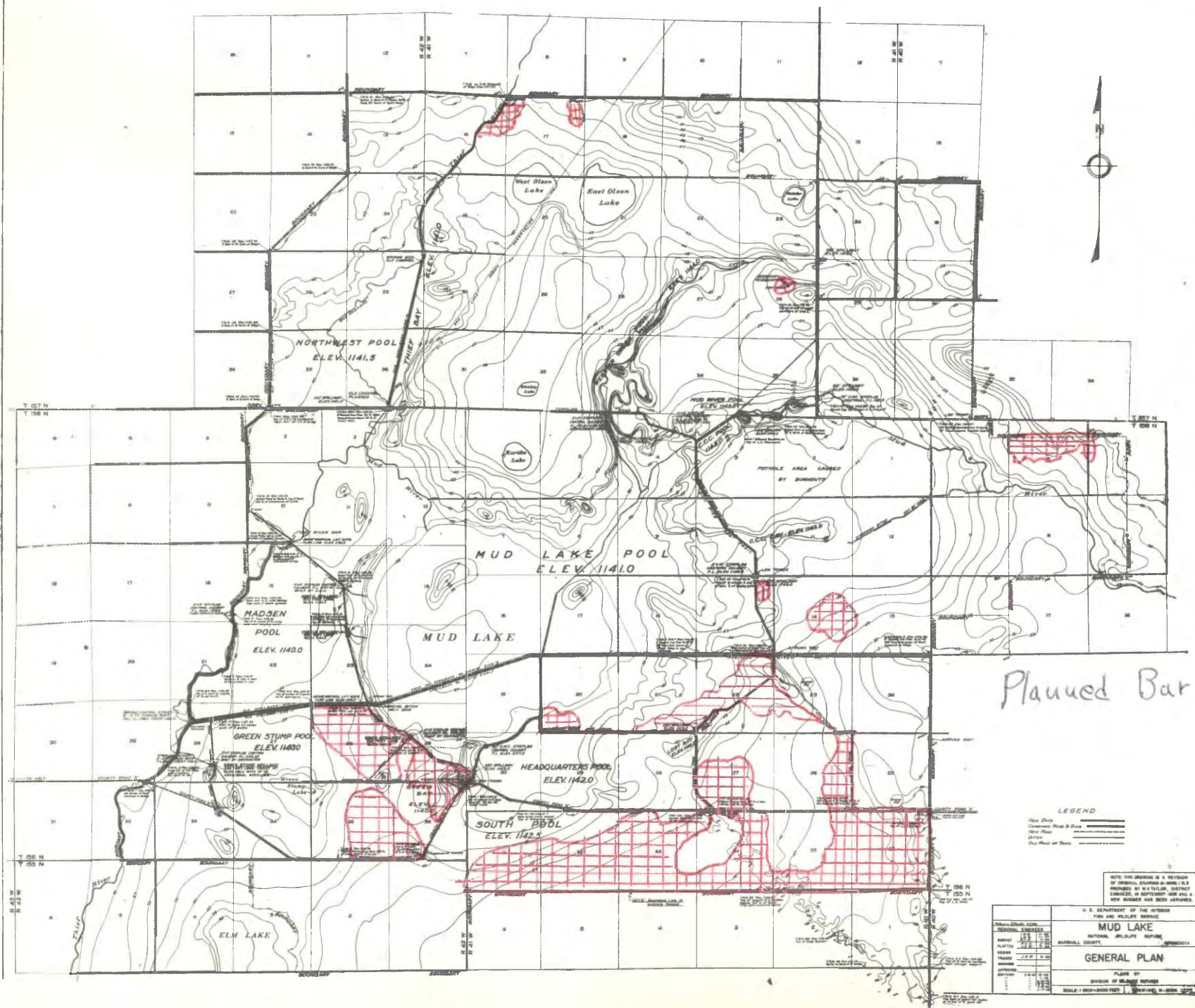
D. PLANNED BURNING.

Planned burning was again carried out early this spring, primarily for the control of willow and other woody species. A total of 4,795 acres was burned. No wildlife was found destroyed with the exception of one mallard nest-beginning which contained two eggs.

Following burning, transects were ~~run~~^{run} to evaluate the results. As in past years, virtually 100% of the willow up to three feet was killed; a smaller per cent of mature willow was also killed. One area, which was burned in 1959 but not this year, showed a marked improvement in grass cover. This resulted from the control of willow plus drying as a result of the drawdown program.

The following is a tabulation of burning accomplished this spring. (See map)

<u>Area</u>	<u>Acreage Burned</u>	<u>Date(s)</u>
II	30	April 12
Secondary Hdqtrs. Site	10	May 2
IX (Goose Pen)	165	April 9 & 16
VIII (SE corner)	440	April 14 & 19
XII	1050	April 19
XIV	610	April 12 & 14
XVII	2410	April 18



Planned Burning, 1960

LEGEND

New Data
 Changes from Old Data
 Old Data

NOTE: THIS DRAWING IS A REVISION OF DRAWING 1142-1, WHICH IS A PRELIMINARY DRAWING. IT IS PREPARED BY THE BUREAU OF LAND MANAGEMENT, DISTRICT OFFICE, IN BUTTE, MONTANA, AND A NEW SHEET HAS BEEN ADDED.

MUD LAKE	
GENERAL PLAN	
DATE	11-1-60
BY	J.E. 11-1-60
CHECKED	J.E. 11-1-60
APPROVED	J.E. 11-1-60
DIVISION OF WILDLIFE	
BUREAU OF LAND MANAGEMENT	

IV RESOURCE MANAGEMENT.A. GRAZING.

None this period.

B. HAYING.

None this period.

C. FUR HARVEST.

Two permits were issued for beaver trapping. A total of 32 beaver were taken.

D. TIMBER REMOVAL.

None. A timber management plan was partially completed during the period.

