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One of the refuge's captive geese defending its nest. Two out of the five eggs laid were hatched and the goose continued to incubate the three eggs showing. In this case persistence did not win out when after 71 days the goose finally gave up. This is probably not a record for incubation of eggs but it is indeed a very good average.

NARRATIVE REPORT

Fish Springs National Wildlife Refuge
Dugway, Utah

January - December
1966

PERSONNEL

Robert G. Yoder	Refuge Manager
Morris C. LeFever	Ass't. Refuge Manager (Transferred 1/66)
Edgar P. Bailey	Ass't. Refuge Manager (EOD 4/66)
Jimmie Layland	Maintenanceman (Resigned 7/66)
Clyde B. Peay	Maintenanceman (Died 8/66)
Kathryn V. Sabey	Clerk-typist
Jared F. Bronson	Temporary Appointment (Resigned 9/66)
Melvin J. Buchholtz	Temporary Appointment (Resigned 6/66)
Gail F. Parker	Temporary Appointment (Terminated 1/66)
	" " (11/66 -)
George T. Rawlings	Temporary Appointment (Terminated 1/66)
Lyle J. Sabey	Temporary Appointment (8/66 -)
Charles F. Timm	Temporary Appointment (Terminated 9/66)
Irl G. Timm	Temporary Appointment (Terminated 12/66)
	" " (12/66 -)

U. S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

NARRATIVE REPORT
Fish Springs National Wildlife Refuge
Dugway, Utah

January - December
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I. GENERAL

A. Weather Conditions

Precipitation, temperatures, and evaporation for the year are summarized in Table 1. This was a critically dry year with only 4.17 inches of precipitation recorded, as compared to 8.63 inches the previous year. Generally in northern Utah about 40 per cent of annual precipitation is recorded in March, April, and May, but in 1966 only 0.38 inches were recorded during this period at Fish Springs. Substantial amounts were recorded only in July and December (Figure 1).

Temperatures were generally above average most of the year; readings over 100°F were registered several times. Only in November and December were temperatures apparently below average. Persistent fogs during the latter two months largely accounted for the low readings.

Measured evaporation for the year was excessive, 69.79 inches, as compared to 50.58 inches in 1965. Evaporation on an open marsh is approximately 0.8 of the evaporation pan readings, or in this case 55.83 inches.

B. Habitat Conditions

1. Water. Total spring flow, as measured once a month at collection ditch outlets and at North Spring, averaged 32.29 c.f.s. and ranged between 28.00 c.f.s. in May and 36.69 c.f.s. in October. Figure 2 shows monthly spring flow fluctuations for the past 2 years. Note that spring production apparently has no positive correlation with local precipitation (Figures 1 and 2). The water source of our springs is not really known.

In April all pools were relatively full, but above normal temperatures and meager precipitation, which prevailed most of the spring and summer, resulted in drastic drops in water levels of most pools. In July Egret, Ibis, and Gadwall pools dried up. By August most of Harrison Pool was dry, followed by Avocet and Pintail pools in September. Although never completely dry, the water level on Curlew Pool remained exceedingly low (below 1 foot on elevation gauge) most of the summer. Only Mallard and Shoveler pools could be maintained at substantial levels with subsequent low to moderate salinity readings (<1000 micromhos/cm.). Due to the

Month	Precipitation		Temperature				Evaporation in Inches
			Averages		Extremes		
	Ppt.	*Normal	Max.	Min.	Max.	Min.	
Jan.	0.25	3.80	40.7	19.6	54	5	
Feb.	0.59	1.58	43.7	23.3	58	11	
March	0.00	7.30	58.3	29.5	79	9	
April	0.08	Trace	67.0	37.5	81	18	
May	0.30	0.48	**	52.4	91	39	14.39
June	0.11	0.85	87.9	57.8	99	43	12.79
July	0.80	0.34	96.8	68.3	102	57	16.22
Aug.	0.08	0.29	94.1	63.2	103	52	12.71
Sept.	0.36	0.64	84.6	55.3	94	42	8.94
Oct.	0.06	1.01	67.2	37.0	82	25	4.74
Nov.	0.20	0.95	56.6	32.7	70	10	
Dec.	1.34	0.18	34.4	22.2	56	0	
Totals	4.17	17.42					69.79

* The normal is from a twelve year record kept by the Dugway Proving Grounds meteorological section and is itself a composite from records of many rain gauges scattered throughout the vast desert proving grounds. Precipitation at Dugway Proving Grounds is generally higher than at Fish Springs. There are not enough records at this station to compile a normal for Fish Springs.

** Maximum thermometer broken.

Table 1. Precipitation, temperature, and evaporation in 1966.

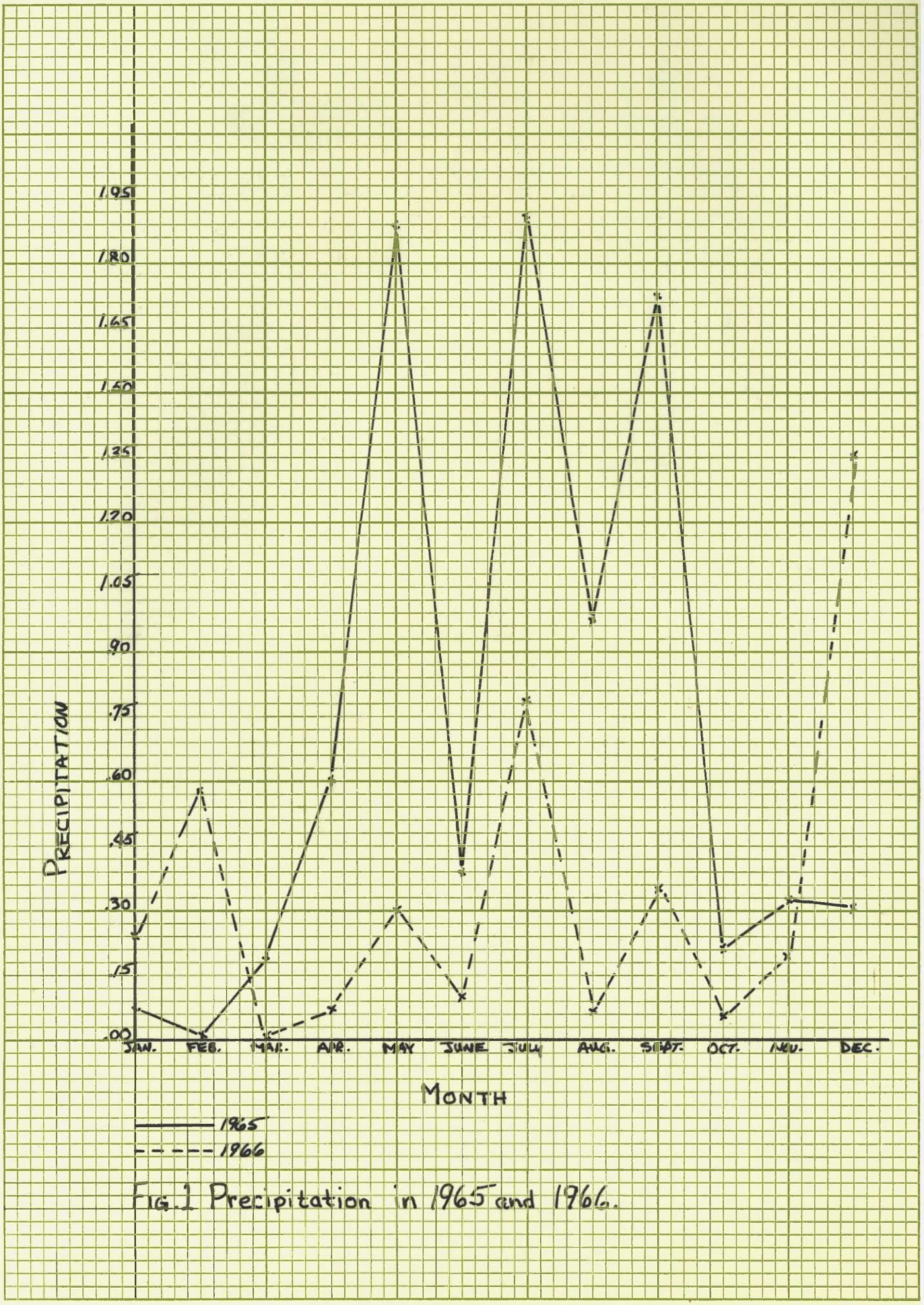


FIG. 1 Precipitation in 1965 and 1966.

FIG. 2. Spring Production in 1965 and 1966.

protracted heat and drought, evaporation and transpiration were not exceeded by spring production until early November; by late November all pools were recovering except Ibis and Gadwall. Ibis Pool began filling in late December, while Gadwall was still completely dry at the end of the year.

A critically dry year like 1966 showed that sufficient spring flow is available only to maintain three pools or one third of our impoundments during summer and early fall. Fortunately water remained in most pools until after broods had been successfully reared.

During the summer some distribution ditches became choked with aquatic growth, which further retarded maintenance of pool water levels. For example, distribution ditches to Avocet Pool became so clogged with vegetation that in October the pool had to be refilled by running water into it through an outlet structure situated on the main collection ditch.

An artificial outlet was dug for Deadman Spring to see if substantial amounts of water could be obtained; however, the resulting flow was insignificant. Attempts to develop Walter Spring will be made in 1967.

2. Food and Cover

a) General. In early spring all nine pools were inundated and adequate food and nesting cover were available. Although most pools began to dry up by July, there still appeared to be sufficient carrying capacity for additional waterfowl. By September with only three pools essentially flooded, fewer waterfowl were understandably inhabiting the refuge than during the same period last year. Then in November just as most pools had largely recovered, ice fogs blanketed the area for prolonged periods, resulting in the freezing over of much of the marsh. Snows followed by temperatures dropping as low as 0°F. in December caused nearly all of the pools to completely freeze over. By the end of the month significant areas of open water were present only on Mallard and Egret Pools, since these pools were receiving the greatest amounts of spring water. Freezing over of the marsh caused many ducks to leave the refuge, while those remaining utilized spring areas heavily.

b) Widgeongrass. Widgeongrass was found in virtually all pools. It failed to survive the summer in Gadwall, Ibis, Egret, and Pintail pools because of excessive salinity followed by dehydration. Copious amounts of dead Widgeongrass also were found in Avocet and Harrison pools because of drought conditions. This species appears to be the most abundant submergent on the refuge; many sloughs, especially those in Mallard, Shoveler, and Curlew pools, were clogged with Ruppia sp.

c) Muskgrass. This submergent is probably second in abundance in most sloughs. It was usually found with Widgeongrass and appears denser in more recently flooded sloughs, as evidenced by its scarcity in older sloughs, such as those in the vicinity of North Spring. Chara sp. was notably profuse in Shoveler and Mallard pools and is probably heavily used by coots, since the majority of the refuge's coot popula-

tion remained on these pools.

d) Bulrush. Alkali Bulrush (Scirpus paludosus) is apparently spreading, for good stands of this excellent seed-producing emergent exists in Avocet, Egret, and Harrison pools. Also, about 900 pounds of seed imported from California (S. robusta) were planted primarily in the Soil and Moisture area and in cultivated sloughs near Pintail Pool. Survival in planted areas appeared better than 60 per cent; this species seems well adapted to this area's saline soil and periodic lack of adequate water.

Olney's Bulrush (S. Olneyi) covers the entire southwestern quadrant of Avocet Pool; here it is extensively used for nesting cover by colonies of Snowy Egrets and Black-crowned Night Herons. The bulk of the refuge's muskrat population is also in this area. Considerable Olney's Bulrush also exists around most springs and in Curlew and Mallard pools.

Hardstem Bulrush (S. acutus) is still comparatively scarce and is thriving obviously well only where previously planted along dikes in Avocet Pool. Hardstem Bulrush planted along dikes in Egret Pool during the spring failed to survive because of insufficient water to maintain the pool flooded all summer. Previous plantings in Harrison Pool also apparently failed to survive because of dehydration.

e) Other Plants. Other notable aquatic plants in most pools include Juncus sp., Phragmites sp., Ceratophyllum sp., and Eleocharis sp. A few small stands of Typha sp. were found only in Avocet Pool. This pool also has traces of Potamogeton sp. which apparently entered the pool from the main collection ditch. Perhaps under more favorable water conditions this valuable plant will increase significantly.

g) Farm Sloughs. About 12 acres of Alkali Bulrush were seeded and subsequently flooded in Harrison Pool and Pintail Pool; success was fairly good. Shortage of water greatly limited additional planting and survival. See discussion under cultivated crops.

II. WILDLIFE

A. Migratory Birds

1. Swans. Although at least one pair of Whistling Swans reportedly remained on the refuge during most of the past two winters, no swans remained here more than a few days at a time this fall. The largest flock of swans, 22, were observed in mid-December; no swans were left at the end of the month perhaps because nearly all impoundments were frozen over. Swan use-days were 625, as compared to 368 in 1965.

