

Sand Lake National Wildlife Refuge

Narrative Report

May, 1958 to August 31, 1958

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Sand Lake National Wildlife Refuge

May 1, 1958 to August 31, 1958

I. GENERAL

A. Weather Conditions

A summary of weather data for the period May through August for the years 1956, 1957 and 1958 is given in the table below as recorded at the official weather station located at refuge headquarters.

Sand Lake Weather Data

Month	Precipitation				Max. Temp.				Min Temp		
	'56	'57	'58	:	'56	'57	'58	:	'56	'57	'58
May	2.3	4.7	1.9		83	85	103		24	31	29
June	2.5	3.8	2.7		101	84	91		35	40	38
July	2.0	2.6	1.7		92	94	92		48	56	44
August	1.3	5.8	.68		94	95	102		38	47	37
Totals & Extremes	8.1	16.9	6.98		101	95	103		24	31	29

This period has been one of the driest in many years, perhaps since the early '40's. In spite of the shortage of rainfall, small grain crop yields were perhaps the highest on record. This was the result of a combination of several factors. Subsoil moisture at the beginning of the period was above-normal, providing excellent planting and starting conditions. The early growing season was comparatively cool, and the few rains that came were exceptionally timely. Along with high yields, harvest conditions were also ideal. A major portion on the grain was harvested and stored without rainfall.

Another factor contributing to good conditions was the absence of hot winds that are so destructive in low moisture years.

The period was cool until the last month; dry throughout and exceptionally dry the last six weeks.

Weather conditions were also ideal for most forms of wildlife, especially upland game.

B. Habitat Conditions

1. Water

Mud Lake was at a level of 1272.2, two tenths of a foot above the approved elevation, at the start of the period. We were able to held this level fairly steady until the middle of July, when a reduced flow in the James River and local drouth conditions caused Mud Lake to start lowering. No drawdown was attempted due to the prevailing dry weather. At the end of August Mud Lake was at a level of 1271.20, two-tenths of a foot above the elevation to be reached by deaw-down a month earlier and maintained for the rest of the year.

Sand Lake was at 1270.90 at the start of the period. The ~~readal~~ gates in the Columbia Dam were open the extent that moderate flooding was occuring along the James River to the south. By mid-May it was possible to reduce the flow from Sand Lake in order to confine the James River to its banks. By June 10 this pool was fifteen hundredths of a foot above the level of 1270 approved for this date. The latter level was attained by June 22, and maintained reasonably steady until the end of July, when the extended drouth started to have an effect. By the end of August Sand Lake was at a level of 1269.28, considerably below the level of 1270, approved for this date. No water was being received from Mud Lake, which in turn was receiving no supply from Dakota Lake, at which the water level was three inches below the spillway.

2. Food and Cover

Food in most forms will be abundant this year. Sago pondweed looked good until early July, when it started to appear in windrows along the shore, torn up by carp and wave action.

As was the case last year, Mud Lake produced a considerably better crop of Sago seed than Sand Lake. The beds there are more sheltered and also carp activity does not seem as great as in Sand Lake. Since summer resident waterfowl use the sago beds heavily, it is doubtful whether there will be enough seed left to appreciably benefit migrants.

The small grain crop was the best in many years, with refuge barley averaging about 50 bushels to the acre. The refuge has 240 acres of this crop standing for use by waterfowl. The harvested portion, 507 acres, is being used by resident waterfowl and early migrants. They will gradually work from this harvested portion into that left standing. Actually, ducks were observed feeding in harvested grain fields the same day as the crop was harvested.

A total of 758 acres of corn was grown on the refuge this year, of which 394 acres will be left standing for waterfowl, pheasants, and of course - the blackbirds. Production looks fair in general, although the big question is how much of this corn will be left by the blackbirds for use by game birds. Considerable loss is already apparent.

The 119 acres of millet to be left standing has done comparatively well, and will also provide a readily available crop if the blackbirds leave any.

Green browse will probably be at a premium unless we get some good rains soon. Pastures are quite brown, and there is not sufficient moisture for either rye planting or the adequate germination of weed seeds and waste grain in the fields.

Cover is abundant in the form of cat-tails and Phragmites. However, now that the drouth has caused the water to recede from many of these sheltered areas, loafing birds may be more exposed to the weather than is desirable, especially on Sand Lake. The vast mud flats and shallow water areas will provide excellent loafing sites early in the migration. Much of the water area will of course freeze rapidly with colder weather due to its shallow nature.

II. WILDLIFE

A. Migratory Birds

1. Waterfowl

a. Geese

At the beginning of this period 20,000 Snow and Blue Geese, 3,500 Little Canada Geese, and 300 Common Canada Geese were present. During the week of May 18 to 24 all migrants left the refuge and a breeding population of about 100 Common Canadas remained throughout the summer.

No attempt was made this year to determine the number of pairs present in the resident flock, or to locate the nesting sites of these birds. As we hope to initiate some nesting studies next spring, more effort will be applied to observations of our resident goose flock.

The following table shows the brood size and location of all broods located during 1958.

Sand Lake Canada Goose Production
1958

<u>Brood Size</u>		<u>Location</u>
5	-	Hanson Point
6	-	Hanson Point
6	-	Mouth of South Level Ditch
6	-	Grazing Unit 16
4	-	Houghton Grade
5	-	Houghton Grade
5	-	Houghton Grade
6	-	Bay S.W. of Site # 3
5	-	N. of Mud Lake Dike
5	-	Grazing Unit # 12
7	-	Grazing Unit # 12
4	-	Grazing Unit # 12
<u>64</u>		

The first brood was observed in the bay southwest of Site # 3 on May 16. This, and all following observations resulted in a total of 12 goose broods, producing 64 young. The average brood size this year was 5.3, which is identical with the 1957 brood size, but the number of broods is 33% under the 1957 production. The following table shows a comparison of the past eight years.

see following page

SAND LAKE CANADA GOOSE PRODUCTION
1950 - 1958

<u>Year</u>	<u>Number of Broods</u>	<u>Number of Young</u>	<u>Average Size of Brood</u>
1958	12	64	5.3
1957	18	95	5.3
1956	14	54	3.9
1955	15	68	4.5
1954	9	46	5.1
1953	12	42	3.5
1952	18	65	3.6
1951	18	56	3.1
1950	<u>12</u>	<u>50</u>	<u>4.1</u>
Nine Year Avg.	14.2	60	4.2

No indication of pairing was noticed in the captive flock of Canadas, and no nests were established.

b. Ducks

At the beginning of this period approximately 2,400 dabblers and 1,480 divers were present. By May 25, the migrants had left and a stabilized breeding population of about 1,550 dabblers and 160 divers remained. About August 3 the local movement of birds to Sand Lake began, and at the end of August approximately 12,600 dabblers and only 70 divers were present. This low population of divers is unnatural at this time of the year. In 1956 and 1957 there were 2,600 and 1,700 divers present on September 1.

The refuge breeding pair count began on May 20 and continued through May 26. Again this year a new method was used to determine the breeding pair population at Sand Lake. Approximately fifty percent of the shoreline areas was covered by canoe. (See area outlined on map at the end of this report). Supporting this count a complete aerial count of all refuge shoreling was made. In making this aerial count a separate record was kept of pairs using the area previously counted by canoe. Then, a ground to air correction factor was determined and the count expanded to arrive at the total number of pairs using the entire shoreline. The correction factor obtained was 2.4 ducks seen on the ground count for each duck seen from the air.

In addition to this shoreline count, a count was made of "other areas", and no correction factor was applied to these areas. Listed below are the other areas censused, and the results of this count.

see following page

"OTHER AREAS" (SAMPLED BY GROUND CENSUS ONLY)

<u>Area</u>	<u>Pairs</u>
1. Display Pool	18
2. N. end of Recreation Area	2
3. S. of Columbia Dam	0
4. Weismantel Grade to Houghton Grade (East Side)*	4
5. Houghton Grade to Hecla Grade (East Side)	34
6. Houghton Grade to Hecla Grade (West Side)	16
7. Dry Run	16
8. Dinosaur Potholes	19
9. Level Ditching (2)	8
10. South Potholes	13
11. North of Hecla Grade	67
* - Does not include potholes	
Total	197

The above count was made by car and foot, except for "Dry Run" which was a canoe count. It is certain that this method did not census all pairs using areas which are not part of the lake proper, because only a minimum amount of walking was done, except on the ditches and potholes.

