

BIRDS OF EL MORRO NATIONAL MONUMENT,
VALENCIA COUNTY, NEW MEXICO

BY

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CHAPTER ONE

A SHORT HISTORY OF ORNITHOLOGICAL INVESTIGATION AT EL MORRO

The rock El Morro was inhabited by Indians long before Europeans explored the region. Although these inhabitants left no written records of the bird-life of the rock, they did leave behind, in their middens and in graves, bones of birds they consumed and otherwise used. Lyndon Lane Hargrave identified 13 species from bones excavated at Atsinna ruin. These birds are listed in Appendix III.

The first recorded mention of El Morro is in the journal of Diego Perez de Luxan, a soldier with the Espejo expedition, which camped by the rock on March 11, 1583 (March 21 according to the Gregorian Calendar (Slater, 1961)). Although many other expeditions passed by the rock or visited the water pool, some chronicles described it, and countless Spaniards inscribed their names on the wall, no one from the Spanish-Mexican period (1539-1846) mentioned the wildlife of the area. The Spanish preoccupation with glory, God, and gold apparently left no time for observations in natural history.

With the cession of New Mexico to the U.S. following the Mexican War, exploration and settling of the Southwest entered a new era. The first official appearance of Anglo-Americans at El Morro was the well-known visit of Lt. James Hervey Simpson, who, with R.H. Kern, copied many inscriptions on September 18 and 19, 1849. In his report Simpson described the early morning, with "the feathered race regaling us -- an unusual treat -- with their gay twittering" (quoted in Slater, 1961). He had nothing further to say about birds. Even so, this is the first recorded statement on the birds of El Morro.

Better coverage was in store, however. Jefferson Davis, Secretary of War under President Franklin Pierce, determined to send exploring parties through the newly acquired domain, and Spencer Fullerton Baird, of the Smithsonian

Institution, saw to it that a naturalist (sometimes at no pay) accompanied each expedition (Sterling, 1974). From the collections brought back by these and other far-flung sorties into the wilds Baird built an international reputation as a systematist. Three such parties, those of Sitgreaves in 1851, Whipple in 1853, and later, Wheeler in 1873, visited El Morro.

The first ornithologist to visit El Morro was Samuel Washington Woodhouse, M.D., physician and naturalist to Captain Lorenzo Sitgreaves's expedition of 1851 down the Zuni and Colorado Rivers. The expedition was organized in Santa Fe, leaving there on August 15, and reached Zuni on September 1. As the route to Zuni was not within the country Sitgreaves was charged to explore, his official report contains no mention of camps. Woodhouse's account, although mentioning a stop at Inscription Rock, gives no date. Fortunately, both men and others of the party left dated autographs on the rock. The date was August 29, 1851 (Slater, 1961).

Woodhouse found the Zuni Mountains "fresh and green," after the journey across the dry plains to the east, probably not realizing that his visit came within the few weeks of the year, after the summer rains, when that green condition prevails locally. "The view when leaving the timber of this mountain was exceedingly beautiful. In front was an open plain, upon which were feeding numerous herds of antelope, (*Antilocapra Americana.*)" (Woodhouse, 1853a). At this point he was surely near El Morro. He continued:

Encamped at the Inscription Rock, a singular sandstone mesa about two hundred and fifty feet high. Here I observed a new swift, of which, however, I was unable to secure a specimen, but I was close enough to become well acquainted with it; I propose for it the name of the Rock swift, (*Acanthylis saxatilis.*) (Woodhouse, 1853a)

The White-throated Swifts Woodhouse saw remain El Morro's main claim to a place in the history of American ornithology. His failure to collect a specimen makes it a qualified claim however. S.F. Baird, in describing the species, did not recognize Woodhouse's description, thinking it to be of another species.

The specific epithet *saxatilis*, however, was later restored and Woodhouse is now listed as the describer. Woodhouse's luck continued mixed on the expedition: He was bitten by a rattlesnake at Zuni, and later took an arrow in the leg. He returned to the East, however, to describe several new species from his specimens. In his report (Woodhouse, 1853b) he did not catalogue the specimens he collected, and his field notes have not been published. Consequently, I do not know what species other than the swift he observed at El Morro.

The fractious Northern and Southern delegations to Congress, unable to agree on a single railroad route across the continent, finally authorized surveys at several latitudes to determine the most practicable route (Slater, 1961). The route at the thirty-fifth parallel was surveyed by a party under Lt. Amiel Weeks Whipple. Caleb Burwell Rowan Kennerly, M.D., joined Whipple at Albuquerque to serve as physician and, along with H.B. Möllhausen, as naturalist of the expedition. The party stopped at El Morro on November 18, 1853, but Kennerly did not mention the place in his brief summary of the route (1856). He collected no specimens, and we have no record of what species he encountered there (Kennerly, 1859). Kennerly suffered a setback of another kind than Woodhouse's: A great number of his specimens were lost in the transit of Panama. Included among these was a mammal collected a few miles east of El Morro at Agua Fria Spring which would have been the type of the White-tailed Antelope Squirrel (*Ammospermophilus leucurus*). He died in 1861 at the age of 31.

Edward Fitzgerald Beale, who led the celebrated camel caravan across the western third of the continent in 1857, stopped at El Morro (without camels) on February 19, 1858, as he returned to the East. Although his journal (Beale, 1929) contains valuable information on the vegetation of that period it says nothing of the birdlife.

Elliott Coues, M.D., probably the best known of the nineteenth-century

Army surgeon-naturalists, passed through the area in 1864. He stopped at old Fort Wingate, near San Rafael, June 28-July 8, and visited El Morro en route from there to Arizona (Cooke, 1928b). A report of his journey (Coues, 1865) does not mention El Morro or its birds.

Without doubt the most significant nineteenth-century contribution to the understanding of the avifauna of El Morro was made by Henry Wetherbee Henshaw as a result of his two-day visit in July, 1873. One of the several predecessors to the current U.S. Geological Survey was the Army Engineer Department's Geographical and Geological Explorations and Surveys West of the 100th Meridian, headed by Lt. George M. Wheeler. In connection with these surveys Henshaw collected in New Mexico in 1873, 1874, and 1884. After spending June, 1873 in Colorado, he entered New Mexico along the Rio Grande, and reached Fort Wingate on July 12. Fort Wingate was by then located at Bear Spring, its present site, between Gallup and Thoreau, and he found birds scarce in that "rather desolate" country. He wrote:

Starting from Wingate July 19, a southwesterly course was pursued, our destination being Apache, Ariz., where we arrived August 12. During this interval, as we moved slowly, I was enabled to spend considerable time in making collections, and some very interesting results were obtained" (Henshaw, 1874)

Their two days, July 23-24, at El Morro, where Henshaw collected 25 specimens, representing 14 species, certainly produced interesting results, chief among them an extra-limital breeding record for the Buff-breasted Flycatcher. Henshaw continued ornithological work, and, after many years studying the birds of Hawaii, became the second Chief of the U.S. Biological Survey in 1910 (Sterling, 1974).

Several field men of the Biological Survey visited the Zuni Mountains around the turn of the century, but none collected or made any notes of observations at El Morro (Cooke, 1928a).

El Morro National Monument was established in 1906, and Evon Z. Vogt, of

Ramah, became its first custodian in February, 1917. He served in that position until October, 1936. Vogt was a man of many talents. Perhaps his major project as custodian was filling in an arroyo below the water pool and building a trail to the top of the rock, both accomplished in 1934 with a large crew funded by the Civil Works Administration (Greene, 1978). His entries in Southwestern Monuments Monthly Reports (SMMR) indicate that he was a keen observer of natural phenomena and knowledgeable of wildlife. Alfred Peterson, a seasonal ranger for several summers, also contributed useful information to SMMR.

The first observer to record lists of species seen was E.Z. Vogt, Jr. He must have spent much time at El Morro, and was acting custodian for part of 1936. His comments in SMMR indicate that he was an accomplished naturalist. The lists which he published therein in 1935 and 1936 have been of great value in the compiling of a comprehensive list for El Morro. He recorded 24 species for the first time at El Morro. Vogt's comment (SMMR, October, 1936) that the Belted Kingfisher was a new species for the Monument indicates that a check-list existed in his day. It is now lost.

E.Z. Vogt, Sr., was succeeded as custodian by Robert L. Budlong, a career Park Service man, who served in the position from December, 1936 to June, 1942. While he published no lists, his comments in SMMR on flora and fauna are valuable, especially with regard to Golden Eagles, which nested on the rock in that period. He also induced the state game and fish department to attempt reintroduction of Scaled Quail to the Monument.

