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JORDAN RIVER TERRESTRIAL WILDLIFE INVENTORY
PROPOSED LAMPTON RESERVOIR AREA
BONNEVILLE UNIT, CENTRAL UTAH PROJECT

U.S. Bureau of Reclamation
Contract 2-07-40-S2096

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JORDAN RIVER TERRESTRIAL WILDLIFE INVENTORY

INTRODUCTION

Lampton Reservoir is being studied as a potential feature of the Bonneville Unit, Central Utah Project to be located on the Jordan River in south Salt Lake County. This report presents results of an inventory of terrestrial wildlife species in the proposed Lampton Reservoir area. The study was conducted from October 1982 through September 1983 by the Utah Division of Wildlife Resources for the U.S. Bureau of Reclamation (Contract 2-07-40-S2096). The purpose of the study was to collect general baseline information on wildlife that could be used in the planning and development of a proposed Lampton Reservoir and for evaluating its effect on the wildlife resources. Primary emphasis of the study was on the game species: ring-necked pheasant (Phasianus colchicus), California quail (Lophortyx californicus), mourning dove (Zenaida macroura), and ducks and geese. Secondary emphasis was given to raptors, shore and wading birds, passerine and other small birds, mammals, reptiles, and amphibians. Specific objectives of the study were:

1. Map and describe major vegetation types within the Jordan River study area.
2. Quantify seasonal abundance of ducks and geese on the study area.

3. Estimate waterfowl nest densities in available cover types and determine brood success.
4. Quantify use of available cover types by pheasants and quail during winter, for nesting, and during summer.
5. Provide an index of dove abundance in the study area.
6. Collect and compile harvest data for pheasants and waterfowl.
7. Document general use of the study area by raptors, shore and wading birds, passerine and other small birds, mammals, reptiles, and amphibians.
8. Identify and map any important wildlife use areas.
9. Discuss use of the area by any rare, threatened, or endangered species.
10. Assemble an annotated bibliography of literature pertinent to wildlife in the Jordan River study area.

Acknowledgements -- Heather Welker and David Braun assisted in collection of data and preparation of figures and tables. Kent Rawley, Kendall Nelson, Darrell Nish, Jay Roberson, Bob Christensen, and Jordan Pederson provided many useful comments on earlier drafts of the manuscript; and Margie Points and Jo Lynn Richards did the typing.

STUDY AREA

If planning investigations showed that Lampton Reservoir was a feasible feature of the Bonneville Unit, it would be created by placement of a dam on the Jordan River at about 9800 South in Salt Lake County. The reservoir would extend south to the vicinity of Bluffdale. A proposal for twin reservoirs has also been considered and would be accomplished by placing another dam approximately at 13100 South. The reservoir would store and regulate return water from the Provo River Project and Bonneville Unit, CUP, and excess water from Utah Lake. Its function would be multipurpose, providing water for irrigation, industrial, and recreational uses. Sizing of the reservoir would ultimately depend on demand for the water. Drawdown would be expected in the summer, but the extent of fluctuation in water level annually would depend on variations in demand and inflow. Lampton Reservoir has also been considered as a proposed feature of the Provo-Jordan River Parkway (Kaiserman Associates and Genge Consultants).

The area identified for study extended south from 9400 South to the bottom of Sec. 11, T. 4 S., R. 1 W. The east boundary was the Denver and Rio Grande Railroad tracks and the west boundary was 1300 West Street (Fig. 1). The study area encompassed approximately 2,398 ha.

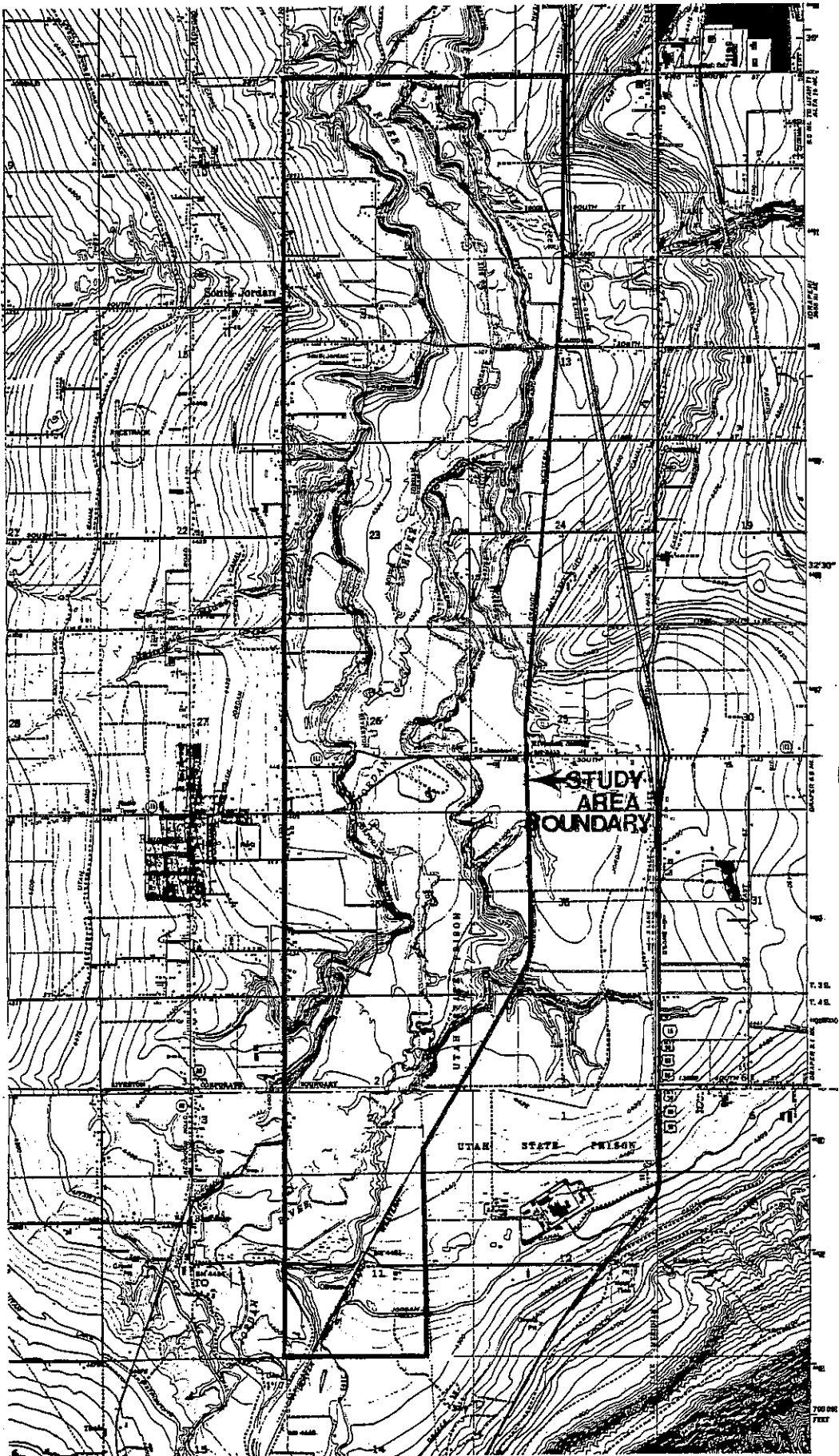


Fig. 1. Jordan River study area, Salt Lake County, Utah.
Scale 1:51,990.

Approximately 24% of the study area was cultivated cropland, primarily alfalfa. Much of the remaining area was grazed by livestock. About 10% of the area was comprised of wetlands, 18% was sagebrush and 7% was residential and farms (Table 1). Much of the land on the benches above the Jordan River is or will be subdivided in the future into housing tracts.

Table 1. General land uses of the Jordan River study area, Salt Lake County, Utah, 1983.

Cover type	Hectares	% of total area
Alfalfa	466	19.4
Small grains	37	1.6
Other crops ^a	63	2.6
Cattail-bulrush	25	1.0
Mixed wetlands ^b	205	8.5
Willow	9	0.4
Pasture-hay meadows	634	26.4
Sagebrush-rabbitbrush	434	18.1
Deciduous woodlands	42	1.8
Strip cover ^c	102	4.3
Waste areas	58	2.4
Urban	166	6.9
River channel-canal	<u>157</u>	<u>6.5</u>
Total	2398	99.9

^aIncludes corn, onion, and other row crops.

^bIncludes sedge-grass, spike-rush, and saltgrass wetlands.

^cRoadsides, fencelines, and ditchbanks.

METHODS

Classification of Cover Types

Eleven major cover types were identified on the study area according to plant composition and land use (Table 1). Cover types were delineated on aerial photographs, and the area of each type calculated using a planimeter. A description of each cover type is found in the RESULTS AND DISCUSSION section. Fig. 2 is a vegetation and land use map of the Jordan River study area.

Ring-Necked Pheasant

Winter Abundance and Cover Use -- Pheasant abundance during winter 1982-83 was estimated using 2 methods; mark-recapture sampling and total counts on sample plots. Forty pheasants were captured with walk-in wire traps (1.2 m x 1.8 m x 0.5 m) baited with corn at 7 trap sites on the study area. Each captured pheasant was marked with a colored back bib and aluminum leg band. Survey routes, selected to sample the entire pheasant population, were walked 3 times from 8-11 March and the numbers of marked and unmarked birds observed were recorded. A modified Lincoln estimator (Bailey 1951) was used to estimate population size and density.

The other method used to estimate pheasant abundance was complete counts of pheasants on established sample plots. Four sample plots, ranging from 14.5 ha to 77.8 ha in size were thoroughly

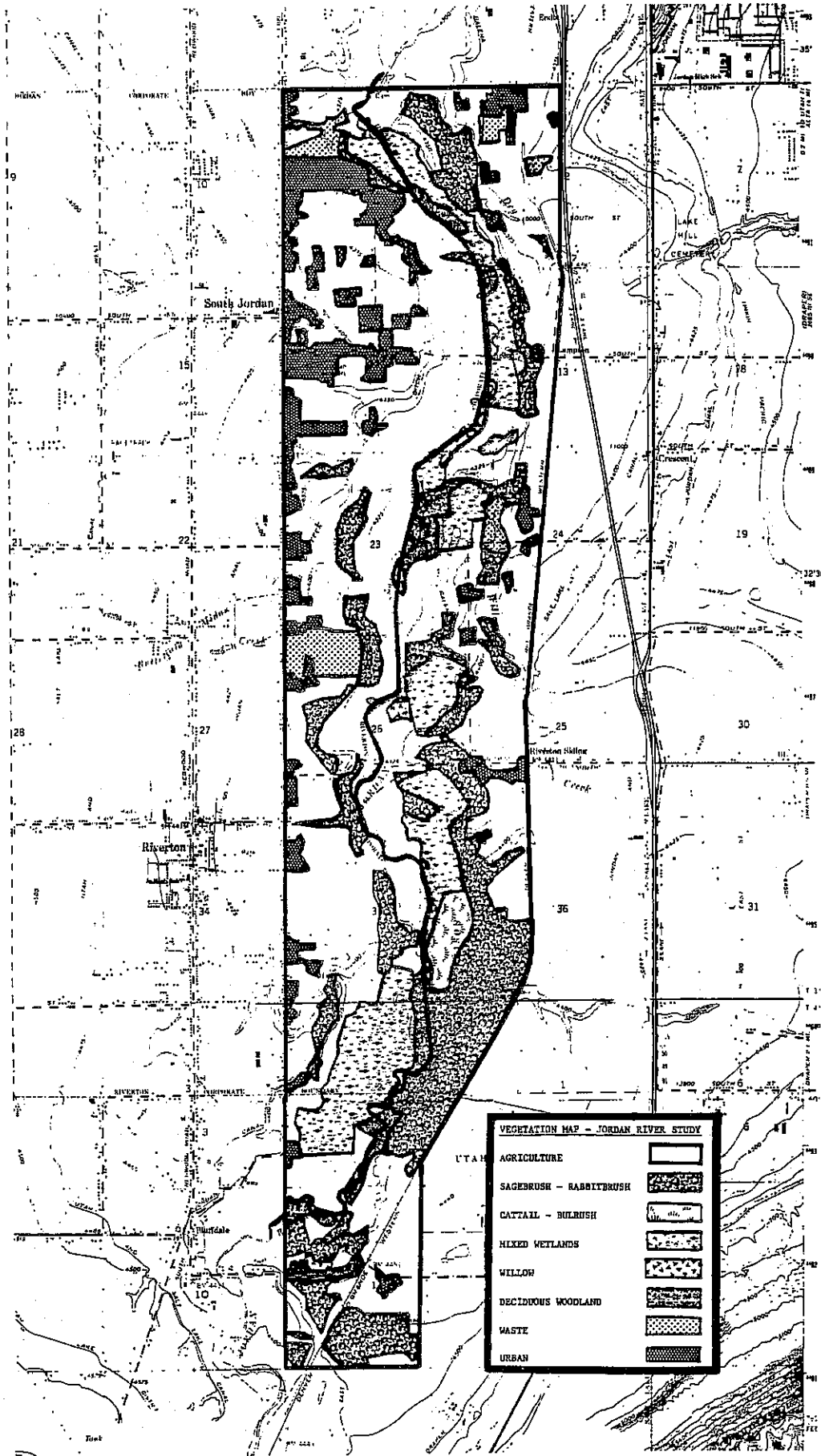


Fig. 2. Vegetation and land use on the Jordan River study area, Salt Lake County, Utah, 1983. Scale 1:53,350.

searched 3 times each during late January, by 3 people and 3 bird dogs. Plots were selected to adequately represent the cover types available on the study area. The average pheasant density and variance for each sample plot was calculated and used to estimate an overall weighted mean density and population size (Smith and Greenwood 1983; David R. Anderson, Utah Coop. Wildl. Res. Unit, pers. commun.).

Evaluation of cover preferences by pheasants during winter was based on observations of 600 pheasants made between mid-November 1982 and mid-March 1983. For each pheasant observed, sex, cover type, and time of day was recorded. Cover types surveyed included alfalfa, small grains, pasture-hay meadows, deciduous woodland, sagebrush-rabbitbrush, waste areas, cattail-bulrush, mixed wetlands, willow, strip cover, and other crops. The hypothesis that pheasant use of available cover types was proportional to the occurrence of the cover types was examined using a chi-square goodness-of-fit test. Selection or avoidance of individual cover types was examined using the technique presented by Neu et al. (1974). This method uses Bonferroni normal statistics to construct confidence intervals around the proportion of pheasants observed in each cover type. If the expected proportion of pheasants in a cover type, based on availability, was within the observed confidence interval then use of that type was not different than expected. An expected proportion greater than the upper confidence limit indicated less use than expected based on availability, and an expected proportion less than the lower observed confidence limit indicated more use than expected.

