SUMMER BIRDS
OF THE
SAN JUAN VALLEY, NEW MEXICO

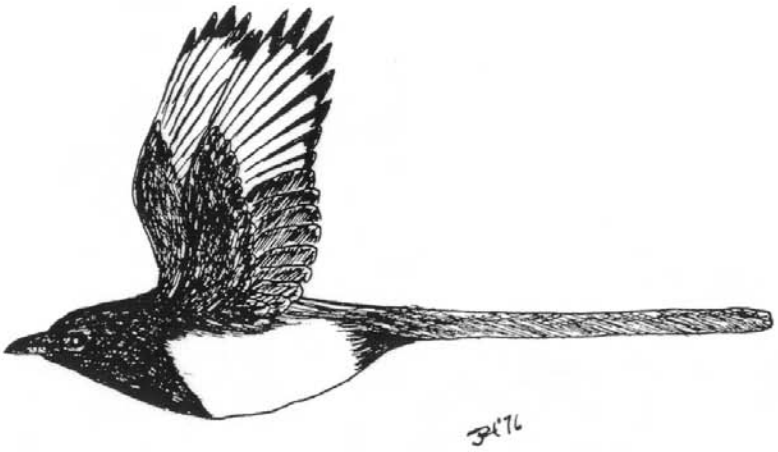

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Figure 1. The study area, San Juan County, New Mexico

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INTRODUCTION

In general, lowland river valleys of the southwestern United States are host to rich avifaunas, yet inexplicably most have received little detailed study. This dearth of information is true even as regards avifaunal composition and other basic data, and the San Juan Valley of northwesternmost New Mexico is no exception. This valley has received ornithological study basically from two sources, one being the U. S. Biological Survey, whose activities were carried out by John A. Loring during 1893, M. French Gilman during 1907, Vernon Bailey during 1908, and Clarence Birdseye during 1908. More recently, White and Behle (1961) and Niles (in Harris, 1961) surveyed birdlife prior to the construction of Navajo Reservoir in New Mexico and Colorado.

As the human population continues to grow in the San Juan Valley, more land is taken up by housing, industrial and agricultural concerns. Typically the land along the floodplain of the river is the first to be used for such development, resulting in the loss or alteration of woodland-shrubland and marshy areas and displacement of birds.

This study was undertaken to place on record the summer birdlife of the San Juan Valley, their breeding status, relative abundance, regularity of occurrence, vegetation types utilized, and zoogeographic affinities. In general, my study follows that of Hubbard (1971) of the Gila Valley in southwestern New Mexico, the only other treatise of a similar nature to mine.

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Also deserving thanks are the many individual land owners of the San Juan Valley that allowed me access to their land and Bill Bovermann, Experimental Statistics, New Mexico State University, for his help in programming a method to suit my data.

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Location

The study was conducted on the floodplain and adjacent slopes of the San Juan Valley, between the community of Hogback and Navajo Dam, San Juan County, northwestern New Mexico. Nine areas along this 55 mile stretch of the San Juan River were chosen as specific study areas (Figure 1).

Description of the Valley

The San Juan River originates in southwestern Colorado, enters northwestern New Mexico and flows southwest, west, and then northwest before re-entering Colorado in the Four Corners Region. The major tributaries adjacent to the study area are the Animas and La Plata Rivers, both of which originate in southwestern Colorado. The San Juan River emerges from Navajo Dam at an elevation of 5,700 feet, descending gradually to an elevation of 5,040 feet at Hogback.

Dregne and Maker (1968) describe the San Juan Valley and adjacent mesas and plateaus as moderately undulating to rolling plains, broken by small mesas, hogback ridges, bottomlands and steeply sloping breaks adjacent to principal drainages. The soils of the floodplain are moderately deep with a variety of brown loams. The soils of the valley slopes are variable, with shale, sandstone and gravelly allivium present in many areas. The valley floor varies considerably in width, from approximately 1,200 feet around the Navajo Dam area, to from one-half mile to well over a mile in lower areas of the valley.

Width of the river channel varies considerably throughout the valley, ranging from 60-80 feet in the narrowest areas to 1,000 feet or more in places where the river meanders and forms small islands between several channels. The riverbanks are generally low and sloping, but steeper banks between 10-15 feet in height are also present. The river thus far has not been channelized.

Average annual precipitation in San Juan County is from five to eight inches along the valley, with most occurring as rain in late summer. Extreme highs are averages of almost 12 inches along the Colorado border and more than 15 inches in the southwestern part of the county. Temperatures reaching 100° F maximum and zero° F minimum are rare (Maker et al, 1969), with most readings falling between these extremes.

DESCRIPTION OF THE HABITATS

Plant names used in this report are from Lamb (1971), Kearny and Peebles (1964), and Little (1950).

Riparian Habitats

These are the most common habitat types on the valley floor. Along larger arroyos such as Gobernador, Pump and Simon (canyons near Navajo Dam) also occur riparian habitats, but not to any appreciable extent. I have classified riparian habitats into shrubland, marshland, and agricultural fields. In general, this order to vegetation extends outward in this sequence from the banks of the San Juan River.

Riparian shrubland. This type is associated with poorly-drained areas adjacent to the river and drain ditches, and the woody dominant vegetation is usually coyote willow (Salix exigua). In the wetter areas are small clumps of cattails (Typha latifolia), bullrush (Scirpus sp.), smooth scouring-rush (Equisetum laevigatum), sedges (Carex sp.), and other hydric plants. In places, especially in a

narrow band adjacent to the water, there may be bare areas of sand, silt, or rock, and other sites occur on which Equisetum sp., spikerush (Eleocharis sp.), Kentucky bluegrass (Pao pratensis), and cocklebur (Xanthium sp.) may dominate. In some of the more alkaline areas salt cedar (Tamarix pentandra) replaces coyote willow. Rio Grande cottonwood (Populus wislizeni) saplings, Russian olive (Eleagnus angustifolius), and patches of peachleaf willow (S. amygdaloides) and pacific willow (S. lasiandra) also are present in a few areas.

Riparian shrubland is present throughout the valley on low, level to gently sloping banks adjacent to the river. Widths of this habitat vary from about four to over 150 feet. Vegetation there is dense to the point of being nearly impassable, and it ranges in height from five to 15 feet.

Riparian woodland. This is the most extensive native riparian type on the study area, being present in at least small areas throughout the valley. The dominant woody plant is Rio Grande cottonwood. Vegetational composition varies throughout the study area, but in general two subtypes are present. The first subtype is most common between Blanco and Navajo Dam. There cottonwoods, 40-60 feet or more in height, occur with an understory of big sagebrush (Artemisia tridentata); the latter forms fairly dense stands from five to 15 feet in height. Often associated with this subtype are clumps of New Mexico olive (Forestiera neomexicana), skunkbush (Rhus trilobata), greasewood (Sarcobatus vermiculatus), rubber rabbitbush (Chrysothamnus nauseosus) and occasionally roses (Rosa sp.). Along larger arroyos in this area is similar vegetation, the main difference being the occasional presence of narrowleaf cottonwoods (Populus angustifolia) and box elders (Acer negundo) in the arroyos. The cottonwood-big sagebrush subtype of riparian woodland is found in the relatively undisturbed areas of the valley. Widths of this vegetation type vary from about 20 to over 500 feet.

The second subtype of riparian woodland is most common between Hogback and Blanco and also is dominated by Rio Grande cottonwood. Cottonwoods, 40-80 feet in height, there have an understory dominated by Russian olive, skunkbush, New Mexico olive, Chinese elm (Ulmus parvifolia), and an occasional salt cedar, coyote willow, rubber rabbitbrush, greasewood and roses. In the wetter areas, extremely dense thickets of the above vegetation and occasionally pacific and peachleaf willow are present, as are Virginia creeper (Parthenocissus vitacea) and western virginbower (Clematis ligusticifolia), particularly along hillsides. The understory attains heights of 10-25 feet or more. This subtype of riparian woodland is generally more dense than the other, and is more closely associated with undisturbed areas which collect irrigation run-off.

Both subtypes contain a variety of grasses, including Kentucky bluegrass, foxtail barley (Hordeum jubatum), streambank wheatgrass (Agropyron riparium), and Canada wildrye (Elymus canadensis). Also present are cocklebur, asters (Aster sp.), Russian thistle (Salsola kali), sunflower (Helianthus sp.), and bee-plant (Cleome sp.).

Marshland. Marshes in the study areas range in size from 20-30 feet along drain ditches to blocks of five to 80 acres in the larger areas. Most are shallow with little or no open water, but a few have small areas four to five feet in depth. Characteristic plants include cattail, bullrush, sedges, flat sedge (Cyperus sp.), spikerush, and other emergent species. Natural marshland in the valley was probably limited, as nearly all marshes in this area seem to be the result of man's agricultural activities.

