

BRANCH OF WILDLIFE REFUGES

NARRATIVE REPORT

ROUTING SLIP

DATE 9/29, 1954

Mr. Salyer _____

Mr. DuMont DAJ

Mr. Krummes _____

Miss Baum _____

Section of Operations:

~~Mr. Ball~~ _____

Dr. Morley _____

~~Mr. Hogan~~ 7KJR

Section of Habitat Improvement:

~~Mr. Griffith~~ REG

Mr. Kubichek _____

~~Mr. Bourn~~ WSP

Mr. Stiles W.S.

Section of Land Management:

~~Mr. Ackerson~~ W.S.

Mr. Davis _____

Stenographers:

REFUGE MUD LAKE

PERIOD MAY - AUGUST, 1954

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

MUD LAKE NATIONAL WILDLIFE REFUGE
Holt, Minnesota

NARRATIVE REPORT

May - August, 1954

PERSONNEL

Robley W. Hunt	- - - - -	Refuge Manager
John C. Carlsen	- - - - -	Junior Refuge Manager
Oliver T. Davidson	- - - - -	Maintenance Foreman
D. C. Wehmeyer	- - - - -	Maintenance Man
Melvin R. Johnson	- - - - -	Clerk
Stanley W. Harris	- - - - -	Student Assistant
Robert L. Jessen	- - - - -	Student Aid

TABLE OF CONTENTS

	<u>Page</u>
I. <u>GENERAL</u>	
A. Weather Conditions	1
B. Water Conditions	1
C. Fires	4
II. <u>WILDLIFE</u>	
A. Migratory Birds	4
B. Upland Game Birds	7
C. Big Game Animals	8
D. Fur Animals, Predators, Rodents & Other Animals	9
E. Predaceous Birds, Including Crows, Ravens, & Magpies	910
III. <u>REFUGE DEVELOPMENT AND MAINTENANCE</u>	
A. Physical Development	10
B. Plantings	14
C. Collections	15
D. Receipts of Seed and Nursery Stock	15
IV. <u>ECONOMIC USE OF REFUGE</u>	
A. Grazing	16
B. Haying	16
C. Fur Harvest	16
D. Timber Removal	16
E. Other Uses	16
V. <u>FIELD INVESTIGATION OR APPLIED RESEARCH</u>	
A. Progress Report	17
VI. <u>PUBLIC RELATIONS</u>	
A. Recreational Uses	22
B. Refuge Visitors	25
C. Refuge Participation	23
D. Hunting	23
E. Fishing	23
F. Violations	23
VII. <u>OTHER ITEMS</u>	
A. Items of Interest	23

APPENDIX

Notices to newspapers

NR FORMS

NARRATIVE REPORT

May - August, 1954

I. GENERAL

A. Weather Conditions

Following is a tabulation of weather conditions for the period:

Month	<u>Snowfall</u>		<u>Precipitation</u>		<u>Max. Temp</u>		<u>Min. Temp</u>	
	1953	1954	1953	1954	1953	1954	1953	1954
May	None	7"	3.39	3.10	86	76	24	23
June	None	None	3.09	4.18	90	89	27	37
July	None	None	.99	1.41	87	92	45	45
Aug.	None	None	1.44	2.95	94	85	41	41
Total	None	7"	8.91	11.64	94	92	24	23

The entire period has been characterized by increased rainfall over the same period of 1953. Temperatures on the whole have not been as high, and the combination of the two resulted in more stable water levels for the period. The same period has been marked by several sessions of high winds, one causing considerable damage to roofs of refuge buildings, and farm buildings of area residents. One severe hail-storm completely hailed out a number of farmers located near our north boundary. Some refuge volunteer clover stands were likewise damaged.

B. Water Conditions

Following is a tabulation indicating water conditions for the current period as compared to the same period in 1953:

Pool	<u>Approved Level</u>		<u>1953 Levels</u>		<u>B 1954 Levels</u>	
Mud Lake	1141.0	2.10	low		.80'	low
Green Stump	1140.0	15-20"	low		24"	low
Madgen	1140.0	18"	low		-	
Headquarters	1142.0	3.1'	low		1.8'	low
South	1142.5	18-24"	low		8-10"	low
East	1143.0	12-14"	low		10-12"	low
CCC	1143.0	Middle & So.	dry		Mid & so	dry
Mud River	1143.0	13-14"	low		10"	low
Webster	1144.0	44"	low		20"	low
Northwest	1141.5	av. 4-6"	on flats		8-10"	low

Water management and draw-down operations for the year called for the following levels for the summer months:

Mud Lake - to be restored to normal if possible.
Green Stump - to be drawn down two feet below normal as of June 1.
Madsen - to be held at normal
Headquarters - to be maintained at 1141.5.
South - to be held at normal
CCC - upper 6-10" high; middle and lower drained completely.
Mud River - to be held at about 1142.2.
Northwest - to be held at 1141.5.
Webster - to be held at 1142.5.

As it turned out the meager run-off, and a subsequent dry spell combined to limit the available water supply for certain pools.

Mud Lake has been about .8' lower than planned since early summer, but it is believed this was actually beneficial as far as growth and survival of new vegetation has been concerned - too deep water on the new emergent aquatics, in our opinion, results in killing out that located in deeper waters.

Green Stump is perhaps a bit lower than the two foot drop planned for, but response of emergents has been good, and growth on planted millets, and volunteer "goose-foot" Chenopodium Album has been excellent, and we predict heavy use of this pool at such time as we re-flood (which will follow the first hard frost this fall).

Madsen pool levels have remained close to normal throughout the summer. Some of the peat burn-outs which dried out completely show a good growth of Scirpus along the edges, and on some of the peathumps.

Headquarters - the limited run-off prevented filling this pool to the old approved level. In view of the new dike, and lush growth of volunteer Scirpus, resulting from the 1953 draw-down, it is just as well that water levels have remained somewhat low - the extensive beds of Scirpus and Typha, occurring in formerly barren areas appear to be prospering, and dike slopes have become well vegetated. Dike shore-

lines are now protected by a solid growth of Scirpus from 1953 clump plantings.

South pool also is a bit low, but aquatics are doing very well, and the pool looks to be in much improved condition.

East pool never did fill. This was not actually intended, but nevertheless is desirable in view of the proposed channel and nesting island work to be accomplished this fiscal year.