Attempts were made to locate pheasant winter concentration areas. Efforts were concentrated in cover types that generally provide good loafing and roosting cover. Areas or habitat types identified as critical for pheasants are those which provide the requirements necessary to sustain existing population levels or allow population growth.

Cover Use for Nesting -- Eight major cover types were surveyed for pheasant nesting: alfalfa, small grains, mixed wetlands, sagebrush-rabbitbrush, pasture-hay meadows, cattail-bulrush, strip cover, and waste areas. Study plots in each cover type were randomly selected, and usually consisted of a entire field or a strip traversing the cover type. Each plot was searched systematically by 2-4 observers walking abreast and using sticks to part the vegetation when necessary (Gates and Hale 1975). Sampling rates varied between cover types but averaged 9% overall. Based on experiments with dummy nests, other researchers have reported a nest searching efficiency of 90-95% using this technique (Baxter and Wolfe 1973, Gates and Hale 1975). One to 3 bird dogs generally accompanied nest searchers and were valuable for locating nests that might have otherwise gone undetected. Any nesting form containing 1 or more eggs was considered a nest.

All sample plots except for those in small grains were searched twice; once in late May to mid-June and again during early July to early August. Plots in small grains were searched once during August soon after harvest. Alfalfa and hay meadow plots were

searched immediately following the first and second cuttings (25 May - 17 June and 11 July - 12 August, respectively) in windrowed condition. Over 265 man-hours (excluding travel time) were devoted to nest searching efforts. The average nest density for each cover type was weighted to account for varying plot sizes (Seber 1973).

Summer Abundance and Cover Use -- Roadside surveys provided an index to summer pheasant abundance, cover utilization, and brood production and size. A discontinuous roadside route, 36.2 km in length, was driven 12 times between 26 July and 28 August (Fig. 3). The route was started at approximately sunrise, driven at 15-20 miles/hour, and took approximately 2 hours to complete. Pheasants observed within 100 m of the road while driving (1 observer) were classified as adult hens with distinct broods, incomplete broods or mixed adult hens and young, or cocks or hens without young. When pheasants were observed along the route, an attempt was made to flush and observe all individuals.

Additional flushing surveys were made during July and August, using bird dogs, to randomly sample all available cover types. All pheasants observed, including those observed on waterfowl censuses and during nesting work, were recorded as to sex, age, time of day, and cover type. Cover utilization by broods and adults without broods during summer was evaluated using the technique of Neu et al. (1974) as described for winter surveys.

Mourning Dove

The roadside survey route (Fig. 3) was also used to provide an index of mourning dove abundance. On 4 days during the last week of

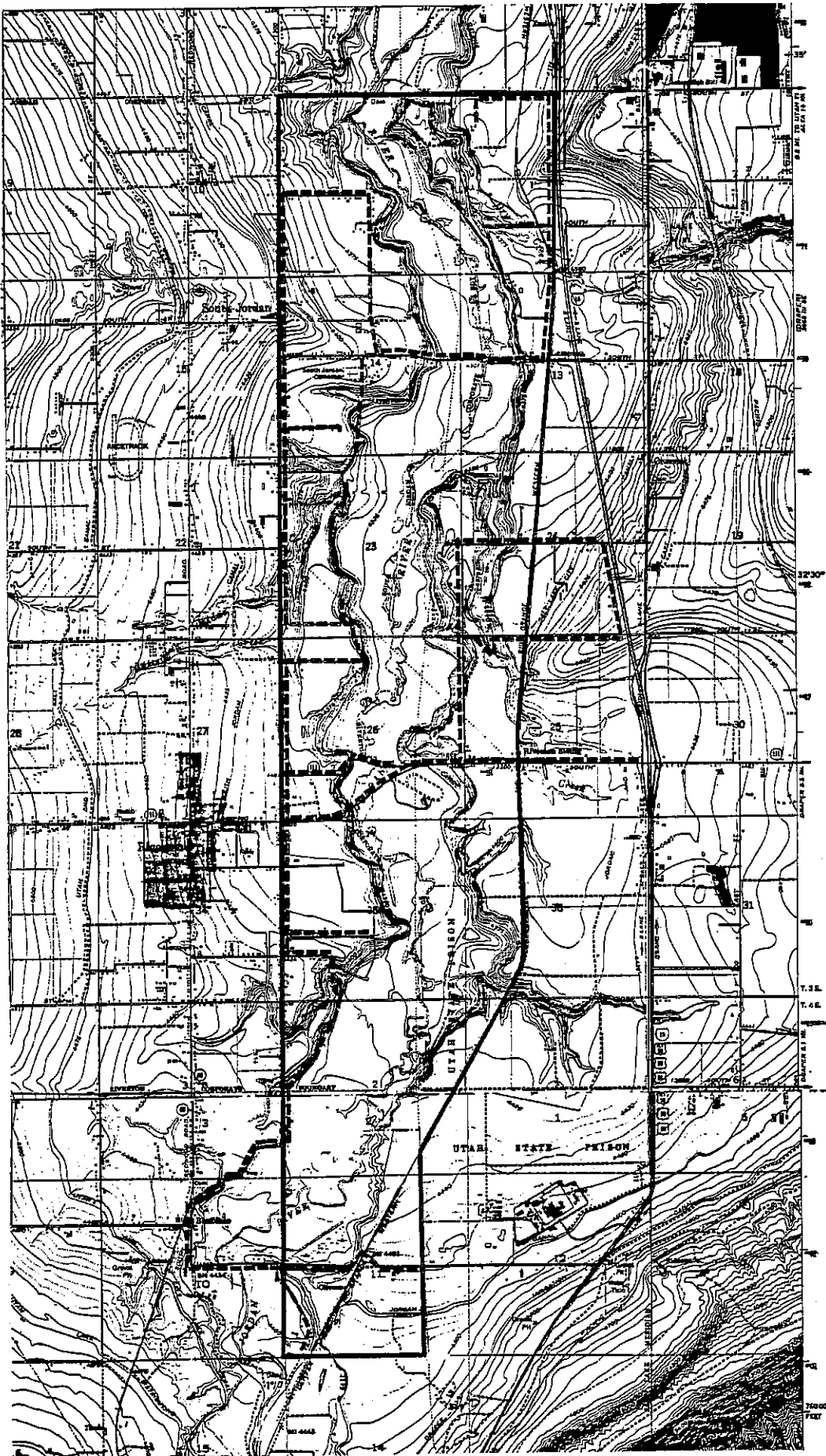


Fig. 3. Pheasant and dove roadside survey route on the Jordan River study area, Salt Lake County, Utah, 1983. Scale 1:51,990.

each month (May - August) the 36.2 km route was driven, and the number of doves observed recorded. The route was started at one-half hour before sunrise and driven at 20-25 miles/hour. The driver was the sole observer.

Waterfowl

Waterfowl censuses were conducted monthly from November 1982 through August 1983. On each census, the Jordan River from 9400 South to Bluffdale was walked, and the number of each species of waterfowl observed was recorded. During winter each census took about 4 man-hours to complete. During spring and summer an accurate count required 6 to 8 man-hours.

Duck nesting surveys were conducted from mid-May through mid-June to estimate average nest densities in individual cover types. Most ducks commonly nest within 300 feet of permanent water (Bellrose 1976), but because of extensive flooding during the spring of 1983, areas within 500 feet of permanent water and within 300 feet of flooded areas were included in the computation of nest densities. Five cover types were sampled: sagebrush-rabbitbrush, mixed wetland, cattail-bulrush, pasture-hay meadow, and strip cover. Sample plots were either totally searched as described for pheasants or rope drags were used to flush nesting hens.

Duck broods were counted during the monthly waterfowl censuses

and incidental to other field work. Data recorded included species, number of broods, and brood size.

California Quail

During winter, efforts were made to locate coveys of quail. Additional data on quail abundance and habitat utilization was collected incidental to other field work. Low densities of quail prevented implementation of standard survey techniques.

Other Wildlife

Occurrence and habitat use of other wildlife species were documented incidental to other field work. On some days during each season an effort was made to record all avian species observed. Data are presented as frequency of occurrence of each species (% of trips species was observed) during each season. A species list that includes potentially occurring species is presented in Appendix A. This list was compiled from Nelson and Wilson (1982) and information provided by Dennis Shirley (UDWR, pers. commun.).

Statistical Abbreviations

Standard statistical abbreviations are used throughout the text and are provided here for those readers unfamiliar with their meaning: \bar{X} - mean, N - sample size, df - degrees of freedom, χ^2 - chi-square value, P - observed significance level, SE - standard error, CL - confidence limit, CV - coefficient of variation,

z-test statistic. Statistical tests used which are not specifically referenced are explained in Ostle and Menzing (1975).

RESULTS AND DISCUSSION

Classification of Cover Types

Eleven major cover types were identified as important components of pheasant, quail, and waterfowl habitat in the Jordan River study area. The area encompassed by each cover type is shown in Table 1. These types were classified as follows:

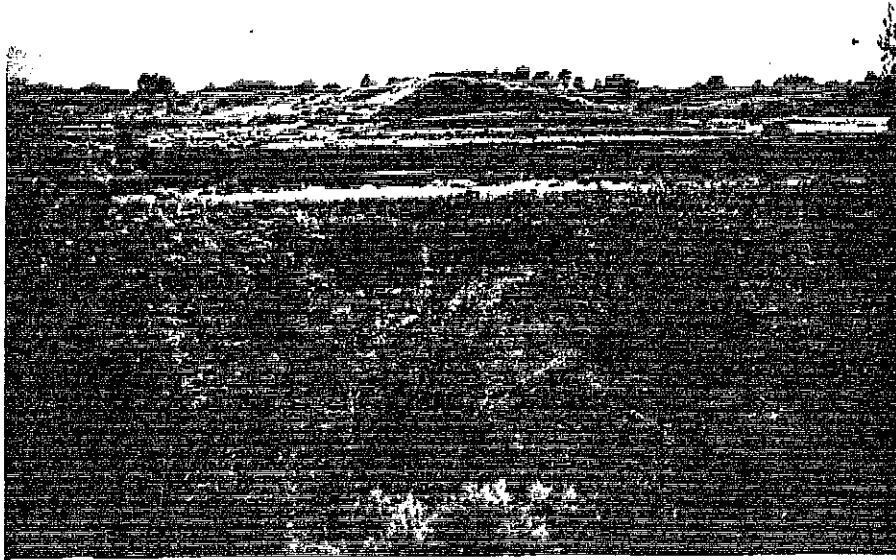
1. Pasture-Hay Meadows (Fig. 4) - Varying proportions of perennial and annual grasses and forbs, grazed by livestock and/or cut for hay. Prevalent species included foxtail barley (Hordeum jubatum), Kentucky bluegrass (Poa pratensis), tall wheatgrass (Agropyron elongatum), cheatgrass (Bromus tectorum), shepherd's purse (Capsella bursa-pastoris), whitetop (Cardaria drapa), and woad (Isatis tinctoria).
2. Alfalfa - This type varied from near pure stands of alfalfa (Medicago spp.), to stands comprised of a mixture of alfalfa (> 50%), perennial grasses and cheatgrass.
3. Sagebrush-Rabbitbrush (Fig. 5) - Stands of big sagebrush (Artemisia tridentata) and/or rubber rabbitbrush (Chrysothamnus nauseosus), sometimes with dense understorys of cheatgrass and whitetop. Other shrub species included black greasewood (Sarcobatus vermiculatus), and squawbush (Rhus trilobata).
4. Mixed Wetlands (Fig. 6) - Areas classified as palustrine, persistent, emergent wetlands by Cowardin et al. (1979).



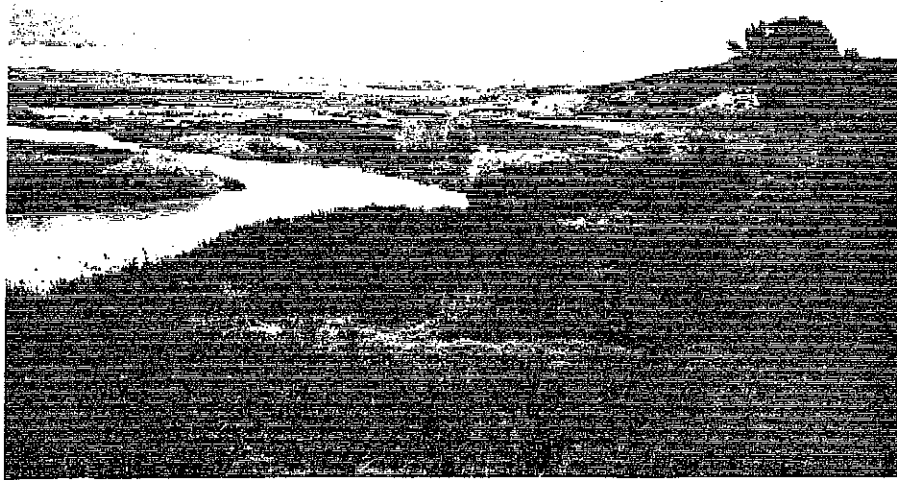
Fig. 4. Pasture-hay meadow cover type on the Jordan River study area, Salt Lake County, Utah.



Fig. 5. Sagebrush-rabbitbrush cover type on the Jordan River study area, Salt Lake County, Utah.