I have found no records of bird observations by Monument staff members since the Budlong era, although some may have been kept. The next major contribution was made by Lyndon Lane Hargrave, the pre-eminent "ornitho-archaeologist" of the Southwest. He visited El Morro on October 5, 1956; June 25-26, 1959; and September 5-6, 1959. He compiled a check-list of 44 species on June 29, 1959,

and produced a revised list of 57 species on September 25 of that year. He personally observed all but two of the species on his lists. During his visits, primarily the last one, he collected 42 specimens representing 24 species. He was especially interested in White-throated Swifts, thinking that perhaps two different races visited El Morro at different times in the warm season.

There arose between 1959 and 1977 another check-list. None of the staff of the National Monument as of February, 1978, when I obtained a copy, knew when or by whom it was produced. This list would be of considerable value could it be credited. However, it includes so many species which are highly unlikely ever to have occurred at El Morro that the whole list is, by association, suspect.

I first visited El Morro July 2-4, 1974. The current study began with a preliminary reconnaissance March 5-7, 1978. Subsequent visits were July 8-10, and 24-26, August 7-8, October 29-31, and December 19-21, 1978. I conducted breeding bird censuses of four study plots in 1979. Visits for this purpose and to canvass other parts of the Monument were made on March 18-19, April 22-26, May 5-9 and 18-22, June 5-8 and 13-17, July 6-8 and 19-21, August 5-9, and September 8-10 of that year.

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CHAPTER TWO

BREEDING BIRD CENSUSES CONDUCTED AT EL MORRO IN 1979

INTRODUCTION

In studying any phenomenon one begins by making general, qualitative observations. The mind organizes these data in a loose way to produce an intuitive synthesis. From the initial synthesis one forms hypotheses to explain what one sees. General impressions, however, can be erroneous. To test his hypotheses the observer gathers quantitative information. It is a canon of Western philosophy that numbers do not lie. Be that as it may, quantitative data allow comparisons to be made in the same units of measurement. One can have some confidence that if the numbers are correct the conclusions drawn from a quantitative analysis are a bit more trustworthy than those drawn from intuitive guesses.

For the majority of bird species the breeding season is the most important time of year. It is not so much the survival of the individual as it is the survival of the species that is at stake. Natural selection has engineered an intricate set of reproductive behaviors which promote the survival of individuals' genes and hence those of the species, behaviors which result in an intensity of activity and seeming purposefulness not displayed by birds at other seasons of the year.

For these reasons I decided I could best increase understanding of El Morro's avifauna by conducting intensive, quantitative studies of the birds of small plots representative of the major habitat-types on the Monument. Not only would quantitative data, suitable for comparisons, result, but also intensive study of a few birds usually leads to more understanding of the species than does shallow familiarity with many. For example, following a few pairs of Vesper Sparrows through the breeding season will teach me more about the biology of the species than making casual observations of a great many individuals.

Specifically, I conducted censuses of the populations of birds breeding in four plots. I obtained estimates of the population density of each species in each plot by mapping the location of each bird seen on each of several visits to the plot. The vegetation of each plot was also described in a quantitative way. I used these data for an analysis of the breeding bird communities of the Monument.

The four plots represent open shrubland with few to no trees; shrubland with a significant complement of trees, which I call savannah; pinyon-juniper woodland; and pine-oak woodland. These four plots describe four points on a continuum of increasing vegetational complexity. The filling of additional strata of vegetation, e.g. trees, and an increasing number of species in each stratum, lead to this increase. It is intuitively reasonable that more variety in species and in sizes of plants generates more complexity. Ecological theory predicts that this complexity will be accompanied by increased complexity in the assemblages of breeding birds. In this study I tested that prediction.

VEGETATION OF THE FOUR PLOTS

Introduction and Definitions

The purpose of studying vegetation is to describe quantitatively the component of the bird's habitat which is contributed by the vegetation. Thus one can see how different the vegetation can be and still support the same kinds of birds, or conversely, how different it must be to appeal to a substantially different assemblage of bird species. Such data also make it possible to order the plots according to increasing vegetational complexity.

Plant ecologists have developed a number of parameters for describing aspects of vegetation. I have used density, dominance, and frequency in this study. *Density* is a simple count of individuals. This measure would seem to be straightforward to obtain, but in some species, e.g. those which spread from

rhizomes, it is difficult to determine the areal limits of an "individual." Also, it is misleading to compare densities of different life-forms. For example, 1000 individuals of a tiny annual can hardly be compared in importance to a single tree. Therefore, I used density only for describing trees.

Dominance is a parameter which attempts to describe the importance of a species in terms of its size, or biomass. I used two techniques to estimate dominance. *Coverage* is the percentage of the total area covered, and hence presumably dominated, by a species. *Basal area* is the total cross-sectional area of the trunks of trees or the shoots of herbs in a plot. I used coverage for all types of vegetation, but basal area for trees only.

Frequency is a measure of evenness of distribution. A species may have high density but low frequency if it is concentrated in one part of a plot. Frequency is the percentage of sub-sections of a large plot in which a species is found.

Methods

Estimates of the parameters described above are usually made from samples taken within, and assumed to be representative of, the entire plots. For sampling to be effective the plots need to be fairly homogeneous. The plots were chosen with this requirement in mind, and are as homogeneous as can be expected, except for the Box Canyon. The canyon is increasingly moist from its mouth to its head and the vegetation changes in a progressive way accordingly. Thus, sampling techniques are not appropriate there.

The methods used for describing each plot are as follows:

- I. Shrub plot. The plot is in the most open area of the Monument, between N.M. Highway 53 and the entrance driveway, and is characterized by Horsebrush (*Tetradymia canescens*), Rabbit-brush (*Chrysothamnus nauseosus*), and a small number of One-seed Junipers (*Juniperus monosperma*), many of which are dead. The

plot is rectangular, 200 m x 400 m = 8 hectares (ha). Its sides were surveyed with a Brunton Compass and steel tape. North-south and east-west grid lines were paced at 33.3 - m intervals, and the corners of the resulting grid blocks were staked and flagged. Six north-south toe point-intercept transects of 200 m each were taken to measure coverage. I scored whatever plant was found at the tip of my toe on each pace of the transect. Each east-west grid line set off sub-transects for the purpose of estimating frequency. The diameters and heights of all junipers in the plot were estimated and their locations recorded on a map.

II. Savannah plot. This plot, located south of the campground, represents the encroachment of pinyon-juniper woodland on shrubland, i.e. it is transitional between those types of vegetation. The plot is similar to the shrub plot except that there are more and larger junipers and there are a few pinyons (*Pinus edulis*) present. It was studied in the same way as the shrub plot.

III. Pinyon-juniper plot. The plot is located on the mesa south of Atsinna ruin. It represents mature pinyon-juniper woodland, as found locally on mesa tops and in the extreme southeastern corner of the Monument. The shrubs characteristic of the preceding two plots are largely lacking there. The plot was partially gridded at 25-m intervals. North-south and east-west transects 4 m wide were taken along 1125 m of these grid lines. Within these transects trees were counted and measured for basal area. Each 25-m sub-section of transect was considered a sub-plot for assessing frequency of trees and shrubs. The total area of the plot and percent canopy coverage of trees were estimated with a grid overlay and the 1:3000 aerial photographs available at the Monument office. The overlay is a sheet of acetate with a number of small dots printed in a uniform pattern on its surface. The number of dots intercepting the entire plot and the number intercepting trees are used for these relative determina-

tions. Scale was obtained by making measurements between identifiable points on the photographs and on C.T. Smith's geologic map of 1953, also available in the office. A map for the census was adapted from the aerial photograph.

IV. Box Canyon plot. The vegetation of the Box Canyon changes gradually from pinyon-juniper woodland at the mouth to Pine (*Pinus ponderosa*) - Oak (*Quercus gambelii*) woodland at the head. Similar vegetation exists below the north face of the mesa. Another important part of the plot is the bare rock of the canyon walls. The results of sampling in this plot would be misleading, so I satisfied myself with determination of canopy coverage of trees and of total area from aerial photographs, as described above. A map for the census was prepared from Smith's geologic map.

Results

Percent coverage and frequency of each species in the shrub and savannah plots, as estimated by the transect method, are given in Table 1. Sums of coverage figures may exceed 100 because in some cases there are two layers of vegetation, each of which was scored.

Table 1. Coverage and frequency of plant species in Shrub and Savannah Plots. Values are percentages.