It would be difficult to determine an accurate correction factor for these areas, therefore, by this direct count method, a comparison may be made from year to year.

Considerable time and effort was necessary to conduct this census in the manner prescribed. We feel that a breeding paircount must be as complete as possible on this refuge, because brood censusing on a marshy area such as this is likely to be inaccurate even with a considerable amount of effort applied.

It is hoped that in the future this method, with slight modifications, will be used as the standard method of conducting breeding pair counts on Sand Lake. Standardization of some method must be accomplished here if a comparison is to be made from year to year. It is hoped that previous managers at Sand Lake will feel free to comment on the method which we have employed. Any suggestions or criticisms will be appreciated.

Possibly after several years of ground to air comparisons, an adequate correction factor may be determined, thus enabling an aerial census of the breeding population using only a minimum of ground support. Until that time, we recommend the above method so that in future years the trend in this population may be determined more accurately.

The breeding pair population was figured in the following manner: the aerial count of the area censused by canoe revealed 168 ducks, as compared to 403 ducks on the canoe count. This gives a correction factor of 2.4. Then the number of ducks observed per pair was figured by dividing the total number of ducks observed by the number of indicating pairs (pairs plus lone males). This figure was 1.47 on the ground sample, and 1.36 on the complete aerial sample. Due to the more detailed observations on the ground count, the figure of 1.47

was used in determining the number of breeding pairs, (last years figure was 1.53). The aerial count of the refuge produced 312 ducks. This figure multiplied by 2.4 (the correction factor) yields 749 ducks. 749 ducks divided by 1.47 yields 510 pairs on the lake proper. These 510 pairs plus the 197 pairs obtained on "other areas" gives the resulting breeding pair population of 707 pairs.

A comparison of the 1957 and the 1958 pair count species composition, based on aerial census, follows:

SAND LAKE PAIRS COMPOSITION
1957 & 1958

<u>Species</u>	<u>1957 %</u>	<u>1958 %</u>	
B. W. Teal	15.5	36.9	240
Gadwall	11.0	21.2	20.0
Mallard	16.0	16.3	22.6
Redhead	8.8	4.5	7.6
Pintail	2.2	3.5	2.5
Shoveller	11.0	2.2	13.1
Ruddy	6.1	1.9	2.9
Baldpate	0.0	1.3	2.5
Scaup	18.2	0.6	4.0
Unidentified	10.5	11.5	
	99.3	99.9	

As the above table shows, there was a considerable increase in the percent of Blue Wing Teal and Gadwall this year. The percent of divers and Shovelers shows a marked decline this year.

The following table shows the estimated number of breeding pairs for 1958, compares that with pairs counts of previous years, and shows estimated broods and an estimation of hatching success.

SAND LAKE PAIRS AND BROOD COUNTS
1953 - 1958

<u>Year</u>	<u>Breeding Pairs</u>	<u>Broods</u>	<u>% of Production</u>
1958	707	305	43
1957	1153	478	41
1956 *			
1955	369	205	55
1954	564	340	60
1953	658	348	53

* No pairs count was made.

As shown in the above table, Sand Lake experienced a considerable decrease in breeding pairs as compared with 1957, but considerably higher than the other three years shown. In comparing breeding pairs with broods produced, the percent of production is 14% lower than the average of 50% for the five years represented.

Two brood counts were made this year. The first from June 27 to July 2, and the second from July 28 to August 2. The same

area was censused for both counts. These areas are the same as those covered in 1957, with the exception that no point observations were made. Another difference from last year is that in 1957 an air thrust motor was used for brood counts while this year brood counts were made by canoe and paddle.

Production was determined in the same manner as last year; using the area covered and expanding this figure to the total area of similar habitat. A total of 2,570 acres was covered on each count, resulting in 49 broods observed. Expanding this number of broods to the 10,493 acres of similar habitat yield (228.36) broods. Then assuming that only two-thirds of the broods were seen, the total production for Sand Lake in 1958 is estimated at 305 broods. By using the average brood sizes from Griffith's data, this total represents 2,022 young. *error in calculation should be 200!*

The following table shows the estimated production for each year from 1952 - 1958.

<u>SAND LAKE DUCK PRODUCTION</u>		
<u>1952 - 1958</u>		
<u>Year</u>	<u>Est. Broods</u>	<u>Est. Young</u>
1952	488	3375
1953	347	2360
1954	340	2240
1955	205	1332
1956	276	1784
1957	478	3158
1958	<u>305</u>	<u>2022</u>
Averages	<u>348</u>	<u>2324</u>

According to the above data, 1958 production was 12.7 percent below the seven year average, and 36.2 percent below last year.

The graph on the following page shows a breakdown of the number of broods produced by the four major species during the past seven years. It is interesting to note in comparing this graph with the preceding table, that in the high production years of 1952 and 1957 there was an eruption in the production of a single species which caused these peaks. The high production was caused by Pintails in 1952 and Blue-wing teal in 1957. This could be due to a high state-wide breeding population of these species in the respective years. These figures are not available, therefore the above statement is only a suggestion of a possible reason.

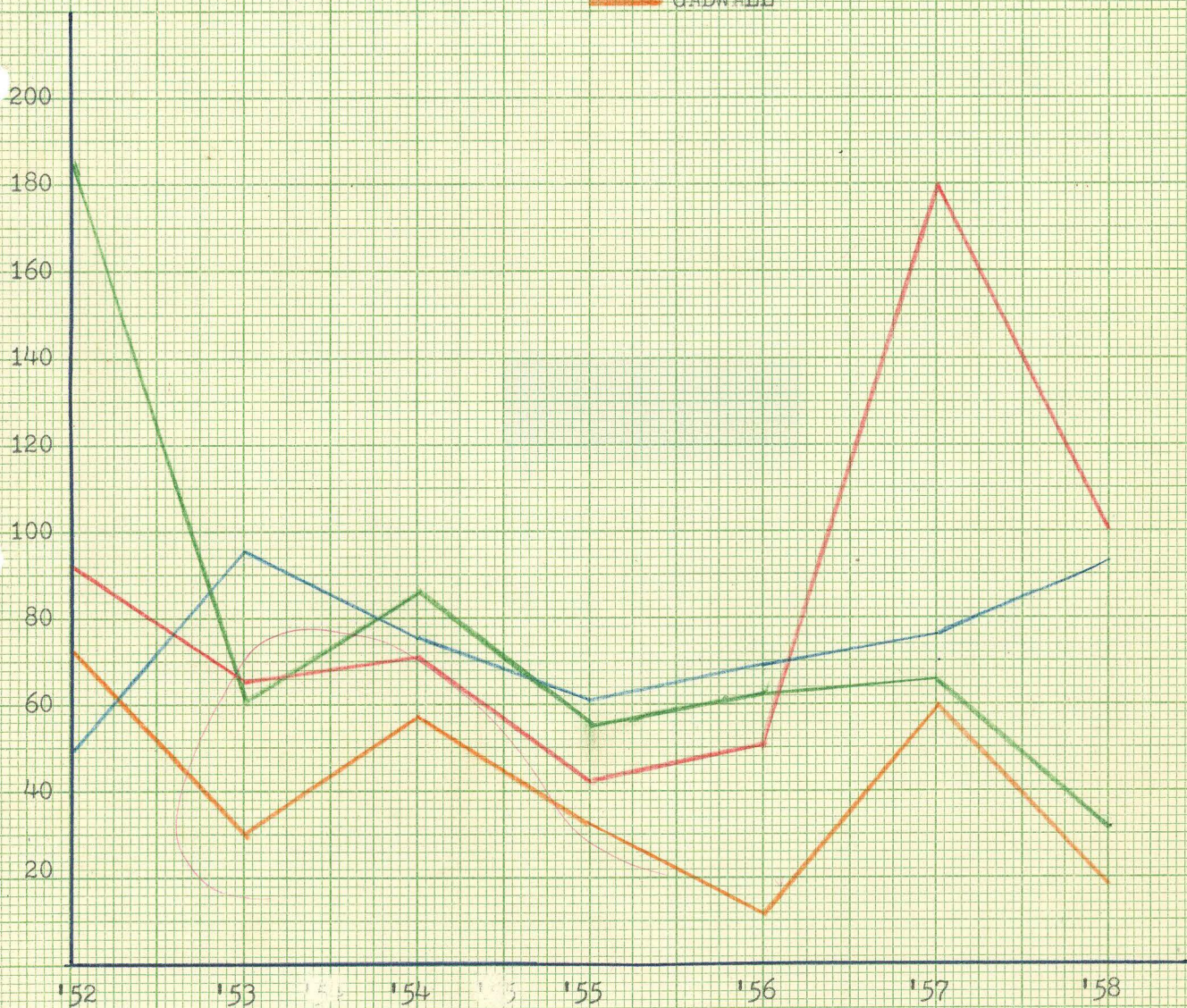
The following table shows the species composition of all broods for the past seven years:

see page following graph

NUMBER OF BROODS OF THE MAJOR SPECIES OF DUCKS

SAND LAKE REFUGE 1952 - 58

MALLARD
BLUE-WING TEAL
PINTAIL
GADWALL



SPECIES COMPOSITION OF SAND LAKE BROODS IN PERCENT

1952 - 1958

Species	1952	1953	1954	1955	1956	1957	1958	7 Year Avg.
Mallard	10.1	27.8	22.2	29.6	25.1	15.9	30.6	21.3
B W Teal	18.6	19.1	20.8	20.3	18.4	37.5	32.7	24.7
Pintail	38.0	17.6	25.0	26.6	22.3	13.6	10.2	22.3
Gadwall	14.8	8.8	16.7	15.6	4.0	12.5	6.1	11.5
Redhead	2.8	7.5	1.4	1.6	7.8	5.7	8.2	5.0
Canvasback	0.9	2.9	1.4	4.7	5.3	2.3	0.0	2.2
Baldpate	3.7	0.0	0.0	1.6	1.3	1.1	0.0	1.2
Shoveler	3.7	7.9	2.8	0.0	0.0	2.3	6.1	3.4
Wood Duck	0.0	0.0	0.0	0.0	0.0	0.0	4.1	0.5
Ruddy	2.8	4.4	0.0	0.0	5.3	0.0	0.0	1.7
Scaup	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.2
Unknown	4.6	7.5	9.5	0.0	10.5	9.1	2.0	6.0

The above table shows that 1958 production of Mallards, Blue-wing teal, redheads, shovellers, and wood ducks was above the seven year average. The increase in mallards and the decrease in gadwalls as compared with 1957 is quite significant.

The hatching curve shows a steady increase in hatching from the middle of June to the peak reached during the last five days of June. This peak was reached 15 days earlier than in 1957. This is because last year the weather was wet and cool while more normal conditions prevailed this year.

2. Other Waterbirds, Shorebirds and Doves

a. Water and Marsh Birds

Coots. Coot production was again low this year. The resident population varied between 500 and 800 birds, compared to 1100 last year. The fall peak of 2500, which lasted for only about a week, was far below last year's figure of 17,400. This year's peak population, compared to that of last year, was earlier, shorter, and lower.

Grebes. We had Western, Eared and Red-billed Grebes here during the period. Western Grebes had another good year, comparing favorably with last year's excellent production. There were few Pied-billed Grebe broods observed, while last year was considered a good year for this species. The estimated peak population of 3500 Western Grebes occurred about the middle of August. Casual observation indicated that this species suffered a higher mortality than other resident birds prior to the late summer die-off. Brood survival also seemed lower than for waterfowl.

Pelicans and Cormorants. A check of the nesting islands during routine waterfowl counts indicated that these two species had another good year of production. Migrating birds raised the pelican population to approximately 5500 and cormorants to approximately 1500 during the latter part of August. The pelican population held steady

considerably longer than last year, possibly due to the excellent fishing provided by the shallow water levels combined with mud flats for loafing.

Gulls and Terns. Franklin's Gulls and Ringbilled Gulls steal the show in this category. An estimated peak of 450,000 Franklin's Gulls occurred late in August, with Ring-bills peaking at roughly 30,000 during the same period.

In order to appreciate the Franklin's Gulls numbers, and to a lesser extent the Black Tern's, one must either be on the refuge early in the morning or late in the evening, the only times the large concentrations are apparent. Black terns feed close to the refuge, while the large flocks of Franklin's Gulls mainly leave the general area to feed.

Forster's and Common Terns have been frequently observed throughout the summer. The largest nesting populations occur in the Pheagmites area just north of the Columbia Dam and levee.

Hérons and Bitterns. Black-crowned Night Herons started flocking early in August. They could be observed fishing near the Columbia Dam any evening during that month. Last year a census indicated 300 each of Great Blue Herons and Black-crowned Night Herons. Although these birds are difficult to census accurately, it was apparent this year that the Night Herons had a more successful nesting season than the Blue Herons in this general area.

An American Egret was first observed on June 20 and was here for about a week. Last year one was also here for about a week starting on August 7.

b. Shorebirds

The spring migration, summer buildup and fall migration periods for this group blended in so closely this year that it is now obvious that we devoted insufficient time to its activities. The peak in about mid-July came and passed much earlier than we expected, although this is apparently normal behaviour in this region.

Several broad conclusions were arrived at, however. Avocets far outnumbered Willets, few of which have been seen. Dowitchers were abundant late in the summer, when small flocks of Wilson's Snipe could be also observed. Pectoral Sandpipers were hard hit by our late summer die-off, while Killdeer, Lesser Yellow Legs and some small unidentified shore birds also died.

c. Doves

The banding program carried on by Bob Hanten, our student assistant, is summarized under Field Investigations. It indicated another good year of production. By the end of the period a movement from the area was apparent.

B. Upland Game Birds

Ring-necked Pheasants have had a good wintering and breeding season. The hunting season, extending from October 18 to Dec. 7 promises to be the best in years. Although no hunting is allowed in the refuge it can take considerable credit for the area due to the excellent overwintering conditions it provides. The affect of our high predator population on nests and hens is something else again.

Gray Partridge coverys were observed fairly frequently early in the period. However, none has been observed for several months, and we must assume that this species is present only in very low numbers.

The only Prairie Chicken record during the period was one made by Elmer Podoll on August 19.

C. Big Game Animals

Because the lack of snow last winter did not allow the taking of an accurate census of our White-tails, we have somewhat lost track of their numbers. Little crop damage has been apparent, although some browsing on corn has been observed on the west side just south of the Four-mile grade, and has no doubt occurred in other areas. The population is roughly estimated at 200 animals. The state has scheduled a bow-and-arrow season for the area. We have not heard regarding definite plans for the refuge, but do not expect a season since it would mainly run concurrent with the waterfowl season.

D. Fur Animals, Rodents, Predators and Other Animals

Yes, we still have them all, but nothing unusual to report. The low water levels will no doubt retard the muskrat population considerably and to a lesser degree that of mink. Beavers may also be affected this winter depending upon future rainfall and winter temperatures.

E. Hawks, Eagles, Owls, Crows, Ravens and Magpies

There is nothing unusual to report in this category, with one exception. Short-eared owls were common all summer, and several could normally be observed during a short evening's ride. These birds are very vulnerable to night traffic, and suffer considerable mortality from this cause. Several burrowing owls were observed during the period.

Last year's report for this period noted that many Red-tails started moving into and through the area during the latter part of August. So far (into mid-September), this movement has not been apparent.

F. Other Birds

Ntes on the arrivals of a few late migrants plus a few miscellaneous observations follow. They were mainly taken from the records of Mr. Podoll, the refuge mechanic.