CCC - Upper CCC is from 6-10" higher than normal. The surplus stored in upper CCC is a result of an active beaver dam in the outlet channel between upper and middle CCC pools - the surplus will be utilized to put water into middle and lower CCC pools right after the first frost - this will create excellent feeding conditions for waterfowl, as the exposed flats have volunteered to good growths of Scirpus - it will also help retard growth of new fleabane plants - we hope.

Mud River - it appears as if some little softstem bulrush has died back because of the higher water levels on this pool. Some loss was perhaps desired, as the heavy volunteer growth of Scirpus appearing in 1953 was almost too dense.

Northwest - Spring run-off did no more than fill the borrow-pits of this pool. It was necessary to cut the plug between Northwest and Mud Lake, and "back" water in from Mud Lake at the time Mud Lake levels were at or a bit above 1141. While the present levels are a little too low, the lower levels have given the dike shorelines a chance to vegetate. We also predict a 90% kill on the willow as soon as we can get levels to 1141.5 - this should be possible in the spring of 1955.

Webster pool has been maintained at close to desired levels (18" below old approved level of 1144.0), and volunteer emergents resulting from previous years draw-downs have not died back - at least noticeably.

As a result of the past several years intended lower water levels the dike system has suffered no erosion with the exception of the Headquarters dike. This dike did lose a bit of slope during the early summer.

Since that time shoreline growths of Scirpus and cattail, plus placing of logs and tree trunks along eroding sections have both helped greatly in reducing damage resulting from heavy winds.

C. Fires

No fires this period. At this time conditions are not considered real hazardous, altho a week or two without rain could create such conditions. Ordinarily the fire hazard is not too great until several hard frosts have killed back the heavy ground cover in the marsh areas to the south and east of the refuge boundaries.

II. WILDLIFE

A. Migratory Birds

1. Population and Behavior

a. Whistling Swan

One Swan was observed regularly in the southwest corner of Green Stump Pool during June and the early part of July.. It is possible that this bird was crippled since it was never observed flying. It was not observed during any of the aerial checks made during the later part of July.

b. Canada Goose

Four observations of goose broods were made during late May and two broods were seen in July during the aerial counts. The total goose production was estimated at 30 goslings. While this is fair progress, it still is not fast enough to put the goose project over the hump during the next few years.

Several flocks of non-breeders were observed during the summer and both family groups and groups up to 60 geese have been seen quite regularly during the latter part of August and first part of September.

A goose which appeared to be a cross between a Lesser Canada and a Snow Goose was observed during the early part of June. Attempts were made to collect this bird but we were unsuccessful.

c. Ducks

Phenologically, this breeding season was about the same as last year, which was a late year. There were several snow storms during the first two weeks of May and the character of the nesting season in general was retarded.

The late arriving Ruddies and the erratic Gadwall were the last two species to begin nesting activities. The first Mallard and Pintail broods were hatched around the 25th of May and the peak of the hatch for all species occurred around the 4th of July. As late as Sept. 10 there were a few early Class II broods in evidence.

Since water levels had been restored on several important pools this year there were many more acres of desirable nesting habitat. It is felt that the increase in the number of broods of diving ducks over the past two years is due to the improved habitat in the various pools used by these species.

Mallards regained the number one position as producers this summer. A close second was the Blue-winged Teal followed by the Redhead & Gadwall. All of the remaining breeding species produced less than 500 ducklings each. In order of abundance they are: Pintail, Ruddy Duck, Ringneck, American Widgeon, Shoveler, Green-winged Teal, Canvasback and Lesser Scaup. There were no brood observations of Black Duck or Wood Duck and it is felt that our summer population of these birds is probably moulting drakes only. Total duck production was estimated at 10,600 ducklings.

It is felt that nest predation was at a minimum this year due to several factors. The resident population of crows was very low and an intensive campaign was waged against such mammalian predators as skunk and coon with fair results.

d. Water and Marsh Birds

This was the best coot producing year since 1951 on this refuge. Due to the irregularity of their hatch and loose brood habits, it was difficult to determine the production with accuracy. Coots demonstrated an affinity for the newly re-flooded

MUD LAKE REFUGE

SUMMARY OF 1954 GOOSE AND DUCK BROOD PRODUCTION

Based upon 294 non-duplicated brood observations over 1,017 acre area throughout summer and 100% coverage of marsh area by airplane on July 14th and 15th, 1954.

Species	Summer Adult Population	Number Broods Observed	Calculated Total Broods Produced	All Classes Brood Size	Estimated Total Young Produced
Canada Goose	120*	6	7	-	30
Mallard	2100	87	515	7.23	3250
Black Duck	150	-	-	-	-
Gadwall	550	23	136	8.22	850
American Widgeon	175	8	47	-	300
Pintail	300	12	71	-	450
Green-winged Teal	125	6	35	-	225
Blue-winged Teal	2000	85	503	8.24	3100
Shoveler	175	7	42	-	275
Wood Duck	75	-	-	-	-
Redhead	750	31	183	6.75	1150
Ring-necked Duck	225	10	59	-	375
Canvasback	100	8	24	-	150
Lesser Scaup	75	3	17	-	100
Ruddy Duck	250	154	64	-	400
Totals for Ducks	7050	294	1696		10625

* Includes Immatures

areas which had volunteered to emergent cover under the draw-down program. In Mud River Pool, a density of one nest per acre was found.

The 35 nest colony of Cormorants in the dead timber around Cormorant island was approximately the same size as last year. Twelve of the young were banded during mid-July.

Both Great Blue Herons and American Bittern were common breeders. The Black-crowned Night Heron was a less common resident but was not known to nest on the refuge. Sandhill Cranes were observed on Green Stump Pool on Sept. 3rd but the main flight will come later in September.

Red-necked, Pied-billed and Horned Grebes nested in the usual numbers the Eared Grebe was seen only in migration. A few Western Grebes visit the refuge during the summer but it is doubtful if they stay for any length of time.

The peak of the shorebird migration occurred during the last week of August. Many kinds of Sandpipers, Phalaropes and other shorebirds were to be found in abundance on the mud flats of the drawn down pools.

Mourning doves and Wilson's Snipe have been quite common this summer.

2. Food and Cover

The refuge program of periodic draw-down has resulted in greatly improved habitat. Extensive areas of hard and soft-stem bulrush have volunteered in areas where previously there had been only open water. The response of the submergent aquatics has been irregular. Some places have responded with heavy beds of vegetation with many seed-heads and similar areas have not responded at all.