2. Geese. The number of Canada Geese on the refuge, excluding captive birds, ranged from 97 in July to 226 in October and averaged 144 according to censuses taken once a month. In May up to 52 goslings were counted on different evenings, thus confirming that production in the wild was exceeding production by the captive goose flock. Survival of wild goslings appeared good, as broods of same numbers were repeatedly observed in the same general areas until they became practically

indistinguishable from adults. Total production was estimated to be between 60 and 70.

Total use-days for geese in 1966 were 49,990, as compared to 33,125 in 1965 and only 133 in 1960! In October, 18 Snow Geese spent a few days on the refuge before resuming migration; one Snow Goose was repeatedly seen with Canada Geese in late December.

3. Ducks

a) General.

January - April. Total use-days during this period were 222,900, a decrease of 98,300 use-days from the same period last year (Table 2). Acutal population fluctuations are shown in Figure 3.

May - August. Total use-days amounted to 418,260, an increase of 156,000 over the same period in 1965 (Table 2). A new waterfowl inventory procedure involving standardized walk and drive routes which cover the entire refuge was initiated in June; so this probably accounts somewhat for the large increase this year. A total of 1,056 young were estimated, based on brood counts taken in June and July (Table 3). Note that Mallard production dropped approximately 54 per cent, but Redhead production more than doubled. Cinnamon Teal production also declined over 50 per cent, but nearly twice as many Ruddy broods were observed.

September - December. Peak duck numbers again appeared during this period with a total of 7,129 in November (Figure 3). The 1965 population peak of 10,181 also occurred in November. Total use-days during this period were 697,450, a decline of 59,920 from 1965. This year's fall decline in duck numbers probably was largely due to less available habitat resulting from the drought. The duck population declined rapidly in December because of the freezing over of most of the marsh.

b) Individual Species.

Mallard. Total use-days for this year were 374,800, as compared to 334,900 in 1965. Although Mallard production dropped sharply in 1966, it is encouraging to note that overall usage increased. Mallards were primarily concentrated in Avocet and Harrison pools most of the year. Most Mallards appear to be year-long residents.

Pintail. Total use-days in 1966 amounted to only 296,400, as compared to 426,700 in 1965. Pintails as usual were the most numerous species on the refuge during fall migration (Table 2). The sharp decline of this species in 1966 also may have been primarily due to drought conditions; however, Pintail broods decreased only slightly. Like Mallards, Pintails were most numerous in Avocet and Harrison pools. Curlew Pool also had large flocks of migrants in the fall.

American Widgeon. Total use-days for Baldpates were 119,260, which represents a 142 per cent increase over 1965. This duck has increased more significantly than any other species; for example, in

	January to May				May to September				September to January			
	63	64	65	66	63	64	65	66	63	64	65	66
Mallard	65,700	39,400	98,900	94,000	30,000	26,300	57,500	87,300	51,200	153,800	178,500	193,500
Gadwall	3,400	5,800	9,200	9,000	600	1,600	11,700	16,200	1,600	5,600	27,300	13,200
Widgeon	1,100	2,700	7,900	10,900	40	300	40	60	5,200	22,400	41,300	108,300
Pintail	42,600	48,400	73,000	4,900	42,400	28,600	79,900	96,800	93,100	159,200	273,800	194,700
G.W. Teal	59,000	44,100	93,700	48,400	7,800	4,800	25,600	24,800	45,100	51,000	167,400	143,900
B.W. Teal	100	40	200	400	500	2,500	1,700	600	35	12,700	2,000	0
Cin. Teal	9,200	4,300	7,200	11,000	25,200	21,400	23,400	80,600	8,600	4,700	17,400	13,100
Shoveler	2,500	2,700	8,500	8,900	1,100	3,100	9,000	8,600	500	1,200	5,600	5,400
Redhead	7,500	6,600	13,200	11,600	10,400	10,600	38,600	86,100	3,400	5,000	21,400	9,300
Ruddy Duck	1,200	2,000	4,100	8,400	1,900	4,700	10,800	16,200	600	2,400	18,900	11,800
Others	2,820	5,150	5,300	*15,400	1,014	1,390	3,730	1,000	1,010	1,500	3,770	4,260
Totals	195,120	161,190	321,200	222,900	120,954	105,290	261,970	418,260	210,345	419,500	757,370	697,460

* 8,000 use-days Lesser Scaup and 5,000 use-days R-b. Mergansers.

Table 2. Use-days of principle ducks from 1963-1966.

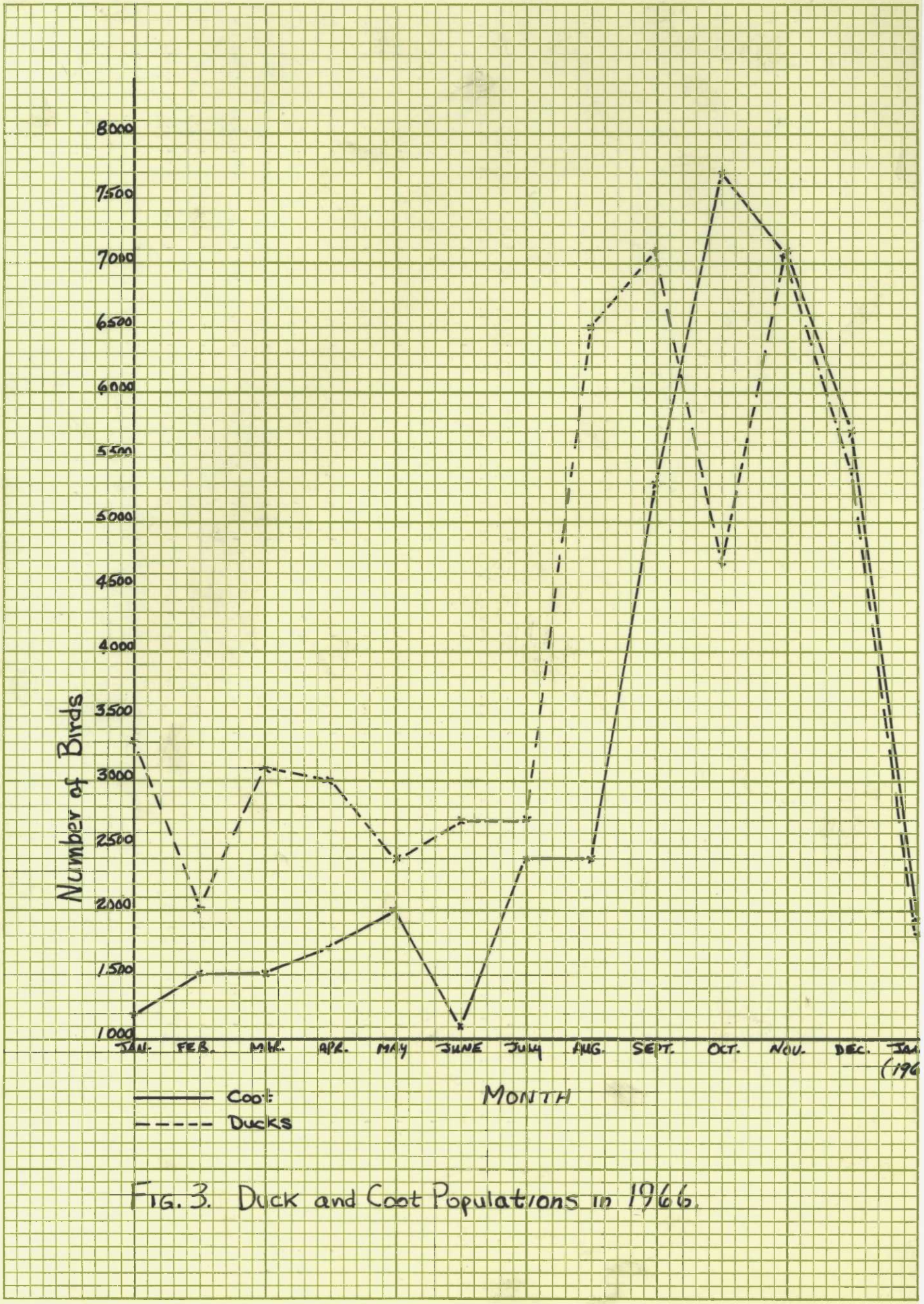


FIG. 3. Duck and Coot Populations in 1966.

1963 only 6,340 use-days were recorded! Widgeons were absent during summer and reached peak numbers (1,883) in November.

Redhead. Total use this year was 107,000 days, an increase of 46 per cent over 1965. This duck was scarce during winter but was the most productive species on the refuge, accounting for 41 per cent of all young counted. Redhead usage and production was heavily concentrated in Egret Pool until it eventually dried up.

Teal. Total Green-winged Teal use-days in 1966 were 217,100, as compared to 286,700 last year. On the other hand, Cinnamon Teal increased markedly with 104,700 and 48,000 use-days in 1966 and 1965, respectively. The former species was most abundant in fall and early winter, while the latter was most numerous during summer, disappearing after October. Blue-winged Teal usage was insignificant and showed a decline from last year (Table 2).

Other Ducks. Total use-days for Gadwall were 38,400, a decline of about 10,000 from 1965. Although present all year, they were most common in summer. Shoveler use was virtually static with a total of 22,900 days. More Ruddy Ducks were evident this year with a total of 36,400 use-days. Total use for all other ducks amounted to 20,660, as compared to 12,800 days in 1965. Other species observed in descending order of use-days included Lesser Scaup, Red-breasted Merganser, Bufflehead, Canvasback, Ring-necked Duck, Common Goldeneye, and Common Merganser.

In conclusion, the total use-days for all ducks during the entire year of 1966 were 1,338,620, a decline of only 2,000 from 1965.

Species	1960	1961	1962	1963	1964	1965	1966
Mallard	200	167	200	222	145	476	217
Gadwall	0	0	0	0	27	48	50
Pintail	40	24	0	40	93	74	66
G.W. Teal	0	24	0	29	0	8	7
C. Teal	115	94	250	137	152	166	78
Shoveler	20	0	38	40	40	45	52
Redhead	10	36	50	111	146	208	435
Canvasback	0	0	0	7	0	61	20
Ruddy	0	0	56	44	44	35	65
Totals	385	345	594	630	647	1121	1056

Table 3. Estimated young based on brood counts in June and July.

American Coot. Peak numbers of Coots (7,770) were recorded in October (Figure 3). Use-days for September through December were nearly twice that for the rest of the year combined. Total use-days for the year amounted to 1,152,000, a figure only slightly less than for all species of ducks combined. Moreover, Coot use increased 24 per cent from 1965, whereas total duck use slightly declined. Coot production was estimated at about 1,200. Mallard Pool received greatest use. Considerable winter mortality, presumably due to starvation was evident.

4. Other Water Birds. No Sandhill Cranes were observed in 1966; the last crane seen on the refuge was in 1964.

Peak numbers of water and marsh birds appeared during the summer. Most abundant species in descending order of total use-days were Snowy Egret, Black-crowned Night Heron, Pied-billed Grebe, Eared Grebe, and Great Blue Heron. Rare visitors included a Double-crested Cormorant, Common Loon, White Pelicans, and Western Grebes. A Horned Grebe was seen in April. Over 100 Snowy Egret and Black-crowned Night Heron nests were found in dense Olney's Bulrush in Avocet Pool.

5. Shorebirds, Gulls, Terns. Shorebird populations reached a peak during mid-summer. Avocets, Black-necked Stilts, and Least Sandpipers were the three most common species. Killdeers, Forster's Terns, Snowy Plovers, California Gulls, and Wilson's Phalaropes were also much in evidence. Some comparatively rarer observations for this refuge included the Black Tern, Northern Phalarope, Spotted Sandpiper, and Common Snipe.

6. Doves and Pigeons. Especially during summer, homing pigeons occasionally appeared around the refuge buildings. Because of the lack of suitable shrub and tree cover, Mourning Doves were uncommon. No doves were banded in 1966.

B. Upland Game Birds

None.

C. Big Game Animals

During the summer three Mule Deer were seen a few times near the office and once at Walter Spring; none were observed on the refuge in 1965. Perhaps the severe drought forced these deer to utilize refuge springs and nearby green forage. Several trees in the headquarters area were apparently girdled by deer and stray sheep. Pronghorn Antelope have been reported south and west of the refuge.

D. Fur Animals, Predators, Rodents, and Other Mammals.

According to the last comprehensive muskrat survey taken in December 1964, 7,768 muskrats were present on the refuge. In 1965 a supplemental count indicated an increase in the population. A new comprehensive inventory, using an airboat to count bank dwellings, was started in December, but persistent ice fogs and low temperatures followed by freezing over of all the pools prevented completion of the census.

This year's drought and the subsequent complete drying up of four pools undoubtedly precluded muskrats from establishing themselves in Egret, Ibis, Gadwall, and Pintail pools. Most of the refuge's muskrats still remain in heavy Olney's Bulrush in the southwestern part of Avocet Pool; spring areas also have a concentration of them. Additional muskrats probably entered Mallard, Shoveler, and Curlew pools, since water remained in them all year long.