Species	Shrub Plot		Savannah Plot	
	Cov.	Freq.	Cov.	Freq.
One-seed Juniper (<i>Juniperus monosperma</i>)	0.8	3	1.4	8
Sand	27.5	100	29.7	100
Litter	15.6	94	18.8	100
Blue grama (<i>Bouteloua gracilis</i>)	14.8	97	20.3	89
ground lichen	9.6	81	2.4	33

Species	Shrub Plot		Savannah Plot	
	Cov.	Freq.	Cov.	Freq.
Horsebrush (<i>Tetradymia canescens</i>)	9.2	86	2.7	50
<i>Plantago argyrea</i>	5.3	47	0.4	6
<i>Artemisia frigida</i>	3.7	50	4.9	42
Snakeweed (<i>Gutierrezia sarothrae</i>)	3.2	67	7.0	69
Squirrel-tail (<i>Sitanion hystrix</i>)	1.9	50	0.5	11
Rabbitbrush (<i>Chrysothamnus</i> spp.)	1.2	25	3.1	36
<i>Eriogonum simpsoni</i>	0.6	14	3.6	36
grass sp. (unidentified bunchgrass)	1.1	36	1.9	17
Groundsel (<i>Senecio macdougallii</i>)	2.4	44	2.0	33
Sulfur-flower (<i>Eriogonum jamesii</i>)	0.4	11	1.0	33
<i>Artemisia carruthii</i>	---	--	1.2	22
<i>Artemisia dracunculoides</i>	0.9	3	0.4	8
<i>Chrysopsis foliosa</i>	0.7	14	1.1	25
<i>Haplopappus spinulosus</i>	0.9	28	0.7	22
<i>Eriogonum</i> sp.	0.7	19	0.8	19
<i>Monarda</i> spp.	0.4	17	0.4	11
other cryptogams	2.0	42	0.4	8
<i>Descurainia</i> sp.	0.9	25	---	--
<i>Ribes cereum</i>	---	--	0.2	6
<i>Senecio filifolius</i>	0.4	6	---	--
<i>Cryptantha</i> sp.	0.2	8	0.9	14
<i>Oenothera</i> spp.	---	--	0.4	8
dead shrubs	0.4	17	2.1	50
dead grass	0.3	11	1.2	25

Species	Shrub Plot		Savannah Plot	
	Cov.	Freq.	Cov.	Freq.
needles	---	--	0.7	11
herbs	1.6	36	1.2	30
other	1.0	--	2.7	--

Density, coverage, and frequency for trees in the shrub and savannah plots are given in Table 2. The very few dead trees in the latter plot were not counted.

Table 2. Density, coverage, and frequency for trees in the Shrub and Savannah Plots. Density values in trees/ha; other values are percentages.

Plot	Species	Density	Coverage	Freq.
Shrub	juniper-dead	5.8	0.09	44
Shrub	juniper-living	3.4	0.14	10
Savannah	juniper	19.5	2.00	76
Savannah	pinyon	2.2	0.15	11

In summary, Blue Grama, Snakeweed, and trees become more important as one goes from shrub to savannah, while the reverse trend is true for Horsebrush and ground lichen.

III. Pinyon-juniper plot. The plot occupies 3.9 ha. This is rather small for a bird-census plot, but it is the largest block of this type of vegetation on the Monument. Total tree coverage, as estimated from the aerial photograph, was 40%. The following data were derived from the transects: The density of pinyons was 140/ha; that of junipers was 96/ha. Basal areas for the two species were $5.1 \text{ m}^2/\text{ha}$ and $3.2 \text{ m}^2/\text{ha}$, respectively. There was one Alligator Juniper (*Juniperus deppeana*) on the plot. Frequencies for trees and shrubs were Snake-

weed, 98%; *Yucca baccata*, 62%; pinyon, 64%; juniper, 49%; Four-wing Saltbush (*Atriplex canescens*), 11%; and Skunkbrush (*Rhus trilobata*), 2%.

IV. Box Canyon plot. The plot occupies 5.1 ha. This is area as viewed from above and does not include the considerable vertical surface area of the cliffs. Even so, 53%, or 2.7 ha, of the plot is rock. Total coverage is 16.7%, divided as follows: junipers, 5.2%; Ponderosa Pine, 4.6%; Gambel Oak, 4.3%; and pinyon, 2.6%. The junipers are mostly *J. monosperma* near the mouth and mostly *J. deppeana* at the head, with a few Rocky Mountain Junipers (*J. scopulorum*) mixed in. The shrubs Horsebrush and Skunkbrush are common near the mouth; Four-wing Salt-bush is abundant in disturbed soil in mid-canyon; Snowberry (*Symphoricarpos utahensis*) is common under oaks; and Rose (*Rosa fendleri*) is uncommon under ponderosas. Cheatgrass (*Bromus tectorum*) is especially abundant in the loose, sandy soil of the canyon floor.

BIRD POPULATIONS OF THE FOUR PLOTS

Methods

Whereas the vegetation statistics were arrived at mainly through sampling a presumably representative subset of an entire population, the population densities of birds were obtained from censuses, i.e. attempts at complete enumeration of all the birds present in the plots. When the U.S. population is censused every decade the counting is done house-to-house. To be counted people must live somewhere, and thus transients (bums) and migratory workers frequently go uncensused. The situation is much the same with birds. It is only those individuals which are stationary--which have territories--that are counted. In fact, since birds are rather difficult for humans to differentiate individually, we count the territories themselves. We think we can delineate territories because males of many species advertise theirs by singing conspicuously from within them. If we plot the location of each singing male on a map, after

several visits to the site we should have clusters of dots representing the song posts (and thus the territories) of each male. Especially valuable are records of simultaneous singing by more than one male of a species and boundary disputes between birds from contiguous territories. This disarmingly simple scheme is complicated by occasional singing by an intruding or transient male, and by the failure of some species to actively defend territories at all. In some of the latter cases one must find nests, and in others the estimate is little more than a guess. Nevertheless, this is the state of the art. Experience helps, and no further improvements are possible without laboriously marking all the birds for individual recognition.

I conducted these censuses by marking on maps of the plots the location of all singing birds encountered each visit. Notes on behavior supplemented these records. From these data I estimated for each plot the locations and the numbers of territories for each species. I then extrapolated the numbers from the pinyon-juniper and the Box Canyon plots to territories-per-8-ha to allow comparison with the other two plots. A further extrapolation of the totals to individuals-per-square-kilometer (100 ha) was made for the purpose of comparing the El Morro censuses to others in the Rocky Mountain region. This was done by doubling the number of territories (because there are two birds per territory) and extrapolating from 8 to 100 ha. I computed the number of pairs per species to see if density was independent of number of species.

An index of similarity between each pair of plots was determined by counting the number of species shared and computing a faunal resemblance factor (Duellman, 1965) for each pair: $FRF = 2C / N_1 + N_2$, where C is the number of species in common, N_1 is the total number of species in one plot and N_2 is the total number of species in the other plot. The FRF values were arrayed in a matrix of similarity (Table 4) to facilitate comparison.

All species of the four plots were assigned to a foraging guild, assemblages defined by what foods the birds eat and where they find it, to determine if groups with specific ecological requirements are distributed other than randomly among the four plots. The guilds I defined were modified after those of Salt (1957). With the same purpose I assigned all species to a nest-site preference group. These groups are cavity-primary, cavity-secondary, rock, foliage (i.e. canopy), and ground.

Results

Table 3 lists all species found in the plots and the number of nesting territories for each species in each plot. The values for the pinyon-juniper and Box Canyon plots are extrapolations; the actual counts follow parenthetically. The symbol "+" represents less than one-half of one territory. The letter "v" signifies that the species was a visitor in a plot, i.e. it used the plot but did not maintain a territory there.

Table 3. Densities of breeding birds, by species, in four study plots. Values are pairs per 8 ha. Parenthetical values are actual counts in plots less than 8 ha in area. + = less than 0.5 pairs. v = visitor.