E. COMMERCIAL FISHING.

None.

F. OTHER USES.

None.

V. FIELD INVESTIGATION OR APPLIED RESEARCH.

A. PROGRESS REPORT.

1. Captive Goose Flocks.

At the close of the period seven Swan Lake Canadas remained in the flock trapped in 1958; there were 34 in the 1959 Swan Lake flock.

A total of 25 geese were released April 13th which had been trapped at Swan Lake in 1957. Of these, orange leg bands were placed on 21; the other four were fliers that were in and out of the pen and could not be caught for color-banding. There were two known pairs in this group and there may have been three others making a total of a possible five pairs released. No nesting has been observed by geese from this group. One of the geese (orange leg band) has since been seen in Headquarters Pool.

Eleven mated pairs of Canada geese were received from the Michigan Department of Conservation April 7th. These had been wing-clipped. They were released in the Dahl Grove pen, together with two pairs from the original Mud Lake flock (on April 12th). Two nests have been seen from the road. However, we have refrained from searching the pen. Based on the appearance of lone geese (males waiting on incubating females), nine pairs have nested. This is believed good in view of having to transport most of these geese from Michigan to Mud Lake just at nesting time.

Of interest was the intense competition that took place for the new island constructed in the goose pen last winter. (See photos) Its attractiveness is attributed to (1) higher elevation which permits visibility over the surrounding marsh (2) the tire casing apparently has a psychological effect with relation to security of the nest (3) an abundance of nest material (oat straw).

Some support for these theories was gained from the experience of the state boys at the neighboring Thief Lake Refuge. Last fall (October) 60-odd young geese were brought in from Carlos Avery. These had been raised there last summer from semi-domestic stock. When the transfer was made, Manager Al Johnson sent along two pairs of adult Canadas which had not produced for him. This was not surprising, as they were geese he had originally obtained at Mud Lake, and we had had the same experience - they refused to breed and nest in the pen. We attributed this to the fact that they had been trapped as adults at Swan Lake in 1951.

JAN-APRIL
19. 1960

Very few of these geese ever nested in captivity. At any rate, when they finally got to Thief Lake (via Swan Lake, Mud Lake and Carlos Avery) these geese had a history of non-production since 1951.

They were placed in a small pen of about 8 acres (containing a 3-acre pond) together with about 60 young geese. This spring the men piled up baled oat straw on the bank creating two mounds of straw which were capped with old tires. One pair immediately started laying inside one of the casings and is now serenely incubating in the midst of the clamoring geese under conditions which we would ordinarily consider not likely to induce nesting. This, of course, suggests that the "old tire" nesting technique may have good possibilities for more general application.

2. Experimental Nesting Islands.

The success of Dick Rodgers (at Crescent Lake) in improvising small nesting islands suggested that similar approach at Mud Lake might work.

The principal objective was to provide islands to be used for nesting by Canada geese. Other objectives were: (1) provide loafing sites for all species of waterfowl (2) provide resting sites for broods (3) provide additional grit by using a mixture of sand and clay for fill material. The construction of these islands was timed to coincide with the drawdown of Webster Creek Pool. This made it possible to build them during the winter at ground level. In this way the hazards associated with building islands on the ice were eliminated.

The Crescent Lake design was slightly modified to fit dimensions of available material and working conditions. The crib was made from tamarack logs, and measured 10 feet square inside. Two feet (minimum) of freeboard was provided. At maximum pool level one log remains out of water. The fill in the center was heaped.

The logs averaged six inches in diameter by 12 feet long. They were notched (chain-saw) at the ends to fit snugly and spiked. One cross-tie (see photo) was notched in to preclude floating. The inside was lined with sheet aluminum (surplus from GSA) which was nailed securely to the logs, lapped, and shaped tightly into the corners. This should prevent leakage of fill from between the logs.

JAN-APRIL
20. 1960

The fill was obtained from a pit, which we covered with hay last fall to prevent freezing. It was loaded into dump trucks, hauled to the site and placed in the cribs with the Ford tractor and front end loader. The tops were mulched with oat straw and each island was capped with an old tire casing said to enhance the site for goose nesting. These casings were split to keep the eggs from rolling inside (as reported by Rodgers).

The expectancy on these islands is estimated to be at least 25 years. The approximate cost is as follows:

Labor (Includes cutting & hauling timber, actual construction, and labor for equipment operation)	
394 hours	\$563.42
Equipment Operation	
Tractors	\$116.70
Trucks & chainsaw	\$115.07
Transportation of Aluminum (freight)	\$ 54.00
Misc. Materials (Nails, etc.)	\$ 8.00
Total Cost (14 islands) ..	\$857.19
Cost per island	\$ 61.22
Estimated cost per year of expected usefulness	\$ 2.44

Two islands similar in size to the cribs were built from plain fill. These cost a total of approximately \$40.00 (trucking \$13.00; tractor \$4.00; labor \$22.88). There is no reasonable basis for estimating expectancy for these islands. They will be used for comparison with the cribs over the period of usefulness for both.

One of the crib-type islands was built in the goose pen where it could readily be observed. When the Canadas were released in the pen, it was of interest that a pair immediately took over the new island. They have vigorously defended it ever since.

A group of school kids touring the refuge was shown the island and female goose incubating within the tire. Quipped a precocious tenth grader, "Now I know where those rubber goose decoys come from!"

3. Predator Control Study.

Live trapping commenced in late March. The state used approximately 105 traps of the National rigid type with 10" x 12" and 9" x 9" openings. Fifty of these were hand made last winter for approximately \$6.00 each as compared to a wholesale price of \$9.00. They have proved to be more satisfactory than any other design used.

