Division of Wildlife Refuges

Narrative Report Routing Slip

Refuge SWUAW CREEK Year 1964

Chief's Office: Mr. Gillett _____ Mr. Ackerknecht _____

Mr. Fermanich _____ Miss. Baum _____

Wildlife: Mr. Ballou _____ Mr. Webster _____ Mr. Stiles _____

Resources: Mr. Stollberg _____ Mr. Lumb _____ Mr. Britt _____

Interpretation: Mr. DuMont ___ Mr. Monson _____ Mr. Goldman _____

Planning: Mr. Crandall

Job Corps: Mr. Regan _____ Mr. Huenecke _____

1964

NARRATIVE REPORT

SQUAW CREEK NATIONAL WILDLIFE REFUGE

PERSONNEL

Refuge Manager.....Harold H. Burgess
Wildlife Technician.....Albert J. Yocum
Maintenanceman.....Henry Munkres
Dragline Operator.....Alva W. Bomar
Operator General.....William R. Hamilton
Maintenanceman (Seasonal).....Walter J. Boyd
Oiler (WAE 3/3-5/9 & 7/1-8/15/64)....Gerald O. Bomar
Clerk-typist (WAE 5/26-11/27/64).....Mrs. Ruth Hagee
Laborer (Student WAE 3/2-8/64).....David L. Trauger
Laborer (Student WAE)(Eod. 9/8/64)...Lee P. Burgess, Jr.
Laborer (Student WAE 11/1-11/25/64)..Eric Prather

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

SQUAW CREEK NATIONAL WILDLIFE REFUGE

MOUND CITY, MISSOURI

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1964

Narrative Report

Squaw Creek National Wildlife Refuge

I. GENERAL

A. Weather Conditions.

	Snowfall	Precipitation This Month	Precipitation Normal		Max. Temp.	Min. Temp.
January	2.9	0.29	1.20		65	-6
February	0.0	0.29	1.09		56	-5
March	3.1	2.03	2.33		72	9
April	0.0	4.80	3.15		88	26
May	0.0	3.26	4.39		91	40
June	0.0	11.84	5.93		90	44
July	0.0	1.89	3.22		100	54
August	0.0	5.08	4.21		101	46
September	0.0	2.24	3.44		89	36
October	0.0	0.11	2.18		82	25
November	1.3	3.07	1.68		82	4
December	3.8	1.33	1.36		63	-3
Totals	11.1	36.23	34.18	Extremes	101	-6

The data for the above summary of weather was obtained from the U.S. Weather Bureau for their station at Rosecrans Memorial Airport, St. Joseph, Missouri - about 25 miles southeast of Squaw Creek National Wildlife Refuge. Snow fall was comparatively light as was precipitation for the first three months of 1964. April and May precipitation was near normal.

Abnormal rainfall in June caused ten crop-destroying floods. Water backed up from the inadequat outlet below the refuge and poured through spillways, over dikes and over the South Pool radial gates.

An inspection on June 23-24 in the vicinity of the refuge found the fields below the Napier Road flooded, the CB&Q Railroad Bridge almost plugged; Five Mile Lane ditch filled to 75% capacity; about 600 acres of cornfields southwest of Bigelow flooded; the old channel of the Little Tarkio overflowing A-12 wheatfield; overtopping the county road into Tule Gun Club, and flooding about 200 acres of the former Dopp Estate cornfields west and adjacent to the CB&Q Railroad.

On the Refuge, water had overtopped most of the west levees and on June 23 was still overtopping the West Pool's levee in four locations. All except the higher refuge cornfields were flooded and the other fields were too wet to work during June. Later inspections found Davis Creek almost plugged with debris and silt from its Squaw Creek junction upstream about a mile including the "radial gate ditch". Heavy rains and overwash had also damaged all refuge gravelled roads.

These floods were followed by a drought in July and early August. September rainfall was below normal. October was dry. November was wet, but December had normal precipitation.

High winds and hail drove snow geese off the refuge pools during an April night; disabled many and killed some snow geese at Mound City and Maitland, Missouri where they were apparently attracted by the street lights. Several refuge buildings' roofs were damaged during this storm.

May, July and August were abnormally hot, but the other months were mild.

B. Habitat Conditions

1. Water

The weather was dry until May. Pump #1 was run until early February before the South Pool showed any effect of pumping. The low water and high population of waterfowl concentrated in a pumped ditch contributed to a fowl cholera outbreak that involved thousands of ducks and geese. Heavy June rains destroyed or retarded planted crops and kept equipment out of the fields. There was sufficient water in Squaw Creek during Autumn to flood Northwest, West and Southwest Pools and Agriculture Units 16 and 19. We were unable to draw down South Pool to promote an abundant growth of food plants during the summer and unable to raise the pool to planned levels during autumn months. Yet South Pool attracted normal numbers of waterfowl during migration. Tables 2 and 3 sum up the water conditions for the South and Northwest Pools.

2. Food and Cover Conditions

There was sufficient food left from the excellent 1963 crops of

Habitat Conditions, 1964 Impoundment Data

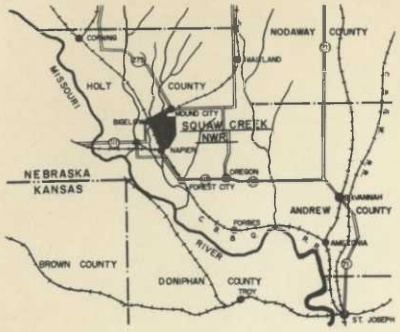
Table 2. Impoundment data, South Pool 1964.

Month	Planned Levels	Average Elevation	Estimated Area Acres	Capacity (acre-feet)	Average Depth
January	851.00	850.10	850	250	0.29
February	851.00	850.20	925	325	0.33
March	851.00	850.27	950	375	0.39
April	851.00	850.50	1150	625	0.53
May	851.00	851.14	1475	1300	0.88
June	850.50	851.60	1750	2200	1.25
July	850.50	851.89	1875	2700	1.55
August	850.50	850.73	1275	725	0.56
September	850.50	850.94	1400	1100	0.78
October	851.00	850.71	1275	725	0.56
November	851.00	850.65	1225	675	0.55
December	851.00	850.52	1175	625	0.54
Average	850.33	850.79	1275	725	0.56

Table 3. Impoundment data, Northwest Pool 1964

Month	Planned Levels	Average Elevation	Estimated Area Acres	Capacity (acre-feet)	Average Depth
January	855.50	855.60	255	80	0.31'
February	855.50	855.51	240	60	0.25
March	855.50	855.28	175	30	0.20
April	855.50	855.28	175	30	0.20
May	855.50	855.58	250	70	0.28
June	854.50	855.98	325	175	0.53
July	854.50	854.54	5	.05	0.01
August	854.50	853.89	Dry	0	0.00
September	855.00	854.63	10	.06	0.06
October	855.50	855.35	190	40	0.21
November	856.60	855.90	315	160	0.50
December	856.60	856.21	340	225	0.66
Average	855.39	855.31	190	97	0.36

1964 Habitat Units



LOCATION MAP

SCALE

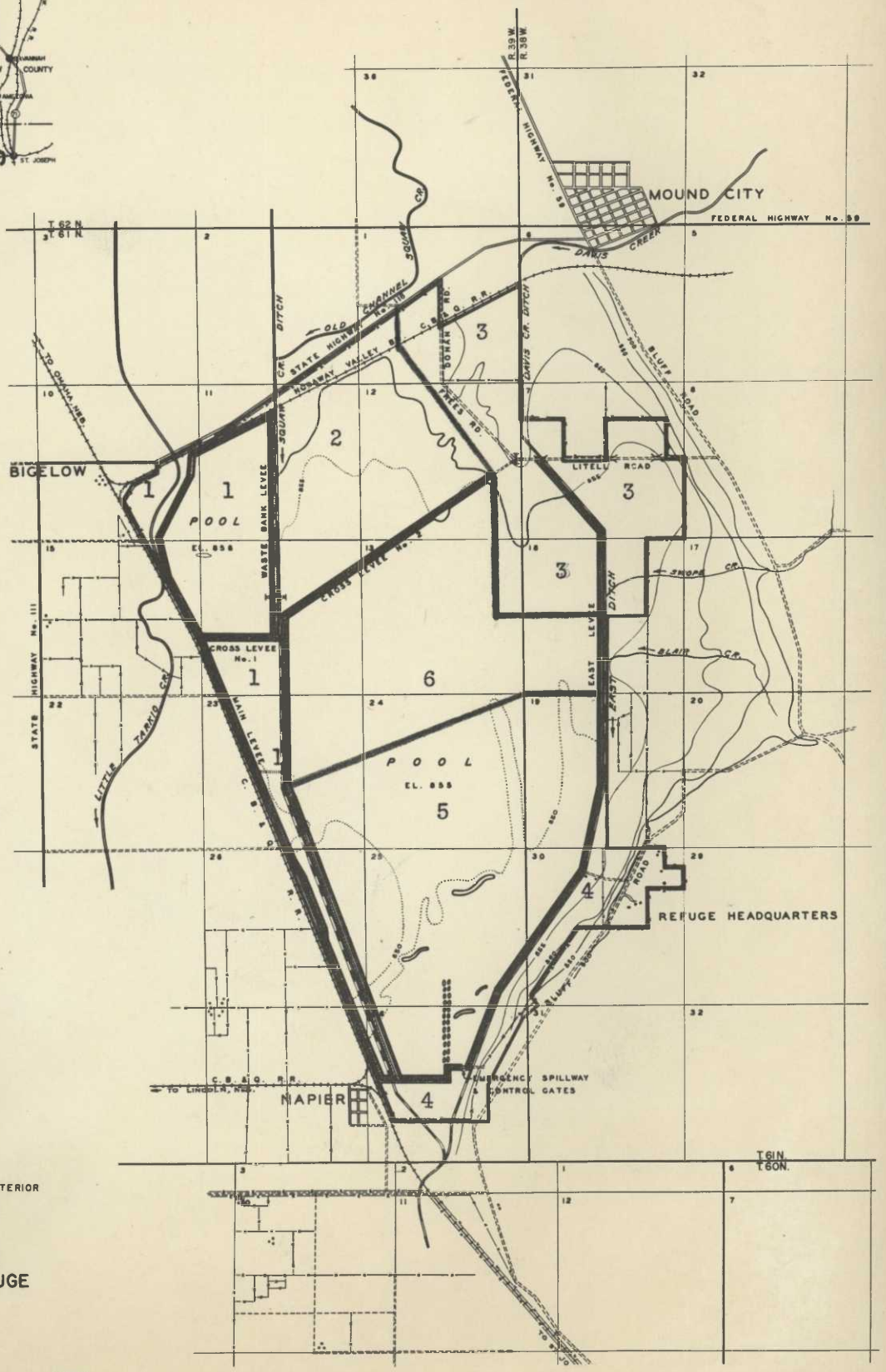
0 5 10 20 30

FIFTH PRINCIPAL MERIDIAN

LEGEND

- REFUGE BOUNDARY
- FENCE LINES
- PRIMARY ROADS
- SECONDARY ROADS
- TRAILS
- CANALS & DITCHES

CONTOUR INTERVAL 5 & 20 FEET
DATUM IS MEAN SEA LEVEL



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

GENERAL MAP

SQUAW CREEK
NATIONAL WILDLIFE REFUGE
HOLT COUNTY

MISSOURI

SCALE

0 1/4 1/2 1 2 MILES
0 20 40 80 160 CHAINS

WASHINGTON, D.C., DECEMBER 1936

REV 590210, 630307

natural food and corn to fill the needs of the spring migrants, although most corn was gleaned from the refuge fields by mid April.

Sufficient winter wheat browse was available on the refuge for all of the geese but large numbers of snow geese sought greener pastures in the Caton Brothers' wheat, about one mile north of the refuge. This led to depredation complaints, investigations and Zon exploder demonstrations by United States Game Management Agent John Hague, but little damage to the wheat.

Reoccurring floods so damaged corn or retarded corn planting that 77% of the normal yield was lost. Supplementary crops of domestic millet germinated slowly, due to the July and early August drought, and failed to mature in many cases. Wild millet and foxtail grasses however made excellent growths and upon flooding proved most attractive to ducks. Geese also used the flooded annuals and grazed intensively on the refuge's wheat browse. But again the snow geese found the neighbors' wheat greener.

Just prior to the hunting season four complaints of snow goose damage were received and investigated by the refuge manager. October was unusually dry so that in two complaints the wheat had not yet germinated and in two other cases the wheat was merely clipped. Two demonstrations of scaring devices were given and two scaring permits were issued. Investigation 30 days later found no sign of damage and the complainants contented.

The refuge's wheat and small supply of corn could not hold the normal numbers of geese after cold weather hit. Some geese moved on. Abnormal numbers of Canadas foraged into adjacent corn fields and were shot. And the George Opp 500 acre sanctuary with an excellant crop of corn 30 miles north of the refuge often held as many snow geese as Squaw Creek.

However some food still remains in the refuge's standing corn which will not be completely shredded until the danger of deep snows has passed.

Sufficient food and cover was available for deer, pheasants, quail, cottontails and other resident wildlife.

Table 4 Waterfowl day use by habitat units 1964

Habitat Unit	Acres	Goose Days	Duck Days	Total Days (Waterfowl)	Days use per acre
1	870	3,319,282	8,173,581	11,492,863	132,102
2	880	911,610	324,050	1,235,660	1,404
3	970	2,128,225	2,667,521	4,795,746	4,944
4	550	278,454	176,126	454,580	827
5	2,080	6,895,478	8,503,001	15,398,479	7,403
6	1,459	1,023,631	3,034,769	4,058,400	2,774
Totals	6,809	14,556,680	22,979,048	37,535,728	Ave. 5,516

II. WILDLIFE

A. Migratory Birds

There appeared to be more duck use this autumn than for many years. During a tour by William Ackerknecht and Dr. William Green on November 5, 1964, we estimated over 200,000 ducks and "probably more waterfowl than any other area east of the Rockies" according to Mr. Ackerknecht. But state aerial counts were consistently lower than our estimates and since we had previously agreed to use their counts for reporting purposes - no new records were recorded. The waterfowl use for 1964 is recorded as 37,535,728 days.