Agricultural fields. Maker et al. (1969) report that 49,000 acres of land in San Juan County are under irrigation, including the limited farm lands outside the San Juan Valley. The most extensively grown crops are alfalfa (Medicago sativa) and corn (Zea mays). Other crops

of importance include fruit trees, small grains, vegetables, and potatoes (Solanum tuberosum). Weedy areas around fields also are used by several species of birds.

Non-riparian Habitats

These habitats are found outside of the valley floor and are independent of the river. Non-riparian habitats include pinyon-juniper woodland, non-riparian shrubland and grassland.

Pinyon-juniper woodland. This type is found between Navajo Dam and Blanco. The vegetation is characterized by pinyon (Pinus edulis) and juniper (Juniperus spp.) trees. The understory is characterized by big sagebrush, Utah serviceberry (Amelanchier utahensis), oaks (Quercus spp.), antelope bitterbrush (Purshia tridentata), and some mountain maghoney (Cercocarpus montanus). Large sandstone cliffs are present in this habitat.

Non-riparian shrubland. This is found along the floodplains of arroyos and on adjacent slopes. Characteristic vegetation is greasewood, rubber rabbitbrush, four-wing saltbush (Atriplex canescens), and Artemisia spp. including big sagebrush. Grasses and forbs characteristic of the grassland areas (below) are also present. This habitat type extends down to the valley floor in several places on the study area.

Grassland. Grasslands are present on the hilly and flat areas outside the valley floor. Some of the characteristic plants are galleta grass (Hilaria jamesii), indian rice grass (Oryzopsis hymenoides), black grama (Bouteloa eriopoda), sand dropseed (Sporobolus airoides), buffalo grass (Buchloe dactyloides), and a variety of forbs. These areas usually contain at least some inclusions of the non-riparian shrubland type.

METHODS

I conducted field work on 121 different dates from 17 May to 16 August 1971 and from 16 May to 28 July 1972. I was in the field on 82 days during the main breeding season, which I consider to be June and July. "Summer" is used to connote the period 1 June through 31 July.

The data recorded from field observations include numbers and breeding status of each species observed during surveys in each habitat type. Bird specimens also were collected in several areas throughout the valley. Determination of breeding status was emphasized in all areas.

I classified as breeding or probable species (marked with an asterisk *) those for which I observed dependent young or nests containing eggs or young or any of the following: adult carrying material to suspected nest sites; singing males; enlarged gonads; presence of brood patch; adults flushed from and/or nervously fluttering around suspected nest sites and/or defending suspected nest sites; and adults and/or young present during many dates during the breeding season. Possible breeding species were those for which fewer similar types of observations were made; these are marked with a degree sign (°).

In most instances data were collected in early morning when birds were most active and most conspicuously singing. Similar work also was done later in the day to insure coverage of birds that are more active at these times.

The riparian vegetation types adjacent to the river and its floodplain were investigated most extensively. Valley slopes and adjacent arroyos were studied about half as much.

Breeding birds are classified according to their apparent dependence upon riparian and/or non-riparian habitats as follows (after Hubbard, 1971):

Restricted Riparian (RR)--occupying riparian habitats exclusively or nearly so in the breeding season.

Primary Riparian (PR)--occupying primarily riparian habitats in the breeding season, but making varying use of adjacent non-riparian habitats.

Secondary Riparian (SR)--occupying non-riparian habitats extensively in the breeding season, but making varying use of riparian habitats.

Non-riparian (NR)--occupying non-riparian habitats exclusively or nearly so in the breeding season, except for drinking and bathing.

The terms regularity of occurrence and relative abundance are taken from Hubbard (1970), and refer primarily to my observations during June and July in two years. Also considered are data gathered by previous workers, including those whose records are published in the Field Notes of the New Mexico Ornithological Society through the 1972 breeding season. My observations made in May and/or August were not used in calculating these terms (in order to exclude migrant species) but are included in the annotated list where pertinent.

In general, I have based regularity of occurrence on the percent of surveys in which the species was observed. The results were grouped into four categories as follows: 100-70 percent--regular, 69-40 percent--irregular, 39-20 percent--occasional, and 19 percent or less--casual. For example, an occasional species in a certain habitat is one that was observed in 20-39 percent of the surveys conducted in the type.

Relative abundance of each species was determined by comparing its numbers with the numbers of other species typically using the same habitat type. For example, the total numbers of all marsh birds observed were put in an array and then grouped according to the following abundance classes: abundant, common, fairly common, uncommon, and rare (listed in order of decreasing numbers). This is arbitrary, but it provides a general index to the relative abundance of the various species observed during the study.

ACCOUNTS OF SPECIES

Following is a list of all birds that I have knowledge of as having occurred in my study area in the San Juan Valley (between Hogback and Navajo Dam) during June and/or July through 1972. The scientific names and taxonomic sequence used below are taken from the Check-list of North American Birds (A.O.U., 1957 and Supplements). Trinomial and binomial identifications of specimens were made by Dr. John P. Hubbard, and this material is largely deposited in the Delaware Museum of Natural History. Unless otherwise noted, all species marked with an asterisk (*) have actually been found breeding (see Methods) in the area. Evidence for possible breeders, marked with degree sign (°) is largely circumstantial.

°PIED-BILLED GREBE: Podilymbus podiceps. Casual at Kirtland (2 in a marsh 7-15 July 1972); status uncertain, but may breed.

*GREAT BLUE HERON: Ardea herodias. (RR)--Casual to occasional throughout the valley; uncommon to fairly common in marshes and along the river. Three immatures near Navajo Dam 19 July 1972.

°GREEN HERON: Butorides virescens. Casual at Hogback (2 in a marsh 12 June 1972); status uncertain but may breed.

SNOWY EGRET: Leucophoyx thula. Casual at Hogback (5 on 28 June 1972) and Kirtland (2-4 on 1, 5, and 9 June 1972); status uncertain, but probably only a migrant.

°BLACK-CROWNED NIGHT HERON: Nycticorax nycticorax. Casual at Kirtland (1 in a marshy-shrubby area 25 July 1972); possibly overlooked as this species was seen near Navajo Dam by White and Behle (1961) and near Shiprock by Gilman (1908). Status uncertain, but may breed.

°LEAST BITTERN: Ixobrychus exilis. Casual at Kirtland (heard calling at Kirtland July 1972); status uncertain, but may breed, and 1 flushed in same area 22-23 August 1972.

*AMERICAN BITTERN: Botaurus lentiginosus. (RR)--Casual to occasional between Hogback and Blanco; rare to locally common in marshy areas, eight nests at Blanco and Kirtland (first for county).

WHITE-FACED IBIS: Plegadis chihi. Casual at Kirtland (1 on 29 June 1971); probably late spring migrant, and 5 also recorded 5 May 1971.

*CANADA GOOSE: Branta canadensis. (RR)--Casual to irregular between Kirtland and Blanco; rare to fairly common in marshy areas and along the San Juan River. These birds are probably escapes from a collection of waterfowl in Farmington, and at least one hybrid with a domestic goose (Anser sp.) was seen. First breeding reported in 1970 by A. P. Nelson (N.M.O.S. Field Notes).

*MALLARD: Anas platyrhynchos. (RR)--Irregular to regular throughout the valley; fairly common to common in marshes and along the river, breeding in suitable areas throughout the valley (six nests found).

GADWALL: Anas strepera. Casual to occasional in marshes, recorded at Kirtland (2 on 21 July 1971 and 4 July 1971), Blanco (9 on 22 June 1972) and Navajo Dam (2 on 2 June 1971); status uncertain, but probably only a migrant.

PINTAIL: Anas acuta. Casual to occasional in marshes and on the river, recorded at Blanco (1 on 2 June 1971) and Navajo Dam (2 on 2 June 1971 and 4 on 18 June 1971); also seen at Farmington by A. P. Nelson on 24 June 1970 (N.M.O.S. Field Notes). Status uncertain,

GREEN-WINGED TEAL: Anas carolinensis. Casual at Blanco (1 in a marsh 2 June 1971); probably a late migrant.

°BLUE-WINGED TEAL: Anas discors. Occasional between Kirtland and Navajo Dam; uncommon in marshy areas and along the river; probably as a migrant, but may breed.

*CINNAMON TEAL: Anas cyanoptera. (RR)--Casual to irregular throughout the valley; uncommon to locally common in marshy areas and along the river (one nest found).

°NORTHERN SHOVELER: Anas clypeata. Casual to occasional in marshes and along the river, recorded at Kirtland (6 on 4 June 1972), Blanco (1 on 28 June 1971) and Navajo Dam (1 on 26 July 1971); probably breeds in the valley, and found about the Navajo Dam site by White and Behle (1961).

AMERICAN WIGEON: Anas americana. Casual at Kirtland (2 in a marsh 12 July 1972); probably a late migrant.

REDHEAD: Aythya americana. Casual at Navajo Dam (3 on 2 June 1971); probably a late migrant.