(a)

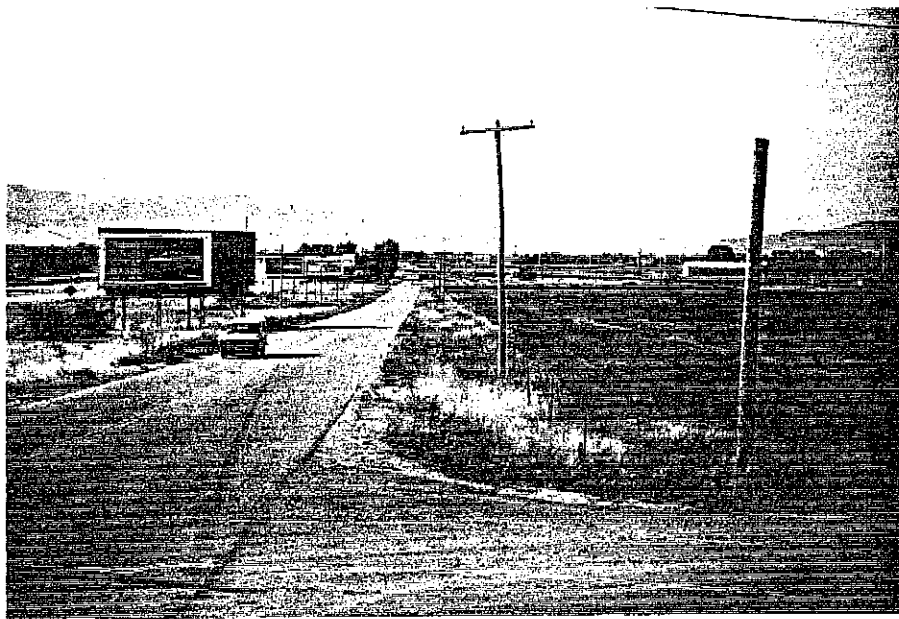


(b)

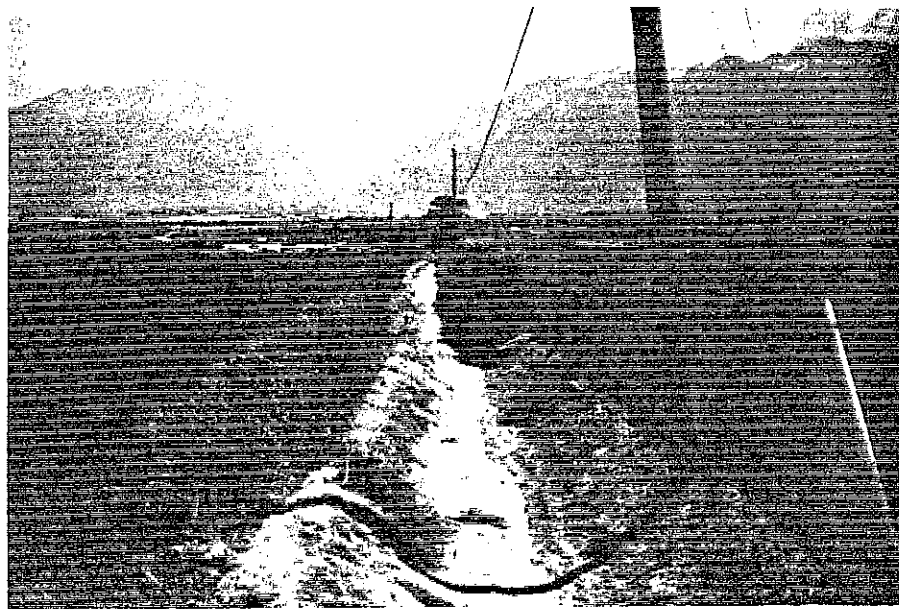
Fig. 6. Mixed wetlands (a) and cattail-bulrush areas (b) were important pheasant roosting and loafing areas during winter on the Jordan River study area.

These wetland areas were vegetatively diverse consisting of persistent hydrophytes and perennial grasses and forbs. Common species included spikerush (Eleocharis spp.), wiregrass (Juncus spp.), sedges (Carex spp.), saltgrass (Distichlis spp.), and milkweed (Asclepias speciosa). Scattered Russian olive (Elaeagnus angustifolia) were also common.

5. Strip Cover (Fig. 7) - Roadside, ditchbank, and fencerow vegetation comprised of varying species and combinations of grasses, weeds, and shrubs. Roadsides were classified as the vegetation between the edge of a road and the adjacent cover type including vegetation along exterior fence lines. Ditchbanks included the vegetation along ditches between 2 adjacent cover types. Fencerows comprised vegetation along all interior fences. Common species included whitetop, cheatgrass, Great Basin wildrye (Elymus cinereus), brome grass (Bromus spp.), woad, and orchardgrass (Dactylis glomerata).
6. Waste Areas (Fig. 8) - Tracts of land subdivided into building lots and in various stages of development. Most of these areas were formerly cultivated. Vegetation was primarily annual grasses and weeds mixed with the previous agricultural crop, mainly alfalfa. Common species included cheatgrass, Russian thistle (Salsola pestifer), whitetop, and pepperweed (Lepidium spp.).
7. Deciduous Woodlands (Fig. 9) - Small patches of deciduous trees primarily composed of Russian olive and Fremont cotton-



(a)



(b)

Fig. 7. Views of roadside cover (a) and ditchbank cover (b) in the Jordan River study area, 1983.

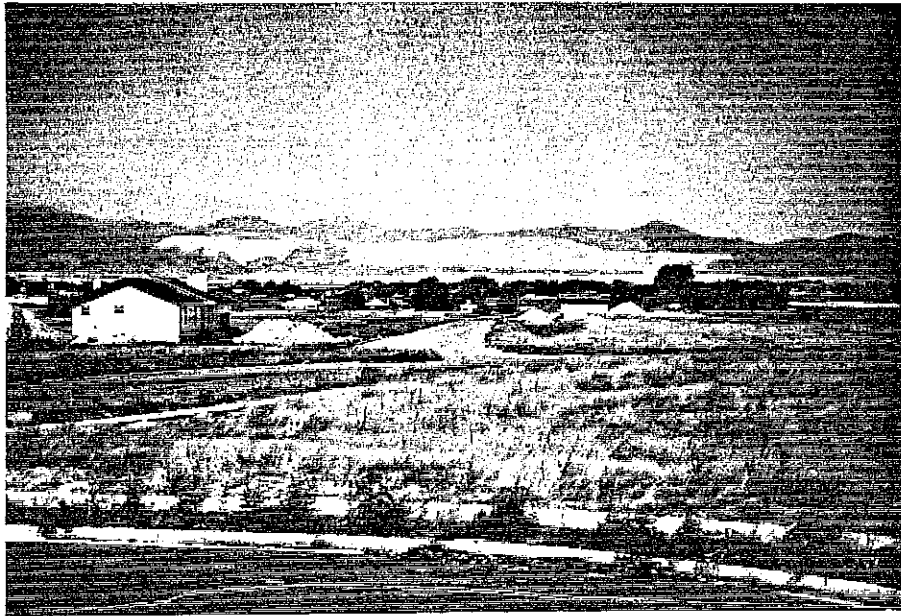


Fig. 8. Waste areas were important feeding and loafing areas for pheasants during winter.

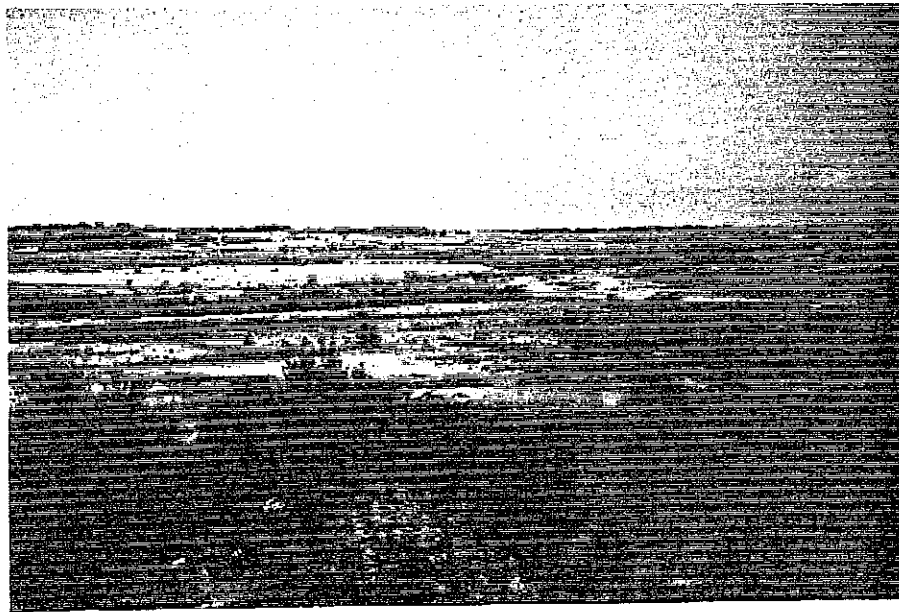


Fig. 9. Deciduous woodlands interspersed throughout pastures on the Jordan River study area.

- wood (Populus fremontii). Understories were comprised of vegetation similar to the pasture-hay meadow type.
8. Small Grains - Irrigated crops of winter wheat, spring wheat, barley, and oats.
 9. Cattail-Bulrush (Fig. 6) - Areas classified as palustrine, persistent, emergent wetlands (Cowardin et al. 1979) and comprised primarily of common cattail (Typha latifolia) and hardstem bulrush (Scirpus acutus).
 10. Willow - Areas generally classified as riverine, nonpersistent emergent wetlands along the Jordan River and canals. Primary species were willow (Salix spp.) and tamarisk (Tamarix spp.).
 11. Other Crops - Row crops of corn, onions, parsley, and other vegetables.

Ring-necked Pheasant

Winter Population Size and Sex Ratio -- Pheasant densities on the 4 sample plots in late January 1983 ranged from 0.306 to 0.580 pheasants/ha, and the average weighted density (SE) was 0.343 (0.021) pheasants/ha. This density is significantly higher ($z = 6.52$, $P < 0.001$) than the estimated average density of 0.104 (0.030) pheasants/ha in the Mona Reservoir area the preceding winter (1982). Based on the average density, the pheasant population ($\pm 95\%$ CL) on the study area was estimated to be 712 ± 84 birds (CV = 6%). Capture-recapture sampling in early March yielded a higher and less precise estimate (939 ± 395 pheasants, CV = 21%) than complete counts on sample plots, but the difference was not significant ($P = 0.27$).

The ratio of hens/cock in February (4.0) was lower ($P = 0.13$) than the ratio observed in January (6.1), but inference about differential survival rates of hens and cocks was difficult based on the small sample sizes. The average sex ratio for all pheasants observed from January through March was 5.0 hens/cock (Table 2).

Winter Cover Use -- The winter of 1982-83 was comparatively light and open in the lower valleys of Utah. Snow accumulation was minimal and relatively little concentrated pheasant use was observed. Fig. 10 shows several areas where we suspect some concentrated use occurs each winter. These areas were identified on the basis of direct observations, roosts, and cover characteristics. Other concentration areas undoubtedly exist, and should be identified, if necessary, in future winters with more "typical" snowfall and temperature conditions.

Since most of the winter pheasant surveys were made between 0900 and 1500 hours, observed cover use patterns represent primarily loafing and roosting cover as opposed to feeding cover. The hypothesis that pheasant use of individual cover types was proportional to availability of the cover types was rejected ($\chi^2 = 1169$, 10 df, $P < 0.0005$). Cover types preferred during winter were cattail-bulrush, mixed wetland, willow, waste areas, and strip cover. Alfalfa, pasture-hay meadows, and other crops (primarily corn and onions) were used less than expected, and use of small grains, deciduous woodlands, and sagebrush-rabbitbrush was not different from expected (Table 3).

Table 2. Monthly sex ratios of pheasants observed on the Jordan River study area, January - March 1983.

Month	Hens observed	Cocks observed	Hens/cock
Jan	244	40	6.1
Feb	95	24	4.0
Mar	145	32	4.5
Total	484	96	5.0

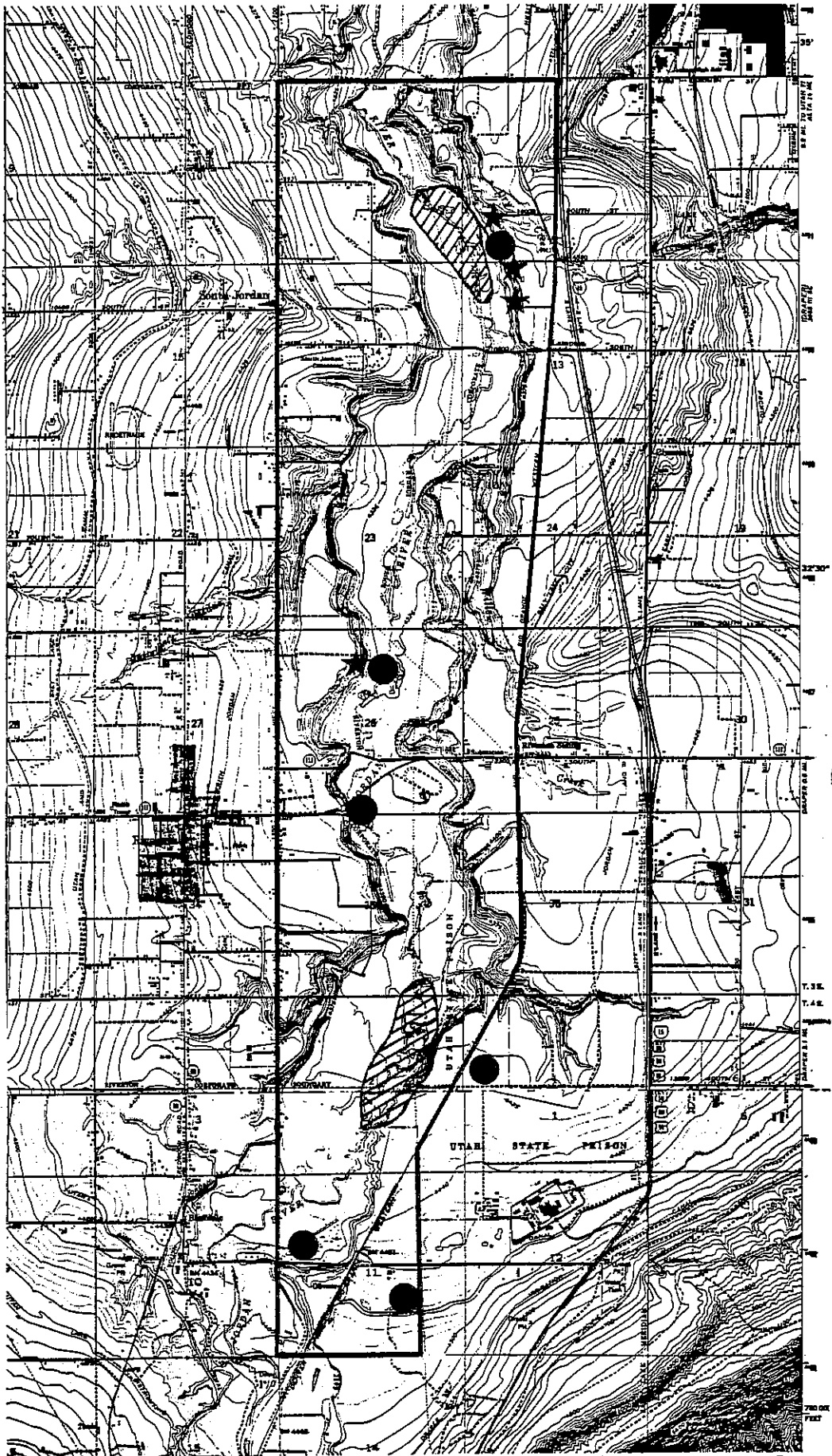


Fig. 10. Locations of winter pheasant concentration areas (●), critical waterfowl use areas (▨), and winter quail concentration areas (★), on the Jordan River study area, Salt Lake County, Utah, 1983. Scale 1:51,990.