A considerable acreage of grain fields are available for the ducks and geese in the goose pen vicinity. There are stubble fields of wheat and barley, swathed barley and swathed millet, as well as the green sprouts of newly seeded fall rye and winter wheat to tempt the geese. There is also a 5-acre field of alfalfa and a 2 acre field of mixed clover and trefoil.

3. Botulism

Checks were made of Green Stump and Mud Lake Pools during the middle of August. No sick or dead ducks were observed.

4. Lead Poisoning and other Diseases

Student Assistant Harris picked up a Greater Scaup on May 13th which died of lead poisoning. There were at least 37 lead shot in the gizzard plus an undetermined number that had been assimilated. This was the only sick bird noted during the period.

B. UPLAND GAME BIRDS

1. Population and Behavior

Very few observation have been made of upland game birds during the period. The Sharp-tailed Grouse is the most common resident followed by the Ruffed Grouse. The Prairie Chicken, Hungarian Partridge and Ring-necked Pheasant are rare here and the fate of the ten Spruce Grouse that were introduced here is unknown at this time. Only two broods of sharp-tails have been seen so there is little that can be said about their status other than that they have not been commonly observed this summer.

2. Food and Cover

Abundant food and cover is available for both the Sharp-tail and Ruffed Grouse. As an experiment, a five acre patch of barley was bundled and shocked and left for the benefit of the chickens. It is hoped that the grouse will make use of these for winter food and cover.

It is unlikely that there ever will be enough farmland developed within the refuge to provide the proper amount of interspersed required for good Pheasant, Hungarian Partridge, or Pinnated Grouse habitat.

3. Disease

None in evidence.

C. BIG GAME ANIMALS

1. Population and Behavior

White-tailed Deer

Since the deer population has been reduced each fall for the past few years, there are not as many on the refuge and hence fewer observations. A high proportion of the doe-fawn observations were of twins and a few cases of triplets.

All deer appear to be in the best of condition. A few large bucks have been seen with magnificent racks. To our knowledge no predation occurred on the refuge and no deer have been hit by cars.

Moose

At least nine moose calves have been seen this summer in the small area visible from the refuge road system. The herd should total in the neighborhood of 85 animals next winter, taking into account the probable loss of from four to six moose during the refuge deer season.

It is possible that the rutting season is slightly delayed this year for unknown reasons. Several bulls have been seen with their racks still in the velvet and in one instance two bulls were seen together, while usually they will not tolerate another bull's company this time of year.

2. Food and Cover

The deer have been making extensive use of the fields being developed in the goose pen vicinity, especially in the spring when the young tender shoots provide a tempting repast. The character of the winter browse situation can best be described by the term abundant. There is food and cover available for more deer and moose than are now present.

3. Disease

None in evidence.

D. FUR ANIMALS, PREDATORS, RODENTS AND OTHER ANIMALS

From outward appearances the muskrat population is still quite low. A few attempts at house-building have begun but a plane count in late Oct. or early Nov. should determine more accurately the total population. The restored water levels should provide better winter habitat for these animals.

Predators such as mink and weasel seem to be quite scarce at present. Larger predators such as bobcat, fox, and coyote are seen or heard only on rare occasions.

The skunk and raccoon populations continue to be more abundant than we would like. They seem to be plentiful despite continual control efforts.

It is possible that the Ground Squirrels will need to be controlled before too long. Both the Thirteen-lined and the Franklin's are becoming increasingly common. Since they are known to be duck nest predators we may have to try control methods.

E. PREDACEOUS BIRDS, INCLUDING CROWS, RAVENS, AND MAGPIES

Crows have not been very abundant this summer for which we are thankful. Ravens and Magpies generally appear about the first of October.

No eagles have been seen this summer. The summer hawk population was composed chiefly of the usual Marsh and Red-tailed hawks. There was a rather heavy movement of Marsh Hawks thru this area about the first week in September.

F. FISH

The refuge fish population is composed mainly of a few hardy minnows that can live in the warm shallow waters in summer and keep from freezing out in the winter. The fish run this spring was very small because we were not releasing water during the period of the fish run and ~~there~~ there was very little water in the river.

III. REFUGE DEVELOPMENT & MAINTENANCE

A. Physical Development

Working conditions have been good for the most part, and considerable progress has been made on the numerous development jobs approved for the year. Our greatest handicap has been the new regulation requiring Washington approval of temporary labor for construction and development projects.

Following are brief summaries of progress since July 1:

Construction

Thief Bay (C-2) All surveys completed, dike cross-section staked out, and spillway location staked. Completed about $4\frac{1}{2}$ miles rough dressing of east spoil bank (which will be west dike of pool); moved about 22,810 yards fill on west and south dike; completed temporary crossing by putting plug in Thief River channel; purchased wakefield piling material, and calco-gate control and culvert.

Ditch 11 Bridge Renovation (C-3) Purchased plank-ing, piling, and cribbing - all on hand.

Dahl Pool Control (C-4) Nothing this period. Surveys to be run this fall.

Patrol Roads (C-5) Rough-dressed about 8.5 miles of new patrol roads; bladed 8.0 miles of same. All bladed sections can now be traveled, and some of rough-dressed sections can also be traveled - with care.

Marsh Development (C-6) Tamarack Pool surveys completed for south and west dike. Wakefield piling materials on hand for control; purchase order issued for calco-gate and culvert; arrangements completed for co-op ditching along north boundary; surveys to be accomplished for inlet ditch from north refuge boundary - possibly to be done by County engineers.

Kelley Pool Nothing accomplished to date. Surveys to be run this fall, and hope to complete dike and spillway construction.

Pool 27 To be held in abeyance pending further surveys.

Rehabilitation

Improve Nesting Habitat

Nothing accomplished.

Townline and Whiskey Lake Roads

Nothing accomplished.

East Pool Rehabilitation

Nothing accomplished.

S & M and Land Improvement

Detailed accomplishments will be reported in the S & M quarterly as of September 30. In general, S & M accomplishments have consisted of the following:

Deep plowing and discing on about 20 acres of area from which deep peat had been burned (west of goose pen); weed control (chemical, and two separate treatments) on about 110 acres of refuge grain crop; mechanical weed control (cultivating) on 60 plus acres in goose pen, several treatments; removal of brush, stumps, etc., from potential crop lands; deep plowing on areas inside goose pen; mechanical weed control in area south of Dahl grove; millet seeding on new lands; surveys and plans completed for demonstration pothole development area south of County Road "E".