Geese

Up to 6,000 Canada geese and 5,000 lesser snow geese wintered at Squaw Creek Refuge in 1964. Large Canadas peaked at 11,020 during early March, when 200 small Canadas, 2,710 white-fronts, 100,000 snow and 200,000 blue geese had also built up to their peak spring numbers.

Only five Canada geese, one blue and one snow goose remained at Squaw Creek Refuge all summer. Migrant geese began returning by mid-September. The fall peak of 99,000 snow geese was observed in mid-October. The blue geese peaked at 29,750 in late November. The largest number of Canada geese counted by the state plane was 6,600 during mid-November and this included 2,000 small Canadas. White-fronted geese peaked at 250 the last two weeks of November.

Ducks

More than 100,000 ducks wintered at Squaw Creek Refuge in 1964. These were mostly mallards but also included 1,000 black ducks and 500 Wood ducks. The ducks were over-crowded in pumped ditches and fowl cholera hit them during January (See Diseases Page __). The spring migration peak was 161,700 ducks in early March, when 150,000 mallards; 10,000 pintails; 1,200 green-winged teal and 500 other ducks were using the refuge. Blue-winged teal reached their spring peak of 5,500 the first week of May, when the peak of 1,000 shovelers were also present.

About 170 duck pairs attempted to establish territories but only 94 ducks, consisting of 70 wood duck, 12 mallards, 2 pintail, 4 green-winged teal and 6 blue-winged teal stayed through the summer. Two mallard broods, a pintail brood, a blue-winged teal brood and two wood duck broods were observed on the refuge during 1964.

The fall duck population peaked at 160,260 during the first half of November and 113,250 still remained December 31, 1964. Mallards predominated with 9,702,655 days, pintails ranked second with 975,060 days and green-winged teal ranked third with 595,030 duck days during the autumn migration.

Other waterbirds

A pied-billed grebe was observed March 12. Twelve pied-bills were seen during August and 47 were observed during early September.

White pelicans first appeared March 30th and 400 were present in mid-April. They departed about April 30th and were not seen again until August 24th. They peaked at 5,000 pelicans the third week of September and departed about November 9. The first double-crested cormorants were observed September 28 when 10 used the refuge.

A great blue heron appeared March 17. They peaked at 100 during August and at least 3 stayed until November 9th. A green heron appeared April 15th. Six green herons were observed during the summer but only two could be found on September 21. The first little blue heron was observed April 17 but 55 were seen in mid-August. The last little blue heron was sighted on September 7.

A common egret was seen April 12th. Two common egrets were present April 15 to May 13. The last egret was observed August 18th. Ten black-crowned night herons were sighted April 26. Sixty "black-crowns" were observed in mid-September but only two could be found on October 18.

A yellow-crowned night heron was sighted May 24. A flock of 10 roosted in the Southwest Pool from August 1 to September 7, 1964.

The first least bittern was sighted May 24. Three pairs were present during June but the last two were sighted July 9. An American bittern was sighted April 15. A pair were present during the summer with the last bittern observed October 19th.

A pair of king rails raised a brood on the refuge during 1964. They were last seen August 31. No soras were sighted until August 9 when 30 were estimated to be using the refuge. No soras were observed after September 1.

Shorebirds

A killdeer was observed February 11th and 64 were present during mid-March. At least two broods hatched on the refuge. Four killdeers sighted October 24th were the last observed in 1964. Fifteen semi-palmated plovers were observed May 10th. The last two were sighted September 7, 1964.

A piping plover was observed August 9. A Golden plover was sighted March 13. The peak number of 15 goldens were observed in mid-May and 8 were observed May 24 for the last observation on the refuge. Fifty black-bellied plovers were observed May 16; this flock built up to 150 the following week, but only three were observed May 24th.

for the last record. A ruddy turnstone was sighted May 16 and two were sighted August 9 to 16, 1964.

A common snipe was observed March 15th; 200 were present during April and two common snipe were observed November 2, 1964. A pair of upland plovers apparently nested on a refuge levee during late May and June and apparently produced at least one young as three were observed during July. The last upland plover was observed August 20th.

Four Spotted sandpipers were first observed April 26. Although this species probably nested in the vicinity, four were the most sighted at one time. The last sighting of "spotties" was two on September 21. Three solitary sandpipers were observed May 10th; four were present during the summer and two were observed September 7th for the last record. Three willets were observed May 17 and one was sighted August 9, 1964. Three greater yellowlegs were observed May 12th; twelve were present from April 20 to May 14th and the last two were sighted September 9, 1964. Four lesser yellowlegs were also sighted April 12, but the lesser variety peaked at 2,000 from April 20 to May 14th and the last 30 were sighted September 9, 1964.

Four pectoral sandpipers were sighted March 13; they peaked at 200 in early May and 50 were last sighted September 7th. White-rumped sandpipers were first observed May 10th; 500 were present the last half of May and 15 were sighted August 9, 1964. A Baird's sandpiper was observed May 10th and two were present during August. A least sandpiper was observed during August and 2 were sighted the first week of September.

Fifteen dunlins were observed during mid-May and the last dunlin was observed May 24, 1964. One dowitcher was sighted May 10th; 25 were observed during mid-May and six were last seen November 9th. Two hundred stilt sandpipers were present in mid-May and seven were last seen August 31, 1964.

Twenty five semipalmated sandpipers were sighted May 17th and 100 were present the following week. A western sandpiper was noted May 10 to 16th. Two buff-breasted sandpipers were noted July 26th. Fifteen Hudsonian Godwits were sighted May 10th; 110 were observed during mid-May and three were noted July 7, 1964. A sanderling was observed May 16 to 22nd. An avocet was noted August 14th and 10 were observed October 20, 1964. Three hundred Wilson's phalaropes were present in early May. The last 20 were observed September 7th. A northern phalarope was observed May 10 to 17th.

Gulls and Terns

Six herring gulls were noted March 1st. Another herring gull was present from October 13 to 19th. Twenty ring-billed gulls were noted February 27th; 500 were present from March 15 to 30th; 30 were observed from August 21 to October 20th and the last one was sighted December 26, 1964. Two hundred Franklin's gulls were

present from May 1 to 15th and the last 62 were noted May 24th.

Three Forster's terns were noted May 17th; six were present from May 24th to July 10th and 10 were noted August 31st. A least tern was noted May 18, 1964. Two Caspian tern were noted May 17 and a single was noted July 7 and August 31st. On May 8th, 440 black terns were first noted; their numbers swelled to 600 during the summer and 300 were still present September 7, 1964.

Doves

Six mourning doves were winter residents. Their numbers grew to 1,400 in late August and the last two mourning doves were sighted on December 23, 1964. Our efforts to live trap flying doves resulted in two mourning doves being trapped but only one being banded during 1964. One escaped while the bander was concentrating on age and sex references. Determination of the age and sex of the other dove was facilitated by her laying an egg in the trap.

B. Upland Game Birds

About 100 ring-necked pheasants and 50 Bob-white quail were present during the past winter. The nesting seasons were relatively poor resulting in the production of about 150 pheasants and 50 quail. Dispersal and mortality of pheasants were great so that only about 100 of the 200 pheasants estimated for August 31 were still present on December 31st.

C. Big Game Animals

White-tailed deer were commonly observed on the refuge wheat during early spring, but less conspicuous during the rest of the year. One deer of any sex could be taken by archery from October 1 to December 15th and by gun from November 13 to 19, 1964. Squaw Creek Refuge was listed as the deer check station for Holt County. Only 36% or 47 of the 130 gun kills checked at Squaw Creek were does. Eleven deer were also killed by arrows. Although total harvest has not been compiled as yet, known kills checked at other stations bring the incomplete Holt County harvest to 174 deer. There still seemed to be plenty of deer on and off the refuge after this second any deer season.

D. Fur Animals, Predators, Rodents and Other Mammals

Form NR-4 for year ending April 30, 1964 indicated an estimated 30 opossum, 200 cottontail rabbit, no woodchuck, 4 Franklin's ground squirrel, 10 gray squirrel, 400 fox squirrel, 10 pocket gopher, 4 beaver, 100 muskrat, 10 Norway rat , 6 coyote, 10 red fox, 2 gray fox, 200 raccoon, 30 mink, 2 badger and 30 striped skunk.

On December 5, 1964, we submitted the following estimate of furbearers

and recommended removal:

Species	Numbers	Recommended Removal	Refuge Share	Permittee Share
Opossum	40	Unlimited	None	100%
Beaver	10	"	"	100%
Muskrat	300	150	40%	60%
Coyote	20	Unlimited	None	100%
Red Fox	10	"	"	100%
Raccoon	200	"	"	100%
Mink	30	25	50%	50%
Skunk	40	Unlimited	None	100%

E. Hawks, Eagles, Owls, Crows and Vultures

A pair of turkey vultures were commonly seen gliding over the refuge during the summer and were last noted September 21.

A sharp-shinned hawk was noted January 28th, April 20th and December 28, 1964. A pair of Cooper's hawks were noted March 17th. Red-tail hawks were present throughout the year. Thirteen were noted in mid-March, but only two pair stayed during the summer. Twelve were observed in September but only seven could be found during the Christmas Bird Count on December 26, 1964.

Two Harlan's hawks were present from January 1 to April 12 and during December, 1964. A red-shouldered hawk was sighted December 11th. A broad-winged hawk was noted September 23rd. Ten rough-legged hawk were present January 1 to March 15, 1964 and four rough-legs were commonly observed during December, 1964.

Six adult and 15 immature bald eagles were counted during January. The peak population of 23 adults and 65 immatures occurred February 15-29, 1964 but only eight immatures remained on April 7th. Two immature eagles reappeared October 12th; 62 were present December 1-7 and 12 adult and 28 immature bald eagles were counted December 31, 1964. Some sightings of golden eagles were reported but not confirmed in 1964.

Marsh hawk are year around residents. Twenty five were counted in late March and late September and 12 were still present December 26, 1964. An osprey used the refuge during April, 1964. A peregrine falcon was observed April 29th, and September 22, 1964. A pigeon hawk was observed September 27th. Three sparrow hawk were noted on the refuge during late March and April and two were noted the last week of December, 1964.

A barn owl was noted April 17, 1964. A pair of screech owls are year around residents near headquarters and four were present September 1 - December 31, 1964. Great horned owls are permanent

residents; an estimated peak of 40 were present during the summer and 20 remained to the year's end. Four barred owls were winter residents. One pair continued to produce a brood in a hollow elm near headquarters. About 10 barred owls were present during December 1964. A long-eared owl was probably present during 1964 because one was taken by our trapper on January 11,1965. A peak of 22 short-eared owls were observed January 1 - April 12, 1964 and probably some had returned to the Cordgrass Prairie by the end of the year. A saw-whet owl was observed by U.S. Game Management Agents John Hague and Victor Blazevic on December 20, 1964.

About 1,700 crows flocked into Squaw Creek Refuge from January 1 to March 31, 1964 to take advantage of the abundant corn crope and dead waterfowl. Only about 20 crows remained during the summer. About 1,000 crows migrated through the refuge in November but "pickings" were not so good as they found the previous winter so only 100 remained to the end of the year.

F. Other Birds

Student laborer Lee Burgess made the Christmas Bird Count on December 27, 1964 and observed the following: 2200 Canada geese, 7500 snow geese, 2500 blue geese, 84,300 mallard, a green-winged teal, a common merganser, 10 red-tailed hawk, a Harlan's hawk, two rough-legged hawk, six marsh hawk, 12 bobwhite, a ring-billed gull, four great horned owl, four yellow-shafted flicker, seven red-bellied woodpecker, a yellow-bellied sapsucker, four hairy woodpecker, 11 downy woodpecker, 12 blue jay, 103 common crow, 23 black-capped chickadee, eight tufted titmouse, five white-breasted nuthatch, two golden-crowned kinglet, five cedar waxwings, two loggerhead shrike, three starling, 18 house sparrow, 1,000,000 red winged blackbirds (minanum estimated), four common grackle, 52 cardinal, 17 american goldfinch, a rufous-sided towhee, 72 slate-colored junco, 154 tree sparrow, a Harris' sparrow, four white-crowned sparrow, five white-throated sparrow, 31 swamp sparrow and 12 song sparrow totaling 1,097,139 individual birds and 41 species. Pintail, barred owl, brown creeper and eastern meadowlark were seen in the area during the counting period but not on count day.

G. Fish

Although the drought and freezeout of 1963-64 probably killed off all the rough fish in Main and West Pools, the June 1964 floods reinfested those impoundments with carp.

District Fisheries Manager Del Robinson surveyed the bluegill-bass borrow pit ponds July 21-23, 1964 and found the small north pond contaminated with young carp and bullheads but no large or game fish. The larger south pond had abundant bluegill, a few adult and numerous young of the year large-mouth bass and a few bullheads. He assumed that carp was also present since the two ponds had reportedly run together during June and therefore treated both ponds with rotenone.

Two very large channel catfish were picked up after this treatment.

On September 9, 1964 the Neosho National Fish Hatchery planted approximately 1500 bass fingerlings, 1500 bluegill fingerlings and 1000 channel catfish in these ponds. There did not appear to be excessive mortality so some sport fishing can be expected at these pits in the future.

H. Reptiles

Snapping turtles are too large and too numerous for a good waterfowl refuge. Numerous observations were made last spring of turtles attacking ducks and coot. Painted turtles were commonly observed in the streams and barrow pits. A large leatherback turtle was collected this fall.

Comparatively few Massasauga rattlesnakes were sighted this year. However two baby massasaugas were found this fall on top of the loess hills, where few snakes are expected due to the absence of rocks. Garter, ring-necked, blue racer, black snake and water snake were commonly observed.

I. Disease

1. Lead poison, etc.

An extended drought occurred during late 1963 so that waterfowl were dependant on pumped water in this locality. Numerous sick and dead ducks were noted on the refuge, resulting from lead poisoning in adjacent hunting club ponds before hunting season, crippling mortality during the hunting season and other causes. After the end of the hunting season on November 28, 1963, thousands of ducks poured into the clubs' ponds and ingested spent lead. Most of the affected ducks continued apparent normal activities until the week of December 15-21, when temperatures dropped from the 60s to 14°F. Our deep pump broke down on December 21, 1963 and this added to the waterfowl stress. Our NR-5 form for the December 31, 1963 Narrative Report noted an estimated 2,600 dead ducks had accumulated from Lead Poisoning. We made gross autopsies of 10 mallards, a green-winged teal and a wood duck. Eight mallards, the teal and the wood duck showed definite lead poisoning symptoms. An additional 150 possible leaded ducks were found in early 1964. Three mallards were fat and two of these showed no sign of lead poisoning. These fat mallards were collected adjacent to Long Slough where we noted other mallards ("spinners") with equilibrium difficulties.