Table 3. Cover utilization by pheasants during winter on the Jordan River study area, 8 November 1982 - 11 March 1983.

Cover type	Total ^a area (ha)	Pheasants ^b expected		Pheasants observed		99% confidence ^c interval on P _i	Apparent selection behavior
		N	Proportion	N	Proportion (P _i)		
Alfalfa	466	136	0.227	27	0.045	0.017 < P ₁ < 0.073	Avoided
Small grains	37	11	0.018	15	0.025	0.004 < P ₂ < 0.046	Indifferent
Other crops	63	18	0.030	6	0.010	0.000 < P ₃ < 0.023	Avoided
Pasture-hay	634	183	0.306	77	0.128	0.083 < P ₄ < 0.173	Avoided
Deciduous woodland	42	12	0.020	29	0.048	0.019 < P ₅ < 0.077	Indifferent
Sagebrush- rabbitbrush	434	125	0.209	140	0.233	0.176 < P ₆ < 0.290	Indifferent
Waste areas	58	17	0.028	48	0.080	0.043 < P ₇ < 0.117	Preferred
Cattail- bulrush	25	7	0.012	61	0.102	0.061 < P ₈ < 0.143	Preferred
Mixed wetland	205	59	0.099	83	0.183	0.131 < P ₉ < 0.235	Preferred
Willow	9	3	0.004	39	0.065	0.032 < P ₁₀ < 0.098	Preferred
Strip cover	102	29	0.049	75	0.125	0.080 < P ₁₁ < 0.170	Preferred
Total	2075	600	1.002	600	0.999		

^aUrban areas and river channel excluded.

^bExpected values of pheasants observed were determined from the area encompassed by each cover type.

^cFrom Neu et al. (1974).

Our data emphasize the importance of wetlands in providing critical winter cover for pheasants. Nearly every pocket of cattails on the study area was used by pheasants. The extensive mixed wetland type also received substantial use. In addition to direct observations of pheasants, the presence of roosts further supported our findings. Of 227 roosts recorded, 173 (76%) were found in mixed wetlands.

Winter cover preferences are determined, to a large extent, by snow depth and duration of snow cover. In Wisconsin, ungrazed sedge meadows and canarygrass wetlands were preferred for roosting until completely covered by snow, at which time wetlands dominated by woody species were most preferred (Gates and Hale 1974). Lyon (1954), in Colorado, reported that pheasants preferred cattails and heavy weeds for winter roosting. Use of the weed type increased during periods of deep snow. Traditional winter cover often serves pheasants from a 1-2 mile radius of surrounding summer ranges (Buss 1946, Buechner 1957, Robertson 1958, Gates and Hale 1974).

During winters with more snow than occurred during 1983, wetlands are probably of even greater value for pheasant welfare in the Jordan River study area. Wetlands comprised 10% of the study area, and because they occurred along the entire length of the river, they were well interspersed with other cover types. Gates and Hall (1974) reported that on 2 Wisconsin study areas that had about 10% wetland cover, 78% and 88% of the pheasant populations were associated with the wetlands during winter.

Cover Use for Nesting -- Nesting cover utilization patterns

exhibited by pheasants are the result of several factors including preference, availability, and pheasant density (Wagner et al. 1965, Gates and Hale 1975). Cover availability and pheasant densities are subject to dramatic annual fluctuations that may be caused by changing land use patterns and weather. Several studies have reported selection of non-agricultural cover types for initial nesting attempts by pheasants (Stokes 1954, Trautman 1960, Gates and Hale 1975). In some areas, however, early growth of alfalfa is sufficient to provide good cover for initial nests (Baxter and Wolfe 1973, Smith and Greenwood 1983). Reported nest densities have generally been highest in strip cover, wetlands, alfalfa, and unused areas, and lowest in small grains, grazed pastures, woodlands, and row crops with little residual ground cover such as corn, peas, and soybeans (Baxter and Wolfe 1973, Gates and Hale 1975, Olsen 1977).

Nest densities for individual cover types on the Jordan River study area were low in comparison to densities reported for similar types in other studies (Stokes 1954, Baxter and Wolfe 1973, Gates and Hales 1975). However, the relative importance of different cover to reproduction was similar (Table 4).

Strip cover (fencerows, ditchbanks, and roadsides) had the highest observed nest density (1.97 nests/ha), however, inference from the data is difficult because only a small area was sampled. Nest searching of this type was tedious due to the thick vegetation (about 50 man hours were spent searching this type). In Nebraska, Baxter and Wolfe (1973) reported densities of 4.7 nests/ha and 1.56 nests/ha in roadsides and fencerows, respectively. It was estimated

Table 4. Average pheasant nest densities for individual cover types on the Jordan River study area, Salt Lake County, Utah, 1983.

Cover type	No. plots	Area sampled (ha)	Nests found		Nests/ha ^a	
			First searches	Second searches	\bar{X}	SE
Alfalfa	8	27.1	22	3	0.89	0.249
Small grains	5	12.6	3	NA ^b	0.24	0.158
Pasture and hay-meadows	7	22.3	8	1	0.41	0.096
Waste areas	4	2.5	0	1	0.35	0.496
Cattail-bulrush	2	3.3	0		0.00	
Mixed wetland	4	12.9	1	1	0.16	0.070
Sagebrush-rabbitbrush	10	13.8	4	6	0.65	0.281
Strip cover	10	1.5	2	1	1.97	0.972

^aNest densities were weighted to account for variable plot sizes.

^bNot applicable.

that at least 25% of the chicks were produced in roadsides while fencerows had very low rates of nest success. During the Jordan River study, 1 of the 2 nests with known histories found in strip cover was successful. Early in the nesting season, strip cover appeared similar in vegetative structure to adjacent cover types in providing nesting cover. After hay-mowing activities were initiated, however, strip cover was manifest and appeared more desirable for nesting. We speculate that it may have contributed over 25% of the chicks produced.

Nesting use of alfalfa was high (0.89 nests/ha), however, nest success was very low. Of 23 nests of known fate found in alfalfa, only 2 were successful (9%), suggesting that alfalfa may have contributed less than 10% of the chicks produced in the study area in 1983. Hatching peaks in Utah normally occur during the first 2 weeks of June and usually coincide with the first alfalfa harvest. Haymowing operations often destroy nests or induce nest desertion by hens. In the Mona area during 1982, only 1 of 28 (4%) nests in alfalfa was successful (Smith and Greenwood 1983). The 2 successful nests found on the Jordan study area were in a field that was not harvested until 21 June. Four other nests in this field were destroyed.

Of the 21 unsuccessful nests found in alfalfa, 4 of the nesting hens (19%) were killed during harvest. At Mona in 1982 hen mortality associated with haymowing was much higher (44%). This difference in hen mortality may be due, in part, to the difference in equipment used at the 2 locations. In general, hay equipment at Mona was newer and comparatively faster than the equipment used on

the "hobby" farms along the Jordan River.

Nesting use of mixed wetlands was lower than anticipated (0.16 nests/ha). Sedge-grass meadows, which comprised most of the type, appeared to provide good residual cover generally preferred for initial nest attempts. Spring flooding along the Jordan River left much of this type too wet for nesting efforts. Low use of sedge-grass meadows at Mona in 1982 (0.05 nests/ha) was also attributed to the presence of standing water throughout much of the type. Gates and Hale (1975), in Wisconsin, found wetlands to be the overall most important cover type for pheasant production.

Areas dominated by perennial grasses that were either pastured or cut for hay received relatively high use for nesting (0.41 nests/ha) compared to the Mona area in 1982 (0 nests/ha). This type provided good residual vegetative cover; 8 of the 9 nests found were probably initial nesting attempts. This supports the conclusions of previous studies which document early use of permanent vegetation before using cultivated crops (Stokes 1954, Trautman 1960, Gates and Hale 1975). None of the nests found in this type were successful. Haymowing and trampling by livestock were the major causes of nest failure. Several study plots were heavily grazed during the summer precluding use for renesting efforts.

Only 1 nest was found on waste area plots. The nest found was successful and was believed to be a reneest. Waste areas were proximal to residential areas, where disturbances from both man and domestic cats and dogs were believed to be high.

Perhaps the overall most important cover type for nesting was

sagebrush-rabbitbrush. The observed nest density (0.65 nests/ha) was lower than that found for alfalfa, but the difference was not significant ($z = 0.639$, $P = 0.52$). Six of the 10 nests found in this type were found during second searches of sample plots, indicating the importance of this type for renesting. For 5 nests of known fate in sagebrush, 3 (60%) were successful suggesting that this type may have accounted for 40-50% of the broods produced on the study area.

Small grains comprised only 1.6% (37 ha) of the total study area and was relatively unimportant from a nesting or production standpoint. Over a third of this type was sampled (12.6 ha) and only 3 nests were found (0.24/ha). Grain harvest began on 25 July and continued through August. Two of the 3 nests found represented late nest attempts and were destroyed by harvest operations. The fate of the other nest was unknown.

In Wisconsin, Gates and Hale (1975) attributed the extremely low use of small grains for nesting (0.03 nests/ha) to the availability of more preferred cover, particularly hay. In Nebraska, wheat (25% of area) had the lowest nest density observed (0.49 nests/ha), but was important for renesting, and accounted for over half of the chicks produced on the study area (Baxter and Wolfe 1973).

Summer Abundance and Cover Use -- Data collected on the roadside route was highly variable. Coefficients of variation were greater than 75% for all of the parameters estimated (pheasants/km,

young/km, young/adult hen, pheasants/hour etc.).

The roadside survey route yielded an average (95% CL) of 0.50 0.86 pheasants/km (range 0.03-1.41) and 0.35 0.66 young/km (range 0 - 0.97). These values are higher than the averages for the roadside survey conducted annually by the UDWR in Salt Lake County but lower than the statewide averages. Averages for the 11 year period from 1972-82 in Salt Lake County were 0.41 pheasants/km and 0.27 young/km, and for Utah statewide were 0.62 pheasants/km and 0.46 young/km (Leatham and Roberson 1983). The route took slightly more than 2 hours to complete and observations/unit effort averaged 8.6 15.4 pheasants/hour, 5.66 12.07 young/hour, and 1.11 1.85 broods/hour.

Pheasant production appeared fair on the study area in 1983. On the roadside route, 71% (36/51) of the adult hens were observed with young and young/adult hen averaged 3.23 5.39. Pooling pheasant observations for all July-August surveys yielded lower values; 65% (81/124) of the adult hens were associated with broods and young/adult hens was only 1.82. Mean brood size was 5.00 4.32 young (N = 38) (Table 5).

Cover use by broods was evaluated based on observations of 74 broods. Eighty percent (59/74) of the broods were observed during the morning period (0630 -1000 hours), and 20% (15/74) were observed during the midday period (1000 - 1700 hours). However, all but 3 broods (96%) were observed before 1200 hours. All data were pooled for analysis because small sample sizes prevented evaluation of time by cover interactions.

Table 5. Numbers of young, hen, and cock pheasants observed per cover type during surveys on the Jordan River study area, July - August 1983.

	Distinct broods		Incomplete or Mixed broods		Adults w/o young		Total	% of total
	No.	Young	hens	young	hens	cocks		
Alfalfa	13	58	8	20	16	8	123	25.6
Small grains	4	19	1	2	7	5	38	7.9
Other crops	0	0	0	0	0	0	0	0
Pasture-hay meadows	8	44	9	43	9	10	123	25.6
Waste areas	1	5	8	26	1	3	44	9.1
Sagebrush-rabbitbrush	3	15	4	10	1	2	33	6.9
Mixed wetland	4	30	4	10	2	1	50	10.4
Cattail-bulrush	0	0	1	2	0	1	4	0.8
Deciduous woodland	0	0	0	0	0	0	0	0
Willow	0	0	0	0	3	2	5	1.0
Strip cover	<u>5</u>	<u>19</u>	<u>8</u>	<u>23</u>	<u>4</u>	<u>2</u>	<u>61</u>	<u>12.7</u>
Total	38	190	43	136	43	34	481	100.0

The hypothesis that brood use of cover types was random was rejected ($\chi^2 = 45.6$, 10 df, $P < 0.0005$). The data failed to indicate preferential use of any of the cover types. Avoidance was demonstrated for the sagebrush-rabbitbrush type which comprised 21% of the study area but accounted for only 10% of the brood observations. Pasture-hay meadows were 31% of the study area and had 19% of the brood observations. While brood use of this type was not different than expected at the 0.10 significance level, avoidance was indicated at the 0.12 level. Use of the remaining cover types was proportional to their availability (Table 6).

Suggested cover use by adults without young ($N = 77$) was also disproportionate to availability ($\chi^2 = 161.6$, 10 df, $P < 0.0005$). Use of small grains (15.6%) was greater than expected (1.8%), and use of sagebrush-rabbitbrush (3.9%) and mixed wetlands (3.9%) was less than expected (20.9% and 9.9%, respectively).

Harvest -- Within the study area, the river bottom south of about 118th South was open to hunting in 1982 and 1983. There has been a trend in recent years for local communities to prohibit discharge of firearms within city limits which effectively eliminates hunting activities. Closure of lands within the Riverton City limits is expected and would preclude all hunting north of 136th South. Nearly all of the land available for hunting is private and posted.

Hunting pressure on the study area was light to moderate. Because only a small number of hunters were interviewed on the study area, harvest data is provided for Salt Lake County. During 1982,

Table 6. Cover utilization by pheasant broods during summer on the Jordan River study area, July - August 1983.

Cover type	Broods expected ^a N	Broods observed N	90% confidence interval on observed proportion (P _i)	Apparent selection behavior
Alfalfa	17	22	0.158 < P ₁ < 0.436	Indifferent
Small grains	1	5	0 < P ₂ < 0.144	Indifferent
Other crops	2	0	NA ^b	Indifferent ^c
Pasture-hay meadows	23	14	0.070 < P ₄ < 0.308	Indifferent ^d
Waste areas	2	5	0 < P ₅ < 0.144	Indifferent
Sagebrush-rabbitbrush	15	7	0.006 < P ₆ < 0.184	Avoided
Mixed wetland	7	9	0.023 < P ₇ < 0.221	Indifferent
Cattail-bulrush	1	1	0 < P ₈ < 0.050	Indifferent
Deciduous woodland	1	0	NA	Indifferent ^c
Willow	1	0	NA	Indifferent ^c
Strip cover	4	11	0.041 < P ₁₁ < 0.257	Indifferent
Total	74	74		

^aBased on the availability of each cover type on the study area.