Although Black-tailed Jackrabbits are abundant, Coyotes and Bobcats appear scarce, and none were removed by Wildlife Services personnel. In February a large male Raccoon was trapped on the refuge, and since this specie's range supposedly did not include the Great Salt Lake Desert region, its capture raised speculation as to whether Raccoons have extended their range into this area. Dr. Stephen Durrant, mammologist from the University of Utah, doubted that this capture represented a range extension but believed that this Raccoon either escaped or was released, especially since the specimen had most of its tail missing.

Another unusual capture this spring was a Cacomistle; these small, secretive, nocturnal predators inhabit the Fish Springs Range in the vicinity of North Spring and probably other springs as well.

A newly established monthly mammal trend count, which covers 47 miles of road at night, was instituted in December.

E. Hawks, Eagles, Owls, Crows

Golden Eagles were regularly observed on the refuge. Marsh Hawks were the most common predaceous birds and remained in the area throughout the year. Other observations included Short-eared Owl, Great Horned Owl, Red-tailed Hawk, Rough-legged Hawk, Sparrow Hawk, Sharp-shinned Hawk, and Raven. In July one Osprey was seen.

F. Other Birds

No new additions were made to the refuge's bird list in 1966.

G. Reptiles and Amphibians

A checklist of herpetofauna was begun this year. Thus far the following species have been found: Western Spadefoot (Scaphiopus hammondi), Bullfrog (Rana catesbiana), Leopard Frog (R. pipiens pipiens), Leopard Lizard (Crotophytus wislizeni), Desert Horned Toad (Phrynosoma platyrhinos), Sagebrush Lizard (Sceloporus graciosus), Side-blotched Lizard (Uta stansburiana), Western Whiptail (Cnemidophorus tigris), Desert Striped Snake (Masticophus taeniatus), Gopher Snake (Pituophus catenifer deserticola), Western Garter Snake (Thamnophis elegans terrestrus), and Western Rattlesnake (Crotalus viridis lutosus). No rattlesnakes were found in the headquarters area this year.

H. Fish

Desert Chub and Mosquito Fish were common in most inundated portions

of the refuge, especially in springs and ditches where salinity and temperature and consequently oxygen levels, remained favorable during summer. Thousands of dead fish appeared in Egret, Ibis, and Pintail pools by late spring because of excessive water salinity and temperatures which preceeded the drying up of these pools. Herons and egrets relied heavily on fish concentrated in collection and distribution ditches.

I. Disease

None.

III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development

A large amount of time was spent maintaining and enhancing the appearance of the headquarters area. Additional lawns were planted behind employee housing, and eroded banks were repaired and faced with rock. The rock wall around the garage area was practically completed, and a rock wall was built around the bunkhouse. A new sprinkler and water system which utilizes a gasoline engine pump at Middle Spring was installed. This system precluded the necessity of using the refuge's electric domestic water supply pump for irrigation of trees, shrubs, and lawns. Several culverts and concrete drainage ditches were constructed around headquarters. Other work begun or completed at headquarters included construction or repair of 126 check dams, a concrete vehicle wash rack, a wall foundation behind quarters number 40, and installation of a 175,000 B.T.U. heater in the east garage. Two new refuge entrance signs with rock bases were erected in the summer.

One of the main projects away from headquarters was preparation of a recreation area in the vicinity of the old Thomas Ranch site. Work included spreading gravel over the area, designating camping spots with concrete blocks, installing culverts, and provision of a chemical toilet and garbage cans. Adjacent to the recreation site a new display pen was constructed for the seven remnants of our captive goose flock.

Enlargement and additional gravelling of the equipment storage yard, spreading of gravel on the east side of the original goose pen to facilitate feeding operations, installment of water elevation gauges with the aid of a Regional Office engineer, erection of a third grain bin, completion of a ditch from North Spring sloughs to Harrison Pool to stop water from leaking out of the refuge, digging of an outlet to Deadman Spring to see if additional water could be procurred, and the marking of newly established walk routes for the standardized census were among other projects completed in the field.

Maintenance of vehicles and other equipment was quite a burden with the vacancy of both maintenanceman positions for the last half of the year. Extensive troubles were experienced with one of the two generators. Although finally completely overhauled in Salt Lake City, it still failed to operate properly and consequently was shuttled

back and forth to Salt Lake most of the fall. The airboat was overhauled and modified for use on census and banding operations. Other significant maintenance jobs included repairing eroded dikes and roads around Ibis Pool; major plumbing repairs at headquarters, including rehabilitation of the refuge's domestic water supply well and pump; repainting of the interior of quarters number 40; removal of weeds and other debris from structures and ditches; grading of roads; and care of lawns and trees.

In February and March 250 bushels of grain were dispersed along dikes to deminish late winter starvation and to induce early migrants as well as some winter residents to remain and later nest on the refuge.

B. Plantings

1. Aquatic and Marsh Plants. Approximately 900 pounds of Alkali Bulrush were seeded on the refuge on about 18 acres. Survival appeared at least 60 per cent on most areas. This species has been the most successful of all aquatics tried so far.

2. Trees and Shrubs. None.

3. Upland Herbaceous Plants. None.

4. Cultivated Crops. About 12 acres of refuge farm sloughs were prepared and seeded to Alkali Bulrush (Scirpus robusta) this spring in an endeavor to provide feed during the fall and winter. This seed was purchased in California as cleanings from the rice mills and is considered a pest or worse to the rice farmers. The seed was soaked for ten days and then hand broadcasted on the prepared seed bed. Six acres in unit Ia (Pintail Pool) showed good germination and despite the severe dry season produced a respectable seed crop; however, 5.6 acres in unit IIIe (Harrison Pool) did not fare as well, as adequate irrigation water was not available.

Six acres of alkali bulrush planted in an experimental area were very successful since it was close enough to a good source of irrigation water. This type of planting will be flooded from the warm springs during the critical winter freeze-over when food is scarce. The Salton Sea Refuge and state management units in the Imperial Valley of California have had very good success with this alkali tolerant plant. It was found in California that Snow Geese actually preferred this food over other types with duck utilization being good, especially with Pintail and Green-winged Teal.

Water control is of the utmost importance in the establishment of good stands of Alkali Bulrush, and the saltier the soil, the more critical is the necessary water control. Narrow borders have been found to produce more uniform dense stands with the soil being kept at a mud flat stage for approximately 30 days. Germination takes place between 15 to 20 days, and seed heads can be formed in 90 days. Once the plants mature they are quite hardy and the units can be dried up until needed. Next year,we plan to seed some of the more extensive salt flat units by using the large helicopters from the nearby Dugway Proving Grounds.

Other experimental plantings were carried out on a limited basis with Jap Millet, Tall Wheatgrass, Caribou Rye, and Overland Oats. However, the results were poor to indifferent because of the extremely dry, hot spring and summer.

C. Collections and Receipts

1. Seed and Other Propagules. Barley transferred to this refuge from Tishomingo N.W.R. totalled 681 bushels. By the end of the year most of the barley had been consumed by the captive goose flock and wild birds which visited the pen.

2. Specimens. As discussed previously in the section on mammals, a Raccoon was trapped in February; the specimen was sent to the U. S. National Museum in Washington D. C.

D. Control of Vegetation

Salt Cedar (Tamarix pentandra) control was continued this year on a limited basis. Eradication was accomplished by cutting or pulling up the young plants when time and personnel were available.

E. Planned Burning

1. General. In the spring some burning of Smotherweed (Kochia sp.) was done along roads and ditch banks with a butane burner mounted on a jeep. Early in April, 25 acres of old sloughs in the east drainage of North Spring were burned prior to planting. Most of the area was burned clean by the initial fire as it passed through; however, isolated protected spots were treated individually.

F. Fires

None.

IV. RESOURCE MANAGEMENT

A. Grazing

None.

B. Haying

None.

C. Fur Harvest

During 1966 James Harrison, the refuge's only trapper, harvested 1,173 muskrats and sold the pelts for about $1,400. In accordance with the annual Fur and Predator Plan, muskrat concentrations in Avocet Pool and around springs were trapped, while more recently flooded areas were left alone.

D. Timber Removal

None.

E. Commercial Fishing

None.

F. Other Uses

J. A. Shriber, leasee of 100 acres of refuge land for frog farming, appeared only on one weekend this year. Litigation to terminate his lease is still pending before the U. S. District Court in Salt Lake City.

S. R. Mahoney, operator of a peat lease on the refuge, visited several times and on two occasions hauled out a total of about 40 cubic yards of peat.

V. FIELD INVESTIGATION AND APPLIED RESEARCH

A. Banding

This year's banding operation was the best since creation of the refuge; a total of 1,022 ducks and geese were banded (Table 4), as compared to 1,256 banded in all years prior to 1966. To date a grand total of 2,278 waterfowl have been banded at this refuge. This year's banding success was mainly attributed to usage of the refuge's airboat, as suggested by Donald McKnight, graduate student from Utah State University. The airboat was equipped with 1,650 watts of light and operated after dark during July and August when most ducks were flightless. As many as 80 ducks a night (4 hours) were banded, using three men in the boat; one man operated the boat while the other two captured ducks with a large dip net and placed them in sacks for subsequent banding on shore. This method accounted for 454 birds banded; 388 and 180 ducks were captured in a bait trap and drive trap, respectively.

Species	Number	Species	Number
Redhead	359	Shoveler	17
Mallard	306	Canvasback	8
Pintail	149	Green-winged Teal	6
Gadwall	69	Canada Goose	15
Cinnamon Teal	67	Total	1022
Ruddy Duck	26		

Table 4. Birds Banded in 1966.

Recovery information of birds banded since establishment of the refuge in 1959 is presented in Table 5. Most of the 14 Mallard band recoveries from other areas indicate movements within the Great Basin area. In addition to the above outside recoveries, 26 Mallards have been recovered on the refuge (not shown in table). Many Mallards are evidently residents. The 11 Pintail recoveries, on the other hand, suggest that most of these ducks migrate to California and Mexico. Only one Pintail so far has been both banded and recovered on the refuge. Like Pintails, band recovery data suggest that Green-winged Teals migrate west and south. Only two teals have been both banded and recovered here. Thus

Drive trap being constructed in Egret Pool. Graduate student Donald McKnight from the Utah Cooperative Wildlife Research Unit at Logan, Utah, advised and assisted in trapping program.

Sacking up portion of the ducks trapped during the initial drive which netted roughly 200 birds. The majority of the ducks banded were Redheads with a few Canvasbacks and Ruddys.

Aging and sexing of the ducks was carried on by the whole crew working as a team with the processing being completed in about three hours.

Photo shows Donald McKnight banding a Redhead prior to releasing. This is the first year that refuge reared Redheads were banded and we are hopeful that band returns will show their wintering areas.

With data collected and birds banded, the final step was releasing. The complete operation was very successful with only one duck being lost and this due to the heat.

Photo shows Redhead on left and Canvasback on right. Fish Springs is one of the only two or three locations in Utah that record Canvasbacks as nesting and raising young.

Species	Date Banded	Date Recovered	Location of Recovery
Mallard	2-12-64	10-10-64	Farmington Bay W.M.A., Utah
"	2-18-64	10-9-65	Mud Lake, nr. Dingle, Idaho
"	1-16-64	11-20-64	Delta, Utah
"	2-21-64	11-7-64	Malad R Plymouth, Utah
"	2-22-64	10-3-64	Ruby Lake N.W.R., Nevada
"	10-2-64	11-17-64	Goshen, Utah
"	9-4-64	11-13-65	Clear Lake, Utah
"	12-19-64	1-2-66	Rosamond, California
"	9-29-65	2-3-66	Farmington Bay W.M.A., Utah
"	10-23-65	10-20-65	Lava Hot Springs, Idaho
"	10-7-65	12-65	Alamo, Nevada
"	9-5-65	10-9-66	Ogden Bay W.M.A., Utah
"	9-29-65	10-12-66	Farmington Bay W.M.A., Utah
"	8-4-66	10-8-66	Swan Lake, nr. Deseret, Utah
Pintail	1-15-64	3-25-65	Ulysses, Kansas (SW Kansas)
"	1-15-64	11-1-64	Oxnard, California
"	2-25-64	11-7-64	Wister, California
"	9-11-62	12-28-64	Culiacan, Mexico
"	9-14-62	12-7-63	Niland, California
"	9-14-62	11-10-63	Oakland, California
"	10-1-62	11-10-65	Niland, California
"	9-10-64	10-28-64	Niland, California
"	9-10-64	1-27-65	Los Mochis, Sin Mexico
"	9-23-64	1-20-65	15 mi. N. of Panuco WC Mexico (Near Tampico)
"	9-12-64	9-28-66	Gray Lodge W.M.A., Calif.
G-w. Teal	3-6-64	10-29-64	Oxnard, California
"	3-6-64	1-16-66	Hiko, Nevada
"	12-15-64	'65 hunt season	Deer Creek Res., Utah
"	2-8-65	12-18-65	Buhne Pt., Eureka, Calif.
"	2-10-65	12-29-65	Gustine, California
"	2-18-64	1-21-66	Colo. R. Delta, BC Mexico
"	2-19-64	11-1-64	Gustine, California
"	2-19-64	2-15-65	Laguna Los Adohas, Mexico
Redhead	8-31-65	10-8-66	Eden, Idaho
C. Goose	6-22-61	12-29-63	Fayette, Utah
M. Dove	6-13-64	12-15-64	E. of Guadalajara, Jalisco Mexico

Table 5. Birds banded at Fish Springs and recovered elsewhere.

far 75 birds or 3 per cent of all waterfowl banded have been recovered.