COMMON GOLDENEYE: Bucephala clangula. Casual at Navajo Dam (5 on 2 June 1971); probably only a migrant, with 1 also recorded 10 August 1971.

*COMMON MERGANSER: Mergus merganser. (RR)--at least formerly summered along the river, although I made no observations in June or July of 1971-72; I have recorded them during the summer in previous years, and White and Behle (1961) found them breeding in the Navajo Dam area.

*TURKEY VULTURE: Cathartes aura. (SR)--Casual to irregular throughout the valley; uncommon to fairly common in all habitats. Several observed on nests in sandstone cliffs in the Navajo Dam area, but actual observation of the nest contents was not made due to the inaccessibility of the sites.

MISSISSIPPI KITE: Ictinia misisippiensis. Casual in dense riparian woodland-shrubland at Kirtland (1 on 2 June 1972); this is the first record for northwestern New Mexico (cf. Hubbard 1970; N.M.O.S. Field Notes, 1962-1972).

*COOPER'S HAWK: Accipiter cooperii. (SR)--occasional near Navajo Dam; rare to uncommon in riparian woodland adjacent to pinyon-juniper mesas, nesting in 1971 and 1972 in Simon Canyon (two nests found). Also found breeding above the Navajo Dam sites by White and Behle (1961).

*RED-TAILED HAWK: Buteo jamaicensis. (SR)--Occasional to irregular throughout the valley; locally rare in riparian woodland to uncommon in pinyon-juniper and grassland areas.

*SWAINSON'S HAWK: Buteo swainsoni. (SR)--Casual to occasional between Kirtland and Navajo Dam; locally uncommon in riparian woodland to fairly common in pinyon-juniper and adjacent riparian habitats. Three immatures seen in a cottonwood grove near Blanco 5 July 1972.

°FERRUGINOUS HAWK: Buteo regalis. Casual in open grassland and pinyon-juniper mesas, recorded at Kirtland (1 on 16 June 1971) and Navajo Dam (1 on 14 July 1972); this species may well breed in the area.

°GOLDEN EAGLE: Aquila chrysaetos. Casual at Kirtland (1 on 11 July 1972); probably breeds, but status uncertain. White and Behle (1961) found the species in the Navajo Damsite area, but they reported no evidence of nesting there.

BALD EAGLE: Haliaeetus leucocephalus. White and Behle (1961) recorded an adult near the Navajo Damsite on 21 July 1960, for the only summer record for the area; possibly only a migrant.

*MARSH HAWK: Circus cyaneus. (NR)--Occasional at Kirtland where a pair nested in a dense greasewood thicket; the nest was located in the middle of a large clump of dead Russian thistles.

OSPREY: Pandion haliaetus. Casual recorded along the river at Blanco (1 on 21 July 1972) and Navajo Dam (1 on 18 June 1971); status uncertain, but probably only a migrant.

*PRAIRIE FALCON: Falco mexicanus. (NR)--Occasional in non-riparian habitats (1 on 27 June 1972, 3 on 4 July 1972); also 1-2

there on 18 May 1972 and 2 on 25 May 1972, plus 1 on 26 May 1972 near Navajo Dam (one nest found). The species was considered common by White and Behle (1961) in the vicinity of the Navajo Damsite.

*PEREGRINE FALCON: Falco peregrinus. (NR)--Casual near Archuleta (1 flushed from a sandstone cliff 29 June 1972); listed as a breeder in this area by Hubbard (1970). One was seen near Navajo Damsite on 21 July 1960, according to White and Behle (1961), plus 2 there 22 June 1967 by A. P. Nelson (N.M.O.S. Field Notes).

*AMERICAN KESTREL: Falco sparverius sparverius. (SR)--Occasional to regular throughout the valley; fairly common in pinyon-juniper and adjacent habitats to common in stands of mature riparian woodland and adjacent shrubby and agricultural areas. A common nester in woodpecker holes, especially in stands of mature riparian woodland. One specimen: adult female, 4 July 1971, Kirtland.

*SCALED QUAIL: Callipepla squamata hargravei. (NR)--Irregular to regular between Waterflow and Blanco; rare to locally common in riparian habitats to uncommon to common in grassy-nonriparian shrubland. Several coveys with young seen both summers. Two specimens near Kirtland: immature male, 16 June 1972, and adult male, 4 July 1972, Kirtland.

*GAMBEL'S QUAIL: Lophortyx gambelii. (SR)--Occasional to regular between Hogback and Archuleta; fairly common to locally common in dense shrubby areas adjacent to agricultural fields and uncommon to fairly common in nonriparian habitats (one nest found).

*RING-NECKED PHEASANT: Phasianus colchicus. (RR)--Occasional to regular throughout the valley; fairly common in agricultural fields and adjacent shrubby habitats. Common nester throughout the valley, particularly in alfalfa fields and adjacent shrubland. One specimen: immature female, 15 August 1972. Introduced species.

*CHUKAR: Alectoris graeca. (NR)--Casual near Farmington (2 adults and 17 immatures 2.5 miles north of the junction of U.S. 550 and N.M. 17 on 26 June 1972, in greasewood-rubber rabbitbrush-fourwing saltbush arroyos, along the La Plata River Valley); this is the only area in New Mexico where chukars are known to maintain breeding populations in the wild since being introduced (N.M. Dept. Game and Fish 1972).

*VIRGINIA RAIL: Rallus limicola. (RR)--Casual to irregular throughout the valley; uncommon to locally fairly common in most large marshes in the valley, but probably overlooked in many areas when silent (2 nests found).

*SORA: Porzana carolina. (RR)--Casual to regular throughout the valley; fairly common to locally common in most marshy areas in the valley (one nest found). Like the Virginia Rail, this species is probably more common than my data show.

*COMMON GALLINULE: Gallinula chloropus. (RR)--Regular at Kirtland, where a pair summered in a marsh between 15 July and 3 August 1971 and in 1972. A nest was located in a clump of cattails on 27 June 1972, and egg shells matched those of Common Gallinule in the Delaware Museum of Natural History and the description given by Bent (1926). This is the first summer and breeding record of this species in northwestern New Mexico (cf. Hubbard, 1970; N.M.O.S. Field Notes 1962-72).

*AMERICAN COOT: Fulica americana. (RR)--Casual to regular throughout the valley; fairly common to locally common in open water marshy areas (18 nests found).

*KILLDEER: Charadrius vociferus. (PR)--Irregular to regular throughout the valley; common along the river, on marshy flats near marshes and in agricultural areas near open water (one nest found).

*SPOTTED SANDPIPER: Actitis macularia. (RR)--Irregular to regular throughout the valley; fairly common to common along the river, with newly hatched young during July. White and Behle (1961) reported the species common near the Navajo Damsite, including both juveniles and adults. One specimen: adult male, 19 July 1972, Kirtland.

GREATER YELLOWLEGS: Tringa melanoleucus. Casual at Blanco (1 on 20 July 1971); undoubtedly an early autumn migrant. One specimen: adult (sex?) 5 August 1971.

BAIRD'S SANDPIPER: Erolia bairdii. Casual at Navajo Dam (4 on 12 July 1972; undoubtedly an early autumn migrant). White and Behle (1961) reported two near the Navajo Damsite on 11 July 1960.

°AMERICAN AVOCET: Recurvirostra americana. Casual near Farmington (1 on 27 July 1971); status uncertain, but this bird behaved as though it had a nest or young nearby.

RING-BILLED GULL: Larus delawarensis. Casual at Hogback (1 on 28 June 1972) and Blanco (1 on 2 June 1972); nonbreeding vagrants or migrants (more frequent to south at Morgan Lake).

BLACK TERN: Chlidonias niger. Seven seen at Morgan Lake, south of the study area, on 3 June 1970 by A. P. Nelson (N.M.O.S. Field Notes); these were probably late migrants.

*ROCK DOVE: Columba livia. (SR)--Occasional to locally regular; uncommon nesters in sandstone cliffs adjacent to the river and agricultural fields (particularly near Waterflow, Fruitland, Kirtland and Farmington). Introduced species.

*MOURNING DOVE: Zenaida macroura. (SR)--Irregular to regular throughout the valley; fairly common in non-riparian habitats adjacent to the valley to common in riparian habitats in the valley. Found nesting in cattail marshes quite commonly at Kirtland, as well as in all shrubby habitats in the valley (32 nests found).

INCA DOVE: Scardafella inca. White and Behle (1961) reported a vagrant near Navajo Damsite on 15 July 1960.

*YELLOW-BILLED CUCKOO: Coccyzus americanus occidentalis. (RR)--Irregular between Kirtland and Bloomfield; uncommon in dense riparian shrubland. No nests with young or eggs found, but 3 fledglings flushed from a dense thicket of Russian olive-willow-cottonwood saplings near Kirtland on 8 August 1972. One specimen: adult male, 5 August 1971, Farmington.