2. Secondary infections

A secondary eye infection was noted in the December 22, 1963 mortality. Dr. Hugh Wallace, D.V., Mound City, Missouri examined several ducks with eye infection and cultured steptococci from the grandular material found between the second and third eyelids. About 200 live ducks were thus affected and many recovered.

3. Fowl cholera

About 8:30am on January 9, 1964, we found about 1,000 dead or dying lesser snow geese on the South Pool ice. There were no dead geese on this ice the previous day and the previous evening Mr. Boyd had observed our wintering flock of 10,000 apparently healthy snow geese come in from feeding so we were appalled by the virulence of the causing agent. We attempted to "post" one goose but found no symptoms we recognized. Dr. Wallace examined two geese and reported hemorrhaging of the entire digestic tract with mucus and pus throughout. His attempt to culture material from the still warm digestic tract failed. Dr. Wallace therefore suggested "an irritant rather than a corrosive poisoning". We began a search for the causing source.

On January 10, 1964, State Waterfowl Biologist Dick Vaught took 15 dead snow geese and 21 mallards to the University of Missouri, School of Veterninary Medicine where Dr. H.C. McDougle, D.V.M., cultured pasteurellosis fowl cholera. Dr. McDougle's diagnosis was later

confirmed by our Patuxent Research Center and Iowa State University. Iowa State also checked for twelve heavy metal poisonings including nitrates and nitrites - all negative and the University of Iowa found no insecticides nor other known toxic material indicated. We therefore believe that Pasteurella multocida was the primary cause of the snow goose dieoff and that chemical poisoning was not involved.

The mallards involved in the January autopsies were all collected from Long Slough where they continued to spin and die through January, perhaps indicating more lingering resistance to fowl cholera than that shown by the snow geese that died all in one night. Our Canada geese must also carry some immunity to fowl cholera as there were no known Canada goose deaths on the refuge caused by cholera although 7,000 large Canada geese were present during January.

However it appears that all of our wintering waterfowl and some other wintering birds must have come in contact with fowl cholera during the 1963-64 winter but no further outbreak occurred here.

On April 3, 1964 we investigated a report of dead geese in an oxbow lake in the northwest corner of Atchison County, Missouri - 43 miles northwest of the Squaw Creek Refuge. Two small Canada geese, 80 snow geese, two white-fronted geese, 17 coot and two mallards were found dead at that location. Five snow geese, a small Canada goose and a coot were autopsied by Dr. McDougle who diagnosed fowl cholera. These snow geese apparently had recovered from a previous infection and then had later developed an acute septicemic form of Pasteurellosis. The coot were "red hot" with a new infection. Four apparently healthy coot collected at the same location with a 22 rifle on April 10,1964 were also loaded with cholera. But four coot and two mallards live-trapped at Squaw Creek on April 30, 1964 were apparently not infected with cholera.

4. Control and Prevention of cholera

The refuge staff began picking up dead snow geese the day of the die-off. About 110 were saved for autopsies and 720 were buried three feet under the ground. On January 20, 1964 the refuge received Patuxant Research Center's confirmation of the fowl cholera diagnosis and was advised "to burn, not bury" carcasses. The interred geese were, therefore, dug up and burned in fuel oil with about 300 other snow geese from the same contamination collected during January. No further sign of fowl cholera was observed in the snow goose flock at Squaw Creek National Wildlife Refuge after January 9, 1964.

The refuge staff also picked up and burned waterfowl associated with the January mallard fowl cholera die-off at the Long Slough portion of the refuge and the December, 1963 lead poisoning die-off. A total of 1,169 blue-snow geese; 66 Canadian geese; 1 white-fronted goose; 5,615 mallards; 23 black ducks; 23 American widgeons; 38 green-

winged teal; 48 wood duck; 1 pintail and 1 canvas back killed by various causes were collected and burned as a sanitation measure. At least 2,500 of these ducks had been killed by lead poisoning during December, 1963 and at least 1,000 of these ducks were killed by fowl cholera during January and February, 1964.

Dispersing the waterfowl by shutting off Pump # 1 was considered during the fowl cholera die-off, but this was not done because it did not appear wise to contaminate other areas (some inaccessible) with the refuge's sick birds.

A close watch of predaceous birds was maintained for signs of secondary infections. One sharp-shinned, 5 red-tailed, 2 Harlan, 10 rough-legged, 4 marsh and 1 sparrow hawk; 88 bald eagles, 12 horned, 4 barred, 22 short- eared owls; and 1500 crows were observed. No other flesh eating birds were seen. Sanitation collectors picked up 2 dead marsh hawks. An immature bald eagle, a Harlan hawk and a red-tailed hawk were also observed disabled during the winter. Hundreds of dead redwings were also observed - but this is apparently an ordinary winter occurrence. The cause of their death and disabilities were not ascertained.

No water was pumped or diverted toward Long Slough during the latter part of 1964 so few waterfowl would use the site of the previous mallard contamination during the 1964-65 winter. A prescribed burn was also planned for Long Slough in 1965 since conditions had not permitted an earlier burn to dispose of any carcasses inadvertedly left in the rank cattail-bulrush fringes.

III. Refuge Development and Maintenance

A. Physical Development and Maintenance

Considerable refuge and regional office effort was put into surveys, discussions, conferences, planning, writing and editing the "Squaw Creek National Wildlife Refuge Master Development Plan in 1964.

It was a crash project, perhaps prematurely conceived with alternate independent, or community flood control programs and an interim silt relief program that will protect the refuge until the community direction can be gauged.

Since we believe that our flooding and silting problem can not be completely solved piecemeal, but must be part of a complete Squaw Creek valley flood program, we are understandably reluctant to completely dike out our neighbor's high waters to protect the critical refuge areas, yet this must be done eventually if the community continues to oppose a complete flood control program.

Meanwhile it is possible to divert the floods into large desilting basins, superimposed on submarginal agricultural or marsh areas, where silt can be tolerated, and even encouraged to improve the productivity of the refuge.

With these expressed limitations, we believe that the Squaw Creek Master Plan will be an excellent source of information as well as a vital guide for future operations and development.

Surveys

Regional Engineer survey parties consisting of Messrs Ebbenson, Wade, Burris and Zebkw from Minneapolis and four local laborers spent many man days from December 1963 to June 1964 obtaining basic topographic and cadastral survey data for master planning. Messrs Bailey and Stevenson, Regional Office engineering planners and Harry Stiles, Assistant Supervisor, Refuge Branch, spent March 16-19, 1964 considering master planning ideas on the grounds. Edgar W. Trecker Recreation specialist, Refuge Branch spent May 11th here going over recreational planning and Jim Shaw made an acquisition survey of adjacent areas May 20-23, 1964. The Refuge Manager was assigned to the regional office June 7-11th to study and edit the first draft of the master plan.

In addition to the master planning surveys, levels were run by the refuge staff for Wood Duck Pond, Blue Wing Pond, agriculture units 1 and 2 drainage and the A-3 Desilting Basin.

Earthmoving

The brush covered - accumulated spoils along Squaw Creek in Agriculture unit 19 was cleared and bulldozed into agricultural levees in

January. The South Pool outlet ditch was dragline - cleaned and its spoils spread into an agricultural levee in February and March. However backwaters resilted this quarter mile ditch during the summer, plugging A-19 outlets so the ditch was recleaned December 1964. A dike and drain was built by dragline across the south end of A-19 in November so that the flood-damaged weed- infested corn fields could be reflooded for waterfowl and drained for future cultivation. The drain was extended through a flapgated 12" C.M.P. into Squaw Creek for a more efficient outlet.

About 1.5 miles of Davis Creek were draglined clean during the year. Its spoils were spread and adjacent fields were levelled and drained prior to farming operations.

A series of small ponds were built where the Davis Creek's east levee paralled marshes and other non-agricultural areas. "Wood Duck Pond" consists of about seven acres adjacent to the CCC plantation; "Blue Wing Pond" comprises five acres of cattails and lies near the Ted Davis, Sr. boundary. "Little Blue Heron Pond" will consist of about 10 acres and lie near the Henry Munkres boundary when finished. These ponds will replace some of the intermittent wet areas previously drained for cultivation.

Davis Creek spillways were cleaned many times with bulldozers during the floods. Their ditches were cleaned out by the dragline at a time when replacement mats had to be floated in. The small management levee was repaired and widened while the dragline was in that area.

The south levee of the large desilting basin, proposed by the Master Plan to protect the East Bay, was started in December.

Possibly our most successful attempt to make fortune out of misfortune was the diversion of Squaw Creek into the flood-damaged, foxtail infested A-16. Tens of thousands of waterfowl flocked into this unit for several months.

The Squaw Creek-Northwest Pool inlet ditch was successfully shortcut to a lower pool contour and adequate water was obtained from the creek for all three west pools.

About 50 man days were spent maintaining heavy dirt moving equipment. The Link-Belt dragline was completely overhauled and other equipment was repaired as needed. All of Squaw Creek's dirt moving equipment, except the cable scraper, is old and badly worn and in need of replacement or progressively more expensive repairs.

We logged sufficient cottonwood timber to supply our dragline mat needs, spending 18 man days to log and build the mats.

Due to repeated floods and other contingencies, about 30 man days were spent cleaning Squaw Creek Dam, Davis Creek Bridge and otherwise maintaining water facilities. The maintenance of deep well pumps in January and February and for a short time during the 1964 autumn, in addition to direct marsh management, took about 30 man days.

About 50 man days were spent blading roads, mowing shoulders and otherwise maintaining refuge roads in 1964. Heavy rains and heavy traffic have deteriorated the gravel roads so that they need a new supply of crushed rock. A survey trail was extended into the "Cordgrass Prairie.

A service airstrip was superimposed on the goose grazing strip in A-5. It was used many times this autumn by the State's and the Bureau's aircraft.

In checking our boundaries, regional engineers found the Ted Davis north fence trespassing about 20 feet inside the refuge. We notified Mr. Davis and requested the removal of two goose blinds. In October we built a new boundary fence on the true property line. The error originated because the refuge built their boundary north of a boundary ditch and didn't move it back when the ditch filled. There are several other such boundaries that need checking and correcting. Several days were spent maintaining boundary fences and signs just prior to the waterfowl hunting season.

About 100 man days were spent keeping the refuge buildings and yards intact. The office remodelling was completed, the interior repainted and the makeshift desks upgraded with metal office desks obtained from Defense Department surplus. Bids were taken for roofing utility buildings, but the specifications were changed so new bids will be invited for 1965 job completion.

About 30 man days were used for preventative maintenance and safety checks, repairs and other maintenance needed to keep the six vehicles moving. The clutch was replaced on the Lark Studebaker and the pinion gears were replaced on the 1957 Chevrolet Pickup.

Surplus property bulletins have been scanned carefully for vehicles that might upgrade our 1956 Ford Courier and 1957 Chevrolet Pickup. We were finally able to replace the 1948 Diamond T stake dump truck with a new Dodge combination truck.

B. Planting

4. Cultivated Crops

The old Economic Use Plan was revised into a new Land Use Plan and thus eliminated 9 amendments. Basically the plan sets cooperative farmer - refuge shares at 60%-40% and schedules the refuge takeover of former cooperatively-farmed areas, when and where needed to meet

refuge wildlife management objectives.

After waterfowl fed out standing corn, 640 acres of stalks were shredded and returned to the soil. Maximum requirements of lime was spread on 24 acres of cropland. Much of this lime was probably lost due to flooding. Future limestone will be spread at minimum requirements to increase efficiency and coverage.

About half a mile of West Pool - old Squaw Creek berm spoils was leveled in north A-17 field and about 5 acres was cleared and leveled for wheat in the southwest portion of south A-17. About 1 mile of Squaw Creek spoils was graded into an agricultural levee in A-14 for a wheat strip. A recent-logged area adjacent to A-13 was also prepared for wheat during 1964.

Out of a possible 930 acres of row crops only 635 acres of corn and 83 acres of soybeans materialized in 1964. The reduced corn acreage was due to floods, wet grounds, withdrawal of low marginal areas and some permittee neglect.

Hail also stripped corn in A-17 and mid-summer drought retarded other corn. Yields were poor - averaging only 37.5 bushels an acre for corn and 18.8 bushels an acre for soybeans.

Refuge operations salvaged 38 acres of corn, supplemented with 92 acres of domestic millet. Mid-summer drought retarded germination until September when webworm finished off the proso crop. The refuge German millet was poor but our late Japanese millet yielded well in A-19.

The 70 acres of Japanese millet planted by Cooperative Farmer Rex Field on flood-damaged corn land also failed due to the mid-summer drought.

With the exception of hail-damaged A-16, the 74 acres of seed wheat looked good until the prolonged June-July floods prevented much of the harvest. No seed rye was harvested due to wet ground.

Cooperative Farmer Eugene Maley's 8 acres of oats in A-2-4 yielded 220 bushels while his 8 acres of oats in A-2-10 were so weedy with scatter cane etc. that it was made into hay.

Fall and winter browse consisted of about 355 acres of wheat, 5 acres of rye, 51 acres of Reed canary grass, 2 acres of redtop grass and 5 acres of brome grass. About 10 acres of rotary-mowed cordgrass was also available but little used.

C. Collections and Receipts

About 10 bushels of German Millet, four bushels of Japanese Millet and 30 bushels of White Proso Millet were purchased for seed in 1964. About 425 bushels of wheat seed were obtained from Desoto National Wildlife Refuge after we were unable to harvest our seed crop due to prolonged wet grounds.

About 200 bushels of shelled corn were transferred in September to Swan Lake National Wildlife Refuge for goose netting bait. About 250 bushels of shelled corn were hauled from Desoto National Wildlife Refuge on December 9, 1964 for winter waterfowl cannon netting.