Species	Plots			
	Shrub	Sav.	P-j.	Canyon
Turkey Vulture				v
Cooper's Hawk				v
Goshawk			v	
Red-tailed Hawk				v
Prairie Falcon	v			
American Kestrel				1.5(1)
Mourning Dove		v	v	
Screech Owl				v

Species	Plots			
	Shrub	Sav.	P-j.	Canyon
Flammulated Owl				1.5(1)
Great Horned Owl				1.5(1)
White-throated Swift	v	v	v	1.5(1)
Broad-tailed Hummingbird				v
Common Flicker			v	3 (2)
Lewis' Woodpecker				3 (2)
Hairy Woodpecker			v	1(0.5)
Cassin's Kingbird	v	v		
Ash-throated Flycatcher		v	4(2)	1.5(1)
Say's Phoebe	v			1.5(1)
Gray Flycatcher			2(1)	
Western Flycatcher				1.5(1)
Western Wood Pewee				v
Violet-green Swallow	v	v	v	8 (5)
Cliff Swallow			v	v
Scrub Jay			v	1(0.5)
Steller's Jay				v
Common Raven	v	v	v	v
Pinyon Jay		v		
Mountain Chickadee				1.5(1)
Plain Titmouse		v	2(1)	1.5(1)
Bushtit			2(1)	
White-breasted Nuthatch			v	1.5(1)
Bewick's Wren		v	1(.5)	v

Species	Plots			
	Shrub	Sav.	P-j.	Canyon
Rock Wren				8 (5)
Northern Mockingbird			v	
Western Bluebird				3 (2)
Mountain Bluebird		v	2(1)	1(0.5)
Solitary Vireo			2(1)	1.5(1)
Western Meadowlark		v		
Brown-headed Cowbird			v	
Western Tanager				1.5(1)
Hepatic Tanager			v	1.5(1)
Black-headed Grosbeak		v		
House Finch			+	3 (2)
Lesser Goldfinch		v		1.5(1)
Green-tailed Towhee	0.5	2		
Vesper Sparrow	7	5.5		
Lark Sparrow	v	2		
Chipping Sparrow	1.5	1	4(2)	3 (2)
Brewer's Sparrow		+		
TOTAL	9	10.5	19(9.5)	55.5(35.5)
Number of Species	3	5	9	24
Individuals/km ²	225	262	475	1392
Pairs/species	3.0	2.1	2.1	2.3

The numbers of species and densities are similar to those found in other studies of similar area. Wiens (1975) reported an average of 14.0 species and

735.8 individuals/km² in 17 censuses of coniferous forest in the Rocky Mountain region. Figures for the Box Canyon (24 species, 1392 individuals/km²) exceed those averages, as would be expected in a mixed habitat. The values for pinyon-juniper (9 species, 475 individuals/km²) are comparable to the three-year averages of 17.7 species and 397 individuals/km² for a similar plot at Cottonwood Gulch, on the north slope of the Zuni Mountains (personal data). The reason for the difference in number of species is the presence in the latter plot of Ponderosa Pines. For 26 shrub-steppe plots Wiens and Dyer (1975) reported an average of 4.1 species and 296.5 individuals/km². These figures are very close to those for the shrub plot (3 species, 225 individuals/km²) and the savannah plot (5 species, 262 individuals), both of which would be called shrub-steppe in Wiens's terminology.

Number of species and density increase, as predicted, along the continuum of habitat complexity defined by the plots. However, number of pairs per species does not increase along this continuum.

Table 4 is a matrix of similarity in species composition among the plots. All FRFs are low except those for the pinyon-juniper and Box Canyon plots (.30), and for the shrub and savannah plots (.75).

Table 4. Matrix of similarity in species composition for pairs of plots. Values in the upper-right half of the table are FRFs. Those in the lower-right half are the numbers of species in common. Total species counts for each plot are italicized on the diagonal.

	Shrub	Sav.	P-j.	Canyon
Shrub	<i>3</i>	.75	.17	.07
Savannah	3	<i>5</i>	.14	.07
Pinyon-juniper	1	1	<i>9</i>	.30
Box Canyon	1	1	5	<i>24</i>

The assignments of species to foraging guilds are listed in Table 5. The assignments reflect the summer habits of the species. These categories should be largely self-explanatory. The fly-catching guild contains species which sit on perches, and, after sighting prey, sally forth to catch it in mid-air. Aerial feeders are airborne almost continuously and sight their prey while in flight. "Ground-insect/seed" refers to birds which eat some seeds during summer, but which feed their young insects. In a few cases the assignments are a bit arbitrary because some species have variable preferences. The Scrub Jay is so much a generalist in feeding habits that I have not included it in the classification.

Table 5. Foraging guilds. The numbers after each species' name represent the plots in which it maintained territories. 1 = shrub; 2 = savannah; 3 pinyon-juniper; 4 = Box Canyon.

Raptorial

American Kestrel 4

Flammulated Owl 4

Great Horned Owl 4

Aerial

White-throated Swift 4

Violet-green Swallow 4

Fly-catching

Lewis' Woodpecker 4

Ash-throated Flycatcher 3,4

Say's Phoebe 4

Gray Flycatcher 3

Western Flycatcher 4

Foliage-insect

Mountain Chickadee 4

Plain Titmouse 3,4

Bushtit 3

Bewick's Wren 3

Solitary Vireo 3,4

Western Tanager 4

Hepatic Tanager 4

Foliage-seed

Lesser Goldfinch 4

Bark-insect

Hairy Woodpecker 4

White-breasted Nuthatch 4

Ground-insect

Common Flicker 4

Rock Wren 4

Western Bluebird 4

Mountain Bluebird 3,4

Ground-insect/seed

House Finch 3,4

Green-tailed Towhee 1,2

Vesper Sparrow 1,2

Lark Sparrow 2

Chipping Sparrow 1,2,3,4

My assignments to the nest-site preference groups are in Table 6.

Table 6. Nest-site preference groups. The numbers after each species' name represent the plots in which it maintained territories. 1 = shrub; 2 = savannah; 3 = pinyon-juniper; 4 = Box Canyon.

Cavity-primary

Common Flicker 4

Lewis' Woodpecker 4

Hairy Woodpecker 4

White-breasted Nuthatch 4

Cavity-secondary

American Kestrel 4

Flammulated Owl 4

Ash-throated Flycatcher 3,4

Violet-green Swallow 4

Mountain Chickadee 4

Plain Titmouse 3,4

Bewick's Wren 3

Western Bluebird 4

Mountain Bluebird 3,4

Foliage

Great Horned Owl 4

Gray Flycatcher 3

Scrub Jay 4

Bushtit 3

Solitary Vireo 3,4

Western Tanager 4

Hepatic Tanager 4

House Finch 3,4

Lesser Goldfinch 4

Chipping Sparrow 1,2,3,4

Brewer's Sparrow 2

Rock

Great Horned Owl 4

White-throated Swift 4

Say's Phoebe 4

Western Flycatcher 4

Violet-green Swallow 4

Rock Wren 4

House Finch 3,4

Ground

Green-tailed Towhee 1,2

Vesper Sparrow 1,2

Lark Sparrow 2

The species are fairly evenly distributed among foraging guilds, but nest-site preference is strongly biased toward cavities and rocks.

Discussion

It is readily apparent from the results reported above that the four plots support very different bird communities. Just how different they are is elucidated by the Faunal Resemblance Factors of Table 4. The low numbers in the upper righthand quadrant of the matrix show that there is a great gulf of dissimilarity between the two open-country plots and the two woodland plots. The presence of some trees in the savannah plot does not appear to make much difference to the birds. The affinities of this plot are clearly with the more open shrub plot, rather than with the more closed pinyon-juniper plot. In fact, the greater diversity of trees seems to add only one species, the Lark Sparrow, to this plot's bird community. In moving to the pinyon-juniper plot one finds a nearly completely different community of birds, adapted to woodland rather than to open country.

The similarity of the pinyon-juniper and Box Canyon communities is moderate. The difference is contributed mostly by the addition (versus substitution) of species in the canyon, although several are restricted to pinyon-juniper. Perhaps because they are somewhat isolated from areas with similar vegetation, both plots are depauperate in species characteristic of the habitat-types they represent. I expected to find Western Wood Pewees, Pygmy Nuthatches, Grace's Warblers, and Virginia's Warblers in the Box Canyon, and Black-throated Gray Warblers in the pinyon-juniper plot.

There is an increase in number of species and population densities as one proceeds from the most open plot, shrub, to the one with the most complex vegetational structure, Box Canyon. However, as the stability of pairs-per-species (see Table 3) shows, the increase in densities is due to the increase in the number of species. Thus, at El Morro, more complex habitat supports more individuals because there is more ecological space for more species.

The increase in the number of species may be explained by the increasing complexity of habitat factors available to the birds on this continuum. In other words, there are more kinds of places to nest and secure food, so there are more kinds of birds. Many theoretical ecologists, following the example of MacArthur (1972:177), believe that this phenomenon can be described by two measures, Bird Species Diversity (BSD) and Foliage Height Diversity (FHD). BSD takes into account not only the number of species present but also the evenness with which the individuals are distributed among the several species. FHD purportedly represents the abundance and evenness of vegetation, irrespective of the species composition, in three layers -- herb, shrub, tree.

I refrain from using these measures for several reasons. To begin with, FHD would underestimate the complexity of Box Canyon habitat because it cannot include a measurement for the contribution of the cliffs. Moreover, the for-

mulae used for computing BSD and FHD have been widely criticized on mathematical grounds (see, for example, Hurlbert 1971). Most importantly, as suggested by Balda (1975), these measures are gross over-simplifications which ignore some of the realities of natural ecosystems. In their continuing romance with numbers, many American ecologists are forgetting about the birds themselves.