*SCREECH OWL: Otus asio. (PR)--Occasional in riparian woodland at Kirtland (up to 3 seen and/or heard calling in June and early July as well as May 1972); no doubt more widely distributed than my data show, as only a few areas were investigated at night with use of tape recorded owl calls. One specimen: adult male, testes 4x6mm, grayish, 8 July 1972, Kirtland.

*GREAT HORNED OWL: Bubo virginianus. (SR)--Casual to irregular throughout the valley; rare to uncommon in riparian woodland. Three immatures about one-half adult size were near a nest in a cottonwood grove near Blanco 22 June 1972.

*SPOTTED OWL: Strix occidentalis. (SR)--White and Behle (1961) reported a pair with three young near Navajo Damsite on 15 July 1960 and another bird upstream the same summer. This is a rather low altitude (6,000 ft.) for the species, and I did not encounter it.

*BURROWING OWL: Speotyto cunicularia. (NR)--Occasional to irregular at Kirtland; uncommon to fairly common in open grassland areas, particularly in or adjacent to white-tailed prairie dog towns (nine nest sites found). Fledglings were seen many times throughout the two summers.

*LONG-EARED OWL: Asio otus wilsonianus. (NR)--Occasional in dense greasewood near Kirtland (3 to 10 on 18-19 July 1971, plus on 11-15 August 1971); this group was probably a locally hatched family unit, and the abundance of castings below abandoned nests of Black-billed Magpie (Pica pica) suggest that this area had been used by the owls for some time before they were found. I saw Long-eared Owls in this general area during the summers of 1968-69 and 1970, but none were recorded summer 1972. One specimen: adult male, testes 9x15mm, 18 July 1971, Kirtland; this was identified O. a. wilsonianus rather than the expected, paler O. a. tuftsi by Hubbard (in litt.).

*POOR-WILL: Phalaenoptilus nutallii. (NR)--Casual in pinyon-juniper at the mouth of Simon Canyon near Navajo Dam (2 called 8 June 1972); probably more frequent and breeding in the area, as few areas were surveyed at night. White and Behle (1961) heard the species above the Navajo Damsite on 3 July 1960.

*COMMON NIGHTHAWK: Chordeiles minor henryi. (SR)--Irregular to regular throughout the valley; fairly common to common over all habitats, especially numerous over riparian habitats. One specimen: adult? female, ovary 4x13mm, reddish (largest ova 4x5mm), 16 July 1972, Kirtland.

BLACK SWIFT: Cypseloides niger. White and Behle (1961) recorded two near the Navajo Damsite on 15 July 1960 and reported that A. H. Harris had "collected a specimen, that may prove to be the first breeding record of New Mexico." I have no additional knowledge of the species nor of Harris' reported "breeding" specimen, and for the moment I consider the above records to pertain to migrants.

*WHITE-THROATED SWIFT: Aeronautes saxatalis. (NR)--Casual to irregular throughout the valley; fairly common above pinyon-juniper and adjacent habitats containing suitable nesting sites in sandstone cliffs (several nests found near Navajo Dam).

*BLACK-CHINNED HUMMINGBIRD: Archilochus alexandri. (PR)--Casual to occasional throughout the valley; rare in nonriparian shrubland to locally uncommon in riparian woodland-shrubland areas (two nests found).

BROAD-TAILED HUMMINGBIRD: Selasphorus platycercus. Occasional in pinyon-juniper and riparian woodland-shrubland, recorded at Farmington (2 on 19 July 1972), and Navajo Dam (8 on 24 July 1972), and near Archuleta (2 on 16 July 1972); probably migrants. White and Behle (1961) also reported records for the Navajo Damsite area.

RUFOUS HUMMINGBIRD: Selasphorus rufus. Occasional at Kirtland (1 on 15 July 1971 and 2 on 17 July 1971); these were autumn migrants. White and Behle (1961) also reported records for the Navajo Damsite area.

*BELTED KINGFISHER: Megaceryle alcyon. (RR)--Occasional to regular; uncommon to locally fairly common along the river, particularly where there are suitable banks for nesting (six nests found).

*COMMON FLICKER: Colaptes auratus. (PR)--Irregular to regular throughout the valley; fairly common to locally common in stands of mature cottonwoods. This was the most common nesting woodpecker in this part of the valley.

°LEWIS' WOODPECKER: Asyndesmus lewis. White and Behle (1961) reported this species as common above the Navajo Damsite and that an adult female was taken on 21 July 1960. I did not record it, but the species may well breed in the area.

*RED HEADED WOODPECKER: Melanerpes erythrocephalus caurinus. (RR)--Occasional in riparian woodland near Blanco, first recorded on 16 August 1971 when one was seen; also one in the same area in June and July 1972, including at a newly excavated hole in a dead cottonwood on 22 June and 6 July. While there is no definite evidence that this was an active nest site, it and the fact that the adult male (testes 6x9mm) collected on 21 July 1972 had a brood patch, suggest breeding. This is the first evidence that this species breeds in northern New Mexico (cf. Hubbard, 1970; N.M.O.S. Field Notes).

*HAIRY WOODPECKER: Dendrocopos villosus monticola. (SR)--Casual to occasional between Archuleta and Navajo Dam; uncommon in pinyon-juniper and adjacent riparian woodland (one nest site found). One specimen: adult? (sex?), 29 June 1972, Archuleta.

DOWNY WOODPECKER: Dendrocopos pubescens. Casual pinyon-juniper and adjacent riparian habitats near Navajo Dam (1 on 13 July 1972 in Simon Canyon); status uncertain, but may breed.

*EASTERN KINGBIRD: Tyrannus tyrannus. (RR)--Occasional to irregular near Kirtland and Blanco; uncommon to fairly common locally in marshland and dense riparian shrubland adjacent to marshy areas, including 2 nests found over open water in a marsh and another about ten feet from open water. This appears to be the first evidence of breeding of this kingbird in northwestern New Mexico, although there is a previous record of individuals seen at Kirtland by A. P. Nelson on 21 July 1964 and at Flora Vista on 15 June 1967. Two specimens: adult male, 20 July 1971 and adult female, 20 July 1971, both at Blanco.

*WESTERN KINGBIRD: Tyrannus verticalis. (SR)--Casual to regular throughout the valley; uncommon to locally fairly common in riparian woodland-shrubland (six nests found). Two specimens: adult male, 20 July 1971, Kirtland, and adult (sex?), 16 August 1971, Navajo Dam.

*CASSIN'S KINGBIRD: Tyrannus vociferans vociferans. (SR)--Occasional to regular between Bloomfield and Navajo Dam; uncommon in riparian woodland to common in pinyon-juniper and adjacent woodland. (two nests found). One specimen: adult male, 26 May 1972, Navajo Dam.

*ASH-THROATED FLYCATCHER: Myiarchus cinerascens cinerascens. (SR)--Occasional to regular throughout the valley; fairly common in riparian woodland and adjacent shrubby areas and uncommon to fairly common in pinyon-juniper areas (two nests found). Two specimens: adult male, 13 July 1971, Navajo Dam, and adult female, 20 June 1972, Navajo Dam.

*SAY'S PHOEBE: Sayornis saya saya. (NR)--Occasional to irregular throughout the valley; fairly common in grassland and adjacent nonriparian habitats (one nest found). One specimen: adult female, 23 July 1972, Kirtland.

*WILLOW FLYCATCHER: Empidonax traillii ssp. (RR)--Occasional at Kirtland in riparian woodland-shrubland (1 on 1 June 1972, 5 on 15 July 1971, and 1 on 28 July 1972); probably overlooked and/or misidentified and thought to breed. One specimen: adult female, ovary 3x3 mm (four ruptured follicles), 28 July 1972, Kirtland.

*GRAY FLYCATCHER: Empidonax wrightii. (NR)--Casual to occasional on pinyon-juniper hillsides and dense greasewood-big sagebrush areas; may have been overlooked, as it was found to be more common in this

general area by White and Behle (1961). Two specimens: adult male, testes 2x4mm and adult male, testes 3x5mm, 14 July 1972, both at Archuleta.

WESTERN FLYCATCHER: Empidonax difficilis ssp. Casual to rare in riparian woodland at Kirtland (4 on 1 June 1972 and 3 on 4 June 1972); these were probably late migrants. Two specimens: adult (sex?), 30 May 1972 and adult male, testes 3x5mm, 31 May 1972, both at Kirtland.

*WESTERN WOOD PEWEE: Contopus sordidulus veliei. (PR)--Casual to regular throughout the valley; uncommon in nonriparian shrubland to fairly common to locally common in riparian woodland. No young or eggs found, but adults were seen carrying food and/or nesting material to several nest sites during the two summers. Two specimens: adult (sex?), 28 July 1971, Navajo Dam, and adult female, ovary 2x3mm, (largest ova 1x1mm), 12 July 1972, Navajo Dam.