May 3	Upland Plover	May 21	Gray Cheeked Thrush
7	Arkansas Kingbird	25	First young Killdeer
7	Eastern Kingbird	26	Ruddy Turnstone
14	Black Tern	26	Baltimore Oriole
16	Red headed Woodpecker	26	Orchard Oriole
16	Two Broods of Canadas	29	Marsh Wren
20	Yellow Warbler	June 20	American Egret
20	Tree Swallows	Aug 15	Martens left Site 3
20	Bobolink	19	Prairie Chicken
20	House Wren		

G. Fish

Approximately 100 fisherman days were noted along the public roads passing through the refuge. This was considerably less than last year. Some fair catches of bullheads were observed.

A contract has been let for the removal of rough fish and bullheads. The program so far has indicated a very high carp population. However, operations have been hampered by the tons of small carp which are taken in the nets and for which there is no market during the summer. An extensive program is therefore planned after the waterfowl season.

In passing, it was interesting to learn that our Northern Pike population was higher than we expected. The best catch was 29 Northern in one hoop net.

It is probable that we will be able to get a good kill of rough fish this winter due to low water levels. Since the James River to the south is also very low, it may be several years before the carp population will then build up again to its present damaging numbers.

H. Reptiles

A very few snapping turtles and some non-poisonous snakes are about all that we have to report in this category.

I. Disease

A moderate die-off of birds occurred in a small part of the refuge just south of the Houghton Grade. Several days were spent identifying dead birds and tabulating sex, age, etc. This data has not been summarized and will be reported in our next narrative report.

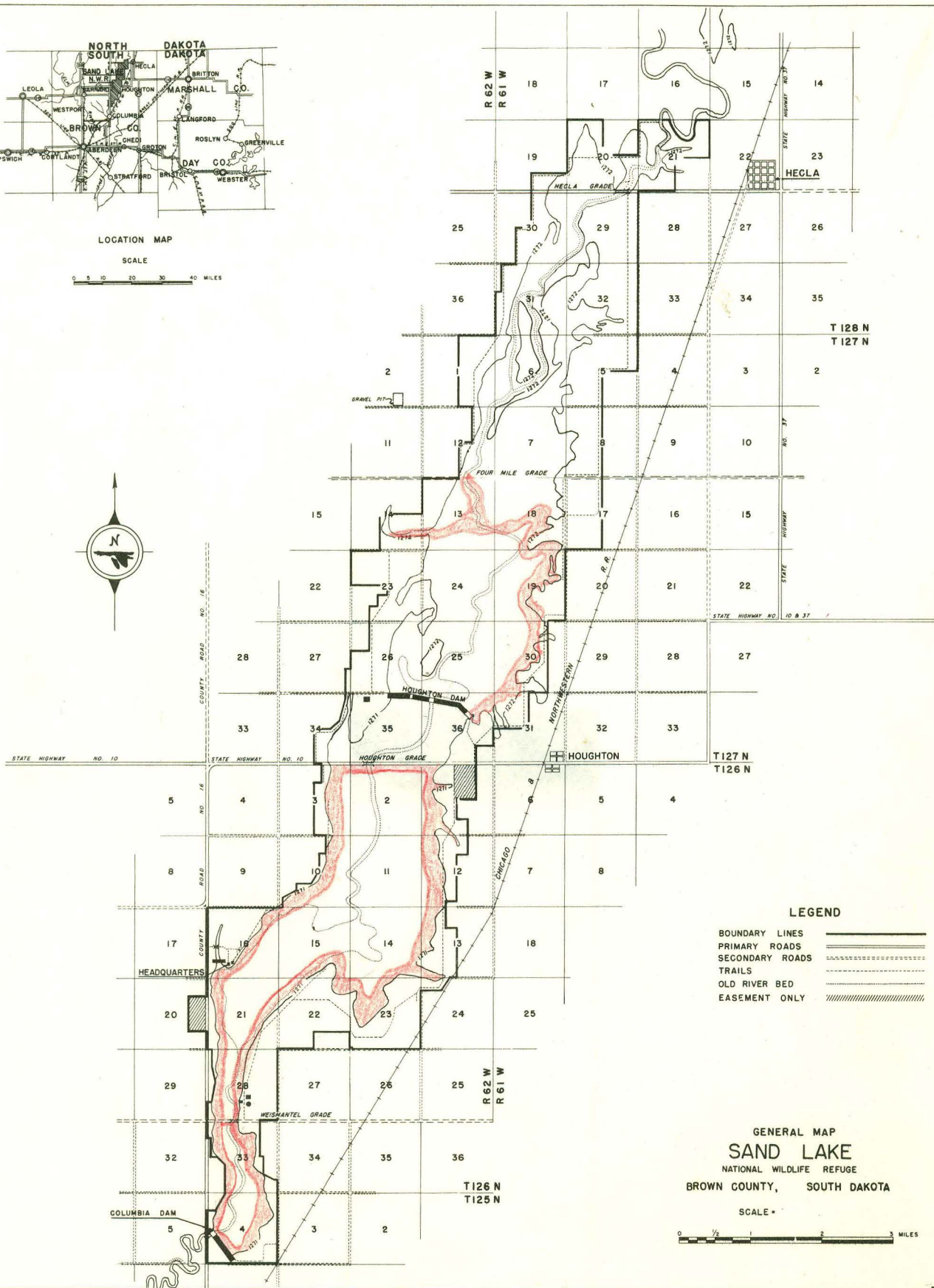
It is estimated that we lost approximately 300 ducks and 100 miscellaneous birds, mainly Coots and shorebirds.

The few sick birds observed appeared to simply be weak. They were unable to stand on their legs, and moved (if not too weak), by beating their wings along the ground. Birds too weak to move rested on the mud flats, and appeared to have perfect control of their neck muscles.