Accomplishments - May, June, 1954

622

712-C-3 - Six-stall equipment storage building completed.

622

712-R - Fencing - 1.3 miles old fencing salvaged, and new fencing completed on same stretch.

Gravel Green Stump Dike - 493 yards placed on west dike slope. 60 yds fill relaid riprap.

S & M - brush removal and land clearing south of "E".

Aquatic Planting - 40 acres planted by plane; 6600 yds. shoreline, 27,585 bulrush tubers harvested and planted.

Miscellaneous Repairs, Maintenance, Job Accomplishments

Buildings

Primary Residence - Painted living room and dining room. Painted all exterior trim, and screens. Cleaned sewer line.

Clerk's Residence - Painted exterior trim. Puttied all windows including storms. Replaced shingles lost during storm.

Jr. Mgr. Residence - Painted exterior trim. Puttied all windows including storms. Replaced shingles lost during storm. Painted bath.

Bunkhouse - Nothing.

Service Building - Repaired deep well pump. Repaired sump pump. Replaced shingles lost during storm.

Equipment Shed - Replaced shingles lost during storm.

Barn, Chicken Coop and Fur Shed - Replaced shingles lost during storm.

Apartments - Installed water main to both apartments.

Laundry - This building completed and set up for use. Installed water main, and hooked up for use of laundry and shower.

Secondary Barn - Painted trim.

Secondary Equipment Shed - Painted exterior trim.

Equipment Repair and Maintenance

The usual greasing, washing and minor upkeep were performed, and 5,000 mile checks, and safety checks accomplished. More or less major repairs to equipment is as follows:

Ford - New window glass. Wiper blade & arm.

Jeep - Belt, battery, cable, starter repair.
(old)

Int. Pickup (I-16874) - New spindle bolts.

Int. Dump (I-18196) - Speedometer repair.

Oshkosh - Drive Shaft repair.

Farmall - New belt.

NW Dragline - New crank and cover.

L-B Dragline - Radiator repair. Generator repair.
Clutch bands, cable clamps. Bucket
teeth.

Miscellaneous

Trip to Seney for goslings.

Trip to Arrowwood for Pickup.

Trip to Norris Camp to check on real property.

Made up five dragline mats.

Grade refuge trail several times - approx. 200 miles
blading.

Mowed refuge trails (not yet completed) - approx. 100
miles to-date.

Removed debris from controls and ditches (beaver dams)
about 20 times.

Brushed out and repaired telephone line to Holt.

Dug up and repaired broken water main.

Wired laundry and new storage shed.

Extended air line from Service bldg. to equipment shed.

Mowed hay from air strip twice (permitted).

Two mowings clover and three mowings alfalfa in goose
pen - stacked first two mowings, and baled third cut.

Made up anchors for plane - in airstrip.

Harvested 9 acres fall rye - cleaned 45 bushels for
planting.

Cleaned millet, wheat, barley and oats before planting.

Planted and cultivated experimental corn field.

Built new gate in goose pen.

Hauled several yds gravel and repaired approaches -

Ditch 11 bridge.

Constructed new bins (2) and put up partitions for 3 additional bins.
Constructed two new duck traps, and one transfer crate.
Two 100' lookout towers partially painted - repairs completed on roofs and cabs.
Mowed headquarters site, with power mower.
Mowed lawn area around buildings weekly (2.5 acres per mowing).
Marked boundary lines on sweet clover areas.
Gathered up all surplus property, scrap metal, etc., and hauled to Headquarters site in preparation for sale or other disposition.
Weighed and measured hay cut under permit.
Erected two 20' observation towers.
Constructed three each nesting and brooding boxes for artificial rearing of geese.
Considerable man-days on "real" property inventory of Mud Lake Refuge and Red Lake Game Refuge.

W. Plantings

1. Aquatics and Marsh Plants

The Dahl Pool dike and islands were seeded with the "dike mixture" consisting of alsike, sweet and red clover, timothy, reed canary grass, and fall rye. Also seeded with this mixture were the islands in East pool and the Stub Tower dike. These plantings totaled 5 acres.

The shoreline of Headquarters Dike and the periphery of the Goose Pen Islands was planted with bulrush tubers. Approximately 33,000 Softstem tubers and 5,000 Hardstem tubers were planted. The barrow pit in the goose pen was also planted with 443 pounds of Duckweed (Lemna minor).

Exposed mud flats and shorelines of CCC and Green Stump pools were seeded with various mixtures of Early Fortune, Japanese and Wild Millet and some Smartweed. This seeding amounted to about 22 acres.

Pilot-Biologist Smith seeded about 40 acres of exposed Mud flat in Green Stump Pool with a mixture of Japanese Millet and Smartweed totaling 1200 lbs.

Survival on all plantings was good, with the bulrush being almost 100%.

2. Trees and Shrubs

None planted this period.

3. Upland Herbaceous Plants

None planted this period.

4. Cultivated Crops

This period refuge permittees have approximately 600 acres in cultivated crops such as flax, barley, oats, sweet, alsike and red clover. The clover yields were not too good as there was too much competition with volunteer sweet clover. The grain crops were spotty, some being fairly good and others poor.

Refuge personnel had an additional 160 acres in crop in the neighborhood of the goose pen. There were 33 acres of wheat, nine acres of fall rye, 37 acres of barley, 32 acres of Early Fortune Millet, 11 acres of Jap Millet, 9 acres of corn, 14 acres of oats, 5 acres of dwarf milo, 13 acres of alfalfa and 2 acres of Birds Foot Trefoil. Some of the wheat and early fortune millet was harvested and the rest mowed and left for the ducks and geese. The barley was mowed and the corn will be dragged down so it will be available to the waterfowl during fall migration.

C. COLLECTIONS

1. Seed and Other Propagules

Approximately 33,000 softstem and 5,000 hardstem bulrush tubers were collected during the period and planted on dikes and islands on the refuge. Sixteen bushels or 443 pounds of duckweed was collected from one of the refuge ditches and placed in the barrow pit in the refuge goose pen.

2. Specimens

None this period.

D. RECEIPTS OF SEED AND NURSERY STOCK.

The Holt Boy Scout Troop planted 50 Spruce trees averaging 4 feet high in the Grove one mile southwest of Headquarters on Saturday May 8th. These trees were planted to provide winter cover for

grouse using the aspen grove.