*HORNED LARK: Eremophila alpestris ssp. (NR)--Regular between Waterflow and Farmington; common in grassland areas (more widely distributed than my data show). Fledglings observed being fed by adults on 27 June 1972 at a waterhole north of Kirtland. Two specimens: adult male, testes 5x9mm, and adult female, ovary 3x9mm, 27 June 1972, both near Kirtland.

*VIOLET-GREEN SWALLOW: Tachycineta thalassina lepida. (SR)--Casual to regular between Kirtland and Navajo Dam; uncommon to locally common in pinyon-juniper areas and adjacent riparian woodland. An adult carried food and/or nest material into a cavity in a cottonwood tree there on 17 May 1972, as did others in the Simon Canyon area. One specimen: adult male, testes 9x10mm, 20 June 1972, Navajo Dam.

*ROUGH-WINGED SWALLOW: Stelgidopteryx ruficollis. (PR)--Irregular to regular throughout the valley; common along the river, nesting in holes in the riverbank in several areas.

*BARN SWALLOW: Hirundo rustica. (PR)--Occasional to regular throughout the valley; common to locally abundant, especially around structures.

*CLIFF SWALLOW: Petrochelidon pyrrhonota pyrrhonota. (SR)--Occasional to regular throughout the valley; common to locally abundant. Nesting colonies with 8 to 200 nests were present locally on sandstone cliffs throughout the valley. Two specimens: adult female and adult male, 9 July 1972, Navajo Dam.

*SCRUB JAY: Aphelocoma coerulescens woodhousei. (SR)--Casual to irregular between Archuleta and Navajo Dam; uncommon in riparian woodland-shrubland to fairly common in pinyon-juniper and adjacent habitats. Adults seen feeding fledglings on several occasions. Seven specimens: immature male, 9 July 1972, immature male and immature (sex?), 20 June 1972, Navajo Dam, and two immatures (sex?), immature male, 14 July 1972, and immature female, 16 July 1972, all at Archuleta.

*BLACK-BILLED MAGPIE: Pica pica hudsonia. (PR)--Irregular to regular throughout the valley; rare in nonriparian habitats (greasewood, big sagebrush and pinyon-juniper areas) to common throughout riparian woodland-shrubland. A very common nester (122 nests found) in cottonwood groves and riparian shrubland (occasionally nests in dense greasewood areas). After late July, flocks of up to 200-300 are common in certain areas of riparian woodland-shrubland. Two specimens: immature (sex?), 10 July 1971, Fruitland, and immature female, 8 August 1972, Kirtland.

*COMMON RAVEN: Corvus corax sinuatus. (SR)--Casual to regular throughout the valley; uncommon in riparian woodland to fairly common to common in pinyon-juniper (two nests found). Probably nests in

cottonwood trees in the Hogback area and possibly elsewhere. One specimen: immature male, 9 June 1972, Navajo Dam.

*PINYON JAY: Gymnorhinus cyanocephalus. (NR)--Casual in Kirtland and occasional to irregular between Archuleta and Navajo Dam; rare in greasewood, fairly common to common in pinyon-juniper and adjacent habitats. Six specimens: two adult males, adult (sex?), immature male, immature female, adult female, 29 June 1972, Archuleta.

*BLACK-CAPPED CHICKADEE: Parus atricapillus. (PR)--Casual to irregular throughout the valley; fairly common in riparian woodland and adjacent shrubland (one nest found). One specimen: immature male, 12 July 1972, Navajo Dam.

*PLAIN TITMOUSE: Parus inornatus griseus. (NR)--Casual to irregular between Blanco and Navajo Dam; uncommon to fairly common in pinyon-juniper and adjacent habitats. One specimen: immature male, 14 July 1972, Archuleta.

*BUSHTIT: Psaltriparus minimus plumbeus. (SR)--Irregular between Archuleta and Navajo Dam; uncommon in pinyon-juniper and adjacent riparian woodland and shrubland. Adults seen carrying food and/or nest material to sites several times near Navajo Dam. One specimen: immature (sex?), 14 July 1972, Archuleta.

*WHITE-BREASTED NUTHATCH: Sitta carolinensis. (RR)--Casual at Hogback to occasional near Navajo Dam; uncommon in riparian woodland and adjacent pinyon-juniper habitats. Three specimens: immature (sex?) and immature male, 12 July 1972, Navajo Dam and immature male, 24 July 1972, Navajo Dam.

°BROWN CREEPER: Certhia familiaris. Occasional in pinyon-juniper near Navajo Dam, where 3 seen and heard singing on 14 July 1972 and others heard on other dates in June and July; probably otherwise overlooked and may breed.

*HOUSE WREN: Troglodytes aedon. (SR)--Casual to occasional between Kirtland and Bloomfield; uncommon in dense riparian shrubland areas. Nested in the Navajo Lake basin before the lake was filled (White and Behle, 1961).

*BEWICK'S WREN: Thryomanes bewickii. (SR)--Casual to locally regular throughout the valley; common in pinyon-juniper mesas to fairly common in riparian woodland-shrubland. Two specimens: two adult females, 6 July 1972, Blanco.

*LONG-BILLED MARSH WREN: Telmatodytes palustris. (RR)--Irregular to regular at Kirtland; rare in one marsh, where singing males seen in June and on 21 July 1971 and in June 1972. Of the 13 nests found, five were female nests and the others apparently were male nests (based on descriptions of Kale. 1965); no eggs or young found, so that breeding is yet to be proven. Several other large marshy areas seem suitable for this species, particularly near Hogback and Blanco. This is only the third area in New Mexico where Long-billed Marsh Wrens have been recorded as summer residents (Hubbard, 1970).

*CANYON WREN: Catherpes mexicanus. (NR)--Irregular to regular between Archuleta and Navajo Dam; fairly common on pinyon-juniper mesas. On 12 and 24 July 1972, adults were seen carrying food and/or nesting materials to inaccessible nest sites on cliffs.

*ROCK WREN: Salpinctes obsoletus obsoletus. (NR)--Casual to irregular throughout the valley; fairly common to locally common in open grassy places near rocky areas and cliffs. Adults seen feeding fledglings several times. One specimen: adult female, 16 July 1972, Archuleta.

*MOCKINGBIRD: Mimus polyglottos. (NR)--Casual to regular between Fruitland and Navajo Dam; rare in riparian shrubland to common in greasewood-fourwing-saltbush-rubber rabbitbrush areas (one nest found). Two specimens: immature (sex?), 19 July 1971 and immature male, 11 July 1972, Kirtland.

BENDIRE'S THRASHER: Toxostoma bendirei. Casual in dense greasewood-rubber rabbitbrush near Kirtland (2 on 17 June 1971 and 2 on 23 July 1972); status uncertain, but may breed.

*SAGE THRASHER: Oreoscoptes montanus. (NR)--Casual to occasional between Kirtland and Blanco; uncommon to fairly common in areas dominated by big sagebrush, greasewood, rubber rabbitbrush, and fourwing saltbush. Fledglings seen in dense greasewood flats near Kirtland. Also found near the Navajo Damsite by White and Behle (1961). Three specimens: adult (sex?), 18 July 1971 and two immatures (sex?), 11 July 1972, Kirtland.

*AMERICAN ROBIN: Turdus migratorius propinquus. (RR)--Occasional to regular throughout the valley; common in riparian woodland and shrubland (eight nests found). Three specimens: immature female, 21 July 1971, adult male, 12 June and immature (sex?), 29 July 1972, Kirtland.

°WESTERN BLUEBIRD: Sialia mexicana. A "family group" was reported above Navajo Damsite by White and Behle (1961), but I did not encounter the species.

TOWNSEND'S SOLITAIRE: Myadestes townsendi. White and Behle (1961) recorded one above Navajo Damsite on 17 July 1960; probably a migrant.

*BLUE-GRAY GNATCATCHER: Polioptila caerulea. (NR)--Occasional near Navajo Dam; rare in pinyon-juniper habitats (one nest found). This species is listed as very common by White and Behle (1961).

CEDAR WAXWING: Bombycilla cedrorum. Casual at Kirtland where 50+ were seen feeding in a dense cottonwood-Russian olive thicket on 1 June 1971; these may have been late migrants. White and Behle (1961) reported one seen above the Navajo Damsite on 4 July 1960.

*LOGGERHEAD SHRIKE: Lanius ludovicianus gambeli. (NR)--Irregular to regular between Hogback and Farmington; common in greasewood, rubber rabbitbrush, fourwing saltbush areas (two nests found).

*COMMON STARLING: Sturnus vulgaris. (RR)--Occasional to regular throughout the valley; fairly common to common in riparian woodland. In late May to mid-June it nested commonly (6 nests found) throughout in woodpecker holes in mature cottonwoods.

*GRAY VIREO: Vireo vicinior. (NR)--Casual to irregular between Archuleta and Navajo Dam; uncommon pinyon-juniper mesas. A family unit was recorded in this area on 12 July 1960 by White and Behle (1961). Two specimens: two adult males, testes on both 4x5mm, 29 June 1972, Archuleta.