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LOCATION MAP

SCALE



LEGEND

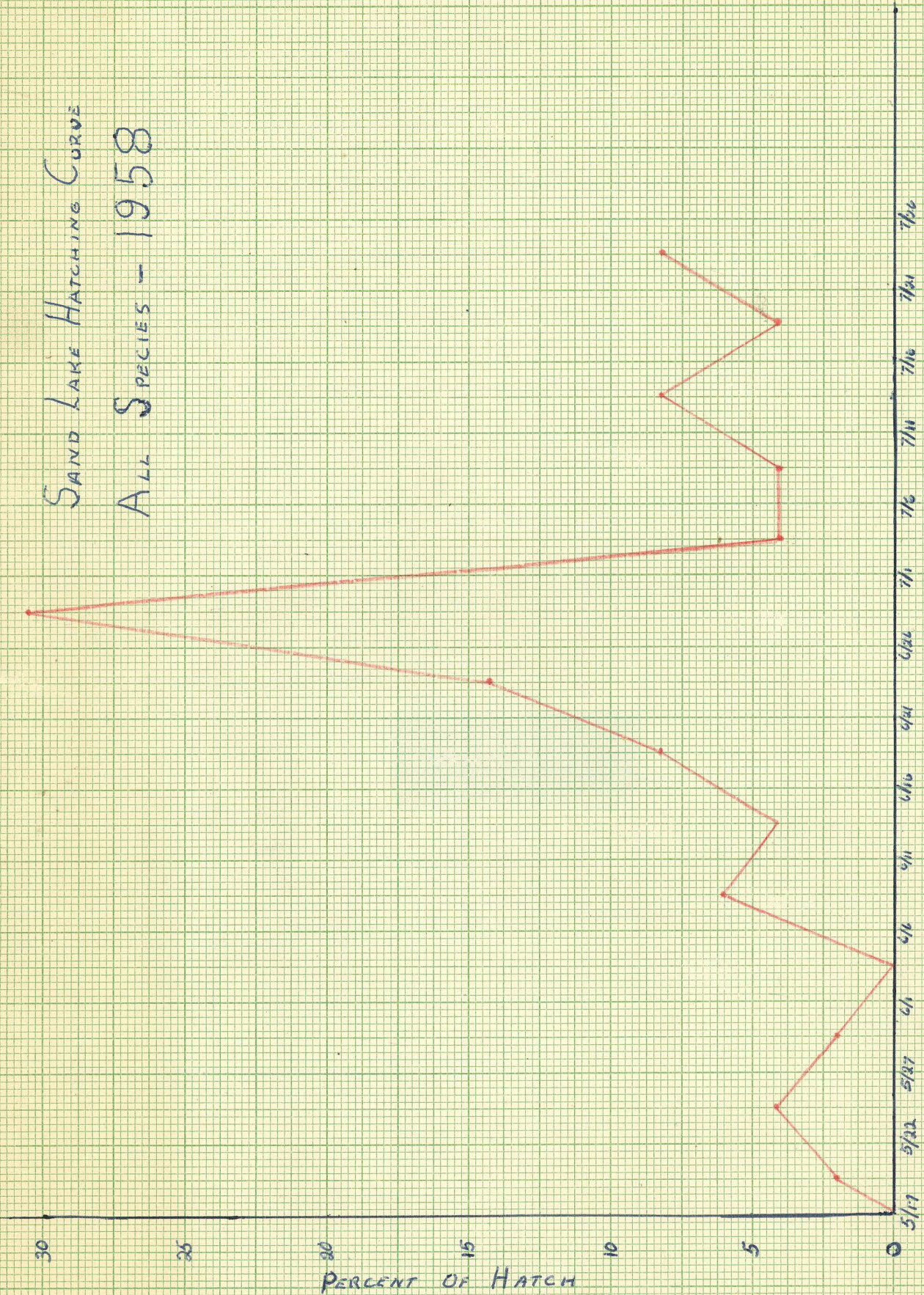
BOUNDARY LINES
PRIMARY ROADS
SECONDARY ROADS
TRAILS
OLD RIVER BED
EASEMENT ONLY

GENERAL MAP
SAND LAKE
NATIONAL WILDLIFE REFUGE
BROWN COUNTY, SOUTH DAKOTA

SCALE •



SAND LAKE HATCHING CURVE ALL SPECIES - 1958



III. REFUGE DEVELOPMENT & MAINTENANCE

A. Physical Development

1. Installed combination windows and doors at residences Sites two and three.
2. Rebuilt 4.5 miles of refuge trail on the east side from the north end south. Maintained all trails.
3. Replaced carbon-tet fire extinguishers with dry chemical type in vehicles and buildings.
4. Bought a used truck gas-tank and remade it into a water tank to service spray rigs.
5. Rehabilitated approximately 15 miles of electric cross-fence in grazing units.
6. Relocated sewer line, for Site four, to drain into lake.
7. Built loading dock out of steel beams and dirt fill.
8. Rehabilitated bathroom upstairs at Site two; new fixtures, floor covering, cupboards and plumbing.
9. Installed water purifiers in residences, Sites two and three.
10. Sprayed approximately 1200 acres noxious weeds.
11. Conducted experimental spraying project on six one-sixth acre plots.
12. Prepared ground for new meal storage building.
13. Installed two cattle guards between Site three and Houghton Grade.
14. Routine maintenance of fences, vehicles, buildings, dikes and structures, tools and equipment, landscapes.
15. Rearranged captive goose pen fence and gate at hospital pen area.
16. Fumigated grain stored in elevator, twice.
17. Conducted experimental spraying project on six acres of quackgrass.
18. Pulled out old stumps and cleared brush on Columbia Dam.
19. Discing new tree plantings three times.
20. Hauled sand and gravel for new metal building.
21. Built new concrete bases and mounted L.P. gas tanks at each building site.
22. Repainted metal grain storage tank.
23. Had two outdoor toilets built for public use at headquarters, and prepared locations.
24. Had new grain feeder built for hospital pen geese.
25. Had information booth built for headquarters area.
26. Painted the elevator and house at Site two under contract.

B. Plantings

1. Aquatic and Marsh Plants

None

2. Trees and Shrubs

Two shelterbelts were planted this spring and another was widened. The larger one planted was on the north side of the road west of Site four, the smaller was west of the residence at headquarters. The shelterbelt north of Site four was made two rows wider. Species composition of the rows follows:

- 1 row 500' of Mongolian Cherry and plum. ✓
- 1 row 500' of Carigana ✓
- 2 row 500' of Cottonless Cottonwood ✓
- 2 row 150' of Cottonless Cottonwood ✓
- 1 row 500' of Chinese Elm ✓
- 1 row 500' of American Elm ✓
- 1 row 500' of Ash ✓
- 1 row 180' of Ponderosa Pine ✓
- 1 row 180' of Cedar ✓
- 1 row 180' of Carigana ✓

Some planting for landscaping and shade was also accomplished.
The following trees were planted in the headquarters area:

- 1 - White Cedar
- 1 - Black Hills Spruce
- 3 - Juniperus var. Cunnannii 2
- 2 - Pfitzer's Juniper

The following trees were planted at Site four.

- ✓ - American Elm 1
- ✓ - Green Ash all
- 1 - Purple Lilac

3. Upland Herbaceous Plantings

None.

4. Cultivated Crops

This was an excellent small grain season, and farmers had the best harvest in many years. The drouth from mid-summer on had no effect on production and was a great help during the harvest season. The same dourth, however, has caused considerable damage to a corn drop that looked excellent until mid-summer. Production has been reduced in varying degrees in most units, and parts of a few will not produce any mature corn. The situation could be much worse, however.

The millet fields will no doubt show a reduced yield, although the seed is more available than normal due to the low growth of most plants.

We have about nine acres of rye in two small units. The 16 acres reserved for this crop on the east side was not planted due to lack of adequate moisture.

On the following page is a summary of the 1958 farming program.

1958 SAND LAKE REFUGE CROP ACREAGES

Permittee	Barley	Permittee - Harvested Acres					:	Refuge - Unharvested				:	Refuge - Harvested			
		Corn	Millett	Oats	Rye	Wheat		Barley	Corn	Millet	Rye		Barley	Corn	Millet	Wheat
Bonzer	61.4	37.3						30.6	18.7							
Dayton	25.7			12.0		33.0		23.3	24.0							
Dennert		4.7		105.				39.0	18.3							
Dinger	93.0			78.0				18.0	68.0							
Eichler	22.9	58.5		34.0		11.5					2.0		13.2	4.0		2.5
Herseith	17.0	43.3		32.0	16.0	25.0		32.0	34.7							
Lahman	11.3			9.0				4.7	24.0							
Mitchell	52.3							7.7		18.0						
Olson	16.0	15.3				10.5		8.0					8.8			3.5
Pfutzen- reuter	35.0	31.7		45.5					15.8	32.0						
Richardson	23.0	16.9				25.0			24.0				13.1			3.0
Scott	44.3	94.0	9.0	54.0		7.5		38.7	49.0	25.0					3.0	-2.5
Sieber	50.0					18.0			14.0				10.0			-4.5
Spurr	9.0	21.0							14.0				3.0			
Webb	21.0	24.3		17.0					26.7					3.0		
Weismantel	17.3	7.4		10.0		9.0		8.7	8.6							-3.0
Wells	89.0				7.0	19.5		4.0		44.0						-6.5
Wilson	28.0	24.0		46.0		41.0		25.0	54.0					10.0		
Totals	616.0	378.4	9.0	442.5	23.0	200.0		239.7	393.8	119.0	2.0		3.0	58.1	7.0	25.5

C. Collections and Receipts

1. Collections

None.

2. Receipts

The species are noted above under "Trees and Shrubs". Most material was in excellent condition. Some of the larger trees purchased for shade or landscaping failed to break dormancy. However, since they were guaranteed we have made arrangements for their replacement next spring.

D. Control of Vegetation

Since we are still in the process of trying to get some spraying done (if the wind ever stops blowing), this operation will be reported in the December NR. In spite of the purchase of another spray rig and the conversion of a gasoline truck tank for carrying water and herbicide, we get far behind in this program due mainly to windy weather. By the time we arrived at the north end of the refuge, having started on the south, most plants were beyond the growth stage where optimum results from herbicide were possible. We plan on revision of this program next spring to try to obtain a more economical use of time and funds. We sprayed only grazing units and other non-agricultural land, but still had more than we could handle. We also had a private spraying plane handle 250 acres.

E. Planned Burning

None during period.

F. Fires

None during period.

IV. RESOURCE MANAGEMENT

A. Grazing

Since this program extends will into September, this section will be reported on in the December narrative.