D. Control of Vegetation

About 40 acres of willows, Salix sp, on old Squaw Creek spillway ditch delta were rotary-mowed and power sprayed with 2,4-D and 2,4,5-T, mixed one pound each active ingredient with 3.75 gallons diesel fuel oil per acre on March 1 and 5, 1964. Results were inconclusive since a hot wild fire burned through this area on March 14th and consumed all vegetation to the ground. This area was disced twice during the summer and planted to wheat browse during August. About 10% of the willows sprouted but this did not stop the geese from grazing the wheat into the ground.

Thirty eight acres of dikes and levees were power sprayed with 2,4-D and 2,4,5-T mixed 0.3 to 0.6 pounds active ingredient each with 20 gallons of water per acre from June 17 to July 8, 1964. Apparently 100% of the growing vegetation, except cottonwood, Populus deltoides, were killed. Cottonwoods were retarded only about 25% and should be chopped out. This brush and broadleaf vegetation removal permitted growth of desired grasses on the slopes. By September a second growth of broadleaf weeds, including smartweeds Polygonum spp. was apparent but due to other priorities this growth was not resprayed. Costs were $2 per acre.

About 20 acres of soybeans were sprayed with 4 pounds active ingredient Amiben by Cooperative Farmer Charles Scarbrough on June 3, 1964 to reduce foxtail growth. Rain occurred the following day but all grasses were apparently killed. The soybeans were rotary hoed once and cultivated twice and some cocklebur and sunflowers were cut out in lat summer. The farmer carried all costs as part of his operating expenses.

A two acre Southwest Bell Telephone right-of-way infested with Johnson grass (Sorgum Halepense) (where encouraged by the utility's broadleaf herbicidal program) was treated twice with Dalpon sprayed 6 pounds active ingredient with 12 gallons of water each time. The control program was started late due to lack of respone by the utility and wet weather and only 50% control was obtained at a cost of $34 per acre, borne intirely by the refuge.

E. Planned Burning

We undertook no prescribed burn in 1964, although need for such management was apparent and an approved Control Burning Plan called for such activity. Our inactivity in this field stemmed from the difficulty in building adequate firebreaks through the explosive cordgrass area, public aversion to large grass fires and an opportunity to take advantage of a wild fire in the northwest portion of the refuge. Prescribed burns were practiced in October, 1963 and again in January 1965. The current Burning Plan will be revised to enlarge and speed up prescribed burning activities to increase feeding and loafing spaces for waterfowl and to maintain desired vegetation in selected areas.

F. Fires

Fire conditions were hazardous during the first quarter, midsummer and autumn of 1964. On March 14 a roadside fire pushed into the refuge on a northwest wind, swept over a railroad, a levee road and four firefighters into Habitat Unit 1 and consumed most vegetation in its path. This fire was so hot that it crowned over a secondary firebreak set up on a 30 foot wide wheat strip and even burned the wheat. It was contained when it encountered a wide expanse of wheat and Northwest Pool. Except for about $122 spent in attempting to control this fire little damage was done. We had already started clearing the higher portions of this impoundment for wheat farming and the fire facilitated this operation. Perhaps some potential waterfowl food was destroyed by the fire but considerable more food was exposed to waterfowl by the fire's activities.

On October 24, 1964 a fire swept into the Bluff Pool area on a south wind from the Forgraves area. It did little harm except cost the refuge about $30 and the rural fire department about $44 to protect adjacent cornfields. Waterfowl, especially geese made greater use of the pool and burn due to the fire opening up a loafing area.

G. Insecticides

On May 19, 1964 Cooperative Farmer Charles Scarbrough treated 40 acres of corn land with 0.7 pounds active ingredient Diazinon to control western rootworm, cutworms and seed corn magots. It was not a bad rootworm year and there was no apparent difference in insect infestation in the treated than in his adjacent untreated corn land. Corn borers were present in both areas. No adverse effects were noted to wildlife.

IV. Resource Management

A. Grazing

Experimental grazing as a waterfowl management tool has been approved but not initiated yet.

B. Haying

In addition to hay harvested as part of regular cooperative farming program about 75 tons of Reed Canary grass and redtop was sold from goose growsing areas for $152.60. An additional 19 tons of cordgrass was sold for bedding for $9.50.

C. Fur Harvest

Due to the illness and death of Permit Trapper Mr. Clyde Stroud and the few available muskrats, we did not attempt to harvest any furs during the 1963-64 trapping season. We did attempt to trap a nuisance beaver during March, but only succeeded in taking two beaver feet, two muskrat and one mink. The muskrat and mink was turned over to Missouri Conservation Commission since the trapping season on those furbearers was closed.

Muskrat numbers were still low in the fall of 1964, but two trappers applied and received trapping permits. Lloyd Whitham, Craig, Missouri trapped 4 muskrats, a female mink, 2 opossum and a beaver from December 16 to 22 and thereafter maintained only a set for beaver until he terminated his permit on December 28, 1964. John Boyd, Fortescue, Missouri harvested 12 muskrat, 4 mink, 9 raccoon, 13 opossum and 5 striped skunk from December 18 to 31, 1964. He continued to trap into January 1965.

V. FIELD INVESTIGATION OR APPLIED RESEARCH

A. Progress Report

1. Vegetation Surveys. Not active in 1964.

2. Wood Duck Study.

Five male and nine female wood ducks were trapped and banded from December 30, 1963 to January 6, 1964 when an estimated 500 wood ducks were using the refuge.

Only one class II brood of wood ducks were observed during the cooperative Missouri Waterfowl Nesting Survey when nine lone drake wood ducks were observed. A total of two wood duck, two mallard, a pintail, and a blue-winged teal broods were observed during 1964.

Wood ducks were uncommon through the summer until the week of October 6-12 when 500 were observed. No additional wood ducks were trapped although several traps were operated for teal and wood ducks during the late summer.

3. Teal Banding.

Flyway Councils recommendations had been made for a special early teal season in 1965. The Missouri Conservation Commission was asked to band several thousand teal before the 1964 hunting season for background information to evaluate future teal hunting. Waterfowl Biologist Richard Vaught requested that Squaw Creek accept a quota of 1,000 preseason banded teal. Our banding efforts resulted in the banding of 1,265 blue-winged teal and 124 green-winged teal. Composition are shown in the following table.

Table 5. Teal Banded September-October, 1964.

Species	Adult		Immature		Unknown	Total
	M	F	M	F		
Blue-winged teal	23	101	466	545	130	1,265
Green-winged teal	5	17	38	62	2	124
Total	28	118	504	607	132	1,389

4. Cooperative Goose Study.

A preliminary outline of a cooperative study with the Missouri Conservation Commission for determining the composition, status and relationships of various races and flocks of Canada, lesser snow and white-fronted geese using Squaw Creek N. W. R. and vicinity was submitted to

the Regional Office on October 19, 1964. A revised draft was submitted December 17, 1964.

All pertinent literature available in Squaw Creek Refuge library was reviewed. Other critically needed references were requested. Weekly aerial surveys of all geese were conducted by state observers from September through December. Aerial counts were supplemented with refuge ground surveys to determine composition.

Preseason Banding.

We were unable to net our preseason quota of 500 large Canadas, 100 small Canadas, 1,000 lesser snow and 50 white-fronted geese. The following geese were taken by cannon net prior to October 30, 1964.

Table 6. Composition of pre-season netted geese.

Species	Adult		Immature		Total
	M	F	M	F	
Large Canada	19	19	27	30	95
Small Canada	1	1	1	2	5
Snow Goose	112	108	61	89	370
Blue Goose	38	29	23	16	106
Totals	170	157	112	137	576

Harvest Surveys.

Two-man highway waterfowl check stations were operated from 8 am. to 7 pm. daily on four exit roads from the refuge vicinity to record numbers of picked and unpicked waterfowl carried out of the area daily.

The minimum unpicked waterfowl harvest was obtained from the ratio of picked waterfowl at check stations to registered picked waterfowl at processing plants compared to the ratio of unpicked waterfowl to x. The total harvest then was the unpicked waterfowl harvest plus the registered picked harvest plus the local unsurveyed harvest (25% of total harvest). The total kill was calculated as the total harvest plus 20% crippling loss.

Time and number studies and experience indicated that significant data could be obtained by reducing our highway check stations to the two most used by hunters, each operated by one checker from 8 am to 4 pm and two checkers during the 4 to 7 pm hazardous evening rush.

In addition to the refuge staff, Bureau personnel from River Basins and Federal Aid and Missouri personnel helped operate the check stations

during the Canada goose season. Bureau Biologist Dr. William Green and Missouri Biologist Dick Vaught helped coordinate the study and survey, while U. S. Game Management Agents Wayne Sanders and John Hague and Missouri Conservation Agents Paul Johnson, Jan Clifton and Glenn McCloud helped check processing plants and enforced hunters' compliance with restrictive Squaw Creek Area regulations.

From the information obtained in the harvest surveys, we estimated the following waterfowl hunting kill in the vicinity of Squaw Creek Refuge.

Table 7. Waterfowl Kill, Squaw Creek vicinity, 10/30 - 12/8/64

Species	Harvest	20% Crippling Loss	Total Kill
Canada goose	1,839	460	2,299
Snow goose	5,515	1,379	6,894
White-front	101	25	126
Subtotal geese	7,455	1,864	9,319
Ducks	14,516	3,629	18,145
Total Waterfowl	21,971	5,493	27,464

VI. Public Relations

A. Recreational Use

The public used the Squaw Creek National Wildlife Refuge about 10,500 days in 1964. No hunting is permitted on the refuge. Fishing accounted for only 1,000 visitor days, while other recreation users accounted for 7,700 days. Cooperative farmers and other economic users accounted for 1,300 days. Due to Master Planning and the Goose Management Study, Official visitors use increased from 282 in 1963 to about 500 in 1964.

B. Refuge Visitors

Those refuge visitors having official or cooperative activities with the refuge are listed on page 25. Each visit is not listed for such regular cooperators as U. S. Game Management Agent John Hague; Missouri Conservation Agents Paul Johnson, Jan Clifton and Glen McCloud. Missouri Waterfowl Biologist Dick Vaught spent numerous assignments at Squaw Creek on Waterfowl mortality studies, aerial waterfowl censuses and goose management studies. Bureau Surveyors Erling Ebbeson and Gene Wade and crews spent months on the refuge obtaining basic information for master planning.

Visitors

1/4	James VanTress, Oregon, Mo., Conservation Agent
1/4	John Hague, St. Joseph, Mo. U.S.G.M.A.
1/7-	Erling Ebbeson, U.S.F.W.S. Engineer, Minneapolis, Minn.
1/7-	Gene Wade, U.S.F.W.S. Engineer, Minneapolis, Minn.
1/7-20	Bob Burris, U.S.F.W.S. Engineer, Minneapolis, Minn.
1/9	Fred Veach, M.C.C. Area Mgr. Swan Lake Refuge Dick Vaught, M.C.C. Waterfowl Biologist, Columbia, Mo.
1/9	Robert Timmerman, U.S.F.W.S. Refuge Manager, Swan Lake Refuge
1/11	Paul Johnson, Dist. Supervisor, M.C.C., St. Joseph, Mo.
1/11-12	Glen McCloud, Atchison Co. Agent, M.C.C., Rock Port, Mo.
1/11	Jan Clifton, Gentry Co. Agent, M.C.C., Albany, Mo.
1/14	Dick Vaught, M.C.C. Waterfowl Biologist, Columbia, Mo. - Census
1/14	Allen Hoefelman, M.C.C. Pilot. Columbia, Mo. - Census
1/20	George Parr, Ducks Unlimited, Mound City, Mo. - Corn & water acres
1/28	Bob Smith, M.C.C. Trapper, Boliver, Mo. - Trapping school
1/28	Ed Meek, Atchison Co. Extension Agent, Rock Port, Mo.
1/28	Garth Sharp, Holt County A.S.C. Office Mgr., Mound City, Mo.
1/28	Frank Sampson, M.C.C. Furbearer Biologist, Columbia, Mo. - Pelts
1/28	Bob Sheppard, U.S.G.S. Bethany, Mo. - Springs
1/30	Byran Childers, Presiding Judge, Mound City, Mo. - N.W. Mo. Court meeting
2/1	Elroy Lumb, U.S.F.W.S. Washington, D.C.
2/6	Bob Sheppard, U.S.G.S. Bethany, Mo. - Springs
2/12	Leo Emetts, U.S.G.S. Rolla, Mo. - Ground water survey
2/14	Bill Earnest, Nebr. Cons. Officer, Valley, Nebr.
2/14	Raymond Frandsen, Nebr. Cons. Officer, Falls City, Nebr.