^bConstruction of confidence interval not possible with 0 observations.

^cSelection or avoidance not suggested from examination of chi-square values and z-test for difference between 2 proportions at P = 0.1.

^dAvoidance indicated at P = 0.12.

field bag checks showed 30 hunters harvesting 5 birds in 102 hours of hunting (5 birds/100 hours). The hunter questionnaire survey indicated 0.57 pheasants bagged/hunter-day in 1982 in Salt Lake County; considerably better success than was suggested by field bag checks. In 1983, 196 hunters bagged 33 birds in 311 hours (11 birds/100 hours). Considering only completed hunts, only 3 birds were bagged by 50 hunters (0.06 birds/hunter) in 67 hours (4 birds/100 hours) in 1983. Harvest figures for Salt Lake County from 1975-82 indicate an average of 0.62 ± 0.17 pheasants bagged/hunter-day. During this same time period, the harvest for Utah, statewide, averaged 0.79 ± 0.20 pheasants/hunter-day. From 1980-82 Salt Lake County provided 7% of the pheasant harvest in the state.

Mourning Dove

Mourning dove abundance as determined by the roadside route was very low on the Jordan River study area. The mean number of doves (SE) observed per km was 0.16 (0.05) in May, 0.22 (0.03) in June, 0.15 (0.03) in July, and 0.55 (0.11) in August. Dove use on the Jordan study area was significantly less for each month ($P < 0.05$) than was observed at Mona Reservoir during 1982 (Smith and Greenwood 1983).

Dove numbers in the valleys of north and central Utah appeared to be lower than normal in 1983. In an attempt to document this, the Mona Reservoir dove route was driven during June and July 1983 for comparison to 1982 results. Doves per km in 1983 were only 12% in June and 33% in July of the numbers observed during the same

months of 1982. The apparent decline in dove numbers along the Wasatch Front in 1983 corresponded to an increase in dove use in western Utah. UDWR personnel reported seeing relatively more doves in the west desert areas of Utah during 1983, probably as a result of the "wet" spring and resulting increased food availability in these areas. Thus, the low number of doves in the Jordan River area during 1983 is probably not representative of a normal year.

Doves are adapted to a wide range of cover conditions and utilize a variety of plant species for food. Doves prefer to nest in large trees, but may also nest in shrubs or on the ground. Diets consist almost entirely of seeds from annuals and cultivated grains. At Mona Reservoir, increased use of cultivated lands by doves in August corresponded to the harvest of small grains which made waste grain available for food (Smith and Greenwood 1983). Along the Jordan River there are no readily apparent factors limiting distribution and numbers of doves.

Waterfowl

Thirteen duck species and Canada geese (Branta canadensis) were identified on waterfowl surveys along the Jordan River. During 1983 approximately 20-30 geese utilized the study area from early January through early March. Geese were not observed again until late August. The most common duck species were mallard (Anas platyrhynchos), cinnamon teal (A. cyanoptera), green-winged teal (A. crecca), northern shoveler (A. clypeata), and pintail (A. acuta) (Table 7).

Table 7. Waterfowl species and numbers observed during monthly surveys on the Jordan River study area, Salt Lake County, Utah, Nov. 1982 - Aug. 1983.

Species	Number observed										% of total
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	
American widgeon	0	0	10	1	0	0	0	0	0	0	1
Blue-winged teal	0	0	0	0	0	0	8	9	0	0	1
Cinnamon teal	0	0	10	7	26	82	78	64	102	64	23
Common merganser	1	0	8	0	3	0	0	0	0	2	1
Gadwall	0	0	0	0	2	22	3	1	0	9	2
Green-winged teal	0	4	6	38	105	268	0	1	0	13	24
Lesser scaup	0	0	0	0	0	0	0	1	0	0	tr ^a
Mallard	16	22	159	61	83	50	32	48	65	81	33
Northern shoveler	0	2	46	9	8	2	0	1	2	20	5
Pintail	0	2	15	4	9	7	0	24	11	4	4
Redhead	0	0	0	0	2	10	0	9	5	4	2
Ruddy duck	0	0	0	0	0	0	0	0	7	5	1
Red-breasted merganser	0	0	0	0	0	4	0	0	0	0	tr
Canada goose	0	4	26	11	0	0	0	0	0	11	2
Unidentified	0	0	0	0	0	4	8	3	9	2	1
Total	17	34	280	131	238	449	129	161	201	215	100

^aTrace = < 1%

Habitat use areas -- Because the period of study coincided with extensive flooding, observed waterfowl use was probably different than in a normal year. Most waterfowl use along the Jordan River occurred from 94th to 106th South and from 126th South to Bluffdale. Over 90 percent of the waterfowl counted during censuses were in these 2 areas. The remaining section of river (106th to 126th South) received only 10% of the use. The null hypothesis that waterfowl use in each section of the river was proportional to the availability (length) of the river was rejected ($\chi^2 = 504.3$, $P < 0.001$, 2 df). It was determined that observed waterfowl use in the section from 94th - 106th South was significantly more than expected based on availability ($P < 0.05$). The section from 106th - 126th South was used significantly less than expected while use in the section from 126th South to Bluffdale was not different from expected (Neu et al. 1974). Portions of the river from 94th - 106th and 126th - Bluffdale were flooded out or contained meandering sections of river. These were found to be important resting and feeding areas for waterfowl (Fig. 10). Waterfowl use may be different in years with less flooding. The river between 106th and 126th was channelized with no flooded portions. Flooded out sections of pasture, Russian olive, and willows were the primary cover in the areas receiving substantial use.

Seasonal abundance -- Waterfowl numbers along the Jordan River were low during November and December, most likely due to hunting pressure. From January through March, waterfowl numbers fluctuated between 280 and 130 birds. In April, waterfowl numbers peaked at 450. However, a count was not made in September, when duck numbers

in Utah are usually highest. After migration, waterfowl numbers dropped and stabilized at about 130 birds. From May through August, waterfowl numbers steadily rose from 130 to 215 (Fig. 11, Table 7). The pattern of seasonal abundance was similar to that documented at Mona Reservoir in 1982 and at Utah Lake in 1979-80 (Smith and Greenwood 1983, Shields and Moretti 1982).

Waterfowl Production -- No goose nesting was documented along the river during 1983. Duck nesting was low and may have been lower than normal because of extensive flooding. During nesting surveys, 4 cinnamon teal, 2 mallard, 2 redhead (Aythya americana), and 1 gadwall (Anas strepera) nests were found. Of the 6 cover types surveyed, nests were found only in wetlands and pasture-hay meadows. No duck nests were found in sample plots for sagebrush-rabbitbrush, waste areas, strip cover, or small grains. However in sagebrush-rabbitbrush plots, duck egg shells were found, and during late July, a mallard nest was found in rabbitbrush along the river. Nest densities (SE) for mixed wetlands and pasture-hay meadows were 0.37 (0.15) nests/ha and 0.18 (0.08) nests/ha, respectively (Table 8).

Only 1 of 6 (17%) nests of known fate was successful. Predation and hay mowing were the major causes of nest failure.

Duck brood counts were not complete, but we believe that they were nearly so because the study area was small enough to effectively census and because similar results were obtained on different counts. Duck production on the study area in 1983 was similar to that estimated for Mona Reservoir during summer 1982, and

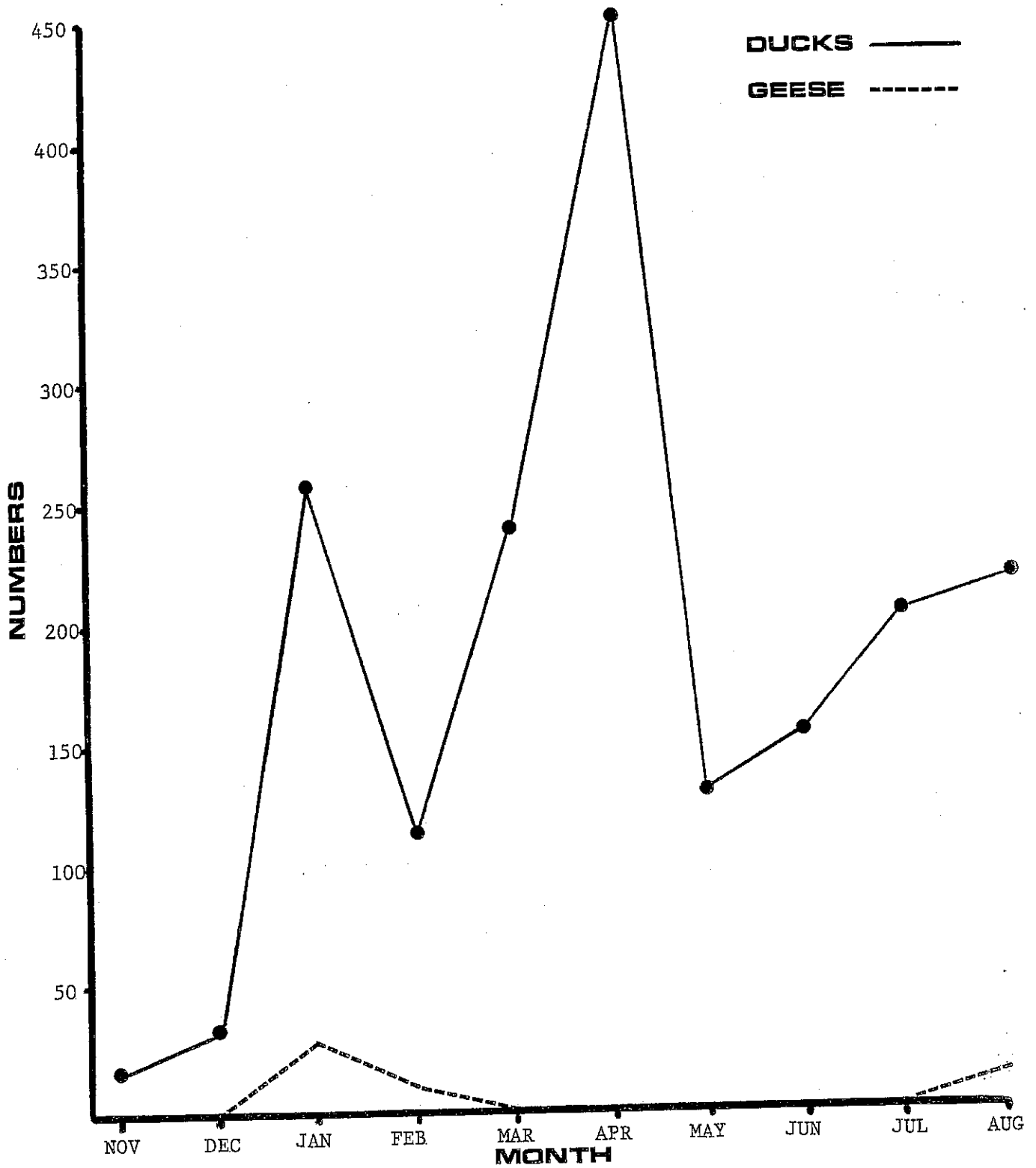


Fig. 11. Numbers of ducks and geese in Jordan River study area, November 1982-August 1983, Salt Lake County, Utah.

Table 8. Duck nest densities by cover type, Jordan River study area, Salt Lake County, Utah, 1983.

Cover type	No. plots	Area sampled (ha)	No. nests found	Nests/ha ^b	
				\bar{X}	SE
Mixed Wetlands ^a	5	16.2	6	0.37	0.15
Pasture and hay-meadow	5	16.4	3	0.18	0.08
Sagebrush-rabbitbrush	9	12.4	0	0.00	0.00
Waste	1	1.6	0	0.00	0.00
Strip cover	2	0.2	0	0.00	0.00
Small grains	2	5.3	0	0.00	0.00

^aIncludes cattail-bulrush areas.

^bDensities were weighted to account for varying plot sizes.

species nesting and producing young were identical to those reported by Shields and Moretti (1982) on Utah Lake. Estimated minimum duck production was 90 young (14 broods). Species producing young included green-winged teal (1 brood, 8 young), cinnamon teal (3 broods, 20 young), gadwall (1 brood, 8 young), mallard (3 broods, 20 young), pintail (1 brood, 10 young), redhead (2 broods, 5 young), northern shoveler (2 broods, 15 young), and ruddy duck (Oxyura jamaicensis) (1 brood, 4 young). The earliest sighting of a brood was on 23 May, but broods were not frequently observed until mid July.

Harvest -- Some jump-shooting for ducks occurs along the river, but hunting pressure is generally light and the annual harvest is very low (K. Rawley, UDWR, pers. commun.). Most of the lands along the river are private and posted, limiting access for hunters. Most of the hunting pressure is from local residents. On 12 trips to the study area during the 1982 hunting season, only 1 group of hunters was interviewed and no ducks were checked. Mallards and green-winged teal generally dominate hunter bags (K. Rawley, UDWR, pers. commun.).

California Quail

California quail, first introduced to Utah over a century ago, are found in scattered, local populations in the central and northern portions of the state. Quail generally inhabit grasslands and sagebrush habitat in the valleys usually along streams and canals.

Like other species of quail, California quail are always found in coveys except during the breeding-nesting season. Leopold (1959) reported that coveys usually consisted of 25-60 birds but occasionally numbered from 500-600. Emlen (1939) studied 4 coveys that ranged in size from 21-46 birds and had corresponding home ranges of 17-45 acres.

Coveys break up in the spring for nesting. Unpaired males are usually the first to disperse and then mated pairs. Females may reneest if their first clutch or brood is lost. If a nesting female dies or otherwise abandons a clutch, males may incubate the eggs. The frequency of second broods has not been clearly resolved. There is some evidence, however, that young of first or early broods are often cared for by males freeing females to produce a second clutch (McMillan 1964, Francis 1965, Anthony 1970). Covey reformation begins during summer as broods merge into subcoveys.

Cover requirements of California quail will, of course, vary with geographic locality. Food is generally not a limiting influence on quail numbers because they consume a wide variety of plant material and seeds. Generally, herbaceous nesting cover is preferred. Emlen (1939) found that covey locations were closely associated with the distribution of brushy cover. Emlen and Glading (1945) studied quail populations on dry farming lands, irrigated lands, range lands, and deserts. Range lands were the overall most important type to the species, but habitat quality on range lands was variable. The best habitat provided available water, a good herbaceous food source, and moderately open brushy cover. Edminster (1954) found that tall shrubs were preferred roosting cover, and

that important escape cover consisted of dense vegetative growth.