With 359 Redheads banded this year, some returns should be forthcoming. Table 6 lists birds that were banded at other locations and recovered at Fish Springs. Note that five of the eleven banded birds were from Ruby Lake N.W.R.

Species	Date Banded	Date Recovered	Location of Banding
C. Goose	7-21-60	11-8-62	Bear River N.W.R., Utah
Mallard	9-18-63	10-11-63	Ruby Lake N.W.R., Nevada
"	9-9-64	8-30-66	Ruby Lake N.W.R., Nevada
"	1-18-63	10-5-63	Overton, Nevada (Nev. F. & G.)
"	8-29-59	1-17-64	Fillmore, Utah (Utah F. & G.)
"	10-2-60	1-2-61	Ruby Lake N.W.R., Nevada
"	3-18-64	9-23-66	Hiko, Nevada (Nev. F. & G.)
Pintail	8-31-64	9-1-66	Ruby Lake N.W.R., Nevada
"	9-12-64	9-24-66	Stillwater W.M.A., nr. Fallon, Nevada
"	9-24-60	10-9-65	Ruby Lake N.W.R., Nevada
G-w. Teal	10-27-61	2-19-64	Naples, Idaho (Idaho F. & G.)

Table 6. Birds banded elsewhere and recovered at Fish Springs.

B. Captive Goose Flock Management

Production by the 50 captive geese was poor. A total of 62 eggs were counted in the goose pen, and only 40 of these hatched for a hatching success of 65 per cent, which is average for Canada Geese in most areas. Survival was only 30 per cent with only 12 goslings reaching adult size. Hence, total productivity (goslings surviving divided by the number of eggs laid) was a meager 19 per cent. Mortality of Canada goslings in the wild usually is less than 20 per cent. The cause of excessive mortality in the pen was not definitely ascertained. Twenty goslings out of 42 hatched survived last year, but in 1964 only 8 out of 41 survived. High mortality in 1964 was attributed primarily to perosis. One persistent goose incubated three infertile eggs for 71 days!

Because of the poor productive history of the captive flock, mounting grain consumption by wild ducks and geese visiting the pen, and considerably better production by increasing numbers of wild geese on the refuge, it became apparent that the captive flock was no longer needed. Hence, on November 28, 37 captive geese were transferred to the Navajo Indian Reservation at Window Rock, Arizona. It is hoped that breeding success will improve with the flock's new home. Seven captive geese were retained and placed in a newly constructed display pen close to headquarters.

VI. PUBLIC RELATIONS

A. Recreational Uses

A sum of 1,155 visits were recorded in 1966; 224 visits were accounted

for by hunters, while the remaining 931 visits were attributed to recreational, official, and economical uses.

Five school groups from Tooele, Partoun, and Eureka, Utah, with a total of 166 students and teachers toured the refuge during spring. Also, three Boy Scout groups totalling 53 people were given tours of the area. A group of 40 University of Utah mammology students and faculty spent the Memorial Day weekend collecting specimens on and nearby the refuge.

In summary, 396 visitor days were recorded during the past year in actual use or participation in recreational activities. This total excludes numerous inquiries at the office by tourists, rock hounds, and curiosity seekers as to where they were and how to get back to civilization. Flat tires, shortage of gasoline, and minor breakdowns were the usual reasons for the refuge personnel to come in contact with these hardy souls who unknowingly braved this somewhat primitive area.

B. Refuge Visitors

		Purpose of Visit
February		
28	Dr. Paul C. Fawson, Supt. Tintic School District; Eureka, Utah	Courtesy
March		
27	E. Arlo Richardson and D. C. Hirschi, WBSCO; Logan, Utah	Check weather station
April		
11	Mr. & Mrs. R. Gritman, Bear River Research Station; Brigham City, Utah	Visit
14	Charles T. Bostick, BSF&W Douglas, Arizona	Water gauge installation
22	Earl Spendlove, Soil Conservation Service; Nephi, Utah	Experimental planting
May		
5	Dr. Keith L. Smart, Ecology Section Dugway Proving Grounds, Utah	Courtesy
June		
14	A. Duane Sperry, Sheriff Nephi, Utah	Courtesy

17	Mr. & Mrs. Lynn A. Greenwalt, BSF&W Albuquerque, New Mexico	Visit
17	Mr. & Mrs. Ernest Greenwalt Tooele, Utah	Visit
July		
20	Terral F. King, Bureau of Land Mgmt. Salt Lake City, Utah	Mutual matters
28	J. B. Low, Utah State University Logan, Utah	Mutual matters
29	Dale Nelson, Supt. Tintic School District; Eureka, Utah	Courtesy
30	Commander W. C. Cook, U.S. Navy, CBR School; Dugway Proving Grounds, Utah	Visit
August		
20	C. R. Lomax, State Representative Nephi, Utah	Courtesy
20	Colonel Joseph Rogers, Deputy Commander Dugway Proving Grounds, Utah	Visit
September		
8	Earl Spendlove, Soil Conservation Service; Nephi, Utah	Experimental planting
30	Colonel Paul Sheffler, Chief, Medical Staff, Dugway Proving Grounds, Utah	Visit
October		
10	John D. Umbergor, BSF&W, Region 3 Minneapolis, Minnesota, and Francis V. Olson, BSF&W, Region 2 Albuquerque, New Mexico	Inspection
15	Colonel Joseph J. Fraser, Commanding Officer, Dugway Proving Grounds, Utah	Visit
20	Keith Junker and Leo Osborne, U. S. Dept. of Agriculture; Nephi, Utah	Courtesy

In addition to the above list, frequent visits were made by personnel from the various State Fish & Game offices. The Ecology and Epizoology Division at Dugway, including both Army and University of Utah branches, often stopped to use the refuge radio, as did other Army and Dugway Security Office personnel.

"Ike" Pomel, Wildlife Services Trapper, stopped regularly to check coyote getters on the refuge, and U.S.G.S. Ground Water Branch personnel stopped whenever they were in the area to check gauges.

A few visits were made by the county road supervisor in addition to the numerous visitors wanting to buy gas and ask directions.

C. Refuge Participation

In April Refuge Manager Yoder presented a slide program concerning refuge activities to 40 people in Callao, and in July approximately 100 persons viewed the refuge's exhibit at the West Desert Fair held in Callao.

Assistant Manager Bailey attended a one-day law enforcement training session conducted by U. S. Game Management Agent Ritter. This session was later followed by two days of field experience.

D. Hunting

Waterfowl hunting pressure increased considerably this year with 224 hunter trips recorded, an increase of 78 per cent over 1965. Hunters spent 1,110 hours afield, bagged 599 ducks and coots, and crippled an additional 82 for a total kill of 681. The average number of birds bagged per hunter was 2.67. In 1965 only 430 hours of hunting were reported with a total kill of 370 birds. Approximately 40, 15, and 10 per cent of this year's total bag were Mallards, Pintails, and Coots, respectively.

Most hunters came from Dugway Proving Grounds, but some drove from as far away as Ogden to escape the crowds. Many hunters revisited the marsh several times, and a few stayed overnight in the newly developed camping area.

E. Violations

No field violation reports were made, but in March two Mallards were found shot by a rifle near the road passing Avocet Pool. Furthermore, some shooting evidently took place at the goose pen during deer season.

F. Safety

Monthly safety meetings were held most of the year. No lost time accidents occurred, and the number of consecutive man-days without an accident stood at 3,951 on December 31, 1966. Safety inspections of buildings, grounds, and equipment were periodically made. All refuge fire extinguishers were checked and properly recharged in December.

VII. OTHER ITEMS

A. Items of Interest

The refuge staff was saddened with the insidious illness and subsequent death of our maintenanceman, Clyde B. Peay, on August 19, 1966. Clyde had been with the refuge since December 1965 as a permanent employee and prior to his appointment had worked for the refuge on three different occasions as a temporary summer laborer.

Jimmie Layland who had been with the refuge for over three years as a maintenanceman quit the service in July 1966 to join his brother in construction work. Jimmie and his family now make their home in Salt Lake City.

The following pictures were located with the help of Mr. Lyle Sabey, at present a refuge employee, and the originals copied and returned. These photos were in the possession of Mrs. Eva Sutherland now 74 years young and living in Tooele, Utah. Mrs. Sutherland, the only daughter of John J. Thomas former owner of the Fish Springs Valley, raised Mr. Lyle Sabey until he was about seven years old. He recalls much of the area as it was when he was young and has many interesting tales to tell of the area.

The first narrative from Fish Springs was put out by Mr. Lynn A. Greenwalt in 1959 when he pioneered the refuge. In this report he wrote "The first actual settlement of the Fish Springs marsh area occurred in 1860, when a way station for the Central Overland California and Pike's Peak Express was built near what is now called House Springs on the refuge. The small stone station house remained standing until the late 1940's, when the walls were torn down and incorporated in a dike built near South Spring. The foundation and packed-gravel floor are still in place, however." It is suspected that the earliest homestead at Fish Springs was established in 1883; however, it was shortly after 1890 when the colorful figure of John J. Thomas entered the picture.

Also quoted from Mr. Greenwalt's first narrative is this section on the Lincoln Highway. "The nation's first transcontinental road, the Lincoln Highway, passed through Fish Springs. Much of the original road is now overlain by the Tooele-Callao road, but about three-fourths of a mile of the original road still exists near South Springs."

Fish Springs Station was made famous when Mark Twain wrote about it in his book called Roughing It. There is also a very interesting chapter on Fish Springs called Robber Barons and Swindlers in Dr. Peck's book called What Next, Doctor Peck? Dr. Joseph H. Peck was a young doctor fresh from internship in 1916 when he accepted the medical supervisor position of a railroad construction gang in the lonely desert of western Utah. The following is quoted from Dr. Peck's book. "Fish Springs Valley was the undisputed kingdom of John Thomas, who owned all the water. He was a man whose appearance and demeanor were the counterpart of the story book descriptions of what a king should look

like. He was six feet four inches tall and four feet wide, and he had a voice that could be heard clear across the valley. It took a generous supply of rocket fuel to start him in the morning, but once he got going he was a dynamo of energy and good humor. He was a rough old diamond, and the country he lived in was not likely ever to smooth him up. A member of a breed of Americans as rare now as the dinosaur, he conformed to nothing but his own desires. He was absolute monarch of an area as large as some European states, with a resident population of two: Charley, his only subject and close friend, and himself."

It was said that John Thomas prospered from tourists on the Lincoln Highway who tried to take short cuts acrossed the marsh just south of his station. He kept two powerful draft animals harnessed and in the barn for these emergencies and charged one dollar a foot to drag the car back to firm ground. The great Eddie Rickenbacker was said to have been one of his victims during a cross country run on the Lincoln Highway and contributed to what was claimed to have been up to one hundred dollars a day during the summer.

The following is also quoted from Dr. Peck's book. "John was called by a good many names, none of them complimentary. Robber Baron or Robin Hood were as appropriate as any of them. He struck the rich and helped the poor and unfortunate, but his dignity more nearly resembled Friar Tuck. I spent many happy hours listening to the tales of the great and near great in that old stage station, and had the sad experience of sitting at his bedside when this rugged individualist breathed his last. I have checked with his only living close relative, a daughter, and she has given me permission to repeat some of the stories about him, stories which are absolutely true."

As mentioned earlier the following pictures were obtained from John Thomas' only daughter as cited in Dr. Peck's book. The captions on the photos are exactly the same as on the original photos.

Assistant Refuge Manager Bailey prepared the forms and the majority of the text of this report. Refuge Clerk Sabey compiled the refuge visitor list and typed the forms and text, including figures and tables.

B. Photographs

A selection of photographs made during the period is attached.

C. N.R. Forms

Appended as follows.