*SOLITARY VIREO: Vireo solitarius plumbeus. (SR)--Casual near Navajo Dam; uncommon to locally fairly common in riparian woodland adjacent to pinyon-juniper mesas, with a nest found in a cottonwood grove near Navajo Dam. One specimen: adult male, testes 5x8mm, 26 May 1972, Navajo Dam.

*WARBLING VIREO: Vireo gilvus ssp. (RR)--Casual to irregular between Hogback and Blanco; uncommon in riparian woodland-shrubland. Adults seen carrying food and/or nesting materials. One specimen: adult male, testes 3x7mm, 19 May 1972, Blanco.

LUCY'S WARBLER: Vermivora luciae. Phillips et al. (1964) map this species as occurring along the San Juan River in New Mexico and Colorado (as well as in adjacent Arizona), and Bailey and Niedrach (1967) record it nesting the the latter state. The only northern New Mexico record is a specimen reported by Bailey (1928) from Shiprock on 19 May 1907. I have not encountered the species.

*VIRGINIA'S WARBLER: Vermivora virginiae. (PR)--Occasional to irregular, including at Kirtland (2 on 25-26 July 1972), Navajo Dam (5 singing males 24 July 1972), and at Hogback (2 on 28 June 1972 and 6, including singing males, 18 July 1972); uncommon in dense riparian woodland-shrubland. Recorded as breeding in Colorado six miles up the Piedra River from its junction with the San Juan River by White and Behle (1961), who also reported a specimen taken near the Navajo Damsite on 15 July 1960.

*YELLOW WARBLER: Dendroica petechia morcomi. (RR)--Occasional to regular throughout the valley; fairly common in riparian woodland, particularly near Navajo Dam and Kirtland (one nest found). One specimen: adult male, 9 June 1972, Navajo Dam.

*BLACK-THROATED GRAY WARBLER: Dendroica nigrescens. (SR)--Occasional near Navajo Dam, uncommon in pinyon-juniper woodland. Reported as common in the basin of Navajo Reservoir by White and Behle (1961).

MACGILLIVRAY'S WARBLER: Oporornis tolmiei ssp. Casual in dense riparian shrubland near Farmington (2 on 5 June 1972); these were presumably late migrants. One specimen: adult male, testes 3x6mm, 18 May 1972, Kirtland.

*COMMON YELLOWTHROAT: Geothylpis trichas occidentalis. (RR)--Irregular to regular throughout the valley; fairly common to locally common in marshy areas, recorded in every marsh surveyed (one nest found). Two specimens: adult male, 20 July 1971, Blanco, and immature female, 19 May 1972, Kirtland.

*YELLOW-BREASTED CHAT: Icteria virens longicauda. (RR)--Occasional to regular throughout the valley; fairly common in dense riparian shrubland. No nests with young or eggs observed, although actions of adults suggested nesting in several areas. Two specimens: adult female, 25 June 1972, Kirtland, and adult male, testes 7x11mm, 19 July 1972, Farmington.

WILSON'S WARBLER: Wilsonia pusilla ssp. Casual at Blanco (2 singing males on 2 June 1972) and Navajo Dam (1 on 3 June 1971); these were probably late migrants. Two specimens: adult male, testes 3x7mm, 18 May 1972 and adult male, 20 May 1972, Kirtland.

*HOUSE SPARROW: Passer domesticus. (SR)--Uncommon in native habitats to very common around barns and feedlots; several nests found in Cliff Swallow nesting colonies near Waterflow (seven nests found). Introduced species.

*WESTERN MEADOWLARK: Sturnella neglecta neglecta. (PR)--Occasional to regular throughout the valley; uncommon to locally common in grasslands to common in agricultural fields and adjacent riparian habitats, including several immatures seen. One specimen: adult female, ovary 5x5mm, 25 July 1971, Kirtland.

*YELLOW HEADED BLACKBIRD: Xanthocephalus xanthocephalus. (RR)--Casual to irregular between Hogback and Navajo Dam; fairly common to locally common in marshy areas, nesting in several marshes in the valley (31 nests found). Three specimens: adult female?, 25 June 1972, adult male, 1 June 1972, and adult male, 25 July 1972, all at Kirtland.

*RED-WINGED BLACKBIRD: Agelaius phoeniceus fortis. (RR)--Regular throughout the valley; common to abundant in marshy areas throughout the valley, nesting in every marsh surveyed and the most abundant bird found during the summers of 1971-72 (232 nests found). Two specimens: adult male and adult female, 19 June 1972, Kirtland.

*SCOTT'S ORIOLE: Icterus parisorum. (NR)--Occasional to irregular north of Kirtland; uncommon to fairly common in greasewood habitats, including three immatures with adults (probably a family unit). J. L. Sands saw an adult male near Archuleta on 6 June 1967 (N.M.O.S. Field Notes). Three specimens: immature female, 19 July 1971, adult male, testes 6x9mm, 11 July 1972 and adult female, ovary 3x6mm, 11 July 1972, all at Kirtland.

*NORTHERN ORIOLE: Icterus galbula bullockii. (PR)--Occasional to regular throughout the valley; fairly common to common in riparian woodland (nine nests found). Three specimens: adult male, 10 July 1971, Fruitland, immature female, 6 August 1971, Farmington and adult male, 17 May 1972, Kirtland.

*BREWER'S BLACKBIRD: Euphagus cyanocephalus. (SR)--Casual to regular between Fruitland and Navajo Dam; uncommon to fairly common in grassy fields near water to locally fairly common in greasewood-rubber rabbitbrush (18 nests found). Two specimens: adult female and adult male, 30 May 1972, Navajo Dam.

*GREAT-TAILED GRACKLE: Cassidix mexicanus monsoni. (RR)--Casual at Hogback to locally regular at Kirtland; rare in marshes at Hogback to locally fairly common in marshes at Kirtland. I first observed the species at Kirtland during the summer of 1967, and it has nested there every summer since (15 nests found). First recorded in this general area at Aztec by Ligon (1961). Three specimens: adult male, 5 July 1971, adult female, 12 July 1971 and adult female, 20 July 1972, Kirtland.

*COMMON GRACKLE: Quiscalus quiscala. (PR)--A. P. Nelson reported an adult feeding a fledgling at Farmington in 1970 (N.M.O.S. Field Notes), but I did not find the species.

*BROWN-HEADED COWBIRD: Molothrus ater artemisia obscurus. (SR)--Casual to regular throughout the valley; fairly common to locally common in riparian woodland and adjacent habitats. Four specimens: adult female and adult male, 13 July 1971, Navajo Dam, adult male, 31 May 1972 and adult female, 4 June 1972, both at Kirtland.

WESTERN TANAGER: Piranga ludoviciana. Casual to occasional in riparian woodland, recorded at Kirtland (3 on 11 June 1971 and 1 on 28 July 1972) and Navajo Dam area (3 on 18 June 1971); there were presumably migrants. One specimen: adult female, ovary 3x8mm, four ruptured follicles, 28 July 1972, Kirtland.

*BLACK-HEADED GROSBEAK: Pheucticus melanocephalus melanocephalus. (PR)--Occasional to regular throughout the valley; uncommon to fairly common in riparian woodland and adjacent habitats (one nest found). Three specimens: adult male, 13 July 1971, Navajo Dam, adult male, 25 July 1972, Kirtland, and adult female, 2 August 1972, Kirtland.

*BLUE GROSBEAK: Guiraca caerulea interfusa. (PR)--Occasional to regular throughout the valley; uncommon in greasewood areas to fairly common to common in riparian shrubland (three nests found). Two specimens: adult male, 26 July 1972, Farmington, and adult female, 6 July 1972, Blanco.

*INDIGO BUNTING: Passerina cyanea. (RR)--Occasional in dense riparian shrubland, recorded near Farmington (40+ on 27 June 1971), Bloomfield (one singing male on 26 June 1972) and Blanco (4 on 22 June 1972); no definite evidence, but probably breeds. White and Behle

(1961) reported one seen on the nearby Rio de los Pinos on 16 July 1960. One specimen: adult male, testes 5x8mm, 26 July 1971, Farmington.

*LAZULI BUNTING: Passerina amoena. (PR)--Occasional in riparian woodland-shrubland areas, recorded at Hogback (3 on 28 June 1972), Farmington (2 on 19 July 1972), and Bloomfield (2 on 2 June and 2 on 22 June 1972); singing males seen on all of the above dates and a nest was found near Navajo Dam on 30 June 1960 (White and Behle 1961). One specimen: adult male, testes 6x9mm, 22 June 1972, Blanco.

*HOUSE FINCH: Carpodacus mexicanus frontalis. (PR)--Irregular to regular throughout the valley; uncommon to fairly common in pinyon-juniper, big sagebrush and greasewood areas to common in riparian woodland (six nests found). One specimen: immature male, 15 June 1972, Kirtland.