The California quail population on the Jordan River study area during 1982-83 consisted of only about 40 birds. During winter, quail were observed regularly in 2 locations: along the Galena Canal between 100th South and 104th South in the northeast part of the study area (approximately 25-30 birds), and along the Beckstead Ditch in the west central part of the study area at about 120th South (approximately 12 birds) (Fig. 10). Along the Galena Canal, quail utilized brushy cover with dense grass and herbaceous ground cover. Prevalent species included sagebrush, rabbitbrush, squawbush, willow, and reed canarygrass (Phalaris arundinacea) with dense patches of squawbush used as escape cover. Cover used by quail along the Beckstead Ditch was primarily sagebrush and rabbitbrush. During January, quail were heard calling from a brushy hillside along 146th South Street, but none were observed or subsequently located. No quail were observed along the Jordan River itself. Local residents were frequently asked about the presence of other coveys of quail but were not able to supply additional information.

Occasional observations of quail were made during the summer and were always near the locations of the winter coveys (Fig. 10); however, we were unable to find any nests. The Galena Canal covey had begun to reform by August and, although young birds were observed, we were unable to obtain an accurate count.

To our knowledge there was no legal harvest of California quail within the study area.

Other Wildlife

Raptors -- Most raptor species observed during this study were either winter residents or migrants (Table 9): Only the American kestrel (Falco sparverius) and turkey vulture (Cathartes aura) and barn owl (Tyto alba) were observed during summer. The absence of raptor species usually common during summer, such as red-tailed hawks (Buteo jamaicensis), was probably due to a lack of suitable nesting sites and/or low prey base (rabbits and rodents) on the study area.

Other Birds -- Fifty-five other avian species (shore and wading birds, passerines, and other small birds) were observed during this study. Frequency of occurrence by season is shown in Table 9 and observed habitat use in Table 10. A list of all birds observed or believed to occur in the Jordan River area is found in Appendix A.

Mammals -- Common mammal species observed during the study were the rock squirrel (Citellus variegatus), striped skunk (Mephitis mephitis), and muskrat (Ondatra zibethica). Other mammals documented included beaver (Castor canadensis), raccoon (Procyon lotor), pocket gopher (Thomomys bottae), red fox (Vulpes fulva), cottontail (Sylvilagus auduboni), and black-tailed jackrabbit (Lepus californicus) (Appendix A).

Threatened and Endangered Species -- No threatened or endangered species are known to use or inhabit the study area. The area is, however, within the distribution of the peregrine falcon (Falco peregrinus) and bald eagle (Haliaeetus leucocephalus).

Table 9. Seasonal observation frequencies and status of birds on the Jordan River study area, Salt Lake County, Utah, 1982-83.

Species	% of trips observed ^a				Comments ^b
	F	W	SP	SU	
Eared grebe	0	0	10	4	Uncommon during spring and summer in wetlands.
Western grebe	0	0	10	4	Spring and summer resident, along the river.
Double-crested cormorant	0	0	10	4	Uncommon spring and summer resident.
Great blue heron	20	58	60	22	Common year-round in wetlands.
Snowy egret	0	0	10	4	Uncommon spring and summer resident.
Black-crowned night heron	0	0	20	26	Spring and summer resident in wetlands.
White-faced ibis	0	0	10	59	Common during spring and summer.
Turkey vulture	0	0	0	7	Uncommon summer resident
Sharp-shinned hawk	20	0	0	0	Found only during the fall.
Red-tailed hawk	40	32	10	0	Fall, winter and spring resident.
Rough-legged hawk	0	32	30	0	Common during winter and spring.
Marsh hawk	0	32	20	0	Winter and spring resident.
Prairie falcon	0	26	0	0	Common during the winter.
Merlin	0	5	0	0	Found only during the winter.
American kestrel	0	47	40	56	Common during winter, spring and summer.
Virginia rail	0	5	30	11	Secretive species relatively common in cattails
Sora rail	0	0	0	4	Uncommon summer resident.
American coot	0	5	30	22	Nested in study area along the river.
Killdeer	0	53	80	81	Common during winter, spring and summer; young found in waste areas.
Common snipe	20	58	60	30	Common year-round, nested in mixed wetlands.
Spotted sandpiper	0	0	10	7	Uncommon during spring and summer.
Long-billed curlew	0	0	10	0	Observed only during spring.
American avocet	0	0	20	4	Observed during spring and summer in wetlands.
Black-necked stilt	0	0	0	19	Summer resident; nested in wetlands.
Wilson's phalarope	0	0	20	11	Spring and summer resident; nested in mixed wetlands.
California gull	40	5	60	93	Common year-round.
Forster's tern	0	0	10	0	Observed during spring.
Rock dove	0	5	20	37	Common resident.
Great horned owl	0	0	10	0	Observed only during spring.
Belted kingfisher	0	5	0	7	Found during the winter and summer.
Common flicker	100	84	70	11	Year-round resident common in deciduous woodlands.

Table 9. Continued

Species	% of trips observed ^a				Comments ^b
	F	W	SP	SU	
Downy woodpecker	0	5	0	0	Observed during winter in deciduous woodland.
Eastern kingbird	0	0	0	7	Uncommon summer resident.
Western kingbird	0	0	0	67	Common summer resident found in agricultural areas.
Horned lark	0	11	30	4	Common resident, found in agricultural areas.
Violet-green swallow	0	0	0	7	Uncommon summer resident.
Tree swallow	0	0	10	11	Found during spring and summer.
Rough-winged swallow	0	0	30	30	Spring and summer resident.
Barn swallow	0	0	30	67	Common during spring and summer; nested at buildings and other structures.
Cliff swallow	0	0	20	15	Common during spring and summer; nested on study area.
Black-billed magpie	100	100	80	100	Year-round resident; nested in deciduous woodlands.
Long-billed marsh wren	40	16	0	4	Secretive species found in marshy areas.
American robin	0	42	60	85	Common yearlong.
Northern shrike	0	5	0	0	Observed once during winter.
Loggerhead shrike	0	0	10	0	Observed once during spring.
Starling	100	89	90	93	Common year-round; nested on study area.
Yellow-rumped warbler	0	0	10	0	Observed only during spring.
Common yellowthroat	0	0	10	0	Observed during spring and summer in cattail-bulrush.
Yellow-breasted chat	0	0	0	7	Observed during summer.
House sparrow	20	53	80	89	Common year-round; nested in urban areas.
Western meadowlark	60	68	90	93	Common year-round, nested in pasture, sagebrush and mixed wetlands.
Yellow-headed blackbird	0	0	20	33	Common spring and summer; nested in cattail-bulrush areas.
Red-winged blackbird	40	21	80	70	Common year-round; nested in mixed wetlands.
Brewer's blackbird	0	5	30	59	Nests found in sagebrush and mixed wetlands.
Northern oriole	0	0	0	4	Uncommon summer resident.
Lazuli bunting	0	0	10	7	Found during spring and summer.
Song sparrow	40	58	70	55	Common year-round in cattail-bulrush areas.
White-crowned sparrow	20	32	20	0	Observed in deciduous woodland and agricultural areas.
Dark-eyed junco	0	26	40	0	Common during winter and spring.
Gray-headed junco	0	5	0	0	Found only during the winter.

Table 9. Continued

Species	% of trips observed ^a				Comments ^b
	F	W	SP	SU	
Savannah sparrow	0	0	10	7	Found during spring and summer in pastures.
Lark sparrow	0	0	0	7	Summer resident.
House finch	0	11	10	11	Common during winter, spring and summer.
American goldfinch	0	0	0	11	Summer resident.

^aFall - 5 trips, Winter - 19 trips, Spring - 10 trips, Summer - 27 trips.

^bComments were based on trips in addition to those used for determination of seasonal frequency.

Table 10. Occurrence of passerine and other small birds by cover type on the Jordan River study area, Salt Lake County, Utah, 1982-83.

	Cultivated agriculture	Pasture- hay meadow	Mixed wetland	Sage- brush	Deciduous woodland	Cattail- bulrush	Willow	Waste areas
Belted kingfisher					X			
Common flicker					X			
Western kingbird	X				X			
Eastern kingbird					X			
Horned lark	X							
Violet-green swallow		X						
Tree swallow		X						
American goldfinch				X				X
Rough-winged swallow		X						
Barn swallow		X						
Cliff swallow		X						
Black-billed magpie	X	X	X	X	X		X	X
Long-billed marsh wren						X		
American robin	X	X			X			
Lazuli bunting					X			
Northern shrike					X			
Loggerhead shrike					X			
Yellow-rumped warbler					X			
House sparrow	X			X	X		X	X
Western meadowlark	X		X	X	X		X	X
Yellow-headed blackbird					X			
Red-winged blackbird	X		X		X		X	
Northern oriole					X		X	
Common yellowthroat					X			
Song sparrow					X		X	X
White-crowned sparrow	X			X	X		X	
Yellow-breasted chat					X			
Dark-eyed and gray-headed junco							X	
Savannah sparrow		X			X			
Lark sparrow			X					
Downy woodpecker				X				X
House finch	X							X
Rock dove	X							

SUMMARY

An inventory of terrestrial, vertebrate wildlife in the proposed Lampton Reservoir area was conducted from October 1982 through September 1983. The study area (2,398 ha) was located along the Jordan River in South Salt Lake County (Fig. 1).

Eleven major cover types were identified on the study area (Figure 2). Approximately 24% of the area was cultivated, 10% was wetlands, 26% was in pasture or grass hay, 18% was sagebrush-rabbitbrush, and 7% was residential developments.

During January 1983, the pheasant population (\pm 95% CL) was estimated to be 712 ± 84 birds and the average density was 0.343 ± 0.041 pheasants/ha. Observed pheasant use of individual cover types during winter was not proportional to the availability of the types. Wetlands were the most important type in providing winter cover for pheasants. Cattail-bulrush, mixed wetlands, willow, waste areas, and strip cover were preferred cover types; alfalfa, pasture-hay meadows, and other crops were avoided; and use of small grains, deciduous woodlands, and sagebrush-rabbitbrush was random with respect to availability. Winter concentration areas are shown in Fig. 10.

Strip cover, alfalfa, and sagebrush-rabbitbrush received the highest use for nesting by pheasants followed, in decreasing order

of importance, by pasture-hay meadows, waste areas, small grains, and wetlands. The low use of sedge-grass wetlands in 1983 was attributed to spring flooding which made much of this type too wet for nesting. Based on nest densities, nest success, and the area encompassed by each type, we speculate that strip cover and sagebrush-rabbitbrush contributed at least 65% of the young produced on the study area.

A roadside survey route was driven 12 times to provide an index of summer pheasant abundance. On the roadside survey, an average of 0.50 ± 0.86 pheasants/km and 0.35 ± 0.66 young/km were observed. These values are higher than the averages (1972-82) for the surveys conducted annually in Salt Lake County but lower than the statewide averages. During summer, 65% of the adult hens observed were with young, young per adult hen was 1.82, and mean brood size was 5.00 ± 4.32 young.

The hypothesis that cover use by pheasant broods during summer was random was rejected. Preferential use was not shown for any cover types. Avoidance was demonstrated for sagebrush-rabbitbrush and possibly pasture-hay meadows. Use of the remaining cover types was proportional to their availability.

Observed cover use by adults without young during summer was also different than expected. Use of small grains was greater than expected and use of sagebrush-rabbitbrush and mixed wetlands was less than expected.

Presently, lands along the Jordan River south of 118th South are open to hunting, however, there has been pressure to prohibit

hunting in the area for safety reasons. Hunter success in Salt Lake County in 1982 was 0.57 pheasants bagged per hunter-day; lower than the statewide average of 0.74 pheasants per hunter-day.

Roadside surveys indicated extremely low use by mourning doves on the study area during summer 1983. The highest use was observed in August when 0.55 (0.11) doves/km were observed. Lower dove numbers observed along the Wasatch Front in 1983 corresponded to increased dove use in western Utah, probably as a result of increased food availability in the west desert areas.

Thirteen species of ducks and Canada geese were identified on waterfowl surveys. Approximately, 20-30 geese utilized the study area during fall and winter. Waterfowl numbers peaked in April when nearly 450 ducks were counted (Fig. 11). During the study, over 90% of the use by ducks on the Jordan River occurred from 94th to 106th South and from 126th South to Bluffdale. However, because of the extensive flooding that occurred during the study, use of the river by ducks may have been different than in a more "typical" year.

During 1983, geese did not nest on the study area and use by ducks for nesting was low. Duck nest densities were 0.37 and 0.18 nests/ha in mixed wetlands and pasture-hay meadows, respectively. Estimated minimum duck production was 90 young (14 broods). Species producing young included green-winged teal, cinnamon teal, gadwall, mallard, pintail, redhead, northern shoveler, and ruddy duck.

California quail numbered about 40 during the study. During winter, coveys were located in 2 areas; along the Galena Canal between 100th and 104th South and along the Beckstead Ditch at about

120th South. The low quail numbers prevented use of standard techniques to evaluate habitat use.

Use of the study area by raptors was limited primarily to the fall, winter, and spring months when 8 species were observed (Table 9). During summer only the American kestrel and turkey vulture were documented. The seasonal occurrence and observed habitat use of other avian species was documented. A list of all vertebrate, terrestrial wildlife occurring or potentially occurring on the study area is presented in Appendix A. No threatened or endangered species are known to utilize the study area.

Of most importance in maintaining or enhancing wildlife values on the study area is the preservation and management of wetland habitats.