The cross-fencing program in effect on many units has continued to prove valuable in protecting upland from grazing and forcing grazing pressure on undesirable emergents. Except for small patches of ground that are unavoidably overgrazed because of their location, refuge pastures came through this drouth period in excellent condition. In fact, the local conservationist with the SCS - Don Minehart, was heard in a radio broadcast to site the refuge as an example of proper pasture management while criticizing neighboring ranchers for faulty grazing practices during this dry season. We actually had some units grazed too lightly for optimum use by nesting waterfowl next spring.

B. Haying

None

C. Fur Harvest

None

D. Timber Removal

None

E. Commercial Fishing

A permit has been issued for the removal of rough fish and bullheads. The take has been small so far, but a large harvest is anticipated through the ice this winter.

Since the state assumes ownership of all fish within the refuge, it receives a share of the profits from their sale, while the refuge receives only material benefit (we hope) in ultimately increased production of Sago pondweed. It may be that a freezeout this winter due to our low water levels will accomplish considerably more than any commercial outfit. The latter arrangement will, however, allow the state to receive some financial assistance from our rough fish crop for other conservation measures.

F. Other Uses

One permit has been issued for the keeping of approximately 60 hives of honey bees at a cost of 15 cents per hive per year.

V. FIELD INVESTIGATIONS OR APPLIED RESEARCH

A. Waterfowl Populations and Shoreline Grazing Use

This study was continued this year, but a complete report cannot be prepared until the end of fall migration. The September to December Narrative will contain a full report on this subject.

B. Artificial Pothole and Level Ditching Study

This study also is not completed for 1958; therefore a complete report will appear in the September -December narrative.

C. Nesting Studies

The nesting studies this year consisted of dragging for nests and a complete check for nests on the Houghton Grade where it crosses the refuge.

1. Nest Dragging - Grazing Units and Wildland Areas

All nest dragging was accomplished this year in the manner used last year. A two hundred foot rope, with pieces of scrap metal attached about two feet apart along the rope, was pulled between two conventional pickups.

The period of nest dragging was between June 19 and June 24. The dragging was done throughout all hours of the day, and we are in agreement with last year's findings, that the time of day did not seem to effect the productivity of the operation.

The results of the past two years nest dragging of these areas, are tabulated on the following page.

SAND LAKE REFUGE
COMPARISON OF 1957 AND 1958 NEST DRAGGING

AREA	ACRES	COVER	1957		1958		COMMENTS *
			NEST & HEN	HEN ONLY	NEST & HEN	HEN ONLY	
SE. Goose Pen	10	Bluegrass	-	-	-	-	-
SW. Goose Pen	14	Bluegrass	1 Pheasant	-	-	-	-
NW. Goose Pen	28	Bluegrass	-	5 Pheasant	1 Gadwall	1 Pheasant	Nest 200 yd to water.
NE. Goose Pen	8	Bluegrass	-	1 Pheasant	-	1 Pheasant	-
N. of NW Goose Pen	22	Bluegrass	-	1 Pheasant	-	2 Pheasant	1 hatched Pheasant nest fd.
E. of Headquarters	12	Bluegrass	-	1 Pheasant	-	1 Pheasant	-
G-15	87	Bluegrass	1 BW Teal	1 Pheasant	2 BW Teal	1 Pheasant	83 acres dragged in '58 - nest 100-250 yd to water. 1 destroyed BW Teal nest located.
G-16	35	Bluegrass	-	1 Pheasant	1 BW Teal	2 BW Teal	Nest 800 yd to water
Conard Slough Area	16	Native	1 Mallard	2 Pheasants	-	2 Pheasants	-
Hanson Point Shelter Belt	7	Bluegrass	-	1 Pheasant	-	1 Pheasant	4 ac. dragged in 1958
W. of Trail N. of Site # 2	18	Bluegrass	-	3 Pheasants	-	-	-
G-3 N. of Ref. Road	34	Mixed	1 BW Teal	1 Pheasant	-	3 Pheasants	-
HQ Landing Strip	8	Alfalfa	-	-	-	1 Pheasant	-
Hanson Point	6	Alfalfa	2 Pintails	-	-	-	-
TOTALS	305 (in 1957)		6	17	4	15	298 acres dragged in 1958

* - Refer to 1958 dragging.

The preceeding data is compiled on information obtained from the re-dragging of approximately 300 acres which was draggen in 1957. As the comparative data shows, only 19 nests (counting hens flushed as an indication of nest) were located in 1958, as compared to 23 located in 1957. A comparison of duck nests shows that in 1958 one more nest was located then in 1957 on these 300 acres.

It is interesting to note the increased use by ducks of the grazed areas in G-15 and G-16. In 1957 only one duck nest was located in these units; but in 1958 three nests were located, two other female Blue-wing Teal flushed, and one destroyed nest found. This may be an indication that the grazing program is beginning to pay off, but no definite conclusions can be drawn on such a small sample.

The following table shows the results of dragging in areas not comparable with 1957.

RECORD OF NON-COMPARABLE NEST DRAGGING
1958

<u>AREA</u>	<u>ACRES</u>	<u>COVER</u>	<u>NEST & HEN</u>	<u>HEN ONLY</u>	<u>COMMENTS</u>
Wildland E. of A-40 on Hanson Point S. to Shelter Belt	4	Cordgrass	-	-	-
Wildland W. of A-5	7	Cordgrass	1 BW Teal 1 Gadwall	-	70 yd to water 40 yd to water
Wildland W. of G-15	28	Cordgrass	-	-	-
East of cross fence in G-11	15	Brome & alf.	1 Mallard	-	-
TOTALS	54		3	-	-

The over all nesting density for this year was one nest per 26.3 acres. This figure is much lower than the one nest per 15.0 acres in 1957. However when considering duck nesting only, the density for 1958 was one nest per 42.1 acres as compared with one nest per 50.0 acres in 1957.

2. Alfalfa Nesting

Eighty-three acres of alfalfa was dragged just before the first crop was cut. This dragging produced one duck nest and four indicating pheasant hens. A square rod island was left uncut around the duck nest, and hatching of this nest was successful.

Again this year not enough information was obtained on the value of, or the dangers of, nesting in alfalfa. It is hoped that in future years this phase of study will be expanded.

Results of this dragging are tabulated in the table on the following page.

ALFALFA DRAGGING
SAND LAKE REFUGE - 1958

<u>AREA</u>	<u>ACRES</u>	<u>AGE OF STAND</u>	<u>NEST & HEN</u>	<u>HEN ONLY</u>	<u>COMMENTS</u>
A-40 SE	45	4 YRS.	1 Pintail	-	$\frac{1}{2}$ mi. to water
A-5	24	2 yrs.	-	3 Pheasants	-
Airstrip	8	5 yrs.	-	1 Pheasant	-
A-40 Hanson Pt.	6	4 Yrs	-	-	-
TOTALS	83		1	4	

3. Highway No. 10, Houghton Grade

A complete check of this grade was accomplished by three men walking the entire grade after it was mowed by the State Highway Dep't. On the 12 acres checked a total of seven nests were located. Six of these nests were destroyed by the mowing operation or by predator action shortly thereafter, and only one nest was hatched. This grade produced .58 nests per acre in 1958. We will contact the Highway Dep't and request that in the future, mowing be delayed until the first of July.

D. Experimental Herbicide Applications

1. Quackgrass

Six one acre plots and a control area were established to test the effects of various herbicides supplied by the American Chemical Company.

Two amino triazol formulations were applied at various rates. These formulations were Benzac 354 applied at the four, five and six pound rates, and M-569 applied at the two, three and four pound rates.

Square yard quadrants were set up in each area and stem counts recorded.

Early observations indicate a high percent kill in the M-569 plots and only a moderate kill in the Benzac 354 plots. (See photo section) These observations will be continued through next spring and a complete report will be made in a later report.

2. Canada Thistle

A one acre plot was sprayed on June 18 with M-569 at the four pound rate. Again no absolute conclusion may be drawn; however, a check of the area during the first week of September revealed no apparent new plant growth. A hasty check of the roots showed these to be rotted.