IV. ECONOMIC USE OF REFUGE.

A. Grazing

A total of 325 AUM's have been covered by special use permits issued to two permittees. The only demand we have for grazing is by the boundary farmers who graze the fenced units adjacent to their farm.

B. Haying

Approximately 600 tons of hay have been cut under special use permit issued to 14 permittees. The demand for refuge hay was not as great this year due to the excellent hay crop obtained outside the refuge. Some of the hay units volunteered to sweet clover this year they were out for seed instead of hay.

C. Fur Harvest

Not applicable this period.

D. Timber Removal

None this period.

E. Other Uses

Mr. George Franzen of Middle River was issued a special use permit to place a number of bee hives on the refuge. The presence of the bees and the large amount of sweet clover on the refuge makes for a mutually attractive proposition. A large flow of honey was expected and a good seed crop of sweet clover.

V. FIELD INVESTIGATION OR APPLIED RESEARCH

A. Progress Report

1. Draw-down study

Field work is being continued on the draw-down study started last summer. Work was started in early May when the 45 one-hundredth acre plots established last year were counted for plant densities and growth. Three additional plots were also established in May in willow stands in the Northwest Pool marshes so that the survival of willow in different water depths could be followed over the summer. Counts have been made on all 48 plots at monthly intervals all summer with the termination counts scheduled for mid-September. In addition to the tall wooded stakes used last year, the plots were all marked with metal stakes driven below the water level to prevent being taken out by ice action so that if needed the plots can be located with some searching and reference to the records at a future date.

Both laboratory and field germination experiments have been conducted with Scirpus validus, S. acutus, and Phragmites communis seeds collected on the refuge and subjected to various storage conditions. Indications at this time suggest a tentative recommendation that if seeding of Scirpus is to be done it be done in the fall on newly exposed mud flats that are to be held exposed the subsequent summer. Recording of seedling Phragmites in Sept. of last year led to attempts at laboratory germination of Phragmites seed since the literature has reported that the species did not grow from seed, but spread vegetatively. Germination experiments were successful and a number of seedlings were obtained in the laboratory. *as should be expected,*

Wildlife utilization has been checked and recorded on the drawdown study areas weekly since May. Particular emphasis has been placed on waterfowl. In addition to the areas watched last year, Upper C.C.C. Pool was established as a further control area for this year's wildlife utilization studies.

Work has started on subjective surveys and records of all areas that have had the water levels

fluctuated under the draw-down program are being kept. This is in addition to the plot studies. This phase of the study is scheduled for completion by the last of September. It is strongly recommended that these records be kept up to date at the end of each growing season in the future so that some definite account will be available on vegetation reaction to reflooding, differing water depths, etc., on the draw-down areas over the years.

This was provided for in approving the water mgmt. program R.E.G.

2. Manuscript on Movements of Deer

The Junior Manager and the local State Game Biologist have prepared a technical paper comparing the movements of tagged White-tailed deer of Mud Lake Refuge and other areas. The paper has received general approval from the Regional Office and the State Conservation Department pending revision of a few details. This revision will be accomplished shortly and the paper submitted to the Journal of Wildlife Management.

3. Waterfowl Banding

The cooperative duck banding project with the Minnesota State Department of Conservation was continued again this year during the first week in August. Again the emphasis was placed on drive trapping broods in suitable locations over the refuge. In four days about 170 local ducks were banded. Banding of locals is especially important to an understanding of Mud Lake's contribution to the hunting take in various localities.

Five small portable box traps plus one larger semi-permanent type bait trap were set out on July 28 to commence our bait trapping program for this year. The bait trapping was carried out by S. W. Harris and R. L. Jessen. Using experience gained last fall on checking times and baits, the traps were checked first thing each morning and again after dark each evening and wheat was used as bait. One additional semi-permanent type trap was constructed and set out on Sunday, August 8 to take advantage of a particular mallard concentration and on August 11 another was built and set out to take advantage of a blue-winged teal concentration. Since that time, all 8 traps have been kept in full

operation and the five portable box traps have been frequently moved as opportunities arose. In addition, a new catching and banding crate was constructed for use with all the traps.

Our total of banded birds up to September 1st is as follows:

Species	Adults			Immature			Local			Total
	M	F	Total	M	F	Total	M	F	Total	
Mallard	0	24	24	129	164	293	96	98	194	511
Black	0	0	0	1	0	1	0	0	0	1
Mal-Black	0	0	0	1	0	1	0	0	0	1
Gadwall	0	0	0	0	0	0	5	11	16	16
BWT	19	20	39	207	286	493	35	44	79	611
GWT	0	0	0	0	1	1	0	0	0	1
Woody	11	0	11	0	0	0	0	0	0	11
Redhead	0	2	2	0	0	0	1	3	4	6
Total Ducks	30	46	76	338	451	789	137	156	293	1158
Wilson's S.	0	0	0	0	0	0	0	0	0	2
Sora Rail	0	0	2	0	0	4	0	0	2	8
Virg. Rail	0	0	0	0	0	0	0	0	0	1
Coot	0	0	0	0	0	0	0	0	14	15
D-C Corm.	0	0	0	0	0	0	0	0	12	12
Pied-B. Grebe	0	0	0	0	0	0	0	0	1	1

Grand Total

1197

The 12 cormorants were banded on July 14 as nestlings at the colony on Cormorant island. One of the surprising things to us this year was the fairly large number of local birds that we were able to bait to the traps.

It is interesting to compare relative costs between our trapping program with bait traps and the drive trapping program in which we cooperated with State crews:

(Next page).

Item	Refuge Bait Trapping	Coop. Drive Trapping
Total Man Hours	Av. 4.4 hrs. day for 2 men x 36 days - 316	Av. 7.75 hrs day for 8 men x 4 days - 240
Labor Cost	316 x \$1.16 - \$366.56	240 x \$1.50 - \$360.00
Bait	1.5 Bu. wheat/day at \$2.50/bu. x 36 days \$135.00	00.00
Mileage	40 miles/day gvt. pickup @ .06¢/mi x 36 days \$86.40	100 miles/day/car x 3 cars x 4 days @ .08/mi 96.00
Per-Diem	0.00	\$8.00/day/man \$128.00 x 4 men x 4 days
Total Cost	\$587.96	\$584.00
Total Ducks Banded	1158	170
Cost per Duck	.51	3.44
Ducks/man hour	3.7	.71

When one considers the actual cost to the refuge of our banding, the above picture changes considerably. Of the 316 man hours expended with the bait traps only 70 have been on official time, which figured at the Student Assistant rate of \$1.32 per hour means that the actual cost for labor to the Service has been \$92.40. This means that the total actual cost was \$313.80 or \$.27 per duck. In addition, all but about \$15.00 worth of the wheat used for bait was grown on the refuge in connection with the S & M Program. Discounting the market price of this wheat, that total cost becomes \$198.80 or \$.17 per duck. It should be pointed out that these cost figures do not include costs of the traps or drive trapping equipment.