Submitted by:

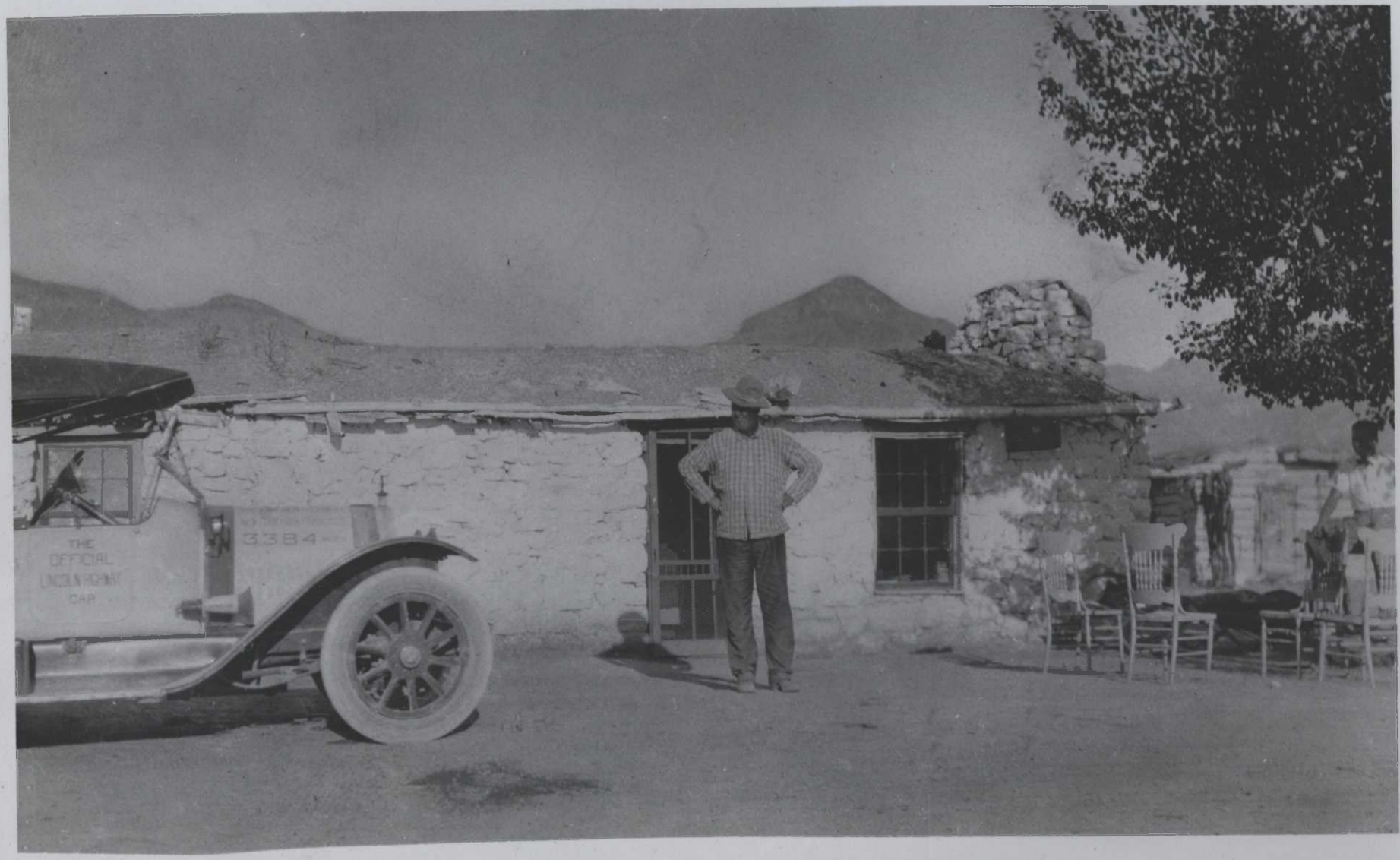
Robert G. Yoder

January 20, 1966

Reviewed by:

William J. Kramer 2/25/67

Regional Director



J. J. Thomas, proprietor of Fish Springs, Utah, famous overnight stop west of Salt Lake City on the Lincoln Highway


L
LINCOLN HIGHWAY
CAR

J. J. Thomas Ranch - Fish Springs Nevada.

Photos showing part of the beautification efforts in and around headquarters and residences. This view is looking north toward shop and and office building with equipment storage building on left.

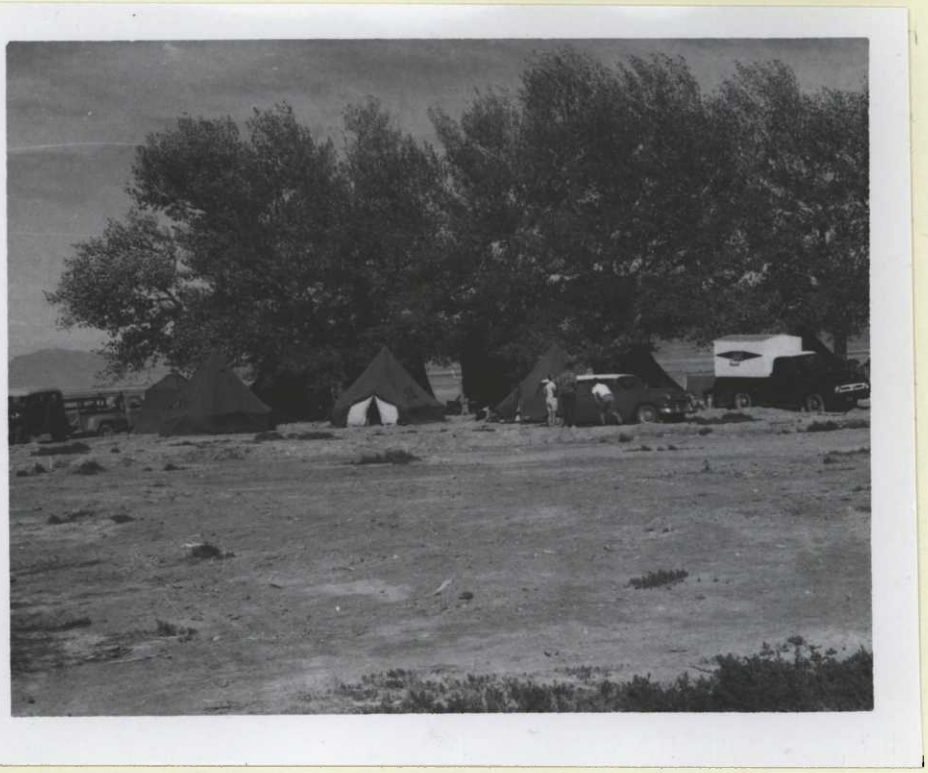
Looking south toward bunkhouse and guest quarters. Rocking of wall will prevent erosion and sloughing of fill. Partial establishment of a mixture of Perennial Ryegrass, Kentucky Bluegrass, and White Dutch Clover is shown in foreground and along driveway.

Portion of the prepared seed bed in the soil and moisture experimental unit. Alkali Bulrush seed was soaked for 10 days prior to hand broadcasting.

Same unit showing good germination and growth of this alkali tolerant species. Once the seed head was formed the water was removed and units dried up until needed this fall or winter.

Visitors of all ages used the refuge this year and groups were toured around the impoundments and given talks on refuge work and conservation. This is a grade school from Partoun, Utah, our closest school at 35 miles distance.

Group of high school students from the Tintic High School about 100 miles distance.



Group from the University of Utah in Salt Lake City on a mammalogy field trip. Dr. Durrant, author of Mammals of Utah, was the professor in charge.

Donald McKnight is kneeling on the bank while Dr. Robert Elbel is checking out a stand of Sago Pondweed in main collection ditch. Don will be working on the refuge dealing with waterfowl production on saline marshes for his Ph.D. dissertation. Dr. Elbel is with the E and E branch at the Dugway Proving Grounds.

Photo shows stockpile of peat and the leasee loading some for trip to Salt Lake City. Sporatic interest was shown in this lease during the spring because of hopes to renew this 10 year lease which was to expire 12/65.

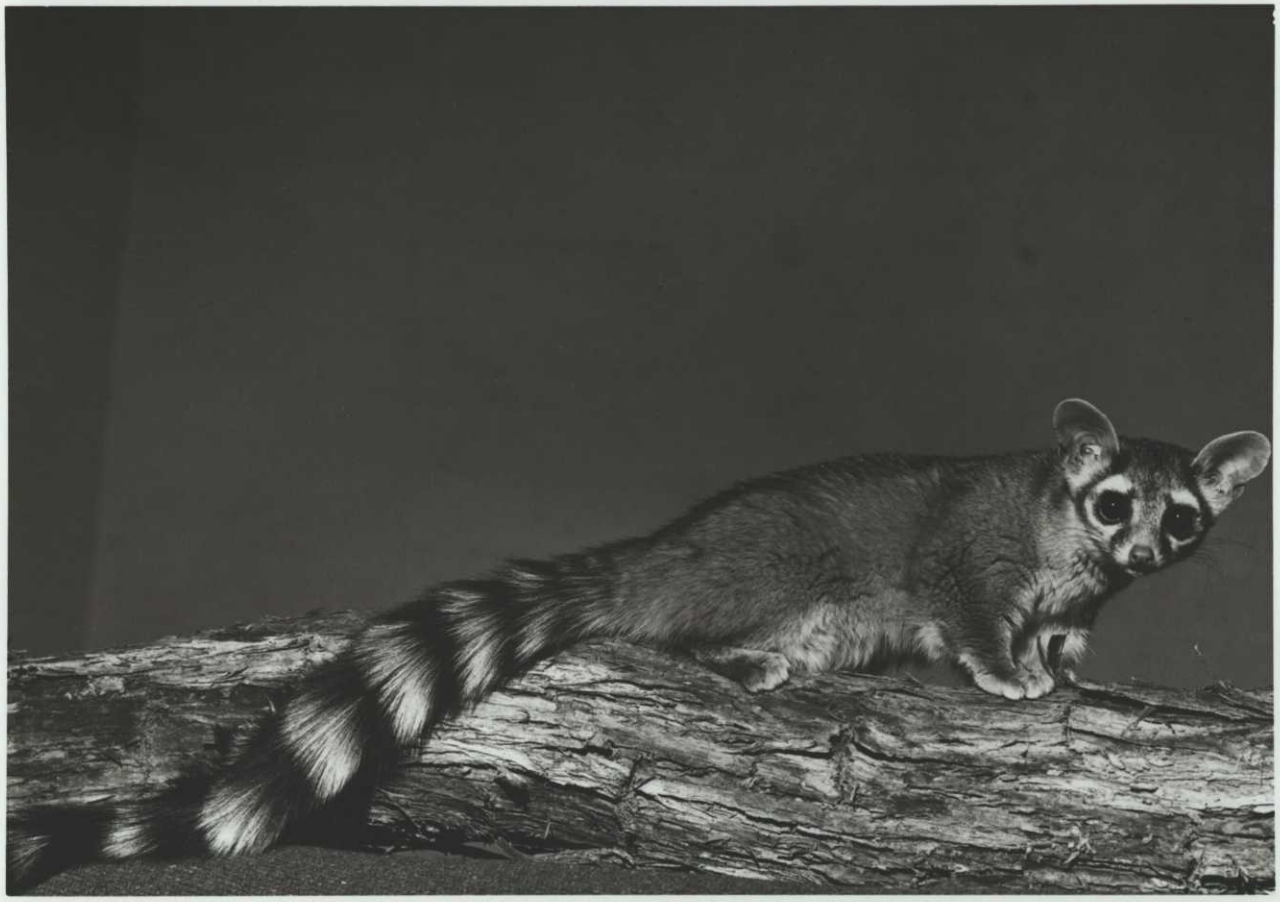
Load of peat will be taken to Salt Lake City where it will be processed into a marketable item. At this stage of the game it is loaded with salt which must be flushed out before it can be utilized.

"Old Jim" showing some of the muskrat pelts taken this year on the refuge. These represent good size adult rats with prime fur.

Damaged skins are being pointed at by former land owner and now winter resident and refuge trapper Jim Harrison. Congestion around warm spring heads causes this as "bucks" fight among themselves.

Refuge Bombardier tractor being returned from Naylor Equipment Co. in Salt Lake City where the backhoe was adapted and mounted. Depth of cut is between 6' and 7' and the present bucket is 18" wide. This attachment has increased the versatility of the tractor 100 per cent.

Racoon pelt and skull which was sent to the U. S. National Museum, as mentioned in the text. This bob-tailed specimen is suspected as being a released pet rather than a normal range extension.



Cacomistles or Ring-tailed Cats are uncommon in the Great Basin region. A female was trapped near North Spring in May; only one other specimen ever has been captured in this area before. Examination of a cave above the spring revealed several remains of muskrats apparently captured by Cacomistles.

A nesting colony of Snowy Egrets was found in dense Olney's Bulrush in Avocet Pool. Note that two of these nestlings have characteristic yellow bills while the other has a black bill.