Over 100 new animals (including 52 skunks and 37 'coons) had been tagged by the close of the period. Some unusual catches were: an adult female fox which was lactating, a ruffed grouse and two male pheasants. A high percentage of 'coons that were live trapped were found to have toes, and even feet, missing. These are the result of refuge trapping seasons. It would seem that crippled predators like these would be forced to seek a food supply more easily available. If so, our trapping program may be contributing maimed predators which are potentially more destructive to nests than those removed! This is something we intend to study very carefully in the future. (See photo section)

Poison commenced (on the study area) May 3rd and will be reported next time. A new formulation of strychnine was used, and more effort will be made to learn the relative effect on nest mortality of bird and mammal predation. A wildlife Aid (Don Perkuchin) was assigned to the study April 4th.

An attempt will be made to positively identify nest predators thru the use of cameras concealed in a device which will automatically photograph any predator which disturbs the bait (eggs). Five of these units were made available by Michigan State University.

Another approach to positive identification of egg-eaters was the development of an improved cubby-set for the experimental No. 220 Conibear trap. We also wish to more fully evaluate the trap as a means for controlling 'coons, skunks and other mammals. (See photo section) Twenty six of the new cubbies were built; (cost 75¢ each) the Animal Trap Company has provided hand-made traps for trial. To avoid confusion on the study area, the Conibear-cubby sets were made at nearby Thief Lake. To date they have proved effective. The results of this trapping promises to yield useful data.

VI PUBLIC RELATIONS.A. RECREATIONAL USES.

We are pleased to report that there are none.

B. REFUGE VISITORS.

Following pages.

C. REFUGE PARTICIPATION.

See page 25.

D. HUNTING.

Nothing to report this period.

E. VIOLATIONS.

Nothing to report.

Date	Name	Organization or address	Purpose
1/7/60	Lester Keifenheim	Red Lake Electric Coop., Inc., Red Lake Falls	Mud Lake write up
1/13/60	George Wickstrom, jr.	Karlstad Telephone Company Karlstad, Minn.	dial system telephone
1/15/60	John Tester	University of Minnesota Museum of Natural History St. Paul	visit
1/15/60	Dr. Walter Breckenridge	University of Minnesota Museum of Natural History St. Paul	visit
2/21/60	DuWayne Warner	University of Minnesota Museum of Natural History St. Paul	visit
2/21/60	Dr. Larry Parks	Carnegie Museum Pittsburgh, Penn.	visit
2/24/60	William Henderson	Farm Agent, Marshall County Warren, Minnesota	Refuge farming
2/29/60	Ole Prestebak & Son	Goodridge, Minnesota Patrolman	waterways
3/2/60	Bud Garrish	Thief Lake State Refuge Middle River, Minn. Ass't Area Forester	courtesy call
3/8/60	Cliff Carlson	Warroad, Minn. District Ranger	timber classification
3/8/60	Ralph Thompson	Minn. Forest Service Warroad, Minn. Biologist	timber classification
3/15/60	Hans Uhlig	Soil Conservation Service, Fergus Falls, Minn. Area Ranger	courtesy call
3/15/60	Gordon Saul	Minnesota Forest Service Grygla, Minn. Area Forester	courtesy call
3/15/60	Conrad Carlson	Minn. Forest Service Warroad, Minn. Area Game Warden	courtesy call
Several Times	Carl Sundstrom	Thief River Falls, Minnesota	courtesy call.

Date	Name	Organization or address	Purpose
3/17/60	Donald S. Balser	Research Biologist, Minn. Conserv. Dept. St. Paul, Minn.	Predator Control Conf.
3/17/60	Harvey K. Nelson	Ass't Supr., Branch of Refuges BSFW, Minneapolis, Minnesota	" " "
3/17/60	Berkeley Peterson	Ass't District Agent, PARC U. of Minn. St. Paul, Minn.	" " "
3/17/60	Merrill Hammond	Wildlife Management Biologist Lower Souris Refuge Upham, N. Dak.	" " "
3/29/60	Donald S. Balser	Research Biologist, Minn. Cons. Dept. St. Paul, Minn.	Predator trapping
3/29/60	John Zorichek	Biologist Minn. Cons. Dept., St. Paul, Minn.	" "
3/29/60	William Longlie	Biologist Minn. Cons. Dept., St. Paul, Minn.	" "
3/29/60	Marius Morris	Biologist Minnesota Cons. Dept., St. Paul, Minn.	" "
4/14/60	Arthur Eustis	Ass't Reg. Supr. Fed. Aid Regional Office, Minneapolis, Minn.	Courtesy Call
4/14/60	Don Burcalow	Wildlife Projects Coordinator Minn. Cons. Dept. St. Paul, Minn.	Courtesy Call
4/19/60	William Sweeney	Fishery Research Biologist Branch of River Basin Studies Minneapolis, Minn.	Watershed study
4/19/60	Jerry Maertens	Wildlife Aid Branch of River Basin Studies Minneapolis, Minn.	" "
4/21/60	Jay Haroldson	Manager Thief Lake State Game Refuge Middle River, Minn.	Courtesy call
4/21/60	Bud Garrish	Patrolman Thief Lake State Game Refuge Middle River, Minn.	" "
4/24/60	Berkeley Peterson	Ass't District Agent, Predator & Rodent Control U. of Minn., St. Paul, Minn.	Predator study
3/29/60	Charles Kansey	Biologist, Minn. Cons. Dept. St. Paul, Minn.	Predator study

C. REFUGE PARTICIPATION.

A number of appearances were made before various groups as follows:

Organization: Community Methodist Church

Thief River Falls, Minnesota

Material used: slides Attendance: 50 By: Dill

Organization: Warren Sportsmens Club

Warren, Minnesota

Material used: talk Attendance: 40 By: Dill

Organization: Chamber of Commerce

Thief River Falls, Minn.

Material used: talk Attendance: 24 By: Dill

Organization: Lincoln High School Science Fair

Thief River Falls, Minn.

Material used: talk Attendance: 1,000 By: Dill

Organization: Newfolden High School

Newfolden, Minn.