Even considering the cost per local banded, the refuge program was still cheaper: Cost per baited local - 293 birds divided into total actual cost of \$313.80 - \$1.07 per local. Cost per local to the drive trapping method is that given in the table - \$3.44, and in addition the 865 flying birds banded in the bait traps at the same time as the locals can not be overlooked.

4. Chronology of Geese

The 87 captive Canada Geese were kept in the pen at Headquarters until March 24th, when they were hauled to the goose pen and released. Courtship behavior was noted in about 6 to 8 pairs. Arrangements had been made to hatch goose eggs under setting hens to efforts were made to locate goose nests in the pen so eggs could be obtained. No nests were located until June 3rd, when one nest was found which had been destroyed by a mammalian predator, probably a skunk. Three of the four eggs contained well developed embryos. No other nesting occurred to the best of our knowledge.

On June 22 & 23 a trip was made to Seney Refuge to obtain a load of goslings. Due to a Leucocytozooan infestation only 24 of the original 34 goslings survived to be released in the refuge goose pen. Since three of these goslings were too small to carry bands they were released without banding.

The geese were corralled on July 23rd for the purpose of clipping their wings. After this and several additional drives, 80 adults and 17 young had been wing clipped. Some of the young birds may have succumbed to the Leucocytozooan or the smallest of the group may have slipped through the fence. The adults became quite adept at slipping through the rank vegetation and some were missed in the round-ups. The escapees have been hanging around in the goose pen vicinity and many times mingle with the flock of wing-clipped birds in the pen.

To the best of our knowledge seven broods totaling about 30 goslings was the production of the free-flying goose flock on this refuge. Four or five broods were seen from the ground and two were seen during the aerial brood count. Since the end of the moulting season, many observations have been made of goose flocks flying around the refuge or going outside the refuge to feed in adjacent fields. The best estimate we can make of the total number of adults, immatures and young of the year on the refuge at this time is 150.

Patrols are being carried out to "educate" these relatively tame refuge geese to the ways of mankind. When the geese are feeding in fields outside the refuge, refuge personnel fire a gun in the air near them to keep them wary enough to keep from getting killed before they can produce more geese for the refuge flock.

5. Waterfowl Brood Census

Special efforts were made this summer to obtain as accurate an appraisal of the waterfowl production on this refuge as possible. Some new techniques were used and old methods modified or improved. Pilot-Biologist Smith was available for almost a week and some excellent brood data was obtained from airplane counts. The final production

figures used were 30 for Canada Goose, 10,600 for ducks and 2,400 for coots. A detailed report will be submitted this winter when the pressure of other work is not so great.

6. Experimental Spraying with 2,4-D

Competition from the winter annual, Marsh Fleabane, has proved a problem on the pool draw-down program, especially when we want to plant exposed mud flats. The Fleabane will come in so thick and heavy so as to exclude all other plants. In places where it was desirable to have waterfowl food plants available and where the Fleabane was too heavy, the areas were experimentally sprayed with a hand pressure sprayer. It was found that while the fleabane could be killed with a large volume of spray, it was neither practicable nor economical. Pilot-Biologist Smith was consulted about spraying the Fleabane from the airplane but we reached the conclusion that it would be impossible to obtain good results unless the area was gone over several times with a strong spray solution. The cost of this operation would be preventive and it also would kill all the desirable vegetation on the area. Since the plant is easy to flood out upon completion of the draw-down, it was deemed more feasible to follow this course.

7. Soil Samples

A considerable number of soil samples have been taken from refuge fields and sent to the Soils Division of the University. Results of the analyses will provide essential information for proper land management.

VI. PUBLIC RELATIONS

A. Recreational Uses

Refuge personnel have conducted many tours of the refuge with visiting groups of students, ornithologists, newspaper editors, Cub and Boy Scouts, and visitors. The local Scout Troop held an overnight camping trip at the Secondary Tower.

B. Refuge Visitors

See following page.

C. Refuge Participation

Refuge personnel frequently give short talks and show the slide collection or movie to groups of students, visitors, school groups or clubs. Most visitors to the refuge are guided around and items of interest pointed out if arrangements are made ahead of time. The Junior Manager is Scoutmaster of the Holt Troop of Boy Scouts.

D. Hunting.

None

E. Fishing

Noheq

F. Violations

None to our knowledge.

VII. OTHER ITEMS

A. Items of Interest

Maintenance Man Irven O. Rostad was transferred to Upper Souris Refuge, Foxholm, N. D. on June 26th. He was replaced on Aug. 4th by Mr. D. C. Wehmeyer of Burlington, Iowa.

Mr. Melvin R. Johnson, Clerk at this refuge since 1949 is being promoted and transferred to Lower Souris Refuge, Upham, North Dakota. This transfer will become effective around the first of October. Mr. Johnson is to be replaced by Mr. Harley Modlin at present Clerk at the Crescent Lake Refuge, Ellsworth, Nebraska.

On June 20th, Mr. Donald Grenier was killed when he fell from the tower at Secondary Headquarters while painting the cab. His death was especially tragic since he left a young wife with three children under four years old and another on the way.