CASSIN FINCH: Carpodacus cassinii. White and Behle (1961) report individuals seen in the vicinity of the Navajo Damsite on 2 and 19 July 1960.

*PINE SISKIN: Spinus pinus. A. P. Nelson reported a nest in Farmington on 3 June 1970 (N.M.O.S. Field Notes); in riparian woodland at Kirtland I saw an adult on 27 July 1972 and 1 at Blanco on 22 June 1972.

*AMERICAN GOLDFINCH: Spinus tristis pallidus. (PR)--Casual to occasional in dense riparian shrubland and woodland and rare in riparian woodland and adjacent pinyon-juniper, big sagebrush habitats at Hogback (2 singing males 13 June 1972) and Navajo Dam (2 on 13 July 1971; 6, including singing males, 8 July 1972); these records, plus one at Kirtland on 6 August 1972 suggests possible breeding, although a definite evidence is lacking. One specimen: adult male, testes 5x8mm, 13 July 1971, Navajo Dam.

*LESSER GOLDFINCH: Spinus psaltria hesperophila. (PR)--Casual to irregular between Blanco and Navajo Dam; uncommon in riparian woodland-shrubland and adjacent habitats. Adults carried food and/or nesting materials to nest sites in Simon Canyon. Two specimens: adult male, 11 July 1971 and adult male, 12 July 1972, Navajo Dam.

GREEN-TAILED TOWHEE: Chlorura chlorura. White and Behle (1961) recorded the species on three dates in June 1960 in the Navajo Damsite area, but I did not find it.

*RUFOUS-SIDED TOWHEE: Pipilo erythrophthalmus montanus. (SR)--Casual to occasional between Blanco and Navajo Dam; rare to uncommon in riparian shrubland and adjacent pinyon-juniper mesas. White and Behle (1961) reported a juvenile taken in the Navajo Damsite area on 2 July 1960. One specimen: adult male, testes 6x9mm, 9 July 1972, Navajo Dam.

*BROWN TOWHEE: Pipilo fuscus mesoleucus. (NR)--Casual to irregular between Archuleta and Navajo Dam; uncommon in greasewood, big sagebrush and rubber rabbitbrush. Fledglings seen being fed by adults near Navajo Dam. Two specimens: adult female, ovary 8x12mm, 27 July 1971, Navajo Dam, and immature female, ovary 3x7mm, 16 July 1972, Archuleta.

LARK BUNTING: Calamospiza melanocorys. Casual in open grassland and greasewood at Kirtland (1 on 8 July; also 14 on 11 August, 25 on 12 August and 21 on 15 August 1971); probably migrants.

*LARK SPARROW: Chondestes grammacus strigatus. (NR)--Casual to regular throughout the valley; uncommon in greasewood areas in riparian vegetation to common in greasewood areas outside the valley floor. Fledglings recorded several times. Two specimens: adult male, testes 4x7mm, 4 July 1972 and adult female, ovary 3x5mm, 4 July 1972, Kirtland.

*BLACK-THROATED SPARROW: Amphispiza bilineata deserticola. (NR)--Irregular to regular between Kirtland and Navajo Dam; common in greasewood, big sagebrush and fourwing saltbush. Fledglings recorded several times in the Kirtland area. One specimen: adult male, testes 5x7mm, 1 June 1972, Kirtland.

*SAGE SPARROW: Amphispiza belli nevadensis. (NR)--Casual at Kirtland to occasional between Blanco and Navajo Dam; fairly common in big sagebrush areas. Fledglings recorded near Kirtland 23 July 1972. White and Behle (1961) recorded fledglings in the Navajo Reservoir area on 11 July 1960. Three specimens: adult male, testes 10x11mm, 29 June 1972, adult female, ovary enlarged, 29 June 1972, both at Archuleta, and immature female, 23 July 1972, Kirtland.

*CHIPPING SPARROW: Spizella passerina arizonae. (SR)--Casual to regular throughout the valley; fairly common to common in riparian woodland and adjacent pinyon-juniper habitats. Fledglings recorded several times throughout the valley. Four specimens: adult male, testes 6x7mm, 20 June 1972; adult female (with brood patch), 14 July 1972; immature female, 16 July 1972; and immature male, 16 July 1972, all from Archuleta.

°BREWER'S SPARROW: Spizella breweri. White and Behle (1961) recorded this species in the vicinity of the Navajo Damsite, but I did not; however, it should breed in the area.

WHITE-CROWNED SPARROW: Zonotrichia leucophrys. Casual near Navajo Dam (3 on 9 June 1972); these were undoubtedly late migrants.

DISCUSSION

Based on data accumulated through July 1972, 105 species of birds breed in the San Juan Valley (Shiprock to Navajo Dam area) of northwestern New Mexico. For all but five of these species (i.e. Poor-will, Red-headed Woodpecker, Long-billed Marsh Wren, Indigo Bunting, American Goldfinch), there is secure evidence of breeding, i.e., nests with eggs or nestlings or presence of highly dependent young in the study area. In addition, 15 other species are regarded as possible breeders, which raises the total to 120 species in the breeding avifauna. Finally, 27 other species have occurred in the area in summer (here defined as June and July), and one other species, Lucy's Warbler, is implied in the literature as occurring at that season. Of these non-breeding species, several are clearly migrants (e.g., Greater Yellowlegs, Baird's Sandpiper, Rufous Hummingbird, White-crowned Sparrow), others are vagrants (e.g. Mississippi Kite, Inca Dove), others potential breeders (e.g., Gadwall, Broad-tailed Hummingbird, Cedar Waxwing), and/or others are variously a mixture as far as categorization. The essence of these findings is that a rich array of species (147, or 148 if Lucy's Warbler is included) has occurred in the area in summer, of which 105 are regarded as breeders and 15 others as possible breeders.

These figures compare very favorably with those from the Gila Valley in southwestern New Mexico (Hubbard, 1971), where 143 species have been recorded in summer, of which 112 were regarded as breeders (another five or six are possible breeders). This is interesting, because although both streams are in the Colorado drainage and both drain topographically varied regions, the San Juan is about 1,000 ft. higher and 250 miles farther north. Hence, one would expect a priori that the San Juan would not host as rich an avifauna as the Gila, especially in view of the richer degree of floral dominants in the latter area.

When the two areas are compared, one finds that of the 105 breeding species of the San Juan, 37 (35.2%) are not regarded by Hubbard (op. cit.) as breeding in the Gila Valley. Of these, five do not even occur in that area, at least on a regular basis (i.e., Red-headed Woodpecker, Eastern Kingbird, Black-billed Magpie, Black-capped Chickadee, Common Grackle), but the bulk are at least migrants in the area, and 20 species (e.g., Prairie Falcon, Spotted Owl, House Wren, Virginia's Warbler, Rufous-sided Towhee) breed in the near vicinity.

If one eliminates the introduced breeding species of the two areas (i.e., Ring-necked Pheasant, Starling, House Sparrow, in both, plus Canada Goose, Chukar, Rock Dove confined to the San Juan), one finds that 31 (31.3%) of the 99 native breeding species of the San Juan are absent as breeders from the Gila. Conversely, of the 109 native breeding species of the Gila, one finds that 45 (41.3%) are not regarded as breeders in the San Juan Valley.

Of the 45 species of the Gila that do not breed in the San Juan Valley, fully 33 are entirely absent or are only vagrants in the latter area, the vast bulk of which being southern species that do not range northward to the San Juan County (e.g., Black Hawk, Montezuma Quail, Elf Owl, Lesser Nighthawk, Gila Woodpecker, Wied's Crested Flycatcher, Vermilion Flycatcher, Mexican Jay, Bridled Titmouse, Verdin, Cactus Wren, Crissal Thrasher, Phainopepla, Hooded Oriole, Bronzed Cowbird, Summer Tanager, Cardinal, Abert's Towhee, Black-chinned Sparrow). Only seven of the 45 species have been recorded in summer in or near the San Juan Valley, of which all but the vagrant Inca Dove may breed (i.e., Pied-billed Grebe, Green Heron, Black-crowned Night Heron, Blue-winged Teal, Golden Eagle, Bendire's Thrasher, Lucy's Warbler). Five other species (i.e., Band-tailed Pigeon, Roadrunner, Barn Owl, Tree Swallow, Common Crow) breed in the vicinity of the San Juan Valley.

In summary, of the 99 native breeding species of the San Juan Valley, 37 (35.2%) do not breed in the Gila Valley and 17 (17.2% do not breed even in that vicinity. Conversely, 45 (41.3%) of the 109 species of the Gila do not breed in the San Juan Valley, and 33 (30.3%) do not breed even in the vicinity. Consequently, the slightly smaller breeding avifauna of the San Juan is more similar (i.e., 64.8% shared species) to that of the Gila, than vice versa, the latter sharing only 58.7% of its species with the former.