Material used: slide talk Attendance: 200 By: Mansfield

Organization: Middle River School

Middle River, Minn.

Material used: slide talk Attendance: 225 By: Dill

Organization: Viking School

Viking, Minn.

Material used: slide-talk Attendance: 92 By: Dill

Organization: Fire Warden Meeting

Grygla, Minn.

Material used: slide-talk Attendance: 25 By: Dill & Mansfield

C. REFUGE PARTICIPATION.

A number of appearances were made before various groups as follows:

Organization: Norman County Rod & Gun Club

Ada, Minn.

Material used: slide-talk Attendance: 70 By: Dill

Organization: Holt School

Holt, Minn.

Material used: slide-talk Attendance: 90 By: Mansfield

Organization: Gatzke School

Gatzke, Minnesota

Material used: slide-talk Attendance: 72 By: Mansfield

Organization: Lincoln High School

Thief River Falls, Minn.

Material used: slide-talk Attendance: 1050 By: Dill

Organization: Strathcona Luthern Mens Club

Strathcona, Minn.

Material used: slide-talk Attendance: 70 By: Mansfield

Organization: Goodridge School

Goodridge, Minn.

Material used: slide-talk Attendance: 240 By: Mansfield

Organization: Grygla School

Grygla, Minn.

Material used: slide-talk Attendance: 242 By: Dill

Organization: LH Club

Goodridge, Minn.

Material used: slide-talk Attendance: 70 By: Mansfield

C. REFUSE PARTICIPATION.

Organization: Oslo Rod & Gun Club

Oslo, Minnesota

Material used: talk Attendance: 65 By: Mansfield

Organization: Pennington County Sportsmens Club

Thief River Falls, Minnesota

Material used: talk Attendance: 22 By: Mansfield

Organization:

Material used: Attendance: By:

Organization:

Material used: Attendance: By:

Organizations

Material used: _____ Abundance: _____ By: _____

Organization:

Material used: Attendance: By:

Organization:

Material used: Attendance: By:

Organization:

Material used: _____ Attendance: _____ By: _____

VII. OTHER ITEMS.

A. ITEMS OF INTEREST.

Gary Hofmaster was transferred to the Branch of Engineering May 16th. Gary's forte was mapping and recording data, and he evidenced a desire to make this change from refuge management. We shall miss Gary and his quiet, efficient ways - especially when it is time to work up data.

Don Perkuchin was assigned as Wildlife Aid and reported on April 4th. Don was our Student Assistant last summer and is a welcome addition to the refuge gang.

Favorable publicity to the refuge plus publicity given land acquisition by the State Department of Conservation awoke members of the slumbering Anti-wetland Improvement Association to the fact that they were behind on their program which advocates draining Mud Lake and halting all purchase of wetlands. State Senator Roy L. Wiseth (DFL) has come out openly and led a delegation before the Pennington County Board of Commissioners which succeeded in sand-bagging the Goose Lake Project - a favorite with sportsmen and conservationists. Several years in the making, Goose Lake land acquisition had been approved by two of the three county boards involved when the senator and his associates entered the picture. This represents a serious set-back to the states program in this area.

B. PHOTOGRAPHS.

Appended.

SIGNATURE PAGE

Credits:

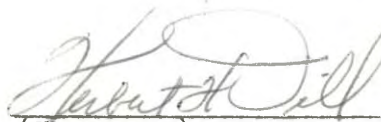
Dill: Sections I, II, III, IV, V, VII

Mansfield: Section IB2, NR-1

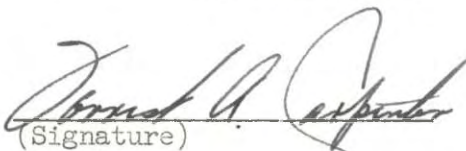
Perkuchin: NR1A, 2 & 4

Thompson: typing, prints, Sec. VI

Submitted by:


(Signature)Herbert H. Dill
Refuge Manager
(Title)Date: June 3, 1960

Approved, Regional Office:

Date: 6-9-60
(Signature)

Regional Refuge Supervisor

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES & WILDLIFE
MUD LAKE NATIONAL WILDLIFE REFUGE
HOLT, MINNESOTA

News Release: February 19, 1960

BIG GAME COUNT AT MUD LAKE

The annual inventory of big game animals was taken at the Mud Lake National Wildlife Refuge February 11 - 12, according to Herb Dill, Refuge Manager. Pilot-biologist Art Brazda and Ass't Refuge Manager Marv Mansfield did the counting from the air.

Eight hundred and eight deer and 110 moose were counted. The following table shows results of the counts since 1948. (Moose were not counted until 1950.

<u>Year</u>	<u>Total Deer</u>	<u>Total Moose</u>
1948	897	-
1949	1150	-
1950	850	47
1951	864	35
1952	844	70
1953	680	86
1954	645	85
1955	650	105
1956	637	130
1957	423	88
1958	325	97
1959	620	86
1960	808	110
Average	723	72

The refuge moose tally was the second highest since counts were started in 1948. Reports from outlying areas state that the trend of the moose population is up.

The physical condition of the animals counted appeared excellent, Dill stated. Conditions for counting were good. The extent of snow cover plays an important part in making a complete deer count. Moose, being larger and darker are not as easily missed.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES & WILDLIFE
MUD LAKE NATIONAL WILDLIFE REFUGE
HOLT, MINNESOTA

FOR RELEASE March 4, 1960

NEWS RELEASE: MALLARDS BANDED AT MUD LAKE REFUGE SHOT IN
ELEVEN STATES AND CANADA

A total of 72 bands have been received from 1,511 ducks banded at the Mud Lake National Wildlife Refuge last fall, according to Herb Dill, Refuge Manager. Dill said that the banding was done in September just prior to the waterfowl hunting season.

The objective was to band 1,000 mallards as a part of a special "DEW LINE" banding program.