2/21	Loren J. Bonde, U.S.G.M.A. Lincoln, Nebr.
2/25-26	Kermit Wilhelm, U.S.F.W.S. Engineer, Minneapolis, Minn.
3/4	Don Tennant, U.S.F.W.S., R.B.S. Grand Island, Nebr.
3/5	Mrs. VanHozer & 5 cub scouts, Oregon, Mo. - Hike to Lookout
3/12	Bill Harper, Dist. Scout Executive, Maryville, Mo.
3/15	Mj. Iven Wahlberg, Boden, Sweden & 30 members of Kansas City Burroughs and St. Joseph Audubon Society.
3/15&19	State Representative Tom Caton, Mound City, Mo. - Snow Geese depredation
3/17-19	Harry Stiles, U.S.F.W.S., Minneapolis, Minn. - Master Planning
3/17-19	Edwin Stevenson, U.S.F.W.S. Engr. Minneapolis, Minn. - Master Planning
3/17-19	Jack Bailey, U.S.F.W.S. Engr. Minneapolis, Minn. - Master Planning
3/21	Arthur C. Storz, Mike Monico & Lee Hudleson, Omaha, Nebr.
3/21	Ken Armstrong, M.C.C. Agent for Nodaway Co., Maryville, Mo.
3/21	Roy Tomilson, M.C.C. Agent for Buchannin Co., St. Joseph, Mo.
4/1	David Gilbert, Sand Lake Refuge, Columbia, S.D. - Deliver Fire unit.
4/14	Tom Davis, M.C.C. Field Service Agent, Cameron, Mo. - Survey Squaw Creek Watershed
4/15	Dave Umberger, Regional Chief Engineer, Minneapolis, Minn. Attend public meeting on drainage at Forest City, Mo.
4/15	Mr. & Mrs. Roy Coy, St. Joseph Museum - Visitor Center
4/15	Harry Stiles, U.S.F.W.S. Minneapolis, Minn. - Attend public meeting on drainage at Forest City, Mo.
5/3	Robert Timmerman & Family, Swan Lake Refuge - Visit
5/4	Larry Campbell, M.C.C., Jefferson City, Mo.
5/5	Robert VanHoser, Holt County Extension Agent, Oregon, Mo.
5/7	Gerald F. Greco & Hilbert E. Snoddy, K.C. Corps of Engr.
5/11-12	Bert R. Laugen, U.S.F.W.S. Minneapolis, Minn.
5/11	Edgar W. Trecker, U.S.F.W.S. Minneapolis, Minn. - Recreation

5/13-29	Mike Zobkw, U.S.F.W.S. Engr. Minneapolis, Minn. - Survey
5/13-29	Gene Wade, U.S.F.W.S. Engr. Minneapolis, Minn. - Survey
5/16	Maryville Garden Club toured Refuge
5/16	Scoutmaster Wilmis & 20 scouts of Troop 142, Maryville, Mo.
5/18	Ira Chandler, B.S.A. Maryville, Mo. - Scouting
5/19-29	Erling Ebbenson, U.S.F.W.S. Engr. Minneapolis, Minn. - Survey
5/20	Mrs Joe Donick, State Pres. of Mo. Garden Clubs - Browsing
5/20-23	Jim Shaw, U.S.F.W.S. Realty, Minneapolis, Minn. - Acquisition Survey
6/14-16	Clair Rollings, U.S.F.W.S. Minneapolis, Minn. - Soil & Moisture
6/19	Paul Douglas, Mo. Highway Comm., Jefferson City, Mo. - Survey
7/4	Eight members 7th Day Adventist Church, St. Joseph, Mo. - Tour
7/7	Twenty five students of N.W. Missouri State College - Tour
7/5	Mr. & Mrs. Red Brailey, Shenandoah, Iowa - Birding
7/5	Senorita Leidacie Brahama, Costa Rica - Birding
7/21-23	Del Robinson & Denny Christhopherson, U.S.F.W.S. Valentine, Nebraska - Fisheries Studies
7/30	Kenneth Formanek, Wabonsi State Park Manager, Hamburg, Ia.
7/28-9/14	Guy Burgess (Harold's 84 year old fishing father) Deckerville, Michigan - Visit and Fishing
8/25	Doc Howing & Wife, Swan Lake Refuge - Hauling wheat from Desoto
8/25	George Brakhage, M.C.C. Biologist, Trimble Game Mgmt. Area - Tour
9/1-5-6	Lee Burgess, Jr., South Easton, Mass. - Job interview
9/3	Nate Austin, Proffessor, Tarkio College - Nature Study
9/3	Jim Christian, Instructor, Tarkio College - Orientation
9/5-6	Peter Peterson, Jr., Davenport, Ia. and L. N. Ingram, Apple River, Ill. - Mist netting and tour
9/13	Sr. Macias, Tarkio College and Cuba - Tour

9/12-13	Fred C. Burgess (Harold's brother) Warren, Michigan - Visit
9/16	Don Scarbrough, John Laukemper, James Crawford and Ray Todd, Mound City, Mo. - Drainage problems
9/16	Dick Rotsch, M.C.C. Administrative Assistant, Kamsas City, Mo.
9/16-18	Biologists Dick Vaught, Bill Crawford & George Brakhage, M.C.C. Goose conference
9/16-18	Harry Stiles, U.S.F.W.S. Minneapolis, Minn. - Goose conference and Quarters Survey
9/17-18	Dr. Green, U.S.F.W.S. Winona, Minnesota - Goose conference
9/17-18	Herb Dill, U.S.F.W.S. Minneapolis, Minn. - Goose Conference
9/17-18	H. Milt Reeves, U.S.F.W.S. Minneapolis, Minn. - Goose conference
9/17	Jim Shipley, Iowa Cons. Comm. Warden, Freemont Co. - Visit
9/21	James A. Christian, w/12 members of Biology class, Tarkio College
9/23	Judge John Bowes, Oregon, Mo. - Toured Refuge
9/23	Larry Smidth, U.S.P.H. Kansas City, Mo. - Inspect disposal systems
9/23	Hollis D. Crawford, M.C.C. Educational Advisor, St. Joseph, Mo.
10/1	Kenneth Formanek, Waubonsi State Park Manager, Hamburg, Ia. - Birding
10/6	Mr. & Mrs. Diggs, Hamburg, Ia. - Birding
10/6	Walter Gonce, Bales Estate Trust Official, Kansas City, Mo.
10/15	Art Storz & Lee Huddleson, Omaha, Nebr. - See Ducks
10/15	Hollis Crawford, M.C.C. Educational Advisor, St. Joseph, Mo.
10/17	Wayne Sanders & John Hague, U.S.G.M.A., Mo. - Hunting meeting
10/17	Dick Vaught & George Brakhage, M.C.C. Biologists - Hunting meeting
10/23	Lee Redman & J.R. Whitley, M.C.C. Fisheries, Columbia, Mo.
10/24	Dick Anderson, Editor of Bluebird, St. Louis, Mo. - Birding
10/28-11/16	A.T. Klett, U.S.F.W.S., A.A.O. Devils Lake, N.D. - Waterfowl Check Station
10/28-11/16	Howard Lipke, U.S.F.W.S., A.A.O. Huron, S.D. - Waterfowl Check Station

10/28-11/6 Dr. William Green, U.S.F.W.S. Winona, Minn. - Waterfowl Check Station

10/28 Don Reynolds, Museum, St. Joseph, Mo.

10/28 Worth Randall, Audubon Society, Cincinnati, Ohio

10/29-11/16 John T. Lokemoen, U.S.F.W.S. Golden Valley, Minn. - Waterfowl Check Station

10/31 James A. Christian w/12 members of Biology Class, Tarkio College

11/4-5 Dave Olson, Agassiz N.W.R. Minn. and Jim Tisdale, Crosscreeks N.W.R. Tenn. (From Swan Lake N.W.R on exchange assignment with Klett and Lokemoen)

11/5 William E. Ackerknecht, U.S.F.W.S. Washington, D. C.

11/7-9 H. Milt Reeves, M&E, U.S.F.W.S. Minneapolis, Minn. - Waterfowl Harvest

11/11 Jerry Schotzko, LaCreek N.W.R. Martin, S.D.

11/12-16 Dean Murphy, M.C.C. Deer Biologist, Columbia, Mo. - Deer Check Station

11/16-30 Ralph Page, F.A., U.S.F.W.S. Minneapolis, Minn. - Waterfowl Check Station

11/18 Chuck Griffith, U.S.F.W.S. Minneapolis, Minn.

11/17-18 Robert L. Dunkenson, M.C.C. Jefferson City, Mo.

11/19-21 Dr. Green and John Winship, U.S.F.W.S. - Waterfowl harvest

11/23-24 Mike Milonski, M.C.C. Jefferson City, Mo. - Snow goose story

11/23-24 Jim Keffe, M.C.C. Jefferson City, Mo. - Snow goose story

11/24 Fred Veach, M.C.C. - Snow goose story

11/24 Don Wooldridge, Photographer, M.C.C. - Snow goose story

11/24 Dave Henderson, U. of Mo. Columbia - Snow goose story

11/26-28 Mr. & Mrs. Henry Burgess (Harolds Brother) Capac, Mich.

11/26-28 Mr. & Mrs. William H. Burgess (Nephew) St. Clair Shores, Mich.

11/29-12/9 Victor Blazevic, U.S.G.M.A. Devils Lake, N.D. - Enforcement

11/29-12/4 Dr. Harold Hanson, Illinois Natural History Survey, Urbana, Ill. Canada goose Classification

11/30 Biologist George Brakhage and M.C.C. Agent Paul Ticknor Canada goose classification

12/9-11 Dr. William Green, U.S.F.W.S. Winona, Minn. - Waterfowl harvest

12/16 Fred Veach and Dick Vaught, M.C.C. - Waterfowl harvest

12/18 Leo Emmett, U.S.G.S. Ground water Branch, Rolla, Mo.

12/21 Presiding Judge Byran Childers, Holt County Court, Presentation of revenue sharing check.

C. Refuge Participation

By Harold H. Burgess

1/28 Showed refuge slides to Bellevue Community Club
2/2-7 At Minneapolis, Minn. attending regional conference
2/10 Showed refuge slides at Starview 4-H Club, Craig, Missouri
2/11 Conferred with Robert Brown and Si Rositzki, St. Joseph Mo. Audubon Club regarding Brown's complaint to Sec. Briggs and public use of refuge.
2/13 Showed exhibits and discussed refuge revenue sharing and other influences of Squaw Creek Refuge at Northwest Missouri District meeting of County Court Judges.
2/15&22 Compiled data for Canadian Wildlife Service Dr. F.G. Gooch's mongraph on lesser snow geese.
2/19 Accompanied by Wm. Hamilton showed slides to 60 at Methodist Father ans Son Banquet, Tarkio, Mo.
2/26 Prepared "Winter Notes" for Bluebird, Missouri Audubon Society publication.
3/1 Discussed refuge operations and conducted 50 members and friends of Tarkio 4-H Club on tour of refuge.
3/2 With Dave Trauger revised "Blue-winged Teal Nesting Success as Related to Land Use" for Journal of Wildlife Management
3/5 Discuss objectives of refuge with 6 Oregon cub scouts.
3/5 Showed refuge slides to 50 members of Holt Co. Democrats Club at Oregon, Mo. (The Republicans havn't requested equal time yet).
3/15 Conducted Major Iven Wahlberg, Boden, Sweden and 30 members of Kansas City Burrough's Club and St. Joseph Audubon Society on tour of refuge.
3/25 Helped Missouri Conservation Commission Biologist Milonski and Agent McCloud examine potential State Game Management Area in extreme morthwest Holt County, Missouri.
3/27 Conducted nine Girl Scouts, Troop 280, Savannah, Mo. on tour of refuge.
4/3,8,10 Helped United States Game Management Agent John Hague and Missouri Agent Glen McCloud investigated waterfowl die-off in extreme northwest Atchison County, Missouri.
4/9 Conferred with District Highway Engineer Fletcher, St. Joseph, Missouri regarding Interstate 29 and direction and warning signs on Highways 118 and T.

4/13 Showed refuge slides to 15 members of Summit 4-H Club, Craig, Mo.
4/14 Accompanied Tom Davis, M.C.C. Field Service Agent on survey of Squaw Creek Watershed.
4/15 With Dave Umberger and Harry Stiles, Minneapolis, Minn. attended public hearing on drainage at Forest City, Missouri.
4/24 Conducted tour for 20 members of Summit 4-H Club of Craig, Mo.
4/26 Hosted 30 members of Oregon Saddle Club for trail ride and picnic.
5/1 With M.C.C. Biologist Brakhage to Swope Park Zoo, Kansas City, Mo. with donated bald eagle incapable of flight.
5/1-2 Attended Missouri Chapter, Wildlife Society Meeting at Knob Noster State Park; toured prairie chicken dancing grounds near Sedalia and deer study area near Knob Noster, Missouri.
5/2 Conferred with Missouri Conservation Commission Biologists C. Ted Shanks, G. Brakhage and Area Manager Blanchard on goose management at Trimble Wildlife Area on return route to official station.
5/12 Attended Interstate 29 Public Meeting at Craig, Missouri.
6/7-11 At Minneapolis, Minnesota Regional Office on Master Planning assignment.
6/16 With Clair Rollings and Dave Umberger, Minneapolis, Minnesota conferred with Corps of Engineers Planner Sid Davis and representative of Drainage Districts 1,4 and 5 at Oregon, Missouri.
6/17 Conferred with BSFW Biologists Dill and Green; Refuge Manager Timmerman and M.C.C. Game Managers Shank, Vaught, Duncanson, German and Agent White at Swan Lake National Wildlife Refuge and Game Management Area regarding Canada goose management in Missouri. Conferred with Herb Dill and Dr. Green re Squaw Creek biological problems at Chillicothe overnight.
6/29 Assisted with Canada goose roundup at Trimble Game Management Area and discussed Squaw Creek management with M.C.C. Biologists Crawford, Vaught and Brakhage.
6/30 With Wm. Hamilton provided evening program including "Land of The Prairie Duck" film for 150 members and friends at Holt County 4-H Club Annual Field Day at Big Lake State Park.
7/4 Showed refuge slides, discussed purpose of refuge and conducted 8 member of 7th Day Adventist Church Camp on tour of refuge (by prior request)
7/7 Discussed objectives and conducted 25 members of N.W. Missouri State College Botany and Entomology classes on tour of refuge.
7/7 Conducted Mrs. Neil and 2 Boy Scouts, Maitland, Mo. on conservation merit badge tour of refuge.
7/12-13 On annual leave toured Louisa-Keithburg N.W.R. portions of Mark Twain National Wildlife Refuge at Wapello, Iowa and vicinity.
7/14-17 On annual leave. Prepared self-guiding nature trail for Michigan Baptist Assembly, Grass Lake, Michigan in cooperation with Michigan Conservation Department, Waterloo Recreation Area.
7/26-28 On annual leave. Visited Prairie du Chien District Upper Mississippi Refuge.
7/29-30 On annual leave. Toured Union Slough N.W.R., Titonka, Iowa.
8/2-6 With Bob Timmerman, Swan Lake N.W.R. attended Mississippi Flyway Technical Committees and Council meetings. Conferred with