It is sufficient, I think, to point out that as one goes from shrub to Box Canyon there is an increase in the dominance of trees and an increase in the number of tree species. There is actually less canopy coverage in the Box Canyon than in pinyon-juniper, but this is offset by the addition in the former place of a layer of tall trees, Ponderosa Pines, and by the addition of rock cliffs.

The usual correlation of BSD with a measure of complexity is probably fulfilled by these data. Such numbers ignore an important fact, the almost complete break in faunal continuity between savannah and pinyon-juniper, as reflected by the FRF of .14 for the two plots. A trend which would appear to be a smooth curve if the points were joined on a graph actually masks a chasm. Although the numbers increase gradually, the birds are of different species. The differences in habitat are clear upon inspection. The pinyon-juniper plot has a semi-closed canopy and few real shrubs (Snakeweed is a sub-shrub. Neither it nor *Yucca* provide appropriate nest-sites for shrubland birds.). For four out of five breeding species in the savannah plot this is intolerable. Similarly, although several pinyon-juniper species visited the savannah plot, there are not enough trees there for them to establish territories. For this reason, "Savannah" was a poor choice of names for the plot.

The following discussion will attempt to elucidate the situation by referring to the birds themselves.

Raptorial and aerial feeders are all restricted to the Box Canyon plot. These are very mobile and wide-ranging species, though, and the swallow and

swift obviously feed all over the Monument. But, they are all dependent on cliffs or cavities for nesting. The kestrel, Flammulated Owl, and swallow might have nested in large pinyon trees, but there are very few cavities in pinyons at El Morro. Woodpeckers, the primary excavators, seem to prefer the softer wood of the ponderosas. Junipers have such hard wood that they are scarcely ever used.

The fly-catching birds are evenly distributed between canyon and pinyon-juniper. All but the Gray Flycatcher have nest-site requirements that cannot be met in the two more open plots. Gray Flycatchers seem to require large pinyons in their territories.

The species which forage on bark obviously require trees. These two species also need soft wood for excavation of their nest cavities.

Species which forage for insects on the ground are virtually limited to the Box Canyon. El Morro's flickers prefer ponderosas to pinyons for nest sites, although this is not invariably the case elsewhere. The wren requires rock. The Western Bluebird might nest in pinyon-juniper if there were more cavities available.

Foliage-insect gleaners are, like the fly-catchers, restricted to the two wooded plots. In the cases of the cavity-nesting chickadee, titmouse, and wren it is clearly nest-site availability which is restrictive. For the others there is probably a requirement for a significant amount of arboreal foliage, for both feeding and nesting. Furthermore, some species prefer ponderosas, others pinyons. Finally, Brewer's and Chipping Sparrows may forage in foliage for insects, thus complicating the assortment of species in this guild. Here at last is a case in which the structure of the vegetation (in this case the height) may be the deciding factor. The above discussion applies also to the single "foliage-seed" forager.

Those species which take seed and insects from the ground comprise a distinctive group. They are, for one thing, all finches of the family Fringillidae, a group morphologically specialized for subsisting on seeds. They take animal food in summer because it is abundant and because the rapidly growing young need concentrated protein. This is the only guild which is dominated by open-country birds. Conversely, all the species of the shrub and savannah plots fit here. The Chipping Sparrow and House Finch are species with great "ecological amplitude." Furthermore, I think the House Finch was attracted to rock-bound nest-sites in or near the canyon and pinyon-juniper plots. The other four species nest on or near the ground and are found only in open areas. There are many nest sites and foraging sites in the Box Canyon which are identical in structure to those found in the shrub and savannah plots. The main difference in the areas is that visibility is much greater in the latter two. This, I speculate, is the limiting factor for these four species. Why it should be so is as enshrouded in the mists of evolutionary time as why it is that White-throated Swifts nest in cliffs.

In recapitulation, the four sites studied represent points on a continuum of habitat complexity. The number of species of birds present increases as this complexity increases. However, the presence of most species can be explained in terms of their individual requirement for nest sites and foraging substrate. I believe such analysis is more useful than referring to abstractions such as BSD and FHD.

The rock El Morro, the key to the existence of the National Monument, is also the key to the richness of the area's avifauna. By providing nesting sites for several species and by collecting water which supports the Ponderosa Pines which are essential to many others, it superimposes on a monotonous shrub-steppe an assemblage of breeding birds almost comparable in richness to that of the

neighboring Zuni Mountains.

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CHAPTER THREE

AN ANNOTATED CHECK-LIST OF THE BIRDS OF EL MORRO

INTRODUCTION

This list of bird species which have been recorded within the current (1979) boundaries of El Morro National Monument has been compiled from sources described in Chapter One and from my own field notes. Those species whose occurrence at El Morro I consider too poorly documented for them to be included in the main list are named in an hypothetical list (Appendix II).

The account of each species is organized as follows: The English and scientific names of the species are those approved and published by the check-list committee of the American Ornithologists' Union (A.O.U.) as of September 30, 1979. The committee makes changes in nomenclature from time to time on the basis of the latest scientific information on the systematics of birds. Their most recent changes have come since the publication of most popular field guides, and some well-established names have been superseded. J.P. Hubbard's Revised Check-list of the Birds of New Mexico (New Mexico Ornithological Society Publication No. 6, 1978) is not only the authoritative source on the status of birds in the state, it contains all currently accepted names. Where an especially well-established name has been changed I include it parenthetically, after the currently accepted name.

An asterisk in the margin left of the English name indicates that the species has at some time bred on the Monument. Criteria for proof of breeding, after Hubbard (Ibid.), are one or more of the following: nest building (preferably to completion), egg laying, incubation (preferably prolonged), young in nest, or presence of highly dependent fledglings. Because these criteria are strict many species which undoubtedly breed on the Monument will not, for lack of evidence, be so recorded.

The body of each species account will detail the first and important subsequent records of the species at El Morro. A description of the status of the species, as now understood, follows these records. Habitat preferences of the species at El Morro come next. Finally, I have included some details, for those species which are common or distinctive on the Monument, of the natural history of the birds. I have chosen facts of general interest rather than highly technical information. My objective is to provide staff and visitors with the kind of information which may help them more readily to notice and more easily to appreciate the birds and thus to come away with a fuller experience of this magnificent place.

The many fine field guides available make it unnecessary for me to provide information on identification. In a few cases where local conditions present special problems I have added a few notes on distinguishing very similar species.

In those cases where a specimen or specimens have been collected on the site of the Monument I give the collector, date, and age and sex of the birds when available. I have not traced the current location of these specimens.

SPECIES ACCOUNTS

Order *ANSERIFORMES*

Family *ANATIDAE*

Bufflehead

Bucephala albeola

This handsome little duck is rather common in winter on reservoirs and ponds in the region. That it can be satisfied with a very small body of water is evidenced by the female I saw on the sewage lagoon all day on March 6, 1978.

This is the only species of waterfowl I have seen on the lagoon, but others occur casually. Ann Jordan reported the presence of teal there, and there are probably many unrecorded additional observations. Whether the lining of the

bottom of the lagoon in 1978 will have an adverse effect on the presence of ducks there remains to be seen.

Order *ACCIPITRIFORMES*

Family *CATHARTIDAE*

Turkey Vulture

Cathartes aura

The Turkey Vulture rides through the air currents of the summer sky sometimes like a sloop running before a gale, others like a gunboat slowly patrolling, but always as though it were virtually weightless. Among land birds it has no equal at reading the currents and working them for all the lift they can provide. It tilts eerily as it sails by, so slowly that one can scarcely believe it is not held up by a cord.

Vultures have floated thus over El Morro for unnumbered summers, but are so natural a part of the setting that it is not surprising that their presence was not recorded until June, 1936, when E.Z. Vogt, Jr., mentioned them. They may have nested there in earlier days, for the cliffs of the rock hold many crevices of the type they might choose for their nests. There is not evidence that they do so now. Early on the morning of April 25, 1979 I found a pair of these birds roosting atop the cliff above the mouth of the Box Canyon. At first I took their dark forms for shadows. They did not leave this perch for nearly two hours. I saw a pair in the same area on July 7, but never found any evidence of nesting.

These vultures, which are frequently erroneously called buzzards, nest almost throughout the U.S. In New Mexico they are present only for the summer, waiting each morning for the heat of the sun to generate the warm convection currents on which they soar so gracefully. On the ground or perched in a tree a vulture is not so graceful; in fact, some would call it grotesque. The main reason for the latter impression is that the head is not feathered. This

seeming oddity is adaptive, for the bird is always thrusting its head into the putrefying remains of cows and the like. Not having to clean head feathers after such meals clearly outweighs any advantages these feathers might confer.