Most of the mallards were trapped with the cannon net trap. This consists of a net 25 x 75 feet which is actually fired through the air by small cannons. The net is cast over the ducks which have been lured into position with bait. While the quota was 1,000 mallards, other species of ducks were captured. These were Green-winged teal, blue-winged teal, baldpate, black duck, pintail and redhead.

Fifty bands from mallards were received from Minnesota of which 28 were recovered locally, or within a few miles of the refuge. Forty seven bands from mallards came from other states and Canada as

follows:

Illinois .. 11	Manitoba .. 4	Tennessee .. 2	Nebraska .. 1
Iowa 10	Missouri .. 3	Louisiana .. 2	Indiana .. 1
Arkansas .. 8	Wisconsin .. 3	S. Dak. .. 2	

Dill noted that mallards sometimes fly north from Minnesota into Canada in late summer and early fall. This is indicated by the four band returns from Manitoba.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES & WILDLIFE
MUD LAKE NATIONAL WILDLIFE REFUGE
HOLT, MINNESOTA

NEWS RELEASE: For release March 24, 1960

BEAVER TRAPPING TO START AT MUD LAKE

The annual harvest of surplus beaver will commence March 26th at the Mud Lake National Wildlife Refuge, according to Herb Dill, Refuge Manager. Trapping will continue until April 30th.

Local trappers are brought in for this work and trap under special permit issued by the State Department of Conservation. A quota of 100 beavers has been set up for removal this year. Ordinarily, from 70 to 90 beaver are trapped, Dill stated.

Mr. Dill explained that emphasis is placed on the trapping of beaver near refuge boundaries to prevent their damming drainage ditches.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES & WILDLIFE
MUD LAKE NATIONAL WILDLIFE REFUGE
HOLT, MINNESOTA

NEWS RELEASE: March 31, 1960

Ducks and Geese are Fed Grain at Mud Lake Refuge

Hungry ducks returning to Mud Lake National Wildlife Refuge this spring will be treated to an assortment of food. Herb Dill, Refuge Manager, stated that nearly 1,500 bushels of refuge grain will be fed. The grain is spread on the ice in late March.

Feeding of this type is done to provide food during the critical period between early thawing and complete spring breakup. When the ducks first arrive, the natural food supply is often limited because of ice.

After the ice is gone, waterfowl use natural foods. The supply of natural food at the refuge has been increased in recent years by a system of drawing down certain pools. This might be compared to the way a farmer rotates his fields, Dill explained. He stated, "With waterfowl habitat disappearing at an alarming rate, it is important to make the refuge as attractive and productive as possible."

3 -1750a

Cont. NR-1

(Rev. March 1953)

W A T E R F O W L
(Continuation Sheet)

REFUGE Mud LakeMONTHS OF January TO April, 19 60

(1) Species	(2) Weeks of reporting period								(3) Estimated waterfowl days use	(4) Production Broods: Estimated seen : total
	11	12	13	14	15	16	17	18		
Swans:										
Whistling						43	22	3	476	
Trumpeter										
Geese:										
Canada					96	180	534	542	9,464	
Cackling Little						4	50		378	
Brant										
White-fronted										
Snow							50		350	
Blue							200		1,400	
Other										
Ducks:										
Mallard					1,460	12,120	6,260	7,550	191,730	
Black							30	20	350	
Gadwall						420	1,800	1,130	23,450	
Baldpate						1,360	3,930	3,230	59,640	
Pintail					74	6,860	1,290	480	60,928	
Green-winged teal						1,690	1,330	3,180	43,400	
Blue-winged teal						280	5,770	8,930	104,860	
Cinnamon teal										
Shoveler						550	1,690	1,490	26,110	
Wood										
Redhead						420	590	3,390	30,800	
Ring-necked						1,180	1,250	1,660	28,630	
Canvasback							250	430	4,760	
Scaup						2,810	8,720	12,440	167,790	
Goldeneye					18	3,250	1,910	140	37,226	
Bufflehead						130	560	1,430	14,840	
Ruddy							30	150	1,260	
Other							10		70	
H. Merganser										
c. "						210	120		2,310	
Coot:						9,920	31,520	33,550	524,930	

(over)

	(5)	(6)	(7)
	<u>Total Days Use</u>	<u>Peak Number</u>	<u>Total Production</u>
Swans	476	43	
Geese	11,592	834	
Ducks	798,154	45,650	
Coots	524,930	33,550	

SUMMARY

Principal feeding areas Mud Lake, Mud River and
Green Stump

Principal nesting areas _____

Reported by E. Marvin Mansfield

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

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance.
- (2) Weeks of Reporting Period: Estimated average refuge populations.
- (3) Estimated Waterfowl Days Use: Average weekly populations x number of days present for each species.
- (4) Production: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (5) Total Days Use: A summary of data recorded under (3).
- (6) Peak Number: Maximum number of waterfowl present on refuge during any census of reporting period.
- (7) Total Production: A summary of data recorded under (4).

3-1751

Form NR-1A

(Nov. 1945)

MIGRATORY BIRDS

(other than waterfowl)

Refuge Mud LakeMonths of January to April 19460

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. <u>Water and Marsh Birds:</u>										
Great Blue Heron	1	3/31								
Pelican	9	4/14								
Pied-billed Grebe	Many	4/15								
Holboell's Grebe	1	4/19								
BC Night Heron	1	4/23								
DC Comorant	1	4/13								
Sandhill Crane	1	4/10								
Common Loon	2	4/19								
II. <u>Shorebirds, Gulls and Terns:</u>										
Killdeer	1	4/7								
Wilson's Snipe	1	4/18								
Woodcock	1	4/15								
Lesser Yellowlegs	Many	4/15								
Greater Yellowlegs	"	4/15								
Franklins Gull	"	4/15								
Herring Gull	2	4/23								
Ring-billed Gull	3	4/10								
Marbled Godwit	1	5/1								