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

WATERFOWL

REFUGE Fish Springs MONTHS OF January TO May, 19 66

(1) Species	(2) Weeks of reporting period 1	2*	3	4	5	6*	7	8	9	10*
Swans:										
Whistling	5	5	5	5	0	0	0	0	0	0
Trumpeter										
Geese:										
Canada	110	140	120	125	120	122	133	140	135	123
Cackling										
Brant										
White-fronted										
Snow										
Blue										
Other										
Ducks:										
Mallard	1600	1500	1400	1200	1000	849	850	850	830	820
Black										
Gadwall	80	80	100	130	140	144	120	100	70	50
Baldpate	20	30	100	130	140	144	140	130	125	120
Pintail	700	800	650	600	600	560	550	500	480	460
Green-winged teal	600	700	560	325	200	193	300	750	900	980
Blue-winged teal										
Cinnamon teal	8	8	8	8	10	14	20	30	75	85
Shoveler				10	25	27	100	125	170	180
Wood										
Redhead	10	10	8	8	8	8	6	10	80	120
Ring-necked	5	5	4	0	0	0	0	0	10	14
Canvasback	0	0	0	0	0	0	0	0	4	6
Scaup	5	5	5	10	15	22	50	75	100	120
Goldeneye	2	2	2	0	0	0	0	0	0	0
Bufflehead	0	0	0	0	0	0	0	10	20	25
Ruddy	120	130	110	100	70	55	40	35	30	28
Other R.B. Merganser	0	0	0	0	0	0	0	10	10	20
Totals	3150	3270	2947	2521	2208	2061	2176	2625	2904	3028
Coots	1100	1200	1200	1300	1400	1456	1480	1485	1490	1500

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

WATERFOWL
(Continuation Sheet)

REFUGE Fish Springs MONTHS OF January TO May , 19 66

(1) Species	(2) Weeks of reporting period 11	12	13	14*	15	16	17	18	(3) Estimated waterfowl days use	(4) Production Broods seen	Estimated total
Swans:											
Whistling	0	0	0	0	0	0	0	-	140		
Trumpeter											
Geese:											
Canada	144	110	100	59	60	55	60	-	13,100		
Cackling											
Brant											
White-fronted											
Snow											
Blue											
Other											
Ducks:											
Mallard	700	400	300	285	260	250	225	-	93,960		
Black											
Gadwall	40	40	30	26	30	40	50	-	8,970		
Baldpate	100	96	90	88	60	30	15	-	10,970		
Pintail	400	350	100	40	40	35	40	-	4,870		
Green-winged teal	600	350	200	106	50	30	10	-	48,400		
Blue-winged teal	0	10	10	10	8	8	8	-	378		
Cinnamon teal	100	125	150	179	160	130	120	-	11,040		
Shoveler	150	115	85	79	70	70	60	-	8,870		
Wood											
Redhead	156	160	170	170	176	180	185	-	11,630		
Ring-necked	14	10	5	0	0	0	0	-	470		
Canvasback	6	6	5	5	5	2	0	-	273		
Scaup	130	140	150	170	100	30	20	-	8,100		
Goldeneye	0	2	2	2	2	0	0	-	98		
Bufflehead	30	30	35	40	30	10	0	-	1,610		
Ruddy	45	60	60	76	75	80	80	-	8,430		
Other R.B. Merganser	30	100	150	175	120	40	20	-	4,760		
Totals	2501	1988	1542	1451	1186	935	833				
Coot:	1500	1500	1500	1515	1400	1300	1200	-	166,000		

(over)

	Total Days Use	Peak Number	Total Production
Swans	140	5	0
Geese	13,100	144	
Ducks	222,800	3,270	
Coots	166,000	1,515	

SUMMARY

Principal feeding areas

Principal nesting areas

Reported by Robert G. Yoder

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).

* Actual censuses made during these weeks; trend counts made other weeks. Beginning in June 1966, standardized walking censuses will be made through slough areas not visible from dike roads. This should increase census data reliability from class C to class B.

Interior Duplicating Section, Washington, D. C.
1953

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

WATERFOWL

REFUGE Fish Springs MONTHS OF May TO September, 19 66

(1) Species	(2) Weeks of reporting period 1	2	3*	4	5	6	7 *	8	9	10
Swans:										
Whistling										
Trumpeter										
Geese:										
Canada	100	100	103	105	105	106	108	106	106	100
Cackling										
Brant										
White-fronted										
Snow										
Blue										
Other										
Ducks:										
Mallard	410	410	412	400	450	500	525	600	600	700
Black										
Gadwall	90	100	106	150	180	240	261	240	200	140
Baldpate										
Pintail	50	70	76	150	200	350	453	350	340	300
Green-winged teal					10	12	15	10	5	
Blue-winged teal	2	4	6	6	10	10	13	10	5	2
Cinnamon teal	230	230	236	300	400	400	458	475	500	525
Shoveler	100	100	108	100	100	100	103	100	70	50
Wood										
Redhead	400	400	400	450	500	630	700	750	800	900
Ring-necked										
Canvasback								2	10	14
Scaup	10	12	13	13	13	14	14	10	2	
Goldeneye										
Bufflehead										
Ruddy	150	150	166	160	160	160	162	150	130	100
Other										
Coot	1030	1030	1030	1030	1030	1040	1050	1200	1800	2000

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

WATERFOWL
(Continuation Sheet)

REFUGE Fish Springs MONTHS OF May TO September, 19 66

(1) Species	(2) Weeks of reporting period 11	12	13	14	15	16	17	18	(3) Estimated waterfowl days use	(4) Production Broods seen	Estimated total
Swans:											
Whistling											
Trumpeter											
Geese:											
Canada	97	100	120	130	150	163	170	170	15,000	15	63
Cackling											
Brant											
White-fronted											
Snow											
Blue											
Other											
Ducks:											
Mallard	722	800	850	900	950	1042	1100	1100	87,300	35	217
Black											
Gadwall	95	90	80	70	60	56	70	80	16,150	8	50
Baldpate						1	2	5	60		
Pintail	283	300	600	1000	2000	2397	2400	2500	96,800	10	66
Green-winged teal		10	25	50	500	898	1000	1000	24,800	1	7
Blue-winged teal							6	10	588		
Cinnamon teal	533	600	800	900	1000	1255	1300	1400	80,600	13	78
Shoveler	34	35	35	35	35	36	38	50	8,610	6	52
Wood											
Redhead	916	900	860	780	700	684	700	800	86,100	69	435
Ring-necked											
Canvasback	21	20	16	15	10	8	10	20	1,020	5	20
Scaup											
Goldeneye											
Bufflehead											
Ruddy	88	90	100	100	100	110	120	120	16,200	12	65
Other											
Coot:	2436	2400	2400	2400	2400	2396	2400	2436	221,000		1200

(over)

	Total Days Use	Peak Number	Total Production
Swans	0	0	0
Geese	15,000	170	63
Ducks	419,000	7,000	990
Coots	221,000	2,436	1,200

SUMMARY

Principal feeding areas **Avocet, Shoveler, & Egret Pools**

Principal nesting areas **Avocet, Shoveler, Egret & Mallard Pools**

Reported by _____

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).

*** Asterick denotes class B reliability; all other weeks are class C reliability.**

Interior Duplicating Section, Washington, D. C.
1953

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

WATERFOWL

REFUGE Fish Springs MONTHS OF Sept. TO Jan., 19 67

(1) Species	(2) Weeks of reporting period 1	*2	3	4	5	*6	7	8	9	10
Swans:										
Whistling							7			2
Trumpeter										
Geese:										
Canada	125	127	140	180	200	226	200	200	200	190
Cackling										
Brant										
White-fronted										
Snow					18					
Blue										
Other										
Ducks:										
Mallard	1200	1250	1300	1300	1400	1394	1400	1600	1800	2000
Black										
Gadwall	165	165	160	150	140	139	130	120	110	100
Baldpate	500	603	620	620	625	625	800	1200	1500	1800
Pintail	2200	2281	2100	2000	1900	1845	1900	1900	1900	1900
Green-winged teal	1700	1736	1200	800	500	417	500	500	500	600
Blue-winged teal										
Cinnamon teal	600	643	500	100	20					
Shoveler	100	103	80	50	40	34	40	40	50	50
Wood										
Redhead	300	270	200	150	100	72	60	50	40	30
Ring-necked										
Canvasback	2		4	10	20	27	20	15	10	5
Scaup										
Goldeneye										2
Bufflehead				5	10	14	30	50	60	70
Ruddy	70	65	80	120	140	161	150	150	150	150
Other										
Coot	5000	5306	5400	6000	7000	7770	7500	7500	7300	7200

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

WATERFOWL
(Continuation Sheet)

REFUGE Fish Springs MONTHS OF Sept. TO Jan., 19 67

(1) Species	(2) Weeks of reporting period * 11	12	13	14	* 15	16	17	18	(3) Estimated waterfowl days use	(4) Production Broods seen	Estimated total
Swans:											
Whistling	2	2	5	10	22	10	10		485		
Trumpeter											
Geese:											
Canada	191	190	190	190	191	190	190		21,800		
Cackling											
Brant											
White-fronted											
Snow									90		
Blue											
Other											
Ducks:											
Mallard	2270	2000	2000	1800	1660	1600	1500		193,500		
Black											
Gadwall	94	90	80	70	65	60	50		13,200		
Baldpate	1883	1500	1000	700	593	500	400		108,300		
Pintail	1976	1800	1200	800	718	700	700		194,700		
Green-winged teal	603	1000	1800	2200	2298	2200	2000		143,900		
Blue-winged teal											
Cinnamon teal									13,100		
Shoveler	50	40	30	20	14	15	15		5,400		
Wood											
Redhead	19	15	10	5	1	4	4		9,300		
Ring-necked							1		7		
Canvasback	2	2							820		
Scaup				2	2	2	2		56		
Goldeneye	3	4	6	8	10	10	10		370		
Bufflehead	85	60	20	5					2,850		
Ruddy	137	100	70	50	32	30	30		11,800		
Other R.B.Merganser	7								49		
Common Merganser					2	2	2		42		
Coot:	7135	7000	7500	6000	5715	5000	5000		765,000		

(over)

	Total Days Use	Peak Number	Total Production
Swans	485	22	
Geese	21,890	226	
Ducks	697,400	7,129	
Coots	765,000	7,770	

SUMMARY

Principal feeding areas

Principal nesting areas

Reported by

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).

* Standardized walk and drive census routes as outlined in new waterfowl inventory plan taken these weeks

Interior Duplicating Section, Washington, D. C.
1953

3-1751
Form NR-1A
(Aug. 1952)

MIGRATORY BIRDS
(Other than Waterfowl)

Refuge Fish Springs Months of January to May, 1966

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Inclusive Dates	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Use
I. Water and Marsh Birds:										
Eared Grebe	10	4/1	300	4/15	100	4/30				4200
Pied-billed Grebe	present					4/30				
Great Blue Heron	4	4/10	10	4/20	6	4/30				400
Snowy Egret	5	4/10	100	4/20	100	4/30				1400
B.C. Night Heron	4	1/20	150	4/20	150	4/30				5000
American Bittern	4	4/10	20	4/30	20	4/30				300
White-faced Ibis	10	4/15	50	4/30	50	4/30				600
Virginia Rail	present									
Sora	present									
II. Shorebirds, Gulls and Terns:										
Killdeer	6	12/9	50	4/15	30	4/30				2000
Common Snipe	4	3/31	20	4/15	2	4/20				300
Long-billed Curlew	2	4/20	10	4/30	10	4/30				100
Willet	2	4/15	8	4/30	8	4/30				100
Greater Yellowlegs	2	2/10	20	4/15	4	4/30				400
Dowitcher	10	4/10	15	4/20	8	4/30				200
Avocet	2	3/15	250	4/15	50	4/30				6700
Black-necked Stilt	4	4/20	200	4/30	200	4/30				1000
California Gull	30	3/1	200	4/20	100	4/30				5000
Common Tern	10	4/15	25	4/20	5	4/25				200

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove	2	4/10	10	4/30	10	4/30		100
White-winged dove								
IV. Predaceous Birds:								
Golden eagle	present							
Duck hawk	4	1/15	12	4/1	6	4/30		500
Horned owl	present							
Magpie								
Raven	1	1/20	6	4/15	6	4/30		400
Crow	2	2/1	2	3/1	2	3/10		100
Sharp-shinned Hawk	present							
Red-tailed Hawk	present							
Rough-legged Hawk	present							
Marsh Hawk	present							
Sparrow Hawk	present							
Short-eared Owl	present							

Reported by_____

INSTRUCTIONS (See Sec. 7532, Wildlife Refuges Field Manual)

(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 migration record for the species for the reporting period.

(3) **Peak Numbers:** Estimated number and inclusive dates when peak population of the species occurred.

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

(5) **Production:** Estimated number of youngproduced based on observations and actual counts.

(6) **Total:** Estimated species days use (average population X no. days present) of refuge during the reporting period.