The above comparisons hint at certain zoogeographic conclusions concerning the native breeding avifauna of the San Juan, perhaps the major one being that the majority of the species are relatively wide-spread. On the basis of zoogeographic affinities, perhaps the largest distinctive element in the fauna might be termed Great Basin, of which the Gray Flycatcher, Sage Thrasher, and Sage Sparrow may be regarded as members. The Black-billed Magpie and Gray Vireo are also characteristic of that avifauna, but both occur well outside the Great Basin. The only Sonoran species in the avifauna is Gambel's Quail, although Lucy's Warbler, if it breeds in the study area, would also be assignable to the group.

Several bird species are at distributional limits in or near the study area, including the largest group which is comprised of species at southern or western limits, i.e., Red-headed Woodpecker, Eastern Kingbird, Black-billed Magpie, Black-capped Chickadee, Long-billed Marsh Wren, Common Grackle, and American Goldfinch. Of these, only the magpie is known to breed in adjacent Arizona--albeit rarely (Phillips et al., 1964), although the marsh wren reappears as a different race along the lower Colorado Valley. Species at or near northern limits are Scaled Quail, Common Gallinule, Gray Vireo, Scott's Oriole, Great-tailed Grackle, and Brown Towhee, none of which breeds in southwestern Colorado (Bailey and Niedrach, 1967). Thus, the San Juan Valley avifauna can be regarded as an important breeding

area for birds, not only in the richness of the avifauna, but also in the fact that 13 (13.1%) species reach distributional limits in the area.

The ecological categorization of the breeding avifauna of the San Juan Valley (see Methods) follows that of Hubbard (1971) for the Gila Valley. Of the 98 native breeding species, the break-down is as follows:

Restricted Riparian	(RR)	26 species (26.5%)
Primary Riparian	(PR)	19 species (19.4%)
Secondary Riparian	(SR)	28 species (28.6%)
Non-riparian	(NR)	25 species (25.5%)

By comparison, Hubbard (1971) found that the 109 native breeding species of the Gila Valley totaled 25.0, 24.1, 22.3, and 28.6 per cent of the avifauna. These figures are rather similar, and in fact an x^2 analysis shows that they are not significantly different (x^2=.8217, 3 df, .9 > p > .75). In other words, the ecological distribution of the native breeding species in the San Juan Valley is the same as that on the Gila.

An examination of this ecological distribution of breeding species shows that 45 (45.9%) of the native breeding species of the San Juan are highly dependent on the riparian ecosystem, with 26 species (26.5%) restricted to it. This means that without this system at least these 26 species (e.g., Great Blue Heron, Mallard, Virginia Rail, Belted Kingfisher, Willow Flycatcher, Long-billed Marsh Wren, Yellow Warbler, Yellow-headed Blackbird, Indigo Bunting) would probably not breed in the area. The same is also true of some and perhaps many of the Primary Riparian species (e.g., Killdeer, Northern Flicker, Black-capped Chickadee, Northern Oriole, Blue Grosbeak, Lazuli Bunting).

Less tied to riparian ecosystem are those categorized as Secondary Riparian species, which together with the Non-riparian group totals 53 species (53.1%) of the native breeding avifauna. While many of the former would probably breed in the area without the riparian ecosystem, some would probably decline in numbers. For example, such species as Cooper's Hawk, American Kestrel, Mourning Dove, Hairy Woodpecker, Western and Cassin's Kingbird, Violet-green Swallow, Bewick's Wren and Brown-headed Cowbird reach their highest densities in habitats fostered by the river, and for them the riparian ecosystem is of great importance.

Non-riparian species are those that seldom use the river or its habitats (except for drinking or bathing) during the breeding season (e.g., Prairie Falcon, Scaled Quail, Burrowing Owl, White-throated Swift, Say's Phoebe, Horned Lark, Plain Titmouse, Canyon and Rock Wrens, Sage Thrasher, Loggerhead Shrike, Scott's Oriole, Brown Towhee, Lark, Sage, and Black-throated Sparrows). For these species the riparian ecosystem is not essential for survival, and without it they would probably still breed in the area. By the same token, without this ecosystem these and some Secondary Riparian species would probably be the only ones breeding in the area.

Hubbard (1971) describes changes that have taken place in the Gila Valley in historic times, and such have also occurred in the San Juan Valley. Detrimental to riparian birds has been the clearing of woodland and shrubland for homes, roads, and other purposes. Construction of Navajo Reservoir and various other lakes has been a mixed blessing, but in general these waters have provided little breeding habitat while destroying various others. More beneficial to birds have been agricultural practices, especially irrigated farming, which by its run-off may be the major source of water fostering the marshes of the valley.

Unfortunately, as population grows, less water may become available for the agriculture and ultimately the riparian ecosystem, and coupled with additional clearing, chemical and air pollution, and other factors, the rich breeding avifauna of the San Juan Valley may well begin to wane. This point may not have been reached yet, and in fact through 1972 there has probably been a net gain rather than loss of species in the breeding avifauna. Contributing to this gain has been invasion of the area by such species as the Great-tailed and Common grackles and Indigo Bunting (possibly also the Red-headed Woodpecker, Eastern Kingbird, Scott's Oriole, and others). However, the Peregrine Falcon and Spotted Owl may have declined during the same period, and if marshes continue to decrease a wholesale crash in waterbirds and other birds using these areas can be expected.

SUMMARY

Through the breeding season of 1972, some 147 (148 if Lucy's Warbler occurs) have been recorded in the summer months of June and July. Of these, 105 species are regarded as breeding species, and an additional 15 may breed in the valley. Of the breeding species, 98 are native, and in richness this avifauna confers favorably with (and has 64.5 % of its species shared with) the more southern Gila Valley, also a tributary of the Colorado River. The two avifaunas differ in various aspects, but both have similar proportions of their breeding species distributed between riparian and non-riparian habitats. Finally 45.9 percent of the native breeding species of the San Juan are dependent on the riparian ecosystem, and many of the less dependent species reach maximum densities there. Because of the richness of the avifauna and presence in the valley of several peripheral species, the San Juan is an important area for birds. To date the richness has not begun to decline, but threats associated with man may well cause this to occur as human populations expand.

LITERATURE CITED

American Ornithologists' Union. 1957. Check-list of North American birds. Lord Baltimore Press, Baltimore, Md. 691pp.

Bailey, A. M. and R. J. Niedrach. 1967. Pictorial checklist of Colorado birds. Denver Museum of Natural History.

Bailey, F. M. 1928. Birds of New Mexico. New Mexico Dept. Game and Fish, Santa Fe. 807pp.

Bent, A. C. 1926. Life histories of North American marsh birds. U. S. Nat. Mus. Bull. 125. 392 p.

Drenge, H. E. and H. J. Maker. 1968. Major land resource areas in New Mexico. Agric. Exp. Sta. Res. Rep. No. 183. New Mexico State Univ., Las Cruces. 4pp.

Gilman, M. F. 1908. Birds on the Navajo reservation in New Mexico. Condor 10:146-152.

Hubbard, J. P. 1970. Check-list of the birds of New Mexico. McLeod Printing Co., Albuquerque, 108pp.

_____ 1971. The summer birds of the Gila Valley, New Mexico. Delaware Mus. Nat. Hist., Greenville. 35pp.

Kale, H. W., II. 1965. Ecology and bioenergetics of the Long-billed Marsh Wren in Georgia salt marshes. The Heffernan Press, Inc., Worcester, Mass. 142pp.

Kearney, T. H. and R. H. Peebles. 1964. Arizona flora. Univ. Calif. Press, Berkeley and Los Angeles. 1085pp.

Lamb, S. H. 1971. Woody plants of New Mexico. New Mexico Dept. Game and Fish. Bull. 14. 80pp.

Ligon, J. S. 1961. New Mexico birds and where to find them. The Univ. New Mexico Press, Albuquerque. 360pp.

Little, J. S. 1950. Southwestern trees. U. S. Dept. Agric. Handb. No. 9. 109pp.

Maker, H. J., R. E. Heher, and J. U. Anderson. 1969. Soil associations and land classification for irrigation, San Juan County. Agric. Exp. Sta. Res. Rep. No. 161. New Mexico State Univ., Las Cruces. 40pp.

New Mexico Ornithological Society. 1962-72. Field Notes. Vols. 1-10.

New Mexico Dept. Game and Fish. 1972. Annual Report, 60th Fiscal Year. New Mexico Dept. Game and Fish, Santa Fe. 63pp.

Niles, D. M. 1963. Birds noted in the Navajo Reservoir district. Appendix B, in Ecological distribution of some vertebrates in the San Juan Basin, New Mexico. Mus. New Mexico Papers in Anthropology, Santa Fe, No. 8: 56-61.

Phillips, A. R., J. T. Marshall, and G. Monson. 1964. The birds of Arizona. Univ. Ariz. Press, Tucson, Ariz. 212pp.

White, C. M. and W. H. Behle. 1961. Birds of Navajo reservoir basin in Colorado and New Mexico, 1960. Univ. Utah Anthropological Papers 55: 129-154.