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons:</u>					
Mourning dove	2	4/15			
White-winged dove					
IV. <u>Predaceous Birds:</u>					
Golden eagle	winter resident	(not common)			
Duck hawk	1	2/11			
Horned owl	Resident				
Magpie	winter resident				
Raven	"	"			
Crow	1	3/25			
Sparrow Hawk	1	4/11			
Rough-legged Hawk	winter sresident				
Marsh Hawk	1	4/2			
Red-tailed hawk	1	4/7			
Red-shouldered hawk	1	4/11			
Cooper's hawk	1	4/20			
Bald eagle	1	3/19			
Reported by Don R. Perkuchin					

INSTRUCTIONS

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

3-1752
Form NR-2
(April 1946)

UPLAND GAME BIRDS

1613

Refuge Mud Lake Months of January to April, 1946

(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 Observed	Pertinent information not specifically requested. List introductions here.
Ruffed Grouse									15	
Sharptail									40	
Gray Partridge									14	
Pheasant									3	

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 National Wildlife Refuge Year ending April 30, 1960

(1) Species	(2) Density		(3) Removals					(4) Disposition of Furs					(5) Total Popula- tion
Common Name	Cover Types & Total Acreage of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	For Re- stocking	For Re- search	Share Trapping			Total Refuge Furs Shipped	Furs Donated	Furs Destroyed
								Permit Number	Trappers Share	Refuge share			
Mink								T-9380	13 1/2	13 1/2			
								T-9381	3	3			
								T-9382	1	0			
								T-9383	8 1/2	8 1/2			
								T-9384	5 1/2	5 1/2			
								T-9385	5	5			
								T-9386	1	1			
								T-9387	6 1/2	6 1/2			
								T-9388	6	6			
								T-9389	1 1/2	1 1/2			
								T-9390	11	11			
Muskrat								T-9380	2	1			
								T-9381	6	6			
								T-9383	1	1			
								T-9384	31	32			
								T-9385	3	2			
								T-9386	1	1			
								T-9388	2	2			
								T-9390	105	104			
Beaver								T-9391	18	0			
								T-9392	14	0			

* List removals by Predator Animal Hunter

* List removals by Predator Animal Hunter

REMARKS: Please refer to Report of Predator Study, 1959 for details of populations and removals.

Reported by Don R. Pertuchin

INSTRUCTIONS

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

(1) SPECIES:

Use correct common name. Example: Striped skunk, spotted skunk, short-tailed weasel, gray squirrel, fox squirrel, white-tailed jackrabbit, etc. (Accepted common names in current use are found in the "Field Book of North American Mammals" by H. E. Anthony and the "Manual of the Vertebrate Animals of the Northeastern United States" by David Starr Jordan.)

(2) DENSITY:

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

(3) REMOVALS:

Indicate the total number under each category removed since April 30 of the previous year, including any taken on the refuge by Service Predatory Animal Hunter. Also show any removals not falling under headings listed.

(4) DISPOSITION OF FUR:

On share-trapped furs list the permit number, trapper's share, and refuge share. Indicate the number of pelts shipped to market, including furs taken by Service personnel. Total number of pelts of each species destroyed because of unprimeness or damaged condition, and furs donated to institutions or other agencies should be shown in the column provided.

(5) TOTAL POPULATION:

Estimated total population of each species reported on as of April 30.

REMARKS:

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

Spruce grouse in a jack pine east of the refuge (Beltrami Island State Forest). Attempts have been made to re-establish this fine bird on the refuge, but with no success. Photo by Dill. M.L. #



Cow moose which was struck by an automobile near the east boundary and had to be destroyed. Butchered by refuge personnel, (Marv Mansfield in picture) the animal dressed out 465 pounds of meat which was sold by the local game warden.
Photo by Dill. M. L. #180-17.



Fetus from moose shot by poacher in November. The moose finally died December 31st. Presumably the animal conceived in September. The small size of the unborn offspring suggests that it may have expired before the parent. Photo by Dill. M.L. #180-5.



Fifteen duck nesting boxes were built and put up during the period. Designed primarily for American golden-eye ducks, we shall welcome any of the tree-nesters (i.e. ducks) that care to try them. Two were spotted on posts over water, the remainder in trees (right background). The tree trunks were covered with sheet aluminum to discourage raccoons. Photo by Dill. M.L. #193-10.



The Conibear cubby (developed in 1959) was shortened and simplified (Section V). Here Wildlife Aid Don Perkuchin holds a No. 220 (experimental) Conibear trap and cubby, which is to be set near the culvert. Culverts are likely spots for 'coons, skunks and other animals (note scats). Photo. by Dill. M.L. #196-7.



A series of 26 cubby-sets were made which were baited with chicken eggs. A small (No. 0 or 1) leg hold trap was set inside to catch any animal small enough to slip through the conibear. Photo by Dill. M. L. #198-3.



The cubby has been baited with eggs, small trap set inside, and the No. 220 is placed in the opening. Photo by Dill. M.L. #196-5.