Date	Visitor	Station-Residence	Purpose	Length
5-11	R. Farnes, PR Biol.	TRFalls, Minn.	Waterfowl check	2 hrs.
5-11	Dr. P. Wendt	TRFalls, Minn.	See Refuge	2 hrs.
5-11	O. Ekern	TRFalls, Minn.	See Refuge	2 hrs.
5-11	L. Lindvall-Warden	Red Lake Falls	Re beaver cplts	2 hrs.
5-11	C. Sundstrom "	TRFalls, Minn.	" " "	2 hrs.
5-21-24	D. Smith, Pilot	MPLS., R.O.	Plane seeding	3 days
6-26	Cub Scouts(50) w/ parents, leaders	TRFalls, Minn.	See refuge	3 hrs.
6-27	D. H. Janzen	Mpls., Reg. Dir.	Refuge Insp.	6 hrs.
6-27	E. Swift	Wash., Ass't. Dir	Refuge Insp.	6 hrs.
6-27	C. Sundstrom-warden	TRFalls, Minn.	Law enforcement	4 hrs.
6-28	Dr. Hofslund)	U.Minn., Duluth	See Refuge	7 hrs.
6-28	U Students (30))	Itasca Park	See Refuge	7 hrs.
6-28	Mr. McMartin SCS	Grygla, Minn.	Soils maps	1 hr.
6-28	M. Smith, Patrolman	Thief Lake Refuge	Refuge opns.	2 hrs.
6-29	L. Lindvall-warden	Red Lake Falls,	Loan refuge boat	1 hr.
6-29	C. Sundstrom "	TRFalls, Minn.	" " "	1 hr.
6-29	R. Farnes PR Biol.	TRFalls, Minn.	Waterfowl survey	2 hrs.
6-29	Mr. Johnson PR Biol.	TRFalls	"	2 hrs.
6-30	S. Bjertness, Co. Commissioner,	Grygla Co-Op ditching	"	1 hr.
6-30	Mr. Swanson, Co. Engr.	Warren	"	1 hr.
6-30	Mr. McMartin SCS	Grygla, Minn.	Re soils maps	1 hr.
7-7	S. Bjertness, Co.Com.,	Grygla, Minn.	Re co-op ditch.	1 hr.
7-7	R. Farnes, PR Biol.	TRFalls, Minn.	Deer paper	2 hrs.
7-11	Grady Mann FWS	Fergus Falls	Ditching	4 hrs.
7-12-13	Dr. Hickey U of Wis., Prof. Zool.		See refuge	2 days
"	Dr. Marshall U of Minn.,	" Wildlife Management	See refuge	2 days
"	w/14 students	U of Minn.	See refuge	2 days
7-13	R. Wright (enr.)	R.O., Mpls.	Marsh Develop.	7 hrs.
7-13-18	D. Smith, Pilot	R.O.	Waterfowl survey	6 days
7-13-14	C. Rollings	R.O.	Habitat imp.&M	2 days
7-19-27	R. Johnson (Engr.)	R.O.	Surveys-develop.	8 days
7-26-29	R. Farnes PR Biol.	TRFalls	Duck banding	4 dys.
"	R. Blazevic, GMA	Missouri	" "	4 days
"	L. Magnus, PR	Roseau	" "	4days
"	C. Schroeder PR	Mpls.	" "	4 days
"	O. Larson, PR	Roseau	" "	4 days
7-29	C. Sundstrom,warden	TRFalls	Re visit Roseau	1 hr.
8-1	Mr. Bebb, Ornithologist,	Tulsa, Okla	See birds	5 hrs.
8-2	R. Farnes, PR Biol.	TRFalls, Minn.	Duck banding	2 hrs.
"	V. Blazevik, GMA	Missouri	" "	2 hrs.
8-10	F. Jacobson, GMA	Ohio	Law enforcement	3 hrs.
8-16	M. Briggs, Editor	Bemidji Paper	News release	4 hrs.
8-19	H. Olson, Sports Ed,	TRFalls Times	" "	4 hrs.
8-19	Senator Dahlquist	TRFalls	" "	4 hrs.
8-19	C.	TRFalls, Businessman	" "	4 hrs.
8-29	Mr. Barrett & wife	?	See refuge	3 hrs.
"	Mr. Putnam & wife	?	See refuge	3 hrs.

Sections II, IV, parts of Sec. 5,
and parts of Sec. VI prepared by
Mr. J. C. Carlsen.

Date Submitted: September 18, 1954

Respectfully submitted,

R. W. Hunt

R. W. Hunt
Refuge Manager

Approved: *L. A. Janger*

Title: Regional Director

Date: 9/23/54

UNITED STATES DEPARTMENT OF INTERIOR
Fish and Wildlife Service
Mud Lake National Wildlife Refuge
Holt, Minn.

NEWS RELEASE!

Sept. 13, 1954

Mud Lake Refuge personnel are concerned over the welfare of the Canada geese which leave the refuge each morning to feed in adjacent fields. These birds are the breeding stock for the future flocks which will provide better goose shooting for local hunting enthusiasts.

These geese are relatively tame and will allow a man to approach within gun range before flying. To assure having as many as possible of these geese on hand for the next breeding season, refuge personnel are attempting to "educate" the geese. Early morning patrols are being carried out to locate fields being used by the geese. After locating a flock, the person approaches as close as possible on foot and then fires a gun in the air. It is hoped that this will make the geese more wary of man and hence save the lives of the breeding stock.

Any farmers in the refuge vicinity having unharvested grain fields which are being used by ducks are urged to contact the Refuge Manager. Refuge personnel will aid the farmer in setting up devices to disperse the ducks from the unharvested field.

UNITED STATES DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Mud Lake National Wildlife Refuge
Holt, Minnesota

NEWS RELEASE!

NEWS RELEASE!

Canada geese have been nesting on the Mud Lake marshes since the spring of 1951. During June of that year a total of 4 broods were actually observed.

Geese have been raised each year since the first nests were successfully hatched out in 1951, but it has been difficult to determine actual numbers produced. It is impossible to search the entire refuge area, and estimates must therefore be based on observations of mated pairs in the spring, actual brood observations, numbers of family groups later in summer, use of goose pen by fliers, observation of unbanded in company with banded geese, etc.

In a number of instances nests have been located.

During the present season of 1954 more goose broods have been observed than any year previous; it is also a certainty that broods have been successfully hatched that will never be observed in gosling stage - simply because much of the marsh area is remote and impossible to get into.

A total of seven separate broods have been observed this season.

Nesting in the pen has not been too successful to-date, due mostly to disturbance by the construction and farm equipment, to lack of nesting islands, and difficulties in eliminating predators within the pen.

Construction work in the pen should be completed this year, and an intensive predator campaign is to be contingued.

The pen has produced several broods of goslings, but the big objective accomplished by the goose pen has been the decoy effect of the captive birds, and the grain fields. Refuge reared geese have stayed in the pen or in the immediate vicinity, thus accomplishing the objective of reducing the kill on refuge geese during these early years of establishment.