Family *ACCIPITRIDAE*

Goshawk

Accipiter gentilis

This, the largest of our three accipitrine, or bird-hunting, hawks, is generally thought to inhabit dense forests in the higher reaches of the mountain ranges. In the Zuni Mountains this is not the case, for it has nested as low as 7600 feet on the north slope. Therefore, although I was startled by the silent, low passing of the huge raptor, I was not surprised to see one on April 26, 1979. This bird, an adult, is the only record for the Monument.

Sharp-shinned Hawk

Accipiter striatus

El Morro's first recorded "Sharpie" was a sub-adult which had the misfortune of flying into the glass wall of the Visitor Center. The dead bird, which was found in late 1978, was preserved as a specimen by the Monument staff. One April 23, 1979, while I was conducting a census in the shrub plot, an adult of this species flew by me and prepared to land in a shrub. The moment before the landing a sparrow emerged from the shrub. The predator made a half-hearted attempt at catching it before landing, but soon returned to the intended perch, and shortly afterward continued on its way.

As these records indicate, the Sharp-shinned is probably a regular transient visitor to El Morro. They probably do not breed, as the closely related Cooper's Hawk, with which they do not normally co-exist, appears to be the resident *Accipiter*.

Specimen, 1: winter 1978-79, juv. fem.

Cooper's Hawk

Accipiter cooperii

This species was first recorded at El Morro by E.Z. Vogt, Jr., in August,

1936. It is a permanent resident in our region. I saw an adult carry a prey item from the vicinity of the campground toward the Visitor Center on July 25, 1978. This act in itself does not confirm local nesting. On April 25 and 26, 1979 an adult called loudly and flew about in the Box Canyon and in the vicinity of the old picnic ground. I expected to find a nest in this area later. On July 20 and 21 a large adult, probably a female, was conspicuous as it carried food and perched in the tall pines above the old picnic ground. This bird called loudly in flight, as accipiters often do when carrying food to a nest. My assistants and I watched this bird for several hours and searched for a nest, but never found any evidence that it had one. Also, as we saw no other bird, it appears that this one was unmated. Even so, occurrence during several summers implies that this species may at times breed at El Morro.

Cooper's Hawks prey largely on birds about the size of robins and meadowlarks. Their flight is low, strong and swift, and they usually are upon their quarry before it knows it is being attacked. The combination of stealth and a preference for avian prey is largely responsible for the bad reputation other hawks, primarily the Red-tailed, have had with poultry keepers. The stealthy Cooper's makes the kill while the soaring Red-tail gets the blame.

Short, broad wings and long tails give accipiters the maneuverability to hunt in their woodland homes. It is amazing to see one fly through the trees, dodging and darting so that it never touches a branch.

It has recently been publicized that Cooper's and Sharp-shinned Hawks cannot safely be distinguished on the basis of the shape of the tail, contrary to information provided in most field guides. The only reliable distinguishing characteristic is size.

Specimen, 1: winter 1978-79, juv.

Red-tailed Hawk

Buteo jamaicensis

The red-tailed Hawk is the common soaring hawk of America, and is well-known throughout the country. It is definitely a permanent resident in the vicinity of El Morro, and a pair may even nest in one of the tall trees in a secluded part of the Monument some years. I saw an adult in the light color phase soaring over the southeast corner of the Monument on several occasions in summer, 1979. The first record was an observation by Hargrave of two birds, thought by him to be *B.j. fuertesii*, on October 5, 1956.

On March 19, 1979, in the midst of a snowstorm, I heard the high *keeer* calls of a red-tail and saw through the snow an adult bird plummeting in a roller-coaster path of steep dives and upward swoops toward the north face of the rock. It peeled off and circled higher, making several more passes by the headland in the next ten minutes. Perhaps it was displaying to a prospective mate perched on the rock, or was it performing simply for its own pleasure? In either case it entertained and enspirited the ground-bound human standing below in the swirling snows.

Red-tails are typical of the genus *Buteo*. They soar high in the sky, scanning the ground for their prey of rodents and rabbits. They are probably the most persecuted of all hawks, for they offer an easy target whether flying overhead or sitting on a telephone pole. Two other Buteos, the Rough-legged and Ferruginous Hawks, probably pass over El Morro occasionally in winter

*Golden Eagle

Aquila chrysaetos

The Golden Eagle is the lord of the Western sky. Except for the almost-extinct California Condor it is America's largest raptor, and certainly its most majestic. In flight or at rest its massive size makes it seem regal, yet the roller coaster path of the headlong dives and upward glides of its courtship display, a heroically exaggerated version of the Red-tail's display, cause

it to appear playful, too.

The eagle prefers for its nest precipitous cliffs. As nothing typifies El Morro better than cliffs, nothing captures the spirit of the place better than the eagles which formerly made their home among them. A pair of eagles nested yearly on the rock from 1936 to 1940. Hargrave noted them as still nesting in 1959. Now they are hardly ever seen.

The birds, which were well known to the custodians and major attractions among the visitors of that period, provided a good deal of amusement as well as excitement. For example, E.Z. Vogt, Jr., reported the following in June, 1936:

About noon last Saturday I heard a loud commotion on the hill above the cabin. It sounded like a riot, but on running up to investigate, I found that one of our eaglets had made his first catch, a prairie dog, and was certainly telling the world about it. The two grown eagles were flying around overhead squawking their approval and praising the young one. I didn't have a camera, so I decided to catch the eaglet and put him in the cabin until someone came along with a camera. He was too young to fly very well, and I was able to capture him after a short chase. I carried him by the wings so his mean beak wouldn't grab one of my fingers. When I put him in the cabin the first thing the little fellow (I say little, but he had a wing spread of 5½ feet) did was to jump upon the desk and on top my typewriter, cock and eagle eye at me, and await further developments. It was then that I named him Oscar.

In July of that year "a wild-looking old Zuni Indian rode in and demanded both the little eagles." His purpose was to take the birds back to Zuni, where they would be kept in wicker cages. Their feathers would be plucked periodically for ceremonial uses. Early visitors reported seeing well-plucked birds in such cages during the nineteenth century. Vogt successfully fended off the old man, but it must have been a common practice for the Zunis to kidnap eaglets at El Morro. Budlong inferred as much when in May, 1937 he observed that the eagles had built a new nest in a niche in the cliff, replacing the old one on top of the rock. In that year, too, eaglets left the nest before they could fly:

. . .one of our visitors succeeded in capturing one of them. It

could not fly, possibly having become slightly injured in its initial venture from home. We parked it in a tree near the cabin, where it remained for three days, loudly informing the world in general that it was lost and hungry. On the third day, having received no nourishment for some time, it eagerly devoured a prairie-dog I shot for it.

On March 18, 1938 the eagle was sitting on the nest, and by May there was and eaglet in the nest. The eagle was sitting again in April, 1939 and 1940. This is the extent of the records. Apparently the birds ate mostly rabbits and prairie dogs.

This pair was fairly typical of the species except for their high tolerance of frequent observation by humans. The time and cause of their disappearance are unknown at this time, because I have not found records for the 1960's.

Family *FALCONIDAE*

Prairie Falcon

Falco mexicanus

Records of this species at El Morro date from June 25 or 26, 1959 when Hargrave saw one. On September 6 of that year he found feathers and bones of a freshly killed and eaten specimen. He identified the specimen from the bones. I have seen one of these birds often at El Morro during summer. All records have been of birds flying over the rock. The cliffs would seem to contain adequate nesting ledges, but there is as yet no evidence of breeding of Prairie Falcons there. Breeding takes place in late spring, the period in which there has been little ornithological field work on the Monument. Local birds may leave the area for lower elevations during winter.

Prairie Falcons require cliffs with ledges or caves in which to lay their 3 to 6 eggs. The female does most of the incubation, and the male brings food for her and for the young after they have hatched. The fledging period is about 40 days long. Human intruders who surprise a female on the nest may cause her to accidentally knock eggs or young out of the nest.

The prey of these falcons is usually small birds or mammals, although rep-

tiles and even insects are taken. They prefer to capture prey on or near the ground, seizing it with the talons and administering the coup de grace by crushing the skull or biting through the neck. The food is eaten on the spot or is taken to a convenient vantage point where the bird can watch for intruders while eating.

Specimen, 1: Hargrave, 9/6/1959.

*American Kestrel (Sparrow Hawk)

Falco sparverius

This little falcon, first recorded by E.Z. Vogt, Jr., in 1936, is a common summer resident at El Morro. The reason for its abundance is probably the abundance of its favorite nesting sites -- isolated, tall, dead ponderosas. These birds nest in cavities, so another prerequisite is large populations of woodpeckers to do the excavation. Flickers and Lewis' Woodpeckers fill this need more than adequately. Kestrels leave their nesting sites in the woodlands and go out into open country in winter. They are often seen on telephone lines and fence posts.