LITERATURE CITED

- Anthony, R. 1970. Ecology and reproduction of California quail in southeastern Washington. *Condor* 72:276-287.
- Bailey, N. T. J. 1951. On estimating the size of mobile populations from recapture data. *Biom.* 38:293-306.
- Baxter, W. L., and C. W. Wolfe. 1973. Life history and ecology of the ring-necked pheasant in Nebraska. *Nebr. Game and Parks Comm.* 58 pp.
- Bellrose, F. C. 1976. Ducks, geese, and swans of North America. *Wildl. Manage. Inst. Stackpole Books.* Harrisburg, Pa. 544 pp.
- Buechner, H. R. 1957. What do wild animals need to survive?. *Wash. State Coll. Agric. Exp. Station Circ.* 295:13-14
- Buss, I. O. 1946. Wisconsin pheasant populations. Prog. rep. of pheasant investigations conducted from 1936 to 1943. *Wis. Conserv. Dep. Publ.* 326, A-46.
- Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deep water habitats of the United States. U.S. Fish and Wildl. Serv., Biol. Serv. Program, U.S. Gov. Printing Off. FWS/OBS-79/31. 103 pp.
- Edminster, F. C. 1954. American game birds of field and forest. Charles Scribner's Sons, New York.
- Emlen, J. T., Jr. 1939. Seasonal movements of a low-density valley quail population. *J. Wildl. Manage.* 3:118-130.
- Emlen, J. T., Jr., and B. Glading. 1945. Increasing valley quail in California. *Univ. of Calif. Agric. Exp. Station Bull.* 695.
- Francis, W. J. 1965. Double broods in California quail. *Condor* 67:541-542.
- Gates, J. M., and J. B. Hale. 1974. Seasonal movement, winter habitat use, and population distribution of an east central Wisconsin pheasant population. *Wis. Dep. Nat. Resour. Tech. Bull. No. 76.* 55 pp.
- Gates, J. M., and J. B. Hale. 1975. Reproduction of an east-central Wisconsin pheasant population. *Wis. Dep. Nat. Resour. Tech. Bull. No. 85.* 75 pp.

LITERATURE CITED (Continued)

- Kaiserman Assoc. and Genge Cons. Jordan-Provo River Parkway Master Implementation Plan. Prepared for Utah Dep. Nat. Resour., Provo-Jordan River Parkway Authority, and Utah Outdoor Recreation Agency, Salt Lake City, Utah.
- Leatham, J. P., and J. A. Roberson. 1983. Utah upland game annual report 1982. Utah Div. Wildl. Resour. Publ. No. 83-08. 195 pp.
- Leopold, A. S. 1959. Wildlife of Mexico: The game birds and mammals. Univ. of Calif. Press, Berkeley.
- Lyon, J. L. 1954. Pheasant winter roosting cover preference in north-central Colorado. J. Wildl. Manage. 18:179-184.
- McMillan, I. I. 1964. Annual population changes in California quail. J. Wildl. Manage. 28:702-711.
- Nelson, K., and M. Wilson. 1982. List of vertebrate wildlife species in central Utah. Utah Div. Wildl. Resour. Publ. Draft.
- Neu, C. W., C. R. Byers, and J. M. Peek. 1974. A technique for analysis of utilization - availability data. J. Wildl. Manage. 38: 541-545.
- Olsen, D. W. 1977. A literature review of pheasant habitat requirements and improvement methods. Utah Div. Wildl. Resour. Publ. No. 77-7. 144 pp.
- Ostle, B. O., and R. W. Mensing. 1975. Statistics in research. Iowa State Univ. Press, Ames. 596 pp.
- Robertson, W. B. 1958. Investigations of ring-necked pheasants in Illinois. Ill. Dep. Cons. Div. Game Manage. Tech. Bull. No. 1.
- Seber, G. A. F. 1973. The estimation of animal abundance and related parameters. Hatuer Press, New York. 506 pp.
- Shields, W. C., and M. O. Moretti. 1982. Utah Lake terrestrial wildlife inventory. Final phase II report for U.S. Bur. Reclamation. 294 pp.
- Smith, R. B., and C. L. Greenwood. 1983. Mona Reservoir Terrestrial Wildlife Inventory Studies, Irrigation and Drainage System, Bonneville Unit, Central Utah Project. Utah Div. Wildl. Resour. and U.S. Bur. Reclamation. 76 pp.
- Stokes, A. W. 1954. Population studies of the ring-necked pheasants on Pelee Island, Ontario. Ont. Dep. Lands and Forests. Tech. Bull. Wildl. Series No. 4. 154 pp.

LITERATURE CITED (Continued)

Trautman, C. G. 1960. Evaluation of pheasant nesting habitat in Eastern South Dakota. Trans. N. Am. Wildl. and Nat. Resour. Conf. 25:202-213.

Wagner, F. H., C. D. Besadny, and C. Kabat. 1965. Population ecology and management of Wisconsin pheasants. Wis. Conserv. Dep. Tech. Wildl. Bull. No. 34. 168 pp.

APPENDIX A

List of Wildlife Species Observed or Potentially
Occurring in the Jordan River
Study Area

Following is a list of vertebrate wildlife species that occur or are believed to occur in the study area. Species that we observed or could find a record of occurrence for are denoted with an asterisk (*). The following code letters are used to describe the status for each species. Status was based on general observations and knowledge, but was rather speculative in many cases.

- C Common - These species are widespread and abundant.
 U Uncommon - These species are widespread, but not abundant.
 R Rare - These species are seldom identified during any one year.
 O Occasional - These species are periodically identified during a long term period (10-50 years).
 A Accidental - Distribution for these species does not normally include this area. Sightings are as far between as 50 to 100 years.
 E Endangered - These species are endangered with extinction or extirpation.
 L Limited - These species are common but restricted to a particular area or habitat type in Utah.
 P Protected - These species are protected by state or federal laws in Utah.
 N Nonprotected - These species are not protected by any laws in Utah.
 G Game or furbearer species.

Species	Status
AMPHIBIANS	
Family Ambystomidae	
Tiger salamander - <u>Ambystoma tigrinum</u>	C-P
Family Pelobatidae	
Great Basin spadefoot toad - <u>Scaphiopus intermontanus</u>	C-P
Family Bufonidae	
Woodhouse's toad - <u>Bufo woodhousei</u>	C-P
Western toad - <u>Bufo boreas</u>	C-P

APPENDIX A (Continued)

Species	Status
Family Ranidae	
Bullfrog - <u>Rana catesbeiana</u>	L-P
Leopard frog - <u>Rana pipiens</u>	C-P
Family Hylidae	
Boreal chorus frog - <u>Pseudacris triseriata</u>	C-P
REPTILES	
Family Iguanidae	
Great Basin fence lizard - <u>Sceloporus occidentalis</u>	C-P
*Northern sagebrush lizard - <u>Sceloporus graciosus</u>	C-P
Side-blotched lizard - <u>Uta stansburiana</u>	C-P
Family Scincidae	
Great Basin skink - <u>Eumeces skiltonianus</u>	L-P
Family Boidae	
Utah rubber boa - <u>Charina bottae</u>	C-P
Family Colubridae	
*Wandering garter snake - <u>Thamnophis elegans</u>	C-P
Valley garter snake - <u>Thamnophis sirtalis</u>	U-P
Regal ring-necked snake - <u>Diadophis punctatus</u>	U-P
*Western yellow-bellied racer - <u>Coluber constrictor</u>	C-P
Western smooth green snake - <u>Opheodrys vernalis</u>	U-P
*Gopher snake - <u>Pituophis melanoleucus</u>	C-P
Western milk snake - <u>Lampropeltis triangulum</u>	U-P
Western long-nosed snake - <u>Rhinocheilus lecontei</u>	C-P
Family Viperidae	
Great Basin rattlesnake - <u>Crotalus viridis</u>	C-P
MAMMALS	
Order Insectivora	
Family Soricidae	
Merriam shrew - <u>Sorex merriami</u>	U-N
Vagrant shrew - <u>Sorex vagrans</u>	C-N
Dusky shrew - <u>Sorex obscurus</u>	C-N
Northern water shrew - <u>Sorex palustris</u>	
Family Vespertilionidae	
*Silver-haired bat - <u>Lasiionycteris noctivagans</u>	
*Hoary bat - <u>Lasiurus cinereus</u>	
*Spotted bat - <u>Euderma maculata</u>	
Pallid bat - <u>Antrozous pallidus</u>	
*Small-footed bat - <u>Myotis leibii</u>	C-N
*Little brown bat - <u>Myotis lucifugus</u>	C-N

APPENDIX A (Continued)

Species	Status
MAMMALS (Cont'd.)	
*Long-eared bat - <u>Myotis evotis</u>	C-N
Western pipistrelle bat - <u>Pipistrellus hesperus</u>	C-N
*Big brown bat - <u>Eptesicus fuscus</u>	C-N
*Long-legged myotis - <u>Myotis volans</u>	
Family Molossidae	
*Mexican freetail bat - <u>Tadarida brasiliensis</u>	
Family Leporidae	
*Black-tailed jackrabbit - <u>Lepus californicus</u>	C-N
*Desert cottontail - <u>Sylvilagus auduboni</u>	C-P-G
Family Sciuridae	
Townsend ground squirrel - <u>Citellus townsendi</u>	L-N
*Rock squirrel - <u>Citellus variegatus</u>	C-N
Least chipmunk - <u>Eutamias minimus</u>	C-N
Family Geomyidae	
*Valley pocket gopher - <u>Thomomys bottae</u>	C-N
Family Heteromyidae	
Great Basin pocket mouse - <u>Perognathus parvus</u>	C-N
Ord kangaroo rat - <u>Dipodomys ordi</u>	C-N
Great Basin kangaroo rat - <u>Dipodomys microps</u>	C-N
Dark kangaroo mouse - <u>Microdipodops megacephalus</u>	U-N
Family Castoridae	
*Beaver - <u>Castor canadensis</u>	C-P-G
Family Cricetidae	
Western harvest mouse - <u>Reithrodontomys megalotis</u>	C-N
Deer mouse - <u>Peromyscus maniculatus</u>	C-N
Brush mouse - <u>Peromyscus boylei</u>	C-N
Northern grasshopper mouse - <u>Onychomys leucogaster</u>	U-N
*Muskrat - <u>Ondatra zibethica</u>	C-N
*Meadow vole - <u>Microtus pennsylvanicus</u>	C-N
Mountain vole - <u>Microtus montanus</u>	C-N
Longtail vole - <u>Microtus longicaudus</u>	C-N
Sagebrush vole - <u>Microtus curtatus</u>	C-N
Family Muridae	
Black rat - <u>Rattus rattus</u>	C-N
Norway rat - <u>Rattus norvegicus</u>	C-N
House mouse - <u>Mus musculus</u>	C-N

APPENDIX A (Continued)

Species	Status
MAMMALS (Cont'd.)	
Family Zapodidae	
W. jumping mouse - <u>Zapus princeps</u>	C-N
Family Erethizontidae	
Porcupine - <u>Erethizon dorsatum</u>	C-N
Family Canidae	
Coyote - <u>Canis latrans</u>	C-N
*Red fox - <u>Vulpes fulva</u>	L-N
Family Procyonidae	
*Raccoon - <u>Procyon lotor</u>	C-N
Family Mustelidae	
Long-tailed weasel - <u>Mustela frenata</u>	C-P-G
Mink - <u>Mustela vison</u>	L-P-G
Badger - <u>Taxidea taxus</u>	C-P-G
*Striped skunk - <u>Mephitis mephitis</u>	C-P-G
Spotted skunk - <u>Spilogale putorius</u>	C-P-G
Family Felidae	
Bobcat - <u>Lynx rufus</u>	C-P-G
Family Cervidae	
*Mule deer - <u>Odocoileus hemionus</u>	C-P-G
BIRDS	
Order Picipediformes	
Family Podicipedidae	
*Eared grebe - <u>Podiceps nigricollis</u>	C-P
*Western grebe - <u>Aechmophorus occidentalis</u>	C-P
*Pied-billed grebe - <u>Podilymbus podiceps</u>	C-P
Order Pelecaniformes	
Family Pelcanidae	
White pelican - <u>Pelecanus erythrorhynchos</u>	C-P
Family Phalacrocoracidae	
*Double-crested cormorant - <u>Phalacrocorax auritus</u>	U-P
Order Ciconiiformes	
Family Ardeidae	
*Great blue heron - <u>Ardea herodias</u>	C-P
Cattle egret - <u>Bubulcus ibis</u>	O-P
*Snowy egret - <u>Egretta thula</u>	C-P
*Black-crowned night heron - <u>Nycticorax nycticorax</u>	C-P

APPENDIX A (Continued)

Species	Status
BIRDS (Cont'd.)	
Family Threskiornithidae	
*White-faced ibis - <u>Plegadis chihi</u>	C-P
Order Anseriformes	
Family Anatidae	
Whistling swan - <u>Olor columbianus</u>	C-P-G
*Canada goose - <u>Branta canadensis</u>	C-P-G
White-fronted goose - <u>Anser albifrons</u>	O-P-G
Snow goose - <u>Chen caerulescens</u>	C-P-G
*Mallard - <u>Anas platyrhynchos</u>	C-P-G
*Gadwall - <u>Anas strepera</u>	C-P-G
*Pintail - <u>Anas acuta</u>	C-P-G
*Green-winged teal - <u>Anas crecca</u>	C-P-G
*Blue-winged teal - <u>Anas discors</u>	U-P-G
*Cinnamon teal - <u>Anas cyanoptera</u>	C-P-G
*American widgeon - <u>Anas americana</u>	C-P-G
*Northern shoveler - <u>Anas clypeata</u>	C-P-G
*Redhead - <u>Aythya americana</u>	C-P-G
*Ring-necked duck - <u>Aythya collaris</u>	U-P-G
Canvasback - <u>Aythya valisineria</u>	C-P-G
*Lesser scaup - <u>Aythya affinis</u>	C-P-G
Common goldeneye - <u>Bucephala clangula</u>	C-P-G
Bufflehead - <u>Bucephala albeola</u>	C-P-G
*Ruddy duck - <u>Oxyura jamaicensis</u>	C-P-G
*Common merganser - <u>Mergus merganser</u>	C-P-G
*Red-breasted merganser - <u>Mergus serrator</u>	C-P-G
Order Falconiformes	
Family Cathartidae	
*Turkey vulture - <u>Cathartes aura</u>	C-P
Family Accipitridae	
*Sharp-shinned hawk - <u>Accipiter striatus</u>	C-P
Cooper's hawk - <u>Accipiter cooperii</u>	C-P
*Red-tailed hawk - <u>Buteo jamaicensis</u>	C-P
Swainson's hawk - <u>Buteo swainsoni</u>	C-P
*Rough-legged hawk - <u>Buteo lagopus</u>	C-P
Ferruginous hawk - <u>Buteo regalis</u>	C-P
*Golden eagle - <u>Aquila chrysaetos</u>	C-P
Bald eagle - <u>Haliaeetus leucocephalus</u>	E-P
*Marsh hawk - <u>Circus cyaneus</u>	C-P
Family Pandionidae	
Osprey - <u>Pandion haliaetus</u>	U-P

APPENDIX A (Continued)