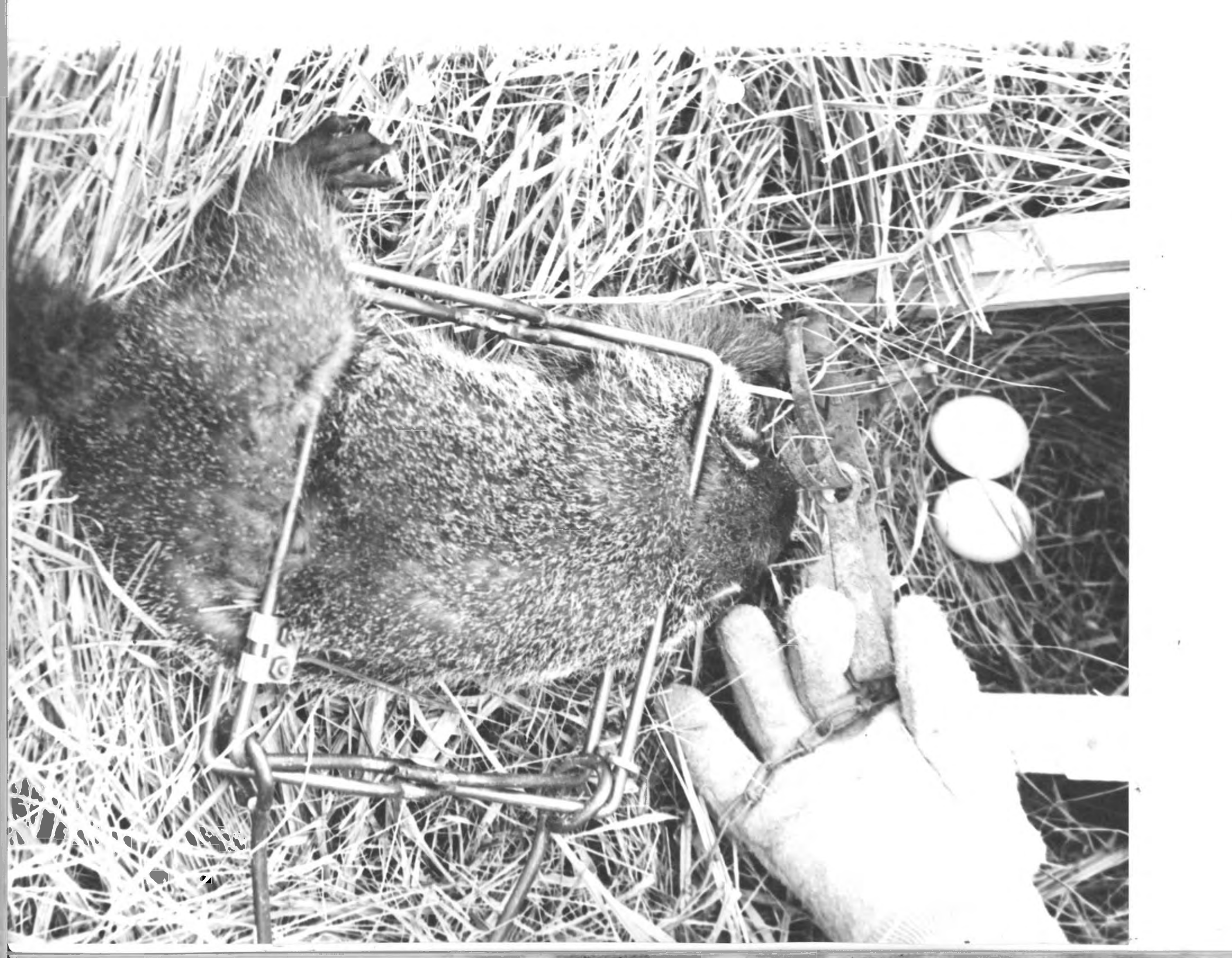
A similar set under a brush pile. Photo by Dill. M.L.#196-11.



The completed set which is partially camouflaged. Photo by Dill. M.L.#196-6.



A woodchuck caught in both leghold and Conibear traps. The woodchuck commonly eats chicken eggs used for bait. Photo by Dill. M.L. #197-3.



A raccoon taken in the No. 220. The animal died soon after it was caught; there was little evidence of struggling. Photo by Dill. M.L. #197-12.



Refuge trapper Glen Bernstein uses the Conibear No. 330 for beaver as a supplement to No. 4 Oneida jump traps. He considers the Conibear a specialized trap - a valuable addition to the tools of the trade under certain conditions. Photo by Dill. M.L. #193-6.



Two mink killed five geese in three nights at the goose pen. Both were trapped in two nights, one in a leg hold trap the other in a Conibear #110. The old culvert provides a good spot for a Conibear set. However, the mink backed into the trap as it tried to drag the goose into the culvert. Photo by Dill. M.L. #186-13.



Fourteen nesting islands were constructed (Section V). These were made from tamarack logs and were lined with sheet aluminum. The cross log prevents floating after they have been filled. Photo by Dill. M.L. #181-11.



A close-up showing earth fill around cross log. Expectancy of these islands is estimated at 25 years. Photo by Thompson. M.L. #183-6.



Dumping fill directly into the cribs was found to be impractical, so the tractor and frontend loader was used to complete the job. The four poles in foreground provide a ramp for the convenience of waterfowl using the island. Photo by Thompson. M.L. #183-7.



A completed island which was built on the bottom while the pool was in drawdown. Spacing of islands was about 300 yards. The tops were capped with straw and an old tire casing which is supposed to induce goose nesting. Photo by Thompson. M.L. # 183-4.



Close up showing tire which has been halved to prevent goose eggs rolling into the casing from which they can't be retrieved by the goose. Photo by Dill. M.L.#185-3.



Because aspen is abundant near most of the pools, aspen logs were used in one island to test their durability (Marv Mansfield). Photo by Bill. M.L. 185-2.



When the geese were released in the goose pen, this pair immediately took over the new island in preference to other islands. They have vigorously defended it, and as this is being written May 12th, the female is incubating inside the casing. Photo by Dill. M.L. #193-14.



Pole and fence post project produced tamarac timbers for nesting islands and corrals as well as 2,000 posts. (Oliver Davidson, Gary Hofmaster, Lyle Blahauvietz).
Photo by Dill. M.L.#181-2.