In late April, 1979 El Morro's kestrels were performing their courtship displays of power dives accompanied by a long series of high, staccato chips. Three pairs went on to nest on the Monument, in approximately the same areas occupied by the species in 1978. On July 6 four or five young of one of these pairs clung clumsily to the limbs of an old pine snag north of the rock.

This species formerly was called Sparrow Hawk. Its name was officially changed in 1973 to bring its nomenclature into line with that of many closely related species around the world and to counter the impression that it feeds mostly on sparrows. Its main prey is large insects which it takes on the ground after pitching from a high perch or hovering overhead. It does, however, occasionally take avian prey even larger than sparrows.

The kestrel is a beautiful bird, and while it does not give the impression

of power, as do the larger falcons, its grace in flight seems to embody the freedom we frequently associate with birds of prey.

Order *GALLIFORMES*

Family *PHASIANIDAE*

Scaled Quail

Callipepla squamata

This species no longer occurs at El Morro and has not for some decades. In reporting an attempt to restock them in 1938 Budlong said, "Old-timers say quail used to be rather plentiful years ago." Thirtynine were released on April 12, 1938 by the New Mexico Game and Fish Department. This transplant apparently failed and more were released in April, 1940. Their fate is unknown.

Scaled Quail occupy unforested areas of New Mexico up to about 7,000 feet. Although El Morro is higher than this, its shrubland appears to be appropriate habitat. These quail feed mostly on the seeds of forbs and shrubs, not grasses. Family groups join into large coveys in winter, which occupy home ranges up to 1.5 miles in diameter. Pairs split off in spring and spread out into surrounding areas to nest. They breed whenever the summer rainy season produces optimal conditions of food and cover.

Order *CHARADRIIFORMES*

Family *CHARADRIIDAE*

Killdeer

Charadrius vociferus

The Killdeer is one of the most handsome of the far-flung shorebird group. It breeds in the U.S. wherever there is open country and a bit of open water, and its haunting whistle is known to many people.

I found an adult and a large juvenile on the banks of the sewage lagoon July 25, 1978. The young bird was too large for me to assume it was raised locally, although appropriate nesting habitat does exist in the flats to the

east of the lagoon and across the boundary to the south. The only other record is one heard at the same place on September 9, 1979.

The broken-wing display, a behavior easily recognized when seen, is suggestive of the presence of a nest or young near the observer.

Order *COLUMBIFORMES*

Family *COLUMBIDAE*

*Mourning Dove

Zenaida macroura

The Mourning Dove occurs throughout the U.S. and is a common summer resident and breeder at El Morro, occupying all habitats from Box Canyon to shrubland. It was first recorded by E.Z. Vogt, Sr., in June, 1936. It has not yet been found there in winter and is generally much less abundant in the region at that season than in summer.

These doves subsist mainly on weed seeds, although they also glean grain fields after harvest. They usually increase in numbers as disturbance by humans increases the abundance of weeds at the expense of native grasses, as has probably happened at El Morro in the past 100 years.

The loose, ramshackle pile of twigs upon which they lay their two white eggs is the barest excuse for a nest. These are placed, often on the old nest of another species, anywhere from a high limb of a tree to the top of a rock or on the ground. When the sitting bird, usually the female, is startled from the nest it leaves with such an awkward clattering of wings that it must seem to destroy its nest in the process. For this reason known nests should not be visited repeatedly.

On July 25, 1978 I flushed a Mourning Dove from under a low shrub while walking north of Highway 53. The bird, after flying a few feet, fluttered on the ground a bit and walked away. Such a distraction display, which is performed to lead a possible predator away from the nest, is typical of the dove family.

Under the shrub was a nest with two almost-grown young.

Order *STRIGIFORMES*

Family *STRIGIDAE*

Screech Owl

Otus asio

Hargrave did not encounter this species, but he included it on his checklist of June 29, 1959 with the notation "photo - Lohr." I heard the calls of the Screech Owl very early on the mornings of June 17 and August 7, 1979. Though it calls during the evening in other places the hour of these observations may indicated why it has not been noticed more often at El Morro. Karen Young, of the Monument Staff, described to me on June 7, 1979 a pair of birds which seemed to have been of this species.

The Screech Owl seems to be an uncommon summer resident of the foothills of the Zuni Mountains. Nothing is known of its status here in winter. These birds nest, and roost, in cavities, usually old woodpecker holes, and eat all kinds of animal food, from mice to worms.

*Flammulated Owl

Otus flammeolus

This tiny owl is common throughout the pinewoods of the Southwest, but it escaped detection at El Morro, as owls easily can, until 1978. In the summer of that year staff members Patty Rost and Lily Riesert identified as this species a pair of small, dark-eyed owls they saw perched on the wall of the Box Canyon one evening. My assistants Brian Malcolm and Tim Lord found a pair of adults in the Box Canyon on July 20, 1979. As we searched for the birds later we flushed a juvenile bird, which fluttered just before us through the thickets of oak. It flew so weakly that it must certainly have come from a nest within the canyon.

Like most small owls, flammulateds nest in cavities. Despite the records cited above, they usually are decidedly nocturnal. Their simple hoots filter

through the dense air of a moonlit night as though they were the muffled cries of a distant, large bird. So deceptive is this quality that an observer may not realize until he hears the hoots over his shoulder that he has walked directly under and beyond the tree where the little bird calls. Nevertheless, these sounds carry over great distances, and, in prime territory, several birds may be heard at once on a still night.

Flammulated owls subsist mainly on insects. They leave our area for warmer climes in winter.

Great Horned Owl

Bubo virginianus

This species was first recorded by Budlong, in 1938. I found Great Horned Owls regularly in the Box Canyon in the summers of 1978 and 1979. On July 8, 1978 I saw two birds in juvenal plumage, with horns not fully emerged. They flew well. The night before I had heard the loud screeches characteristic of young owls. I presume the calls were made by the young birds I later saw. I saw no young in 1979.

I believe the Box Canyon is the center of a territory of this species, for I have seen them there at all seasons of the year. These owls nest either in the nests of other large birds, or on unadorned ledges of cliffs. Both situations should be available in the canyon.

Ernest Thompson Seton aptly characterized this species the "most pronounced and savage of the birds of prey." Not only do they take without hesitation prey as large as striped skunks, they have been known to attack and kill their own mates. Their ferocity is not lessened for man, as Budlong learned with a pair of young ones brought him by local children:

. . .from being teased by children, they have become quite vicious, and the last time I tried feeding them by hand one of them drove his talons clear through my left hand, causing some annoyance in the typing of official reports, including this one.

Their strength is prodigious. One broke the chain of a steel pole trap and flew

off with the trap in tow. Another was caught twice in pole traps, and was seen for a time carrying a trap and pole dangling from each leg. Their appetites are catholic, even running to domestic cats.

For all its fierceness, though, the Great Horned Owl is an attractive character. The sound of its deep, muffled hoots reverberating through the crystalline stillness of a moonlit winter night somehow takes the edge off the cold. And the raucous screeches of the young birds in the Box Canyon, so near a highway and modern houses, bring to one's consciousness the ironic reality that there is a corner of real wilderness.

Pygmy Owl

Glaucidium gnoma

On March 7, 1978, just after dawn, I was standing on the east rim of the Box Canyon, imitating the whistled toots of the Pygmy Owl. Just as hoped I had kicked up a ruckus among the nuthatches, chickadees, and juncos, which were flying all around looking for their traditional antagonist. Then, off to the south I heard the clear, bell-like notes of the real article. My efforts had not only fooled the small birds around me but a real Pygmy Owl.

I had not expected to find this species at El Morro, for it does not occur at similar elevation at Cottonwood Gulch, where five other species of owls do occur, but the tall pines and seclusion of the Box Canyon seem to match its habitat higher in the Zuni Mountains. I saw it so frequently there in 1978 that I suspect a pair nested in one of the many vacant woodpecker holes in the ponderosas near the mouth of the canyon. The species is said to be characterized by home ranges of up to a square mile's extent, but even if the El Morro birds ventured out of the small canyon, much of their mile likely was within the Monument's boundaries. The species was almost certainly absent in 1979. Only time will tell whether 1978 or 1979 was more typical of the status of these owls at El Morro.

Pygmy Owls are well-named, for they are only about the size of a bluebird. They depart from the traditional conception of an owl in another way, for they do most of their hunting in the daytime. This is the reason for the bad reputation with the small birds. During their nesting season they take a great toll of these birds, and just as kingbirds will chase a raven, or a raven an eagle, so these smaller birds mob and try to chase away the owl when they find it. No call is more likely to attract small birds of the West than that of the Pygmy Owl.