A complete report will be presented in a later report.

3. Phragmites

On August 21, six one-sixth acre plots were sprayed with Weedazol at the two, four and six pound rates, and with M-569 at the same rates. Square yard quadrants were set up, as in all of the above experiments.

Again no report will be made until conclusive evidence is available.

E. Shoreline Vegetative Transects

The 26 transects set up last year were rechecked this year. Also eight new transects were established in non-grazed vegetation. Some minor changes were noted, but again a complete report will be presented at the termination of the study, or when a more significant change is noted.

F. Dove Banding

A total of 163 nestling doves were banded this year. This is 64 more than were banded in 1957.

All banding was restricted to the four shelterbelts located within one-half mile of headquarters. The most productive area was the shelterbelt located just north of the tower. 108 doves were banded in this 49 acre woodlot.

The period of greatest nesting density occurred in late May and June. July was quite productive with 56 doves being banded. After this time the number of nestling doves decreased rapidly, with only 11 and 17 banded in August and September respectively. At the time of this writing no more eggs were being layed, and it is believed that all doves will be of flying age by the 25th of September.

VI. PUBLIC RELATIONS

A. Recreational Uses

We noted a much greater use of the Columbia Recreation Area this summer. Perhaps this was due somewhat to our having kept the area mowed much better this year. Swimming use seemed to be alot greater also. There were numerous overnitters and large picnic groups. With the advent of the newly oiled road we anticipate greater use of the area; and also greater need for improvement.

Fishing along public roads was considerably less this year. Approximately 100 fisherman days were noted.

The usual visitors during migration held up well in May. Casual visitors through the headquarters area were at least average.

"Visitors Welcome" signs have been placed on the recognition signs at the headquarters and Recreation Area gates.

The Hecla Recreation area again was the place for sizeable numbers of fishermen. 1,000 fisherman days were estimated for the period, with success quite low.

B. Refuge Visitors

- 5/6 Presentation Junior College - Discussion and tour refuge.
- 5/7 Mr. Gonkel - MRB Bismarck - Discussion of area.
- 5/8 Messrs Hammond & McLaughlin - tour area and discussion.
- 5/16 R. Marquart - Student - Research on geese.
- 5/26 G. Mann - WHP Biologist - Discussion waterfowl developments
- 5/27 Messrs Sharp & Dean - Fisheries - Study fish situation
- 5/28 C. Randall - Commercial Fisherman - Discuss fishing possibilities
- 5/28 I. Boeker - Pilot Biologist - Air-ground correlation

- 6/4 K. Dybsetter - Tewaukon Ref. Mgr. - Pick up supplies
- 6/9 Messrs Boeker & McGlauchlin - Air-ground correlation

- 8/14 Messrs Page & Hammond - Discussion pothole & ditch development etc.
- 8/12 J. Carlson - Waubay Ref. Mgr. Return equipment
- 8/26 Messrs Rose & Larson - S. Dak. Game Managers - Discuss Managed Hunting.
- 8/26 Prof. Hunt - U. Of Michigan - Discuss and tour refuge.

Numerous visits by USGMA Hopkins, State Warden Richardson, and casual visitors too numerous to mention.

C. Refuge Partidipation

Numerous talks were given by the manager and assistant manager to small groups of visitors too numerous to mention in addition to the following;

- 5/11-15 Stollberg and Monnie participated in the statewide breeding pair counts.
- 5/21 - Stollberg showed film and gave talk to Young Peoples church group in Columbia.

6/7 - Monnie attended S. Dak. Wildlife Federation Convention in Aberdeen.

7/6 - Stollberg showed slides and gave talk to Marshall County Sportsmens Club in Britton, S. Dak.

7/13-16 - Stollberg and Monnie conducting statewide broods counts.

VII. OTHER ITEMS

A. Items of Interest

1. Easement Refuges

Dakota Lake, comprising 1048 acres just over the line in North Dakota, had a very slow year. At the start of the period there was about seven inches of water going over the spillway at the south end of this refuge until mid-May, when the flow gradually lowered to two inches by the end of the month. This flow remained remarkably steady until August, by the end of which the James River north of this spillway was four inches below this structure.

Waterfowl use was so low that it was not considered worthwhile to conduct either a breeding pair count or brood count on this area.

2. Maple River, also in North Dakota, had little use, although with adequate control over the water and crop management this area could be made very productive. The light flow over the spillway at the start of the period gradually stopped, and there was inadequate water in the refuge during the breeding season to make it attractive.

2. Miscellaneous New Items

Vickie, the new daughter of the Monnie's, was born on July 25. She weighed 7 pounds 8 ounces at birth and appears to be well adjusted to refuge living.

Bob Hanten, our student assistant this summer, has returned to school at South Dakota State. During his comparatively short stay here he made a definite contribution to refuge research and the general refuge program. His willingness to take on any job was gratifying, and leads us to conclude that the money used for the student assistant program is a very good investment.

Two other college students who worked here during the summer as WAE employees have also returned to school. They were Richard Thompson and Orville Krage, who are enrolled at Northern State Teachers College.

The only other news item is that we have just had one of the driest summers on record since the "Dirty Thirties" and as yet there is no sign of a change. The fire hazard is almost as high as it could get and the waterfowl season opens in a week.

3. Credits

Monnie - waterfowl section of IIA, V.

Wahl - IA, IIIA, F, VI. Ted also typed the entire report, which in itself is quite an accomplishment considering the notes he had to decipher.

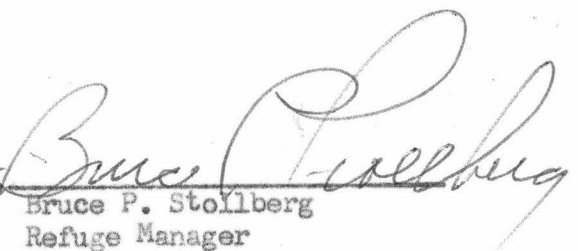
Stollberg - the rest.

B. Photographs

A few, taken by Wahl and Stollberg, will be found at the end of this report.

Date 8/29/58

Submitted by


Bruce P. Stollberg
Refuge Manager

Approved by _____ Date _____

WATERFOWL

REFUGE SAND LAKE

MONTHS OF May 1 TO August 31, 1958

(1) Species	(2) Weeks of reporting period									
	5/4-10 1	5/11-17 2	5/18-24 3	5/25-31 4	6/1-7 5	6/8-14 6	6/15-21 7	6/22-28 8	6/29-7/5 9	7/6-12 10
Swans:										
Whistling Trumpeter										
Geese:										
Canada	200	200	150	150	150	150	150	100	100	100
Cackling Small Canada	3000	1000								
Brant										
White-fronted										
Snow	3900	1000	10	10	10	10	10	10	10	10
Blue	6000	3000	5	5	5	5	5	5	5	5
Other										
Ducks:										
Mallard	400	300	200	325	300	325	325	400	900	900
Black										
Gadwall	100	150	180	250	275	230	230	250	950	950
Baldpate	100	100	40	70	70	150	150	150	350	350
Pintail	700	200	100	100	100	100	100	125	300	300
Green-winged teal	200	50					10	50	50	50
Blue-winged teal	500	500	700	700	700	650	700	700	500	500
Cinnamon teal										
Shoveler	400	300	100	100	100	100	100	100	150	150
Wood	6					50	50	50	30	30
Redhead	200	150	80	75	50	50	50	50	230	230
Ring-necked		10	10	10						
Canvasback	100	50					30	30	20	20
Scaup Lesser	1000	500	50	40	30	30				
Goldeneye										
Bufflehead										
Ruddy	200	200	30	40	40	40	40	40	40	40
Other Com. Merg.	20									
Coot:	1000	1000	500	500	500	500	500	500	700	700

3-1750a

Cont. NR-1
(Rev. March 1953)WATERFOWL
(Continuation Sheet)REFUGE SHAD LAKEMONTHS OF May 1 TO August 31, 1958