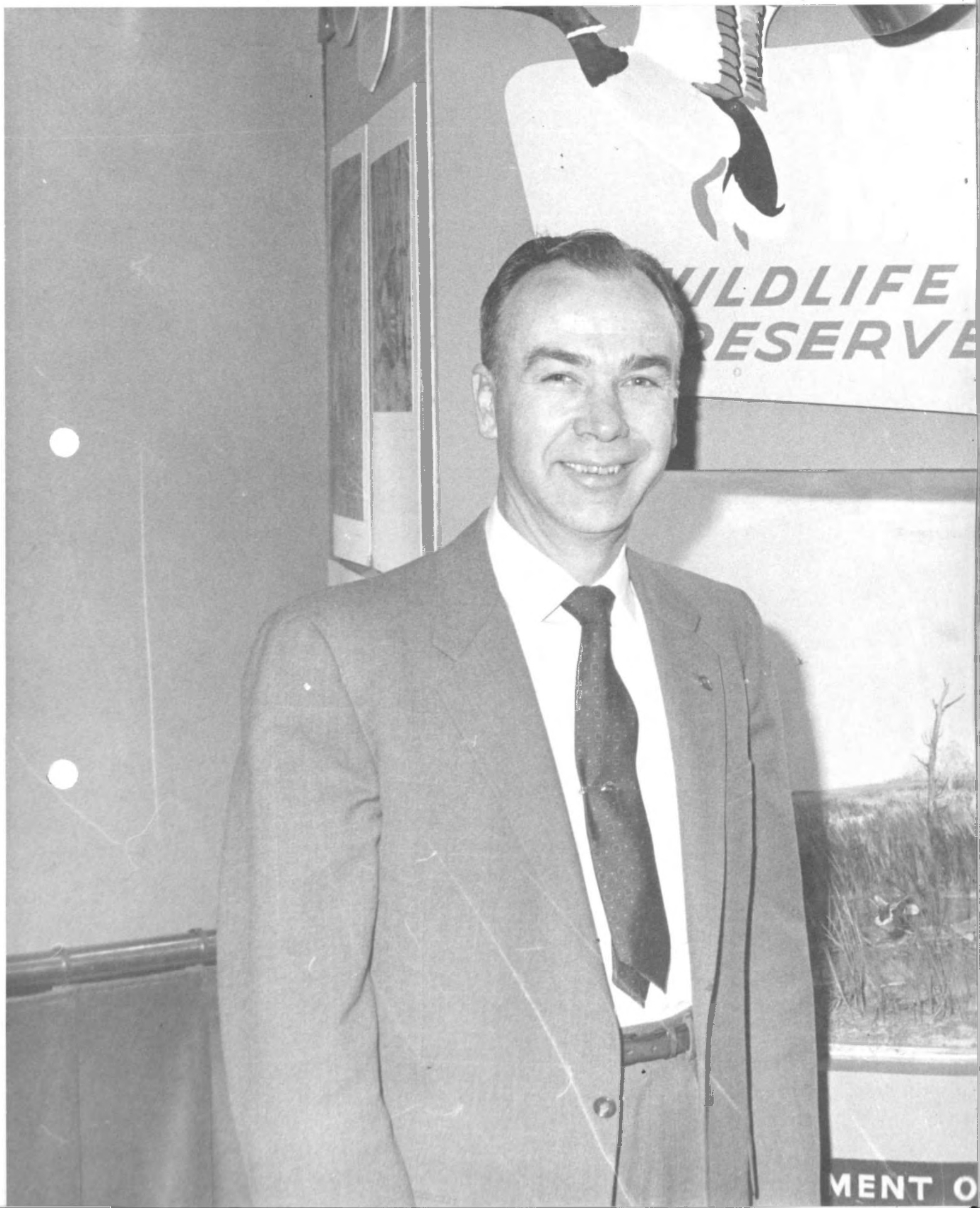
Piles of waste peat east of the goose pen were discovered to be harboring predators.
We burned them last winter together with several old hay butts in the same category.
Photo by Dill. M.L. #184-9.



The writer drew a 10-day assignment to the Northwest Sportsmens' Show at Minneapolis April 1 - 10 where the service had an exhibit for the first time. A total of 132,000 people attended of which at least 40,000 were believed to have viewed our exhibit. Photo by Dill. M.L. #187-11.



Regional Director Bob Burwell was one of the exhibitors as were several other members of the Regional Office staff. The diorama behind Mr. Burwell depicts a typical pothole and was an outstanding part of the exhibit. Photo by Dill. M.L.#188-21.



Young and old are equally impressed with the pothole diarama. Photo by Dill. M.L.#190-21.



A continuous movie, aquarium and wildlife photos rounded out the exhibit which was intently studied by thousands. A special feature, added by RO, was a complete set of duck stamps beautifully displayed under glass. (My picture of same was a flop.)
Photo by Dill. M.L. #190-18



Near the service exhibit was a team of huskies that performed on a treadmill.
Unlike many sled dogs, they were friendly. Photo by Dill. M.L. #193-4.



Don Balser and Bill Longley, Minnesota Department of Conservation at work on the cooperative predator study. The box on the left is used as a chamber for anesthetizing animals. Once the animal is inside, a plunger device is pushed in which is airtight and which reduces space occupied by the animal to a minimum. This greatly facilitates anesthetizing. Photo by Dill. M.L. #197-9.



A raccoon inside the ether-box. The 'coon is behind glass in the sealed chamber and will shortly go to sleep. Photo by Dill. M.L. #196-15.



A blood sample is taken directly from the heart using a syringe needle and vacuumized tube, a great improvement over the old system. Photo by Dill. M.L. #197-6.



The anesthetic must occasionally be renewed while the 'coon is handled. Here the ear tags have just been fastened on. Photo by Dill. M.I. #197-4.



A double amputee as a result of previous encounters with leghold traps. A surprisingly large percentage of the animals live trapped have toes, and even legs missing.
Photo by Dill. M.L. #196-17.



When released, the raccoon (previous picture) hopped off kangaroo fashion, only occasionally touching the ground with the stubs left in front. Undoubtedly an animal handicapped in this way would resort to preying on nests, poultry or other forms of food more easily available. Photo by Dill. M.L. #196-21.