Bureau's Messrs. Dill, Green, Timmerman, F. Davis and Dr. Gies and M.C.C.'s Messrs. Shank, Brakhage and Vaught regarding Squaw Creek's Goose Management during meeting.
8/6 Conferred with Jim Shaw, BSF&W Realty, at Fountain Grove regarding Squaw Creek acquisition surveys.
8/16 Prepared summer notes for Bluebird.
8/25 Conferred with Biologist Dick Vaught at Columbia, Missouri re Canada goose background information for Commission hearing.
8/26 Attended Missouri Conservation Commission hearing on proposed waterfowl regulations. Inspected waterfowl holding pens at Green Wildlife Experiment Area.
8/27 Conferred with Biologist Vaught regarding fowl cholera studies.
9/9 Described importance of refuge to Mound City Kiwanis.
9/16 Joined Mound City Kiwanis - "to attend meetings when possible".
9/16-18 Conferred with Missouri Biologists Crawford, Vaught and Brakhage and Bureau's Stiles, Dill Reeves and Dr. Green regarding goose management at Squaw Creek on 9/17 and at Ranchhouse Motel, St. Joseph on 9/18.
9/18 Attended Roy Coy's premier showing of "Missouri - Northwest" (Squaw Creek) on St. Joseph Audubon Screen tour in evening.
9/22 Discussed objectives of refuge and conducted 13 members of Tarkio College Biology and Ecology classes on tour of refuge.
9/26 Conferred with Landowners Laukemper, Todd and Gabbert; Highway Maintenance Supervisor Simmons and two representatives of CB&Q RR re flood relief on Porter Creek.
9/29 With Missouri Conservation Agent Jan Clifton attended Tri-State Conservation Law Enforcement meeting at Forney Lake, Iowa.
10/7-8 Accompanied by Lee Burgess, to Swan Lake N.W.R., observed attempted night driving-trapping of Canada geese. Discussed goose management with refuge and game management area staffs and Herb Dill, Dr. Green and John Winship of our Bureau. Helped cannon net and band Canada geese.
10/9 Discussed objectives and conducted 51 members of Tarkio Schools Science Classes on tour of refuge.
10/14 Conducted Art Storz and Lee Huddleson on tour of duck areas.
10/17 Chairmaned Waterfowl Management public meeting at Mound City with Sanders, Hague, and Boyd of our Bureau; Vaught and Brakhage of M.C.C. and 13 outsiders attending.
10/24 Guided Editor Dick Anderson of Bluebird on tour of refuge.
10/29 Accompanied by Mrs. Burgess, Dr. Green, Tom Klett, Howard Liptke and John Lokemoen of our Bureau, attended Mound City Kiwanis annual Queens Night banquet.
11/4 Accompanied by Dave Olson, Agassiz N.W.R. and Jim Tisdale, attended weekly Kiwanis dinner.
11/11 Attended weekly Kiwanis dinner with guest speaker Howard Lipke, A.A.O., BSFW, Huron, S.D. giving us the lowdown on wet land acquisition.
11/18 Attended Kiwanis dinner with M.C.C. Biologist Bob Dunkeson as guest.
11/25 Attended Kiwanis dinner with M.C.C. Biologist Dick Vaught as guest.

12/8 Accompanied by Lee Burgess, attended Tri-State Conservation Law Enforcement meeting at Rock Port, Missouri and discussed Squaw Creek Area harvest.
12/21 Appeared as State witness in Magistrate Court, Oregon, Mo. in case Missouri vs Nolan Bros.
12/21 With Mrs. Burgess dined with 80 Graham, Missouri Lions and Ladies and gave illustrated talk on refuge.
12/28 On annual leave, toured Holla Bend N.W.R. with Manager Dennis Holland.
12/30 On annual leave, toured Lacassine N.W.R., Lake Arthur, La. with manager Jim Pulliam.
12/31 On annual leave, toured Sabine N.W.R. with Manager John Walther and Assistant Manager "Jem" Jemison.

Other Participation

Wildlife Technician Yocum continued as Cubmaster of Cub Scout Pack 71. Operator General William Hamilton continued as Scoutmaster of Boy Scout Troop 71 and Refuge Manager Harold Burgess continued as Neighborhood Commissioner. Hamilton is a member of the Lions Club, Yocum is a member of the Parent-Teachers Association and Burgess is a member of the Mound City Kiwanis. Henry Munkres has served as Secretary of the Mound City Odd Fellows for several years and Alva Bomar is a member of the Forest City Masons.

Harold Burgess and Student Laborers David Trauger and Lee P. Burgess, Jr. are all members of the Wildlife Society. Lee Burgess is also a member of the American Society of Fisheries and the American Society of Mammalogists, while Harold Burgess is also a member of The Society of American Foresters.

The refuge prepared 12 news releases for 18 outlets, including newspapers, radio and TV stations. They began the Squaw Creek Digest, a periodical news column in October.

The staff again helped Missouri Conservationist Editor Jim Keefe and Photographer Don Wooldridge gather material for their photo story on decoying snow geese ("The Rag Bag" Missouri Conservationist January 1965). Their February issue carried "Stopover at Squaw Creek".

The refuge manager was pleased to learn that "Blue-winged Teal Nesting Success as Related to Land Use" by Harold Burges, Harold Prince and David Trauger was scheduled for publication in the January 1965 issue of The Journal of Wildlife Management.

D. Hunting

No hunting is permitted on Squaw Creek Refuge, but we are concerned with waterfowl hunting that occurs withing the direct influence of the refuge. In recent years we have been concerned with the over-harvest of Canada geese and the underharvest of snow gees in this area.

In 1964 the Squaw Creek Area hunters were offered a 70 day split season on snow, blue and white-fronted geese; a 40 day season on ducks but only a 30 day season on Canada geese. The aggregate daily bag limit on geese was five, of which two could be white-fronts and one could be a Canada goose. Ducks were limited to four a day of which two could be wood duck and two could be mallard. Duck possession limits were eight of which two could be wood duck and four could be mallard.

All waterfowl seasons opened October 30th; the Canada goose season closed November 28, the duck season closed December 8 and the first portion of the mixed goose season closed December 13, 1964. The second portion of the split mixed goose season ran from December 22 through January 15, 1965.

The expected cry of anguish was heard from local entrepreneurs' when the 1964 waterfowl hunting regulations were announced in late August.. The Mound City News-Independent headlined a two column story with "Merchants, sportsmen Mourn Hunting Privilege Reduction - Customary 70 day Goose Season Cut to 30: Chamber of Commerce and Hunters Investigating Reasons". We also received the expected number of bitter telephone calls and callers. To all we gave the same story. The Squaw Creek Canada goose flock has been overharvested for years and we have a special responsibility to protect this flock since the uncommon giant Canada goose makes up a significant portion of the flock. The cries of discrimination and less complimentary remarks died down surprisingly quick. Only 13 interested persons took the trouble to attend an open meeting conducted by Bureau and Missouri Conservation Commission officials on October 17, 1964 to discuss the 1964 waterfowl hunting regulations.

We were determined to have better harvest information to defend future constructive waterfowl management proposals and programs and set up the surveys described under V. Investigations, 4. Goose Study, page 21to obtain it.

Results can be best described by quoting the summary on page 23 of the first preliminary report of that study:

"Harvest survey indicates that 2,299 Canada geese were killed by hunters in the Squaw Creek Area during 1964. Aerial surveys indicated the peak population was 6,600 Canada geese. These figures indicate the 34.5% of the peak population was killed. Hanson and Smith (1950) and others have indicated that a 20% kill is about the maximum for a growing goose flock. Therefore our kill was about 15% too high, even though the bag was restricted to one per day and the season for 30 days. The reduction of our corn yields by repeated floods to 20% of normal and the fact that successful crops were on the outer margins of the refuge may have increased the vulnerability of the Canada goose even during a restricted hunting season. It is

certain that a much higher percentage of the Canada flocks would have been killed with a two goose daily bag limit and a 70 day season. It is interesting to find that at least six types of Canada geese were using Squaw Creek Refuge making it a virtual crossroad for Canadas. We hope by studying the habits of each individual race that we can come up with some mamagement practices that will help obtain our objectives of 20,000 Canada geese."

The hunting-connected mortalities of other waterfowl from October 30 to December 8, 1964 were estimated at about 6,900 snow (blue) geese, 126 white-fronted geese and 18,145 ducks. The snow goose kill for the second split season has not been estimated at this writing.

We estimated 24,645 waterfowl hunting days for the period October 30 to December 8, 1964 by the ratio of the total ducks checked at check stations to the number of hunters checked at check stations compared to the estimated total duck harvest to X. Where X is the number of duck hunter days spent in the hunting area directly influenced by Squaw Creek Refuge. Since this formula did not include the hunters involved in hunting snow geese during the second split season, we added 355 hunter days for that purpose and thus arrived at 25,000 hunting days. The fact that this is five times the 1963 guestimates does not indicate an increase in hunting pressure, but only that we have developed a technique for measuring this use and we are measuring the pressure over a larger area. The refuge staff believes the hunting pressure was about the same in 1964 as in 1963, but considerably greater than in 1962.

We estimate an additional 500 hunters days were spent chasing squirrels, rabbits, bob-white quail, ring-necked pheasant, raccoon and other small game in the refuge vicinity. About 200 deer hunting days (bow and gun) were spent in the same area during 1964.

E. Violations

The U. S. Game Management Agents and Missouri Conservation Commission Agents did an excellent job of patrolling the Squaw Creek Area where in addition to their routine duties the burden of enforcing restrictive Canada goose hunting regulations fell squarely on their shoulders. They apprehended 24 offenders near Squaw Creek Refuge and we are sure their presence prevented may other violations.

Biological checkers at the highway check stations and processing plants were amazed at the inability of many waterfowl hunters to properly identify their take. One hunter checked in a sandhill crane as an unusual blue goose! We also noted the transportation of many mallard possession limits although it appeared that they had been taken in a single day. At times some of their "mallards" turned out to be shovelers or even green-winged teal - but the violation intent was apparent.

The following defendants were processed:

By Magistrate Judge John Bowes, Oregon, Missouri

Name and Address	Violation	(Witness)	Fine	Costs
Dr. Robt. Forsythe Shawnee Mission, Kans.	Take waterfowl before sunrise	(H. Burgess & R. Vaught)	$5.	$12.
Chas. Camden St. Joseph, Mo.	Overlimit ducks	(J. Clifton)	$10.	$12.
Lloyd D. Parr St. Joseph, Mo.	Overlimit ducks	(J. Clifton & Logue)	$10.	$12.
Warren DeGoler Kansas City, Kans.	Invalid hunting permit (Consfiscated permit)	(Wright & Drummond)	$10.	$12.
Eugene Barnhart Independance, Mo.	Take waterfowl before sunrise Hunt w/unplugged gun	(Wright & Drummond)	$5. $5.	$6. $6.
Joe Sousley Leawood, Kansas	Take waterfowl before sunrise Hunt w/unplugged gun	(Clifton & Logue)	$5. $5.	$6. $6.
Chas. Groeitz St. Joseph, Mo.	Take waterfowl before sunrise	(Clifton)	$5.	$12.
Ron. Alley Filmore, Mo.	Hunt Wf. w/unplugged gun	(Wright & Drummond)	$5.	$12.
James Hart St. Joseph, Mo.	Take Wf. before sunrise	(McCloud)	$10.	$12.
L. Schaeffer, K.C.Mo.	Attempt take Wf. before sunrise	(Clifton)	$5.	$12.
Carl Bobue Independence, Mo.	Attempt take Wf. before sunrise	(reeves)	$10.	$12.
Chas. Tiedt St. Joseph, Mo.	Poss. sandhill crane	(Burgess & Clifton)	$15.	$12.
Steve Ward, K.C.,Mo.	Attempt take Wf. from vehicle	(Clifton)	$10.	$12.
A. Reynolds,K.C.,Mo.	Hunting trespass,private land	(Ramsey)	$35.	$12.
C. Dinwiddie Columbia, Mo.	Overlimit Canada geese	(Hague)	$5.	$12.
Wm. Nolan,St. Jo.Mo.	Attempt take Wf. after sunset	(Burgess)	$5.	$12.
J.W.Nolan,St. Jo.Mo.	Attempt take Wf. after sunset	(Burgess)	$5.	$12.
Carl Paxton Oregon, Mo.	Take Canada geese in closed season.	(Hague & Blazevic)	$5.	$12.
Vernon Miller St. Joseph, Mo.	Attempt take Wf. in closed Season.	(Clifton)	$5.	$12.
Richard Miller Oregon, Mo.	Attempt take Wf. in closed Season.	(Clifton	$5.	$12.

By Circuit Court Juvenile Officer George Beverlin, Maryville, Missouri

Harold Bruntmeyer Skidmore, Mo.	Overlimit Mallards & Take ducks after sunset	(Clifton & McCloud)	Suspend driving license.	

By U. S. Commissioner Victor Gehrs, St. Joseph, Mo.

Francis Wohlford Oregon, Mo.	Take Wf. from Motor Vehicle	(Hague & Blazevic)	$50.	$26.20
Larry Worley Forest City, Mo.	Take Wf. from Motor Vehicle	(Hague & Blazevic)	$50.	$18.
Max Hunzinger Forest City, Mo.	Take Wf. from Motor Vehicle	(Hague & Blazevic)	$50.	$27.
Otis Uehlin Amazonia, Mo.	Take Canada goose in closed season.Overlimit snow geese.	(Clifton & Blazevic)	$25.	$22.36

F. Safety

Our safety record stands at 653 days since A. J. Yocum's encouter with a bulldozer. Mr. Yocum's leg is slowly mending in a brace and he continues to work out of a wheel chair - a daily reminder to our safety consciousness. Combination safety-staff meetings were held monthly in 1964 and new employees were orientated on this phase of their work before they started other activity.

VII. Other Items

A. Item of Interest

The Master Plan was completed and approved in 1964. The Corps of Engineers have actively promoted reactivation of their Squaw Creek Ditch proposal. It is likely that the area below the Napier Road will be organized and construction will be started in 1965. While not solving our flooding problems, such action will give us a better outlet and considerable relief.

This report was drafted by Harold Burgess and typed by A. J. Yocum except Lee Burgess helped write and type V. Field Investigations and typed most of the NR forms. Mrs Harold Burgess proof read the report.

B. Photographs

A selection of photographs is attached.

C. N. R. Forms

Narrative report forms NR-1B and NR-4 have been submitted previously. NR-7, NR-9 and NR-11 were not appropriate for this refuge during 1964.

SIGNATURE PAGE

Submitted by:

Harold H. Burgess
(Signature)
Harold H.Burgess

Date: February 9,1965

Refuge Manager
Title

Approved, Regional Office:

Date: 2-11-65

Harry E. Stiles
(Signature)

Assistant
Regional Refuge Supervisor

Story of Photographs - The Corps of Engineers Tarkio - Squaw Creek Ditch was stopped by court order in 1958. It does, however, drain high waters from the natural Penny Lake Slough drainage which prior to refuge construction drained a portion of the Squaw Creek Marsh. When flood waters overtopped the western levees of Squaw Creek Refuge, we provided a high spillway into the Penny Lake Slough drain.