(1) Species	(2) Weeks of reporting period								(3) Estimated waterfowl days use	(4) Production Broods: Estimated seen : total young	
	7/13-19 11	7/20-26 12	7/27-8/3 13	8/3-9 14	8/10-16 15	8/17-23 16	8/24-30 17	18			
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	100	100	100	175	175	175	175		17,150	12	64
Cackling Little Canada									28,000		
Brant											
White-fronted											
Snow	10	10	10						35,070		
Blue	5	5	5						63,385		
Other											
Ducks:											
Mallard	900	900	900	1500	3000	6000	8000		179,025	15	606
Black					5	5	10		140		
Gadwall	950	950	950	600	600	600	600		60,095	3	134
Baldpate	350	350	350	200	200	300	300		25,060		
Pintail	300	300	300	700	700	900	900		43,575	5	189
Green-winged teal	50	50	50	100	100	100	100		6,720		
Blue-winged teal	500	500	500	1000	1100	1300	2000		91,000	16	680
Cinnamon teal											
Shoveler	150	150	150	300	300	400	500		25,130	3	126
Wood	30	30	30						1,932	2	96
Redhead	230	230	230	300			10		15,220	4	157
Ring-necked									210		
Canvasback	20	20	20						2,170		
Scaup Lesser									11,550		
Goldeneye											
Bufflehead											
Ruddy	40	40	40	60	60	60	60		7,490		
Other Can. Merg.									140		
Unidentified										1	32
Coot:	700	700	700	800	1500	2500	2200		105,000	6	140

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production	SUMMARY
Swans	0		0	Principal feeding areas _____
Geese	143,605	13,100	64	_____
Ducks	469,457	12,665	2,022	Principal nesting areas _____
Coots	105,000	2,500	140	_____
				Reported by <u>staff</u>

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 Sand LakeMonths of May 1. to August 31. 1958

(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>										
Eared Grebe			20	8/1-31						
Western Grebe			3000	8/1-20						
Pied-billed Grebe			200	7/1-8/31						
White Pelican			5500	8/20-31						
Double-crested Cormorant			1500	8/20-31						
Great Blue Heron			100	8/1-25						
Black-crowned Night Heron			300	8/10-20						
American Bittern			Reasonable estimate impossible - some always observed along marsh edge							
American Egret			1	6/20-27						
Sora Rail			Reasonable estimate impossible, but apparently abundant.							
* - All of these figures are very rough estimates, due to the lack of sufficient time to devote to the study of this group of birds.										
II. <u>Shorebirds, Gulls and</u>										
Terns:										
Killdeer			500	8/1-31						
Spotted Sandpiper			300	"						
Greater Yellowlegs			200	8/10-31						
Lesser Yellowlegs			400	"						
Pectoral Sandpiper			300	8/1-31						
Baird's Sandpiper			100	"						
Dowitcher			3000	7/20-8/20						
Avocet			150	8/10-25						
Marbled Godwit			250	8/10-25						
Ring-billed Gull			25000	8/10-31	(Includes Herring gulls also)					
Franklin's Gull			450000	8/15-31						
Common Tern			400	7/24-8/25						
Forster's Tern			300	"						
Black Tern			500	8/1-25						
Wilson's Snipe			50	8/1-31						

(over)

UNITED STATES
DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service

WATERFOWL UTILIZATION OF REFUGE HABITAT

Refuge Sand Lake

For 12-month period ending August 31, 19 58

Reported by Bruce P. Stollberg

Title Refuge Manager

(1) Area or Unit Designation	(2) Habitat			(3) Use-days	(4) Breeding Population	(5) Production
	Type	Acreage				
ONE	Crops	339	Ducks	1,209,173	110	371
	Upland	229	Geese	668,535	0	0
	Marsh	393	Swans	1,796	0	0
	Water	643	Coots	188,550	56	46
	Total	1,604	Total	3,068,054	166	417
TWO	Crops	899	Ducks	5,194,387	214	578
	Upland	751	Geese	1,478,621	12	17
	Marsh	183	Swans	4,174	0	0
	Water	1,305	Coots	50,795	45	24
	Total	3,138	Total	6,727,977	271	619
THREE	Crops	133	Ducks	1,298,321	184	371
	Upland	390	Geese	293,729	16	20
	Marsh	398	Swans	3,827	0	0
	Water	2,306	Coots	54,900	60	0
	Total	3,227	Total	1,650,777	260	391
FOUR	Crops	77	Ducks	1,633,345	170	331
	Upland	288	Geese	91,756	4	6
	Marsh	170	Swans	112	0	0
	Water	721	Coots	38,615	20	0
	Total	1,256	Total	1,763,828	194	337
FIVE	Crops	914	Ducks	2,397,288	350	124
	Upland	1,294	Geese	1,344,331	16	21
	Marsh	1,255	Swans	3,514	0	0
	Water	2,543	Coots	67,504	24	0
	Total	6,006	Total	2,712,637	390	145
SIX	Crops	682	Ducks	995,764	252	206
	Upland	2,215	Geese	2,110,150	0	0
	Marsh	1,648	Swans	140	0	0
	Water	657	Coots	30,376	18	70
	Total	5,202	Total	3,137,430	270	276
Seven	Crops	0	Ducks	12,782	134	41
	Upland	781	Geese	1,715	0	0
	Marsh	187	Swans	0	0	0
	Water	50	Coots	1,120	4	0
	Total	1,081	Total	15,617	138	41

(over)

1613

Months of May 1 to August 31, , 19458

[illegible]



Site of a successful shoveller nest on the Houghton Grade - State Hgwy. # 10. The hen was frequently observed from the road, and when she was off the nest the eggs could also be seen while driving by.



SD-SDL-810
Commercial carp fishermen were hampered by vast quantities of carp too small to sell during the summer there were many big ones also.



View of tank from gas truck converted for carrying water and herbicide for weed control operations. The herbicide is in the end tank. A pump seen on the left side is used for loading water. This will be helpful as a reserve during the fire season. 50-50L-811



Close-up of valve arrangement on above tank. Herbicide is drawn from the lower valve.



We still could use some funds for sloping
and riprap. This bank is about 100 feet from
a refuge road.

50-50L-812



More need for sloping and riprap.



The planting of a 500 foot shelterbelt by the Soil Conservation Service personnel. The cost was \$0.17 per running rod including equipment, personnel and trees.

SD-SDL-813



Survival was close to 100% in spite of a severe summer drouth.

SD-SDL-814



Invasion of cattail on a mud flat in Sand Lake. Man's cap near center of photo. Very little spreading of Phragmites has taken place so far.

SD-SDL-815



Protection of upland from overgrazing by the use of an electric fence. This photo was taken in early September, after the electric fence had been out-of-use all summer. This practice is widely used here to protect upland and force feeding on low value emergents, mainly Phragmites and cattail.

SD-SDL-816



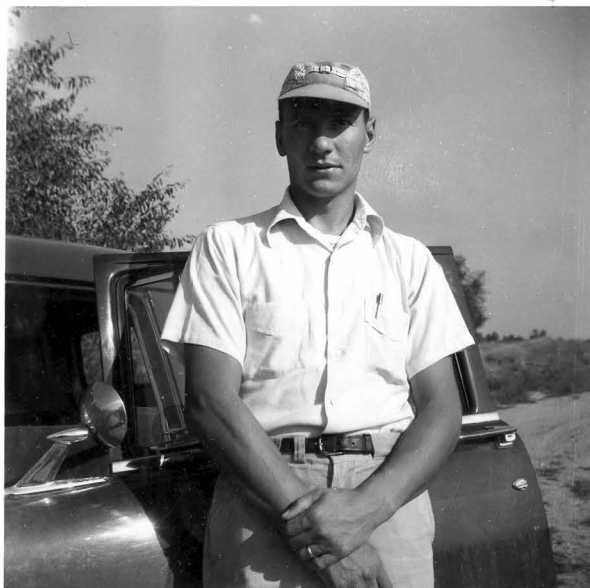
Elmer Podoll's portable scaffold being used to close in the bathroom window of the Assistant Manager's quarters. The maintenanceman lives downstairs.

SD-SOL-817



Removing a few items from the barn prior to an inspection.

SD-SOL-818



James Monnie, the new Assistant Refuge
Manager, entered on duty March 31.

SO-SOL-819