Species	Status
BIRDS (Cont'd.)	
Family Falconidae	
*Prairie falcon - <u>Falco mexicanus</u>	C-P
Peregrine falcon - <u>Falco peregrinus</u>	E-P
*Merlin - <u>Falco columbarius</u>	U-P
*American kestrel - <u>Falco sparverius</u>	C-P
Order Galliformes	
Family Phasianidae	
*California quail - <u>Lophortyx californicus</u>	C-P-G
*Ring-necked pheasant - <u>Phasianus colchicus</u>	C-P-G
Order Gruiformes	
Family Gruidae	
Sandhill crane - <u>Grus canadensis</u>	L-P
Family Rallidae	
*Virginia rail - <u>Rallus limicola</u>	C-P
*Sora rail - <u>Porzana carolina</u>	C-P
*American coot - <u>Fulica americana</u>	C-P
Purple gallinule - <u>Prophyrula martinica</u>	A-P
Order Charadriiformes	
Family Charadriidae	
*Killdeer - <u>Charadrius vociferus</u>	C-P
Black-bellied plover - <u>Pluvialis squatarola</u>	C-P
Family Scolopacidae	
*Common snipe - <u>Capella gallinago</u>	C-P-G
Long-billed curlew - <u>Numenius americanus</u>	C-P
Willet - <u>Catoptrophorus semipalmatus</u>	U-P
*Spotted sandpiper - <u>Actitis macularia</u>	C-P
Marbled godwit - <u>Limosa fedoa</u>	C-P
Solitary sandpiper - <u>Tringa solitaria</u>	U-P
Greater yellowlegs - <u>Tringa melanoleuca</u>	C-P
Lesser yellowlegs - <u>Tringa flavipes</u>	C-P
Semipalmated sandpiper - <u>Calidris pusilla</u>	R-P
Western sandpiper - <u>Calidris mauri</u>	C-P
Long-billed dowitcher - <u>Limnodromus scolopaceus</u>	C-P
Family Recurvirostridae	
*American avocet - <u>Recurvirostra americana</u>	C-P
*Black-necked stilt - <u>Himantopus mexicanus</u>	C-P
Family Phalaropodidae	
*Wilson's phalarope - <u>Steganopus tricolor</u>	C-P

APPENDIX A (Continued)

Species	Status
BIRDS (Cont'd.)	
Family Laridae	
*California gull - <u>Larus californicus</u>	C-P
Ring-billed gull - <u>Larus delarwarensis</u>	C-P
Franklin's gull - <u>Larus pipixcan</u>	C-P
Bonaparte's gull - <u>Larus philidelphia</u>	U-P
*Forster's tern - <u>Sterna forsteri</u>	C-P
Caspian tern - <u>Sterna caspia</u>	U-P
Black tern - <u>Chilidonias niger</u>	C-P
Order Columbiformes	
Family Columbidae	
*Rock dove - <u>Columba livia</u>	C-P
*Mourning dove - <u>Zenaida macroura</u>	C-P
Order Cuculiformes	
Family Cuculidae	
Yellow-billed cuckoo - <u>Coccyzus americanus</u>	U-P
Black-billed cuckoo - <u>Coccyzus erythrophthalmus</u>	A-P
Order Strigiformes	
Family Tytonidae	
*Barn owl - <u>Tyto alba</u>	L-P
Family Strigidae	
Screech owl - <u>Otus asio</u>	C-P
*Great-horned owl - <u>Bubo virginianus</u>	C-P
Pygmy owl - <u>Glaucidium gnoma</u>	U-P
Burrowing owl - <u>Athene cunicularia</u>	L-P
Long eared owl - <u>Asio otus</u>	C-P
Short-eared owl - <u>Asio flammeus</u>	C-P
Saw-whet owl - <u>Aegolius acadicus</u>	C-P
Order Caprimulgiformes	
Family Caprimulgidae	
Poor-will - <u>Phalaenoptilus nuttallii</u>	C-P
*Common nighthawk - <u>Chordeiles minor</u>	C-P
Order Apodiformes	
Family Apodidae	
White-throated swift - <u>Aeronautes saxatalis</u>	C-P
Family Trochilidae	
Black-chinned hummingbird - <u>Archilochus alexandri</u>	C-P
*Broad-tailed hummingbird - <u>Selasphorus platycercus</u>	C-P

APPENDIX A (Continued)

Species	Status
BIRDS (Cont'd.)	
Order Coraciiformes	
Family Alcedinidae	
*Belted kingfisher - <u>Megaceryle alcyon</u>	U-P
Order Piciformes	
Family Picidae	
*Common flicker - <u>Colaptes auratus</u>	C-P
Lewis' woodpecker - <u>Melanerpes lewis</u>	U-P
Yellow-bellied sapsucker - <u>Sphyrapicus varius</u>	C-P
Hairy woodpecker - <u>Picoides villosus</u>	C-P
*Downy woodpecker - <u>Picoides pubescens</u>	C-P
Order Passeriformes	
Family Alaudidae	
*Horned lark - <u>Eremophila alpestris</u>	C-P
Family Hirundinidae	
*Violet-green swallow - <u>Tachycineta thalassina</u>	C-P
*Tree swallow - <u>Iridoprocne bicolor</u>	C-P
*Bank swallow - <u>Riparia riparia</u>	C-P
*Rough-winged swallow - <u>Stelgidopteryx ruficollis</u>	C-P
*Barn swallow - <u>Hirundo rustica</u>	C-P
*Cliff swallow - <u>Petrochelidon pyrrhonota</u>	C-P
Family Corvidae	
Scrub jay - <u>Aphelocoma coerulescens</u>	C-P
*Black-billed magpie - <u>Pica pica</u>	C-P
*Common raven - <u>Corvus corax</u>	C-P
Common crow - <u>Corvus brachyrhynchos</u>	U-P
Family Tyrannidae	
*Eastern kingbird - <u>Tyrannus tyrannus</u>	C-P
*Western kingbird - <u>Tyrannus verticalis</u>	C-P
Eastern phoebe - <u>Sayornis phoebe</u>	R-P
Say's phoebe - <u>Sayornis saya</u>	C-P
Willow flycatcher - <u>Empidonax traillii</u>	C-P
Gray flycatcher - <u>Empidonax wrightii</u>	C-P
Western flycatcher - <u>Empidonax difficilis</u>	C-P
Western wood pewee - <u>Contopus sordidulus</u>	C-P
Family Paridae	
*Black-capped chickadee - <u>Parus atricapillus</u>	C-P
Bushtit - <u>Psaltriparus minimus</u>	C-P
Family Sittidae	
White-breasted nuthatch - <u>Sitta carolinensis</u>	C-P

APPENDIX A (Continued)

Species	Status
BIRDS (Cont'd.)	
Family Certhiidae	
Brown creeper - <u>Certhia familiaris</u>	C-P
Family Cinclidae	
Dipper - <u>Cinclus mexicanus</u>	C-P
Family Troglodytidae	
House wren - <u>Troglodytes aedon</u>	C-P
Bewick's wren - <u>Thryomanes bewickii</u>	C-P
*Long-billed marsh wren - <u>Cistothorus palustris</u>	C-P
Family Mimidae	
Mockingbird - <u>Mimus polyglottos</u>	U-P
Gray catbird - <u>Dumetella carolinensis</u>	U-P
Sage thrasher - <u>Oreoscoptes montanus</u>	C-P
Family Turdidae	
*American robin - <u>Turdus migratorius</u>	C-P
Hermit thrush - <u>Catharus guttatus</u>	C-P
Veery - <u>Catharus fuscescens</u>	U-P
Western bluebird - <u>Sialia mexicana</u>	U-P
*Mountain bluebird - <u>Sialia currucoides</u>	C-P
Family Motacillidae	
Water pipet - <u>Anthus spinoletta</u>	C-P
Family Bombycillidae	
Bohemian waxwing - <u>Bombycilla garrulus</u>	C-P
Cedar waxwing - <u>Bombycilla cedrorum</u>	U-P
Family Laniidae	
*Northern shrike - <u>Lanius excubitor</u>	U-P
*Loggerhead shrike - <u>Lanius ludovicianus</u>	C-P
Family Sturnidae	
*Starling - <u>Sturnus vulgaris</u>	C-P
Family Vireonidae	
Solitary vireo - <u>Vireo solitarius</u>	U-P
Red-eyed vireo - <u>Vireo olivaceus</u>	A-P
Warbling vireo - <u>Vireo gilvus</u>	C-P

APPENDIX A (Continued)

Species	Status
BIRDS (Cont'd.)	
Family Parulidae	
Orange-crowned warbler - <u>Vermivora celata</u>	C-P
*Yellow warbler - <u>Dendroica petechia</u>	C-P
Black-throated blue warbler - <u>Dendroica caerulescens</u>	A-P
*Yellow-rumped warbler - <u>Dendroica coronata</u>	C-P
Black-throated gray warbler - <u>Dendroica nigrescens</u>	C-P
*Common yellowthroat - <u>Geothlypis trichas</u>	C-P
*Yellow-breasted chat - <u>Icteria virens</u>	C-P
Wilson's warbler - <u>Wilsonia pusilla</u>	C-P
American redstart - <u>Setophaga ruticilla</u>	U-P
Family Ploceidae	
*House sparrow - <u>Passer domesticus</u>	C-P
Family Icteridae	
Bobolink - <u>Dolichonyx oryzivorus</u>	L-P
*Western meadowlark - <u>Sturnella neglecta</u>	C-P
*Yellow-headed blackbird - <u>Xanthocephalus xanthocephalus</u>	C-P
*Red-winged blackbird - <u>Agelaius phoeniceus</u>	C-P
*Northern oriole - <u>Icterus galbula</u>	C-P
*Brewer's blackbird - <u>Euphagus cyanocephalus</u>	C-P
*Brown-headed cowbird - <u>Molothrus ater</u>	C-P
Family Thraupidae	
Western tanager - <u>Piranga ludoviciana</u>	C-P
Family Fringillidae	
Black-headed grosbeak - <u>Pheucticus melanocephalus</u>	C-P
Blue grosbeak - <u>Guiraca caerulea</u>	C-P
*Lazuli bunting - <u>Passerina amoena</u>	C-P
Lapland longspur - <u>Calcarius lapponicus</u>	U-P
Lark bunting - <u>Calamospiza melanocorys</u>	U-P
Fox sparrow - <u>Passerella iliaca</u>	U-P
*Song sparrow - <u>Melospiza melodia</u>	C-P
Lincoln sparrow - <u>Melospiza lincolni</u>	C-P
*White-crowned sparrow - <u>Zonotrichia leucophrys</u>	C-P
White-throated sparrow - <u>Zonotrichia albicollis</u>	R-P
*Dark-eyed junco - <u>Junco hyemalis</u>	C-P
*Gray-headed junco - <u>Junco caniceps</u>	C-P
*Savannah sparrow - <u>Passerculus sandwichensis</u>	C-P
Grasshopper sparrow - <u>Ammodramus savannarum</u>	O-P
Tree sparrow - <u>Spizella arborea</u>	U-P
Chipping sparrow - <u>Spizella passerina</u>	C-P
Brewer's sparrow - <u>Spizella breweri</u>	C-P
*Vesper sparrow - <u>Pooecetes gramineus</u>	C-P
*Lark sparrow - <u>Chondestes grammacus</u>	C-P

APPENDIX A (Continued)

Species	Status
BIRDS (Cont'd.)	
Black-throated sparrow - <u>Amphispiza bilineata</u>	C-P
Green-tailed towhee - <u>Pipilo chlorurus</u>	C-P
Rufous-sided towhee - <u>Pipilo erythrophthalmus</u>	C-P
Evening grosbeak - <u>Hesperiphona vespertina</u>	C-P
Cassin's finch - <u>Carpodacus cassinii</u>	C-P
*House finch - <u>Carpodacus mexicanus</u>	C-P
Black rosy finch - <u>Leucosticte atrata</u>	U-P
Common redpoll - <u>Carduelis flammea</u>	U-P
*American goldfinch - <u>Carduelis tristis</u>	C-P
Lesser goldfinch - <u>Carduelis psaltria</u>	U-P

APPENDIX B

Annotated Bibliography

Salt Lake County Division of Water Quality and Pollution Control.
Wetland Resources of Salt Lake County. Salt Lake County, Utah.
62 pp.

Maps included with this report show locations of wetlands along the Jordan River from past wetland inventory efforts made by the Army Corps of Engineers and Environmental Protection Agency. The Salt Lake County Division of Water Quality and Water Pollution Control is presently conducting a wetland inventory of Salt Lake County. When completed this effort should provide the best available information on the distribution and classification of Jordan River wetlands.

Kaiserman Associates, Inc., and Gense Consultants. Provo-Jordan River Parkway Master Implementation Plan. Prepared for the Utah Dept. Nat. Resour., Provo-Jordan River Parkway Authority, and Utah Outdoor Recreation Agency. Salt Lake City, Utah.

This plan consists of a set of maps with accompanying narrative that show proposed features of the Provo-Jordan River Parkway. Existing land use and status along the Parkway corridor are shown and recommendations for development are made.

APPENDIX B (cont.)

Brigham Young University, Center for Health and Environmental Studies. 1975. Environmental studies of: proposed Jordanelle Reservoir site, Provo River, Utah Lake, Jordan River, proposed Lampton Reservoir site. Final Phase I report to Bur. Reclamation. Brigham Young Univ., Provo, Ut. 232 pp.

This report gives a broad overview of existing environmental conditions for the proposed Jordanelle Reservoir site, Provo River, Utah Lake, Jordan River, and proposed Lampton Reservoir site for use in planning the Bonneville Unit of the Central Utah Project. Aquatic resources, birds and mammals, vegetation, and aesthetics are discussed. The report also identifies future study needs for each area. Information concerning water quality and aquatic biota of the Jordan River are presented and no future aquatic studies are recommended. There is no information provided regarding birds, reptiles, mammals, and amphibians in the area of the proposed Lampton Reservoir and an inventory is recommended. The report recommends determining the feasibility of establishing a buffer zone surrounding the proposed Lampton Reservoir to improve the quality of runoff water.

APPENDIX B (cont.)

HBS Research Corporation. 1977. Vegetative and Wildlife Assessment of the Jordan Aqueduct Extension, Bonneville Unit, Central Utah Project (Section 3). Report submitted to Bureau of Reclamation. 45 pp.

This 1977 report presents baseline data on terrestrial plant and animal communities found along the proposed extension of the Jordan aqueduct in Salt Lake City (between 3600 and 400 West and beginning at 5800 South running to 2100 South). This extension is north of our study site, but the species lists are applicable to the Lampton Study. Vertebrate species were assessed between Bluffdale and 2100 South. Spring crowing counts for pheasants were conducted and density estimates for cocks derived. Both mammal and avian species lists are comparatively incomplete.