Squaw Creek Refuge Photos

Only the center portion of the abandoned C. of E. ditch was filled. There was no water on the berm or levees and its small Napier Road Bridge was carrying about half of its capacity. H.H.B. 6/23/64

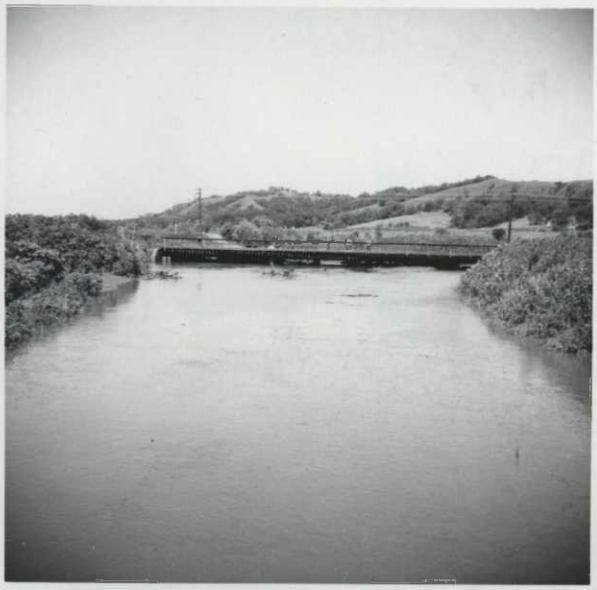
Flood waters were overflowing the refuges' west levees. We opened a spillway to Penny Lake Slough drainage and obtained some needed relief. H.H.B. 6/23/64

Story of photographs

The C. B. & Q. Railroad bridge is the first of many bottlenecks between the refuge and the Missouri River on Squaw Creek that cause annual floodings of Squaw Creek National Wildlife Refuge.

Squaw Creek Refuge Photos

Flood debris and railroad crew at Squaw Creek C,B & Q Bridge
Photos by H. H. Burgess 6/23/64



High creek below railroad bridge. H.H.B. 6/23/64

Refuge unit A-19 cornfield under Squaw Creek flood waters. H.H.B. 6/23/64

Squaw Creek Refuge Photos

High Squaw Creek at Napier Road Bridge and below. H.H.B. 6/23/64

Higher flooded cropland south of Napier Road. The other land was completely flooded. H.H.B. 6/23/64

Story of Photo - The Napier Road Bridge is the second barrier to refuge drainage, but the worst barrier occurs about a mile further south where Squaw Creek is completely silted and the creek seeks its own outlet to the Missouri River.

Squaw Creek Refuge Photos

Flapgated 36" CMP outlet from West Pool to Squaw Creek after one of many overtoppings. H.H.B. 6/24/64

Corn in A-17 damaged by repeated overtopping of Squaw Creek levee. H.H.B. 6/24/64

Flooded Little Tarkio Ditch west of refuge. H.H.B. 6/24/64

Corn on A-19 Squaw Creek levee after some flood waters had retreated. H.H.B. 6/24/64

Squaw Creek Refuge Photos

Lead poisoning and hunting mortality contributed to a die-off of waterfowl at Squaw Creek during the 1963-64 winter. H.H.B. 12/28/63

Northwest Missouri State College Plant Ecology Class visit refuge.

Kansas City, Kansas BoyScouts piled up four bags of litter on half mile of Highway T.

Squaw Creek Refuge Photos

Permanent Cannon Net Site #1 constructed on old Squaw Creek berm, was cleared, leveled and dressed with pea gravel in 1964. Photo by Lee Burgess with K-12 Graflex 12/27/64

South and base levee for Davis Creek desilting Basin
Photo by Lee Burgess with K-12 Graflex 12/27/64

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

WATERFOWL

REFUGE SQUAW CREEK MONTHS OF SEPTEMBER TO DECEMBER, 1964

(1) Species	(2) Weeks of reporting period 9/1-7 1	9/8-14 2	9/15-21 3	9/22-28 4	9/29-10/3 5	10/6-12 6	10/13-19 7	10/20-26 8	10/27-11/2 9	11/3-9 10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada (Large)	5	5	30	400	1,900	4,300	3,800	2,640	4,350	4,600
~~Cackling~~ (Small)				200	200	200	200	2,760	550	2,000
Brant										
White-fronted		2	2	2	50	50	15	90	200	120
Snow	2	2	6	350	12,000	56,250	99,000	84,600	39,225	43,200
Blue	1	2	5	150	5,000	18,750	24,000	28,200	13,075	14,410
Other										
Ducks: TOTAL GEESE	8	11	43	1,102	19,150	79,550	127,015	118,290	57,400	64,330
Mallard	165	210	200	500	5,100	21,000	25,000	25,000	36,590	119,460
Black					10	20	250	250	370	1,250
Gadwall		10	10	20	200	400	800	800	520	120
Baldpate	2	10	20	40	100	600	800	800	740	130
Pintail	700	450	3,220	4,300	15,000	19,600	8,150	8,150	21,000	25,810
Green-winged teal	900	730	910	2,000	5,210	8,000	8,600	8,600	22,600	9,080
Blue-winged teal	550	720	3,110	5,000	9,210	2,000	1,600	1,600	200	100
Cinnamon teal										
Shoveler	100	100	50	60	70	500	200	200	520	1,230
Wood	20	35	40	100	90	430	450	450	20	80
Redhead					10	10	10	10	30	
Ring-necked				10	10				50	
Canvasback									10	
Scaup									600	3,000
Goldeneye										
Bufflehead										
Ruddy				10	10				80	
Other										
TOTAL DUCKS	2,437	2,265	7,560	12,040	35,020	52,560	45,860	45,860	83,330	160,260
Coot:	35	200	200	4,500	6,500	6,000	1,100	1,100	1,200	7,280

Int. Dup. Sec.,
Wash., D. C. 37944

3 -1750a
Cont. NR-1
(Rev. March 1953)

WATERFOWL
(Continuation Sheet)

REFUGE SQUAW CREEK MONTHS OF SEPTEMBER TO DECEMBER, 1964

(1) Species	(2) Weeks of reporting period 11/10-16 11	11/17-23 12	11/24-30 13	12/1-7 14	12/8-14 15	12/15-21 16	12/22-28 17	12/29-31 18	(3) Estimated waterfowl days use	(4) Production Broods seen	(4) Production Estimated total
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada (Large)	4,600	3,580	3,580	3,000	5,450	5,190	5,050	5,050	382,510		
[illegible] (Small)	2,000	200	200	450	50	100	100	100	64,770		
Brant											
White-fronted	120	250	250	100	10	10			8,897		
Snow	43,200	89,250	89,250	33,000	29,100	18,850	19,250	19,250	4,653,495		
Blue	14,410	29,750	29,750	17,000	14,600	9,400	9,000	9,000	1,619,521		
Other TOTAL GEESE	64,330	123,030	123,030	53,550	49,210	33,550	33,400	33,400	6,729,193		
Ducks:											
Mallard	119,460	250,740	250,740	101,000	145,000	126,000	111,950	111,950	9,702,655		
Black	1,250	2,530	2,530	1,000	1,450	1,260	1,100	1,100	96,190		
Gadwall	120								21,000		
Baldpate	130						100	100	24,604		
Pintail	25,810	2,530	2,530	1,000	1,000	30	10	10	975,080		
Green-winged teal	9,080	2,690	2,690	1,000	2,800	100	10	10	595,030		
Blue-winged teal	100								169,330		
Cinnamon teal											
Shoveler	1,230				10				29,890		
Wood	80				10	10			12,705		
Redhead									490		
Ring-necked									490		
Canvasback									70		
Scaup	3,000								46,200		
Goldeneye		10	10						140		
Bufflehead											
Ruddy									700		
Other Amer. Merg.					100	100	80	80	2,200		
TOTAL DUCKS	160,260	258,500	258,500	104,000	150,370	127,500	113,250	113,250	11,676,754		
Coot:	7,280								247,765		

(over)

	(5) Total Days Use	(6) Peak Number	(7) Total Production
Swans			
Geese	6,729,123	127,015	
Ducks	11,676,754	258,500	
Coots	247,765	6,500	

SUMMARY

Principal feeding areas Flooded smartweed pools and fields of foxtail.

Principal nesting areas

Reported by Harold H. Burress, Refuge Manager

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).

Interior Duplicating Section, Washington, D. C.
1953

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

MIGRATORY BIRDS
(other than waterfowl)

Refuge Squaw Creek Months of September to December 1964

(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
										Days Use
I. Water and Marsh Birds:										
White pelican	500	9/1	5,000	9/22-28	42	11/9				221,680
Pied-billed grebe	47	9/1	47	9/1-7	2	10/19				810
Double-crested cormorant	10	9/28	10	9/22-28	10	9/28				100
Great blue heron	34	9/1	34	9/1-7	3	11/9				1,300
Green heron	3	9/1	3	9/1-7	2	9/21				60
Little blue heron	1	9/1	1	9/1-7	1	9/7				7
Black-crowned night heron	34	9/1	60	9/15-21	2	10/18				1,260
Yellow-crowned night heron	10	9/1	10	9/1-7	10	9/7				70
American bittern	1	9/1	1	9/1	1	10/19				50
II. Shorebirds, Gulls and Terns:										
Killdeer	2	9/1	4	10/20-26	4	10/26				600
Semipalmated plover	2	9/1	2	9/1-7	2	9/7				14
Common snipe	6	9/1	6	9/1-7	2	11/2				360
Spotted sandpiper	1	9/1	2	9/22-28	2	9/28				60
Solitary sandpiper	2	9/1	2	9/1-7	2	9/7				14
Greater yellowlegs	2	9/1	2	9/1-7	2	9/7				14
Lesser yellowlegs	30	9/1	30	9/1-7	30	9/7				210
Pectoral sandpiper	50	9/1	50	9/1-7	50	9/7				350
Bairds sandpiper	2	9/1	2	9/1-7	2	10/24				120
Least sandpiper	2	9/1	2	9/1-7	2	9/7				14
Dowitcher	20	9/1	20	9/1-7	6	11/9				1,200
Avocet	4	9/1	10	10/20-26	10	10/26				100

continued

(over)

(1)	(2)		(3)		(4)		(5)			(6)
III. Doves and Pigeons:										
Mourning dove	1,000	9/1	1,000	9/1-7	2	12/23				40,000
White-winged dove										
IV. Predaceous Birds:										
~~Golden eagle~~ ~~Saw~~ Whet Owl	1	12/20	1	12/15-21	1	12/20				7
Duck hawk	1	9/22	1	9/21-27	1	9/22				7
Horned owl	20	9/1	20	12/15-21	4	12/21				2,400
~~Magpie~~ Barred Owl	4	12/21	10	12/15-21	4	12/31				1,200
~~Raven~~ Screech Owl	4	9/1	4	9/1-12/31	4	12/31				480
Crow	10	9/15	1,000	11/1-30	100	12/31				30,000
Turkey vulture	1	9/7	2	9/15-21	2	9/21				42
Sharp-shinned hawk	1	12/28	1	12/28	1	12/28				1
Red-tailed hawk	12	9/28	12	9/22-28	7	12/26				1,440
Harlans hawk	1	10/19	2	12/1-7	1	12/26				120
Red-shouldered hawk	1	12/11	1	12/8-15	1	12/11				7
Broad-winged hawk	1	9/23	1	9/23	1	9/23				1
Rough-legged hawk	1	10/19	4	12/8-15	1	12/26				120
continued										

Reported by Harold H. Burgess

INSTRUCTIONS

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

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

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

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

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

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

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

MIGRATORY BIRDS
(other than waterfowl)

Refuge **Squaw Creek** Months of **September** to **December** 195**64**

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. Water and Marsh Birds:										
II. Shorebirds, Gulls and Terns:										
Wilson's phalarope	20	9/1	20	9/1-7	20	9/7				140
Herring gull	1	10/13	1	10/13-19	1	10/13				7
Ring-billed gull	30	10/13	30	10/13-19	1	12/26				300
Black tern	300	9/7	300	9/1-7	300	9/7				2,100

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove								
White-winged dove								
IV. Predaceous Birds:								
Golden eagle								
Duck hawk								
Horned owl								
Magpie								
Raven								
Crow								
Bald eagle	2	10/12	62	12/1-7	40	12/31	(12 adults:28 immatures)	2,400
Marsh hawk	3	9/7	25	9/22-28	6	12/26		1,200
Pigeon hawk	1	9/27	1	9/27	1	9/27		1
Sparrow hawk	2	12/21	2	12/21	2	12/21		6

Reported by.....

INSTRUCTIONS

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

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

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

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

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

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

INT.-DUP. SEC., WASH., D.C.

59317

3-1752
Form NR-2
(April 1946)

UPLAND GAME BIRDS

Refuge Squaw Creek Months of September 1 to December 31, 1964

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re-stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked pheasant	3,455 acres of upland crops, brush and herbs	34			1:1	None			100	
Bob-white	same as above	69			no data	None			50	

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

(1) SPECIES: Use correct common name.

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

(3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.

(4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.

(5) REMOVALS: Indicate total number in each category removed during the report period.

(6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.

(7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

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

3-1753
Form NR-3
(June 1945)

BIG GAME

Refuge Squaw Creek Calendar Year 1964

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions		(7) Estimated Total Refuge Population		(8) Sex Ratio
Common Name	Cover types, total Acreage of Habitat	Number	Hunting	For Re-stocking	Sold	For Research	Predation	Disease	Winter Loss	Number	Source	At period of Greatest use	As of Dec. 31	
White-tailed deer	2,000 acres brushland and wet prairie; 1,600 acres of croplands	20					1					100	50	?

Remarks:

Reported by _____

INSTRUCTIONS

Form NR-3 - BIG GAME

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

(2) DENSITY: 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 total number of young produced on refuge.

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

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

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

(7) TOTAL REFUGE POPULATION: Give the estimated population of <u>each species</u> on the refuge at period of its greatest abundance and also as of Dec. 31.