The kill on the refuge goose flock must be kept to a very minimum for the next several years, until such time as it can be determined that production is greater than the number of geese killed annually.

3-1750
Form NR-1
(Rev. March 1953)

WATERFOWL

REFUGE MUD LAKE

MONTHS OF May TO Sept., 19 54

(1) Species	(2) Weeks of reporting period									
	1	2	3	4	5	6	7	8	9	10
Swans:										
Whistling	25	10	1	1	1	1	1	1		
Trumpeter										
Geese:										
Canada	750	250	200	120	150	150	150	150	150	150
Cackling	50	50								
Brant										
White-fronted	10									
Snow } together	150	500								
Blue }										
Other										
Ducks:										
Mallard	5000	3000	2100	2100	2100	2100	2100	2750	3400	4200
Black	25	25	25	25	75	100	100	100	100	100
Gadwall	750	750	500	550	550	550	550	700	900	1100
Baldpate	3000	1000	750	500	250	175	175	225	275	375
Pintail	3000	1000	750	500	500	300	500	400	500	600
Green-winged teal	500	250	250	200	125	125	125	175	225	275
Blue-winged teal	5000	6000	3000	2500	2000	2000	2000	2500	3250	4100
Cinnamon teal										
Shoveler	750	500	300	175	175	175	175	250	300	350
Wood	25	25	25	25	50	75	75	75	75	75
Redhead	300	500	750	750	750	750	750	1000	1200	1500
Ring-necked	750	500	500	400	250	250	225	300	375	450
Canvasback	100	100	100	100	100	100	100	150	160	200
Scaup	500	750	500	500	250	100	100	120	150	150
Goldeneye	50									
Bufflehead	250	25								
Ruddy	100	100	200	200	250	250	250	250	250	350
Other										
Coot:	6000	4000	4000	3500	2000	1200	1200	1700	2200	2750

3 -1750a

Cont. NR-1

(Rev. March 1953)

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

REFUGE MUD LAKEMONTHS OF May TO September, 19 54

(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		seen	total
Swans:											
Whistling									250	-	-
Trumpeter											
Geese:											
Canada	250	150	150	150	150	150	150	150	24,000	6	30
Cackling											
Brant											
White-fronted											
Snow											
Blue											
Other											
Ducks:											
Mallard	4700	5100	5250	5500	5500	5500	5500	5500	500,000	87	3250
Black	100	100	100	150	150	150	150	150	12,000	-	-
Gadwall	1250	1350	1400	1400	1400	1400	1400	1400	120,000	23	850
Baldpate	400	450	450	450	450	500	1000	1000	78,000	8	300
Pintail	675	725	750	750	750	750	750	750	98,000	12	450
Green-winged teal	325	350	350	350	350	350	350	350	37,000	6	225
Blue-winged teal	4500	5000	5100	5100	5100	5100	5000	5000	570,000	55	3100
Cinnamon teal											
Shoveler	400	425	450	450	450	450	450	450	47,000	7	275
Wood	75	75	75	75	75	75	75	75	8,000	-	-
Redhead	1700	1750	1900	1900	1900	1900	1900	1900	162,000	31	1150
Ring-necked	525	575	600	600	600	600	600	600	57,000	10	375
Canvasback	225	250	250	250	250	250	250	250	22,000	3	150
Scaup	175	175	175	175	175	175	175	175	32,000	3	100
Goldeneye									350		
Bufflehead									2,000		
Ruddy	450	500	550	650	650	650	650	650	49,000	14	400
Other											
Coot:	3200	3500	3500	3500	4000	4000	4000	4000	410,000	65	2400

(over)

	(5)	(6)	(7)
	Total Days Use	Peak Number	Total Production
Swans	250	25	-
Geese	24,000	750	30
Ducks	1,744,350	19,250	10,600
Coots	410,000	4,000	2,400

SUMMARY

Principal feeding areas All refuge pools

Principal nesting areas Madsen Pool, Olson Lakes,
Mad Lake Pool, Headquarters Pool, Mad River Pool, Webster Pool

Reported by J.C. Carlson

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 LAKE

Months of May to September 1944

(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	Summer Resident				Still Present					500
Bl. Cr. Night Heron	"	"			"	"				50
American Bittern	"	"			"	"				200
Horned Grebe	"	"			"	"				50
Pied-billed Grebe	"	"			"	"			400	600
Holboell's Grebe (Red-necked)	"	"			"	"			50	200
Western Grebe	Ocasional Summer Visitor									5
D.C. Cormorant	Summer Resident				Still Present		1	30	70	150
Hooded Merganser	"	"			"	"				
S										
II. <u>Shorebirds, Gulls and Terns:</u>										
Franklin's Gull	Summer Resident				Still Present					Abundant
Black Tern	"	"			"	"				"
Common Tern	"	"			"	"				Uncommon
Greater and Lesser Yellow-legs	"	"			"	"				Abundant
Killdeer	"	"			"	"				Abundant
Phalaropes, Sandpipers and Plovers	Present in fluctuating numbers during most of summer									

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. Doves and Pigeons:					
Mourning dove	Summer Resident		Still Present		500
White-winged dove					
IV. Predaceous Birds:					
Golden eagle					
Duck hawk					
Horned owl	Permanent Resident				50
Magpie					
Raven					
Crow	Summer Resident		Still Present		400
Marsh Hawk	"	"	"	"	100
Red-tailed Hawk	"	"	"	"	50
Sparrow Hawk	"	"	"	"	25-35
Reported by J.C. Carlson					

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 May to September, 1954

(1) Species	(2) Density	(3) Young Produced	(4) Sex Ratio	(5) Removals	(6) Total	(7) Remarks	
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd. Estimated Total	Percentage	Hunting For Re- stocking For Research	Estimated number using Refuge	Pertinent information not specificioally requested. List introductions here.
Ruffed Grouse	Willow, aspen hardwood groves approx. 5,000 acres.					300-400	Lowering of totals from last period's report due to reevaluation of upland game bird populations.
Sharptailed Grouse	Upland - 10,000 acres					350-450	
Ring-necked Pheasant	Very little true pheasant habitat on refuge.					5-10	
Hungarian Partridge	Upland - 10,000 acres					25-40	
Pinnated Grouse	Upland - 10,000 acres					5-10	
Spruce Grouse	Spruce-Tamarack Bog - 1500 acres					10	6 males and 4 females introduced to Whiskey Lake area last February. Status unknown at present.

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.