3-1751
Form NR-1A
(Aug. 1952)

MIGRATORY BIRDS
(Other than Waterfowl)

Refuge Fish Springs Months of May to September, 1966

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Inclusive Dates	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Use
I. Water and Marsh Birds:										
Eared Grebe	100	5/1	100	5/15	12	8/31		None	Observed	8,100
Western Grebe	1	5/15	1	5/15	1	8/1		0	0	75
Pied-billed Grebe	30	5/1	98	7/15	50	8/31		20	80	7,950
White Pelican	2	6/15	4	7/1	1	8/28		None	Observed	240
Great Blue Heron	6	5/1	36	8/15	35	8/31		None	Observed	1,900
Snowy Egret	100	5/1	425	8/15	425	8/31	1	80	250	31.500
B.C. Night Heron	150	5/1	166	7/15	100	8/31	1	30	100	17,300
American Bittern	20	5/1	20	5/1	2	8/31		2	10	1,010
White-faced Ibis	50	5/1	50	5/1	5	8/31		None	Observed	2,520
Virginia Rail	present							None	Observed	
Sora	present									
II. Shorebirds, Gulls and Terns:										
Snowy Plover	15	5/15	50	7/15	17	8/31		10	30	3,790
Killdeer	30	5/1	40	7/1	17	8/31		15	25	3,200
Long-billed Curlew	10	5/1	12	6/15	2	8/31		None	Observed	880
Spotted Sandpiper	3	7/15	3	7/15	3	8/1		None	Observed	45
Willet	8	5/1	22	6/15	1	8/31		None	Observed	1,640
Greater Yellowlegs	4	5/1	4	5/1	1	8/31		None	Observed	240
Least Sandpiper			800	7/15	20	8/31		None	Observed	25,000
Avocet	50	5/1	260	7/15	70	8/31		50	150	15,800
Black-necked Stilt	200	5/1	450	7/15	235	8/31		70	220	40,400
Wilson's Phalarope	20	5/15	100	8/15	100	8/31		None	Observed	7,570
Northern Phalarope	10	8/15	10	8/15	10	8/25		None	Observed	100
California Gull	100	5/1	130	7/15	70	8/31		None	Observed	13,400
Forster's Tern	5	5/15	65	6/15	20	8/31		None	Observed	3,380
Black Tern	8	7/1	8	7/10	10	7/10		None	Observed	80

(over)

(1)	(2)		(3)		(4)		(5)		(6)
III. Doves and Pigeons:									
Mourning dove	10	5/1	30	6/15	25	8/31	None	Observed	2770
White-winged dove									
IV. Predaceous Birds:									
Golden eagle	4	5/1	8	7/15	6	8/31	None in Refuge		750
Duck hawk									
Horned owl	present								
Magpie									
Raven	6	5/1	10	7/15	10	8/31	None	Observed	1010
Crow									
Sharp-shinned Hawk	present								
Red-tailed Hawk	present								
Rough-legged Hawk	present								
Marsh Hawk	present								
Osprey	present								
Sparrow Hawk	present								
Short-eared Owl	present								

Reported by _____

INSTRUCTIONS (See Sec. 7532, Wildlife Refuges Field Manual)

(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 migration record for the species for the reporting period.

(3) **Peak Numbers:** Estimated number and inclusive dates when peak population of the species occurred.

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

(5) **Production:** Estimated number of youngproduced based on observations and actual counts.

(6) **Total:** Estimated species days use (average population X no. days present) of refuge during the reporting period.

3-1751
Form NR-1A
(Aug. 1952)

MIGRATORY BIRDS
(Other than Waterfowl)

Refuge Fish Springs Months of September to January, 19 67

(1) Species	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Inclusive Dates	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Use
I. Water and Marsh Birds:										
Common Loon	1	11/1	1	11/1	1	11/1				1
Eared Grebe	12	9/1	36	10/20	3	11/15				1,300
Western Grebe	2	10/20	2		2	11/15				50
Pied-billed Grebe	50	9/1	89	11/15	10	12/31				6,000
White Pelican	1	12/15	1		1	12/18				3
Great Blue Heron	35	9/1	81	10/20	16	12/31				5,400
Snowy Egret	425	9/1	425	9/1	243	9/15				5,000
B.C. Night Heron	100	9/1	121	11/15	63	12/31				11,400
American Bittern	2	9/1	2		2	12/31				120
White-faced Ibis	5	9/1	34	9/15	2	10/1				420
II. Shorebirds, Gulls and Terns:										
Killdeer	17	9/1	21	9/15	1	12/31				1,560
Common Snipe	1	12/15	1	12/15	1	12/15				1
Lesser Yellowlegs	45	9/15	45	9/15	13	10/20				1,000
Least Sandpiper	20	9/1	20	9/15	1	11/15				830
Long-billed Dowitcher	20	10/20	20	10/20	2	10/30				110
Western Sandpiper	143	9/15	143	9/15	2	11/15				4,000
American Avocet	70	9/1	70	9/1	14	10/20				2,100
Black-necked Stilt	200	9/1	200	9/1	10	11/1				3,000
Wilson's Phalarope	100	9/1	230	9/15	4	10/1				3,300
California Gull	60	9/1	60	9/1	8	11/15				2,550
Forster's Tern	20	9/1	20	9/1	9	9/15				225

(over)

(1)	(2)		(3)		(4)		(5)	(6)
III. Doves and Pigeons:								
Mourning dove	10	9/1	10		2	10/20		300
White-winged dove								
IV. Predaceous Birds:								
Golden eagle	2	9/1	2		2	12/30		240
Duck hawk								
Horned owl	present							
Magpie	present							
Raven	present							
Crow								
Marsh Hawk	10	9/1	12	10/20	6	12/30		1,680
Sparrow Hawk	present							
Red-tailed Hawk	present							
Rough-legged Hawk	2	9/1	2		2	12/31		240
Short-eared Owl	present							

Reported by_____

INSTRUCTIONS (See Sec. 7532, Wildlife Refuges Field Manual)

(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 migration record for the species for the reporting period.

(3) Peak Numbers: Estimated number and inclusive dates when peak population of the species occurred.

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

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

(6) Total: Estimated species days use (average population X no. days present) of refuge during the reporting period.

3-1750b
Form NR-1B
(Rev. Nov. 1957)

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OS SPORT FISHERIES AND WILDLIFE

WATERFOWL UTILIZATION OF REFUGE HABITAT

Refuge **Fish Springs** For 12-month period ending August 31, 1966

Reported by _____ Title _____

(1) Area or Unit Designation	(2) Habitat Type	Acreage		(3) Use-days	(4) Breeding Population	(5) Production
Avocet Pool & South Sloughs	Crops	0	Ducks	331,000	400	300
	Upland	1,000	Geese	2,550	10	5
	Marsh	400	Swans	220	0	0
	Water	600	Coots	245,000	200	200
	Total	2,000	Total	578,770	610	505
Curlew Pool	Crops	0	Ducks	245,000	200	110
	Upland	50	Geese	2,550	10	0
	Marsh	450	Swans	0	0	0
	Water	400	Coots	211,000	150	100
	Total	900	Total	458,550	360	210
Shoveler Pool	Crops	0	Ducks	259,000	350	200
	Upland	100	Geese	10,200	25	20
	Marsh	230	Swans	140	100	0
	Water	200	Coots	265,000	250	400
	Total	530	Total	534,340	725	620
Egret Pool	Crops	0	Ducks	273,000	300	160
	Upland	50	Geese	3,820	20	15
	Marsh	175	Swans	0	0	0
	Water	350	Coots	63,500	65	80
	Total	575	Total	340,320	385	255
Pintail Pool	Crops	10	Ducks	57,600	70	30
	Upland	545	Geese	1,280	0	0
	Marsh	200	Swans	0	0	0
	Water	200	Coots	300	0	0
	Total	955	Total	59,180	70	30
Gadwall Pool	Crops	6	Ducks	7,200	0	0
	Upland	350	Geese	0	0	0
	Marsh	50	Swans	0	0	0
	Water	150	Coots	0	0	0
	Total	556	Total	7,200	0	0
Harrison Pool	Crops	20	Ducks	86,400	100	25
	Upland	400	Geese	2,120	10	13
	Marsh	120	Swans	0	0	0
	Water	480	Coots	10,600	30	20
	Total	1,020	Total	99,120	140	58

(over)

INSTRUCTIONS

All tabulated information should be based on the best available techniques for obtaining these data. Estimates having no foundation in fact must be omitted. Refuge grand totals for all categories should be provided in the spaces below the last unit tabulation. Additional forms should be used if the number of units reported upon exceeds the capacity of one page. This report embraces the preceding 12-month period, NOT the fiscal or calendar year, and is submitted annually with the May-August Narrative Report.

(1) Area or Unit: A geographical unit which, because of size, terrain characteristics, habitat type and current or anticipated management practices, may be considered an entity apart from other areas in the refuge census pattern. The combined estimated acreages of all units should equal the total refuge area. A detailed map and accompanying verbal description of the habitat types of each unit should be forwarded with the initial report for each refuge, and thereafter need only be submitted to report changes in unit boundaries or their descriptions.

(2) Habitat: Crops include all cultivated croplands such as cereals and green forage, planted food patches and agricultural row crops; upland is all uncultivated terrain lying above the plant communities requiring seasonal submergence or a completely saturated soil condition a part of each year, and includes lands whose temporary flooding facilitates use of non-aquatic type foods; marsh extends from the upland community to, but not including, the water type and consists of the relatively stable marginal or shallow-growing emergent vegetation type, including wet meadow and deep marsh; and in the water category are all other water areas inundated most or all of the growing season and extending from the deeper edge of the marsh zone to strictly open-water, embracing such habitat as shallow playa lakes, deep lakes and reservoirs, true shrub and tree swamps, open flowing water and maritime bays, sounds and estuaries. Acreage estimates for all four types should be computed and kept as accurate as possible through reference to available maps supplemented by periodic field observations. The sum of these estimates should equal the area of the entire unit.

(3) Use-days: Use-days is computed by multiplying weekly waterfowl population figures by seven, and should agree with information reported on Form NR-1.

(4) Breeding Population: An estimate of the total breeding population of each category of birds for each area or unit.

(5) Production: Estimated total number of young raised to flight age.

Interior Duplicating Section, Washington, D. C. 27580

3-1750b
Form NR-1B
(Rev. Nov. 1957)

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OS SPORT FISHERIES AND WILDLIFE

WATERFOWL UTILIZATION OF REFUGE HABITAT

Refuge **Fish Springs** For 12-month period ending August 31, 1966

Reported by _____ Title _____

(1) Area or Unit Designation	(2) Habitat Type	Habitat Acreage		(3) Use-days	(4) Breeding Population	(5) Production
Ibis Pool	Crops	0	Ducks	57,500	60	40
	Upland	170	Geese	0	0	0
	Marsh	150	Swans	0	0	0
	Water	75	Coots	100	0	0
	Total	395	Total	57,600	60	40
Mallard Pool	Crops	40	Ducks	101,000	180	100
	Upland	120	Geese	7,650	20	10
	Marsh	100	Swans	0	0	0
	Water	200	Coots	265,000	300	400
	Total	460	Total	373,650	500	510
North Spring & Drain	Crops	0	Ducks	14,400	10	10
	Upland	100	Geese	12,300	50	12 captives
	Marsh	100	Swans	0	0	0
	Water	100	Coots	0	0	0
	Total	300	Total	26,700	60	22
Other Springs & Ditches	Crops	0	Ducks	7,200	20	15
	Upland	100	Geese	0	0	0
	Marsh	300	Swans	0	0	0
	Water	200	Coots	0	0	0
	Total	600	Total	7,200	20	15
Totals	Crops	76	Ducks	1,439,300	1,690	990
	Upland	2,985	Geese	43,470	145	75
	Marsh	2,275	Swans	360	0	0
	Water	2,955	Coots	1,060,500	993	1,200
	Total	8,291	Total	2,542,630	2,828	2,265
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			

(over)

INSTRUCTIONS

All tabulated information should be based on the best available techniques for obtaining these data. Estimates having no foundation in fact must be omitted. Refuge grand totals for all categories should be provided in the spaces below the last unit tabulation. Additional forms should be used if the number of units reported upon exceeds the capacity of one page. This report embraces the preceding 12-month period, NOT the fiscal or calendar year, and is submitted annually with the May-August Narrative Report.

(1) Area or Unit: A geographical unit which, because of size, terrain characteristics, habitat type and current or anticipated management practices, may be considered an entity apart from other areas in the refuge census pattern. The combined estimated acreages of all units should equal the total refuge area. A detailed map and accompanying verbal description of the habitat types of each unit should be forwarded with the initial report for each refuge, and thereafter need only be submitted to report changes in unit boundaries or their descriptions.

(2) Habitat: Crops include all cultivated croplands such as cereals and green forage, planted food patches and agricultural row crops; upland is all uncultivated terrain lying above the plant communities requiring seasonal submergence or a completely saturated soil condition a part of each year, and includes lands whose temporary flooding facilitates use of non-aquatic type foods; marsh extends from the upland community to, but not including, the water type and consists of the relatively stable marginal or shallow-growing emergent vegetation type, including wet meadow and deep marsh; and in the water category are all other water areas inundated most or all of the growing season and extending from the deeper edge of the marsh zone to strictly open-water, embracing such habitat as shallow playa lakes, deep lakes and reservoirs, true shrub and tree swamps, open flowing water and maritime bays, sounds and estuaries. Acreage estimates for all four types should be computed and kept as accurate as possible through reference to available maps supplemented by periodic field observations. The sum of these estimates should equal the area of the entire unit.

(3) Use-days: Use-days is computed by multiplying weekly waterfowl population figures by seven, and should agree with information reported on Form NR-1.

(4) Breeding Population: An estimate of the total breeding population of each category of birds for each area or unit.

(5) Production: Estimated total number of young raised to flight age.