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

17060

3-1755
Form NR-5
60701

DISEASE

Refuge Squaw Creek Year 1964

Botulism

Period of outbreak _____

Period of heaviest losses _____

Losses:

	Actual Count	Estimated
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Number Hospitalized	No. Recovered	% Recovered
(a) Waterfowl		
(b) Shorebirds		
(c) Other		

Areas affected (location and approximate acreage) _____

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.

Condition of vegetation and invertebrate life _____

Remarks _____

Lead Poisoning or other Disease

Kind of disease Fowl Cholera

Species affected Snow geese, mallards

Number Affected

Species	Actual Count	Estimated
snow geese	1,000	1,200
mallard	3,252	5,000
other waterfowl	100	150

Number Recovered 8,800 snow geese; 95,000 mallards

Number lost 6,350

Source of infection Long Slough Ditch

Water conditions 1 to 2' deep in pumped ditch

vegetated loafing area needed sanitation, but it could not be safely burned until 1/23/65.

Food conditions an ample supply of waste and standing corn and wheat browse were available.

Remarks Dead waterfowl were collected, piled, drenched with diesel fuel and burned.

NR-6

Bureau of Sport Fisheries and Wildlife

PUBLIC RELATIONS

(See Instructions on Reverse Side)

Refuge Squaw Creek Calendar Year 1964

1. Visits

a. Hunting none b. Fishing 1,000 c. Miscellaneous 9,500 d. TOTAL VISITS 10,500

1a. Hunting (on refuge lands)

none

TYPE	HUNTERS	ACRES	MANAGED BY
Waterfowl			
Upland Game			
Big Game			
Other			

Number of permanent blinds

Man-days of bow hunting included above

Estimated man-days of hunting on lands adjacent to refuge 25,700

25,000 waterfowl hunters
500 small game hunters
200 deer hunters

1b. Fishing (area open to fishing on refuge lands)

TYPE OF AREA	ACRES	MILES
Ponds or Lakes	1,000	
Streams and Shores		10

1c. Miscellaneous Visits

Recreation 7,700 Official 500

Economic Use 1,300 Industrial -

2. Refuge Participation (groups)

TYPE OF ORGANIZATION	on refuge NO. OF GROUPS	on refuge NUMBER IN GROUPS	off refuge NO. OF GROUPS	off refuge NUMBER IN GROUPS
Sportsmen Clubs	2	32	1	20
Bird and Garden Clubs	3	40	3	300
Schools	4	119		
Service Clubs			9	460
Youth Groups	6	230	2	160
Professional-Scientific	1	10	9	323
Religious Groups	1	8	2	100
State or Federal Govt.	1	4	22	154
Other	3	15	1	50

3. Other Activities

TYPE	NUMBER	TYPE	NUMBER
Press Releases	12	Radio Presentations	6
Newspapers (P.R.'s sent to)	10	Exhibits	12
TV Presentations	2	Est. Exhibit Viewers	1,000

3-1756
(Rev. 4/63)

INSTRUCTIONS

Item 1: Total of a, b, and c, equal d.

"Visit" - definition. Any person who is on refuge lands or waters during a day or part thereof for the purpose of: hunting, fishing, bird-watching, recreation, business or economic use, official visit, or similar interest. INCLUDE - those who stop within the refuge while traveling on a public highway because of an interest in the area. EXCLUDE - persons engaged in oil or other industry not directly related to the refuge, persons using refuge as most direct route or principal avenue of traffic, and those boating on navigable rivers or the Intercoastal Canal, unless they stop to observe wildlife on the refuge.

Computing visits. Where actual counts are impractical, "sampling" is used with midweek and weekend samples varied by season or weather. A conversion factor of 3.5 (of passengers per car) is used when accurate figures are not available. Each refuge will develop a conversion factor for boats based on range of usage. Count a camper once for each 24-hour period or fraction thereof.

Item 1a: Acres - of refuge open for each type of hunting.

Managed hunts require check in and out of hunters, issuance of permits, or assignment of blinds.

Other - INCLUDE crow, fox, and similar hunting.

Lands adjacent to refuge. Normally considered within 1 mile or less of boundary, unless established sampling procedures cover a wider area. For big game hunting, the distance may be greater.

Item 1b: Acres of streams open to fishing, if practical; otherwise just miles open. Information on "shores" is primarily for coastal fishing.

Item 1c: Recreation. INCLUDE photography, observing wildlife, picnicking, swimming, boating, camping, visitor center use, tours, etc. TOTAL Recreation, Official, and Economic Use visits under Item 1.

Industrial. INCLUDE persons engaged in industry, i.e., oil industry or factories. EXCLUDE these from Item 1.

Item 2: INCLUDE the "On Refuge" groups in Items 1c and 1. In "Off Refuge" column include only those group meetings in which refuge employees actually participate. EXCLUDE these from Items 1c and 1.

Item 3: Exhibits - INCLUDE displays, fairs, parades, and exhibits OFF the refuge; EXCLUDE those ON.

3-1758
Form NR-8
(Rev. Jan. 1956)

Fish and Wildlife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge Squaw Creek County Holt State Missouri

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return				Total Acreage Planted	Green Manure, Cover and Water-fowl Browsing Crops Type and Kind	Total Acreage
			Harvested		Unharvested				
	Acres	Bu./Tons	Acres	Bu./Tons	Acres	Bu./Tons			
corn	318.3	12,660			316.7	11,211	635.0	Winter wheat	355
soybeans	83,0	1,560	11.4	292			83.0		
wheat	27.1	682	11.4	292			38.5	Rye	5
oats	8.0	220					8.0	Reed canary grass	51
Japanese millet	70.0	failed			15.0	300	85.0	Redtop-alsike	2
Proso					30.0	failed	30.0	Brome grass	5
								Total	418
German millet					47.0	470	47.0		
								Fallow Ag. Land flood damaged and neglected	212
Totals	506.4	15,122	11.4	292	408.7	12,011	926.5		

No. of Permittees: Agricultural Operations 9 Haying Operations 5 Grazing Operations 0

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	GRAZING	Number Animals	AUM'S	Cash Revenue	ACREAGE
oat hay	16.0	8.0	coop. agreement	1. Cattle				
alfalfa	69.0	13.0	" "					
Redtop	2.0	2.0	$4.00	2. Other				
Reed canary	73.3	51.0	$148.60					
				1. Total Refuge Acreage Under Cultivation				1,221
Hay - Wild	19.0	10.0	$9.50	2. Acreage Cultivated as Service Operation				512

DIRECTIONS FOR PREPARING FORM NR-8
CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared on a calendar-year basis for all crops which were planted during the calendar year and for haying and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State.

Cultivated Crops Grown - List all crops planted, grown and harvested on the refuge during the reporting period regardless of purpose. Crops in kind which have been planted by more than one permittee or this Service shall be combined for reporting purposes.

Permittee's Share - Only the number of acres utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the Bushels Harvested column. Report all crops harvested in bushels or fractions thereof except such crops as silage, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

Government's Share or Return - Harvested - Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. Unharvested - Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under Bushels Unharvested column.

Total Acreage Planted - Report all acreage planted, including crop failures.

Green Manure, Cover and Waterfowl Grazing Crops - Specify the acreage, kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

Hay - Improved - List separately the kinds of improved hay grown. Annual plantings should also be reported under Cultivated Crops, and perennial hay should be listed in the same manner at time of planting.

Total Refuge Acreage Under Cultivation - Report total land area devoted to agricultural purposes during the year.

INT.-DUP. SEC., WASH., D.C.91767

3-1570
NR-88
(4/54)

REFUGE GRAIN REPORT

Refuge Squaw Creek Months of January through December, 1964

(1) Variety*	(2) On Hand Beginning of Period	(3) Received During Period	(4) Total	(5) Grain Disposed of				(6) On Hand End of Period	(7) Proposed or Suitable Use*		
				Transferred	Seeded	Fed	Total		Seed	Feed	Surplus
corn shelled	900	250	1,150	200		550	750	400	-	400	-
ear	900		900			600	600	300	-	300	-
wheat	333	725	1,058		725	183	908	150	-	150	-
oats	7		7			7	7				
rye	26		26		24		24	2	2		
German millet		10	10		10		10				
Japanese millet		4	4		4		4				
White proso millet		30	30		30		30				
Brome grass	16	8	24		16		16	8	8		

(8) Indicate shipping or collection points Mound City, Missouri

(9) Grain is stored at Squaw Creek Refuge, Mound City, Missouri

(10) Remarks

*See instructions on back.

REFUGE GRAIN REPORT

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

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)—55 lb., corn (ear)—70 lb., wheat—60 lb., barley—50 lb., rye—55 lb., oats—30 lb., soy beans—60 lb., millet—50 lb., cowpeas—60 lb., and mixed—50 lb. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

(1) List each type of grain separately and specifically, as flint corn, yellow dent corn, square deal hybrid corn, garnet wheat, red May wheat, durum wheat, spring wheat, proso millet, combine milo, new era cowpeas, mikado soy beans, etc. Mere listing as corn, wheat, and soybeans will not suffice, as specific details are necessary in considering transfer of seed supplies to other refuges. Include only domestic grains; aquatic and other seeds will be listed on NR-9.

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

(4) A total of columns 2 and 3.

(6) Column 4 less column 5.

(7) This is a proposed break-down by varieties of grain listed in column 6. Indicate if grain is suitable for seeding new crops.

(8) Nearest railroad station for shipping and receiving.

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

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

INT.-DEP. SEC., WASH., D.C. 17065

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge	Proposal Number	Reporting Year
Squaw Creek	1	1964

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3/1-7/64	Salix interior, Salix amygdaloides Salix nigra and Populus deltoides Stumps*	Old Squaw Creek spillway ditch, delta in North-west Pool	40	2-4D 2-4-5T	40 lbs. 40 lbs.	1 lb. ai 1 lb. ai	3.75 gal diesel fuel	Power ground sprayer

10. Summary of results (continue on reverse side, if necessary)

The saplings were rotary-mowed with a gyramower after February 10 and stump sprayed March 1-7. Results were inconclusive since a hot wild fire burned through this area on March 14. The area was later disced twice and planted to wheat in August. About 10% of the willow stumps sprouted during the summer. Labor costs were $101 for mowing; $48 for spraying and $48 for herbicide or $4.90 per acre.

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fish[illegible]es and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: Squaw Creek

Proposal Number: 1a

Reporting Year: 1964

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
annual program								
6/17/64	Sunflower	E. Dike, Davis Creek	6	2-4D & 2-4-5T	1.8 lbs. each	0.3 ai lbs. each	water	power
6/17/64	Willow, poplar, sunflower, hemp	Frees Poad Ditch	2	" "	1.2 lbs. each	0.6 ai lbs. each	20 gal.	sprayer
6/18/64	Willow, hemp, sunflower, and smartweed	E. Dike, Squaw Creek	10	" "	6.0 lbs. each	0.6 ai lbs. each	"	"
(about 7" rain 6/20-22/64)								
6/23/24/64	willow, hemp cottonwood	W. Dike, Davis Creek	10	" "	5.0 lbs. each	0.5 ai lbs. each	"	"
(about 1" rain 7/4/64								
7/8/64	willow, hemp cottonwood	West levies, Squaw Creek	10	" "	5.5 lbs. each	0.55 ai lbs.	"	"
(no additional rain in July 1964)								
Total	willow, sunflower, cottonwood, hemp	dikes & levies	38A	2-4D & 2-4-5T	19.5 lbs. each	0.3 to 0.6 lbs.	water 20 gal.	power sprayer

10. Summary of results (continue on reverse side, if necessary)

Sprayed areas observed 7/31/64 when 100% of all broadleaf vegetation except cottonwood appeared to be killed. Cottonwood was only 25% retarded. On September 1, 1964 the second crop of seedlings and sprouts were 3' high and will be burned. Cottonwood will need to be chopped out. Total cost of this operation was $2 per acre or $76.00

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fishe[illegible]s and Wildlife

Refuge Squaw Creek

ANNUAL REPORT OF PERSTICIDE APPLICATION

Proposal Number 2

Reporting Year 1964

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5/19/64	Western corn rootworm, seed corn maggots in corn field	Agriculture Unit A-8 cooperatively farmed	40	Diazinon	28 lbs.	0.7 ai lbs.	dry	band

0. Summary of results (continue on reverse side, if necessary)

1964 was not a bad seed and rootworm year. There apparently was no difference in results in the 40 acres of corn treated and the 56 acres of untreated corn. Corn borers were present in both areas. Diazinon is considered very hazardous to operators by permittee. It would be more effective if it could be applied when insects attack corn roots. No Bureau costs.

3550

3-1979 (NR-12)
(9/63)

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge	Proposal Number	Reporting Year
Squaw Creek	4	1964

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6/3/64	Foxtail and other weeks in soybeans	Agriculture Unit A-8 cooperatively farmed	20	Amiben	80 lbs. 10 gal.	4 lbs./ acre	self	spray

10. Summary of results (continue on reverse side, if necessary)

It rained 6/4/64 one day after application, but still resulted in 100% kill of grasses. Soybeans were rotary hoed once and cultivated twice. Some cockleburr and sunflowers were cut out late in season. Cost borne by cooperative farmer, none by Bureau.

35500

3-1979 (NR-12)
(9/63)

Bureau of Sport Fis[illegible]ies and Wildlife

ANNUAL REPORT OF PERSTICIDE APPLICATION

Refuge: Squaw Creek

Proposal Number: 7

Reporting Year: 1964

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7/22/64	Johnson grass, sorghum, halepense	SW. Bell telephone R. of way Highway ℄ T to wood duck pond	1	Dalapon	6 lbs.	6 lbs.	water 13 gal.	Power sprayer
8/7/64	same	same	1	same	6 lbs.	6 lbs.	water 12 gal.	same
(no effective rain after 7/22/64 until 8/28/64)								
9/3-4/64	same	same	2	Dalapon	12 lbs.	6 lbs.	water 25 gal.	same
(about.66inches of rain on 9/5/64								

10. Summary of results (continue on reverse side, if necessary)

This area was so overgrown that it was rotary-mowed just before treatment, with the higher acres being sprayed July 22; the lower wetter areas treated August 7. This portion of the right-of-way was rotary-mowed and treated again on September 3 and 4. Results were a 50% reduction of Johnson grass and no apparent seeding. Costs were $24.00 for mowing, $24.00 for spraying, and$20.00 for herbicides or $34.00 per acre.

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