Interior Duplicating Section, Washington, D. C. 27580

3-1750c
Form NR[illegible]
(Sept. 1960)

WATERFOWL HUNTER KILL SURVEY

Refuge Fish Springs Year 1966

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est. Total Kill
10/8-10/15	58	305	Mallard (84), Pintail (49), Baldpate (21), G.W. Teal (19), Redhead (19), Coot (15), Gadwall (9), Shoveler (9), C. Teal (8), Ruddy (3).	236	28	264	(all hunters & bags checked; cols. 2 & 7 assumed 100% sample)	
10/16-10/22	9	45	Mallard (7), G. W. Teal (2), Gadwall (2), Pintail (1), Ruddy (1), Redhead (1).	14	5	19		
10/23-10/29	7	35	Mallard (14), G. W. Teal (2), Redhead (2), Ruddy (1), Shoveler (1).	20	3	23		
10/30-11/5	3	12	Mallard (3), Coot (2).	5	0	5		
11/6-11/12	8	38	Mallard (7), Pintail (7), Coot (7), Baldpate (2), Shoveler (2), Gadwall (2).	27	3	30		
11/13-11/19	24	115	Baldpate (11), Shoveler (8), Gadwall (7), Mallard (4), Pintail (3), G.W. Teal (3), Redhead (1).	37	6	43		
11/20-11/26	16	74	Coot (23), Mallard (10), Pintail (2), Shoveler (2), Baldpate (1).	38	6	44		
11/27-12/3	11	60	Mallard (26), Coot (7), Pintail (1), Gadwall (1), Baldpate (1), Ruddy (1).	37	7	44		
12/4-12/10	13	70	Mallard (14), Pintail (6), Gadwall (5), Baldpate (3).	28	5	33		
12/11-12/17	23	118	Mallard (39), G.W. Teal (13), Pintail (10) Coot (1).	63	6	69		
12/18-12/24	21	115	Mallard (11), Pintail (9), Baldpate (1), Gadwall (1), Redhead (1).	23	3	26		
12/25-12/31	27	97	Ruddy (22), Mallard (20), Coot (7), Pintail (4), Gadwall (3), G.W. Teal (2), Common Goldeneye (2), Redhead (1), Baldpate (1), Shoveler (1).	63	9	72		
1/1-1/5/67	4	26	Mallard (2), Ruddy (2), G.W. Teal (2), Shoveler (1), Pintail (1).	8	1	9		
Totals: 13	224	1110	Mallard (241), Pintail (93), Coot (62), G. W. Teal (43), Baldpate (41), Gadwall (30) Ruddy (30), Redhead (25), Shoveler (24), Cinnamon Teal (8), Common Goldeneye (2).	599	82	681		

(over)

INSTRUCTIONS

(1) The first week of hunting begins with opening day and ends at the close of hunting 6 days later. Successive weeks follow the same pattern.

(2) The goal is to survey a minimum of 25 percent of refuge hunters each week and to record data only from those who have completed their day's hunting. This information should be collected during each day of the week and in each area hunted in relative proportion to the hunter effort expended. When the 25 percent goal cannot be achieved, particular care should be taken to collect representative data.

(3) Record the total number of hours the hunters spent hunting on the refuge.

(4) List waterfowl species in decreasing order of numbers bagged. Sample entry: Mallard (61), Pintail (36), Redhead (16), Gadwall (11), Widgeon (6), Coot (4), Canada Goose (3), Green-winged Teal (1).

(5) Record total numbers of waterfowl bagged.

(6) Record total numbers of waterfowl reported knocked down but not recovered.

(7) Total of Columns 5 and 6.

(8) Estimate the total number of hunters who hunted on the refuge during the week, including hunters checked (Column 2).

(9) Kill sample projected to 100 percent. Column 9 = $\frac{\text{Column 8}}{\text{Column 2}}$ x Column 7.

3-1752
Form 1 2
(April 1946)

UPLAND GAME BIRDS

Refuge Fish Springs Months of January to April 30, 19 66

(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.
No upland game birds are present on this refuge. Eight chukars were released into the Fish Springs Mountain Range. Chukars are present on nearby mountain ranges. Valley quail and pheasants are established in farming areas 25 - 50 miles to the west.										

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.

3-1752
Form 1 2
(April 1946)

UPLAND GAME BIRDS

Refuge Fish Springs Months of May to September, 19 66

(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.
(No upland game birds observed on refuge in 1966.)										

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.

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(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.

3-1752
Form 1 2
(April 1946)

UPLAND GAME BIRDS

Refuge Fish Springs Months of Sept. to Jan., 19 67

(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.
No upland game birds observed on refuge in 1966.										

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

(1) SPECIES: Use correct common name.

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

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

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

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

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

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

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

3-1754
Form NR-4
(June 1945)

SMALL MAMMALS

Refuge Fish Springs Year ending April 30, 1966

(1) Species	(2) Density		(3) Removals					(4) Disposition of Furs						(5)
								Share Trapping						
Common Name	Cover Types & Total Acreage of Habitat	Acres Per Animal	Hunting	Fur Harvest	Predator Control *	For Re-stocking	For Re-search	Permit Number	Trappers Share	Refuge share	Total Refuge Furs Shipped	Furs Donated	Furs Destroyed	Total Population
1. Blacktail Jackrabbit	6,000 acres of upland greasewood, shadscale type. 1,000 acres upland marsh.	100												75
2. Audubon's Cottontail	Old buildings, rocky cliff areas (100 acres)	10												20
3. Striped Skunk	Spreading throughout marsh.	-												30
4. Coyote	18,000 acres of uplands and marsh meadow type.	-												6
5. Muskrat	10,000 acres of pools, marsh, and marsh meadows.	1.5		969				T-5233		0				7 - 8,000

* List removals by Predator Animal Hunter

REMARKS:

Reported by Robert D. Golden

INSTRUCTIONS

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

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

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

(3) REMOVALS: Indicate the total number under each category removed since April 30 of the previous year, including any taken on the refuge by Service Predatory Animal Hunter. Also show any removals not falling under headingslisted.

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

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

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

32715

3-175
Form 9-5
60701

DISEASE

Refuge Fish Springs Year 19 66

Botulism

Period of outbreak None

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 None

Species affected

Number Affected Species	Actual Count	Estimated

Number Recovered

Number lost

Source of infection

Water conditions

Food conditions

Remarks

NR-6 Bureau of Sport Fisheries and Wildlife

PUBLIC RELATIONS

(See Instructions on Reverse Side)

Refuge Fish Springs Calendar Year 1966

1. Visits

a. Hunting 224 b. Fishing 0 c. Miscellaneous 931 d. TOTAL VISITS 1,155

1a. Hunting (on refuge lands)

TYPE	HUNTERS	ACRES	MANAGED BY
Waterfowl	224	1,895	Refuge Staff
Upland Game	0	0	
Big Game	0	0	
Other	0	0	

Number of permanent blinds 0

Man-days of bow hunting included above 0

Estimated man-days of hunting on lands adjacent to refuge 0

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

TYPE OF AREA	ACRES	MILES
Ponds or Lakes	0	0
Streams and Shores	0	0

1c. Miscellaneous Visits

Recreation 781 Official 100

Economic Use 50 Industrial 0

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	0		0	
Bird and Garden Clubs	0		0	
Schools	5	166	0	
Service Clubs	0		0	
Youth Groups	3	53	0	
Professional-Scientific	0		0	
Religious Groups	0		1	40
State or Federal Govt.	0		0	
Other	0		0	

3. Other Activities

TYPE	NUMBER	TYPE	NUMBER
Press Releases	2	Radio Presentations	0
Newspapers (P.R.'s sent to)	2	Exhibits	1
TV Presentations	0	Est. Exhibit Viewers	100

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.

UNITED STATES
DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Bureau of Sport Fisheries and Wildlife
Washington, D.C. 20240

Fish Springs
Name of project

1966 PUBLIC USE CONVERSION FACTORS

	Number of Visitors	Estimated Average Hours for Each Visit [1]	Total Hours
A. Hunting			
Waterfowl	224	6.4	1,434
Upland Game [2]			
Big Game			
Other [3]			
Total [11]	224	6.4	1,434
B. Fishing Total [11]	0	0	0
C. Miscellaneous			
Nature Study [4]	219	6	1,314
Driving & Sightseeing [5]	522	2	1,044
Picnicking			
Swimming			
Boating [6]			
Ice Skating			
Water Skiing			
Camping, Tent [7]			
Camping, Trailer or Camper	40	24	960
Camping, Group [8]			
Other Accommodations [9]			
Berry & Mushroom Picking			
Visitor Centers & Museums			
Other Uses (Identify) [10]			
Total [11]	781	32	3,318
D. Grand Total of A, B, C [11]	1065	38.4	4,752

Total hours divided by 12 equals number of Visitor days 396

(See reverse side for footnotes)

FOOTNOTES

1/ Will never exceed 24 hours. For additional trip or camping hours, increase the number of visitors.

2/ Will include rabbit and squirrel hunting, and dove shooting.

3/ Do not include trapping. Should include crow and "varmint" hunting.

4/ Includes birdwatching, wildlife observations, photography, and use of nature trails.

5/ Include visitation to historic sites.

6/ Other than for hunting and fishing. Include canoeing, and boating tours.

7/ Most agencies report camping as 12 hours; the remaining portion of the 24 hours being recorded for other major uses, except where camping facilitates hunting or fishing.

8/ Include "day" camps.

9/ Include lodges, shelters, motels.

10/ Consider rock hounding, shell collecting, hiking, horseback riding, winter sports, dog trials, educational groups. Do not include economic, industrial, or official uses or visits.

11/ Totals will agree with line 1 on Form NR-6

3-1757
Form NR-7
(April 1946)

PLANTINGS
(Marsh - Aquatic - Upland)

Refuge Fish Springs Year 1946

Species	Location of Area Planted	Rate of Seeding or Planting	Amount Planted (Acres or Yards of Shoreline)	Amount & Nature of Propagules	Date of Planting	Survival	Cause of Loss	Remarks
Alkali Bulrush (S. robusta)	S & M	50#/ac.	6 ac.	300# seed	5/2	70%		
Alkali Bulrush (S. robusta)	Farm slough Unit Ia	50#/ac.	6 ac.	300# seed	5/3	60%		
Alkali Bulrush (S. robusta)	Farm slough Unit IIIe	50#/ac.	5.6 ac.	300# seed	5/14	10%	Lack of irrigation water.	
Hardstem Bulrush (S. acutus)	E-W dike Egret Pool	1 plant/ 3 yds.	300 yds.	100 transplanted	5/16-19	0%	Insufficient water to maintain Egret Pool.	
Jap Millet	Unit IIIg	30#/ac.	2.6 ac.	60# seed	5/16	10%	Lack of irrigation water.	
Tall Wheatgrass	Unit IIIf	6#/ac.	8.5 ac.	50# seed	5/17	10%	Lack of irrigation water.	
Caribou Rye	S & M	80#/ac.	1.0 ac.	55# seed	9/8	0%	Lack of irrigation water.	
Overland Oats	S & M	55#/ac.	1.0 ac.	60# seed	9/8	0%	Lack of irrigation water.	
Perennial Rye Grass Mixture	Hdqtrs. & Residence	20#/ac.	10 ac.	600# seed	3/3,6/12 10/10	70%	Alkaline soil, saline water, and severe dry season.	

TOTAL ACREAGE PLANTED:

Marsh and aquatic 17.6
Hedgerows, cover patches 0
Food strips, food patches 13.1
Forest plantings 0

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

Fish and Wildlife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge Fish Springs County Juab State Utah

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return				Total Acreage Planted	Green Manure, Cover and Waterfowl Browsing Crops Type and Kind	Total Acreage
			Harvested		Unharvested				
	Acres	Bu./Tons	Acres	Bu./Tons	Acres	Bu./Tons			
Alkali Bulrush					12.0	90	12.0		
Alkali Bulrush					5.6		5.6		
Jap Millet					2.6		2.6		
Tall Wheatgrass					8.5		8.5		
								Overland Oats	1.0
								Caribou Rye	1.0
								Fallow Ag. Land	115

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

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	GRAZING	Number Animals	AUM'S	Cash Revenue	ACREAGE
				1. Cattle	0			
				2. Other	0			
				1. Total Refuge Acreage Under Cultivation				30.7
Hay - Wild				2. Acreage Cultivated as Service Operation				30.7

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 Fish Springs Months of Jan. through Dec., 1966

(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
Alta Fescue	2	0	2				0	2	2		0
Reed Canary Grass	1	0	1				0	1	1		0
Tall Wheat Grass	2	0	2		1		1	1	1		0
NK Pasture Mix	4	0	4				0	4	4		0
Overland Oats	2	0	2		2		2	0			
NK 125 Sorghum	4	0	4				0	4	4		0
Jap Millet	1	0	1		1		1	0			
Caribou Rye	1	0	1		1		1	0			
Whole Corn	0	2	2			2	2	0			
Alkali Bulrush	32	0	32		18		18	14	14		0
Barley	1700	681	2381			2281	2281	100		100	0
Perennial Rye Grass	10	0	10		10		10	0			
* Strawberry Clover	1/3	0	1/3				0	1/3	1/3		0
* Alsike Clover	1/3	0	1/3				0	1/3	1/3		0
* Y.B. Sweet Clover	2	0	2				0	2	2		0
* Bannock Oats	3	0	3				0	3	3		0

(8) Indicate shipping or collection points Refuge

(9) Grain is stored at Refuge Granary

(10) Remarks * Experimental seed purchased in 1965 but went unreported on that years narrative report.

*See instructions on back.

NR-8a

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.

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

Bureau of Sport Fisheries and Wildlife

ANNUAL REPORT OF PESTICIDE APPLICATION

Refuge: Fish Springs

Proposal Number:

Reporting Year: 1966

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)
		None						

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

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