Outside the nesting season this owl switches its diet to other animals but it still takes some birds, as I learned one November afternoon in Colorado. I heard a small commotion, which sounded no more violent than a bad landing by a jay, in a scrubby oak. But on scanning the tree I saw a Pygmy Owl only seconds after it had dispatched a junco, which was drooping across a branch in the firm grasp of the little owl. The junco's flockmates were chipping madly, apparently the most extreme alarm they could muster from their behavioral repertoire, but the owl was undaunted by them; he simply stared unflinchingly at me until finally he gathered his prey and flew away.

Order *CAPRIMULGIFORMES*

Family *CAPRIMULGIDAE*

Poor-will

Phalaenoptilus nuttallii

I heard one of these birds calling on a night in May, 1979, for the only record. El Morro would seem to provide appropriate nesting habitat for this summer resident of our region, but the absence of more records of such an aurally conspicuous species argues against the conclusion that it occurs regularly on the Monument.

Common Nighthawk

Chordeiles minor

The Common Nighthawk is indeed common throughout the U.S., as it is at El

Morro. It was first recorded at the Monument by E.Z. Vogt, Jr., in June 1936, but there is little doubt it is of regular occurrence every summer. It is, however, decidedly restricted to the warm season, not arriving in our region until late May, and departing in early September. Its dependence on flying insects for food necessitates this short sojourn.

The nighthawk probably nests at El Morro, for I have heard its booms, which frequently are performed near the nest, in the open country on the east side of the Monument. The boom is part of a nuptial display of the male. He dives from great height, and just as he swoops up at ground level lowers his wings. Vibration of the flight feathers under the resulting stress produces the sound.

Nighthawks are active at dawn and dusk, and take all their food (which is 100% insects) on the wing. The female lays her two eggs, which are a mottled brown, directly on the ground. There is no nest, and in fact in the process of tucking the eggs under herself repeatedly she may move them several feet during the course of the incubation period. The male may incubate some, but he usually sits on a nearby branch, his body oriented lengthwise with his perch.

The male Common Nighthawk is highly territorial toward others of its species, and, in southern New Mexico, toward the closely related Lesser Nighthawk. In that region commons do not nest in the low deserts inhabited by the lesser, presumably because they spend so much time chasing the smaller birds, which are indifferently territorial, that not enough is left for successful nesting.

Specimen, 1: Hargrave, SWAC #187, 8/9/1959, *Chordeiles minor howelli*, an extralimital record. Identification confirmed by A. Wetmore.

Order APODIFORMES

Family APODIDAE

*White-throated Swift

Aeronautes saxatilis

Because of its historical interest I quote below Woodhouse's statement on

this species in its entirety:

Acanthylis saxatilis, Woodhouse. The Rock Swift, or Spine-tail

Head and rump white; back, tail, wings, and sides black, beneath white; upper tail-coverts white. About the size of *A. pelagica*, and in its mode of flight the same.

This beautiful swift I saw whilst encamped at Inscription Rock, New Mexico. Being on the top of this high rock at the time without my gun, I was unable to procure specimens. I had a fair view of the birds at this time, as they flew close to me. I descended immediately and procured my gun; but the birds by this time flew too high for me to be able to procure a shot at them. They were breeding in the crevices of the rocks. I was still in hopes of seeing them again along our route, but I had not this pleasure, it being the only place that I have observed them.

The White-throated Swift remains one of the abundant and distinctive summer birds of El Morro. It depends as much on the high cliffs for nesting as it does on the open sky for all its other needs. The nests, made of twigs and feathers glued together with saliva, are placed in crevices in the rock, often far back in them. Some of these cracks seem unbelievably narrow for a bird to enter. Above the trail along the north side of the rock visitors may see these swifts dart in at breakneck speed, somehow brake successfully and, clinging momentarily to the sandstone, disappear into a hitherto invisible crack under an exfoliating slab. They emerge from these cracks seemingly in full flight, so great is their speed, although actually a free fall precedes the first stroke of the wings. All their food (flying insects) is taken on the wing, and copulation even takes place in mid-air, the couple usually tumbling almost to the ground in the process.

Nesting is asynchronous and spread throughout the summer. I heard young in a nest on 25 July, 1978, and Hargrave had the same experience on September 6-7, 1959.

This species is occasionally confused with the Violet-green Swallow, which is somewhat similarly patterned. The "twinkling," erratic flight of the swift, which seems to flap its wings alternately, once seen, is quite easily distinguish-

ed from the slower wingbeats and more roundabout patterns of the swallow.

Specimens, 10: Hargrave collected 8, June 25-27, 1959. He cited, in a later report, 10 as the total number of specimens at El Morro.

Family TROCHILIDAE

Black-chinned Hummingbird

Archilochus alexandri

Evon Z. Vogt, Jr., recorded this species in July, 1936. His is the only record. The status of the species in the Zuni Mountain region is unclear, but the few records indicate it may breed sparingly up to the elevation of El Morro. It is a widespread breeding bird in New Mexico.

Broad-tailed Hummingbird

Selasphorus platycercus

The Broad-tailed is the common hummingbird of forested regions of the Rocky Mountains, and abundant at El Morro in July. In 1873 Henshaw noted that it "in certain localities, as at Inscription Rock, exceeded the Rufous-backed in numbers." He, however, was observing birds already on their "fall" migration. Whether it breeds at El Morro is not yet known, but the Box Canyon certainly provides appropriate habitat.

Hummingbirds, which are so well known to the public, have many interesting adaptations. Because they are so small there is an almost constant need for energy, which they obtain in the form of nectar, a concentrated energy source. They respond to cold in an unusual way. Instead of burning energy, which they can't obtain at night, to stay warm, as do most birds and mammals, they lower the body temperature. This state is known as torpor.

The mechanics of hummingbird flight are different from those of all other birds. They are the only birds which can hover without the assistance of a headwind and the only ones that can fly backwards. These special abilities of course facilitate taking nectar from flowers. It is thought that hummingbirds and the flowers they use co-evolved means to exploit each other. The flowers are fre-

quently red and have long tubes with the nectaries at the base, where only hummers can reach them. The birds do their part by carrying pollen, which rubs off on their foreheads, from flower to flower. Several of these flowers are common at El Morro, including the paintbrush *Castilleja integra*, the gillias *Gilia aggregata* and *G. longiflora*, the fire pink *Silene laciniata*, and the Scarlet Bugler *Penstemon barbatus*.

The brightly-colored throat, called the gorget, also has special attributes. Its colors shine brightly only at certain angles. These are the angles at which the male presents himself to a female or to a rival male. The courtship display is a dive from thirty or forty feet above. When the male pulls out of the dive just above the sitting female the gorget flashes brilliantly in her direction. This of course requires his orienting properly to the sun. Once he has won her, though, he is finished. Male hummingbirds are promiscuous and have nothing to do with nest-building, incubation, or raising the young.

Specimen, 1: Henshaw #492, 7/24/1873, ad. fem.

Rufous Hummingbird

Selasphorus rufus

Henshaw found the Rufous Hummingbird "quite numerous at Inscription Rock," on July 24, 1873. Its abundance at this season throughout New Mexico led early ornithologists to assume it breeds here. Actually, it breeds no closer than western Montana. Spring migration proceeds up the West Coast in April, nesting is in May and June, and the major part of the population returns to the south via the Rocky Mountain states. The phalanx of migrants, led by adult males, reaches us the middle of July. The peak in numbers occurs in early August, and some remain in early September. Their "fall" migration is thus primarily a summer phenomenon.

The Rufous is the most pugnacious of our hummingbirds. Males spend much of their time in New Mexico chasing others of their species, as well as the lar-

ger Broad-tails and other species.

Specimens, 5: Henshaw ##491, 495, 496, all 7/24/1873.
Hargrave, 2, 9/5-6/1959.

Calliope Hummingbird

Stellula calliope

Henshaw reported, "At Inscription Rock..., where it was first seen [on his expedition], perhaps half a dozen were found in a two-days' stay. [July 23-24, 1873]" Considering their abundance then it is surprising that none have been encountered since. The species is a regular July visitor at Cottonwood Gulch, 20 miles north, and my experience there is that it is easily overlooked. A few probably visit El Morro every year. The timing and path of migration are like those of the Rufous Hummingbird, and are described above.

The Calliope is a tiny bird, weighing only 3 grams, half the bulk of a kinglet or bushtit. It is the smallest species found in the U.S. Its metabolic requirements are proportionately strict. A bird removed from a mist net becomes torpid almost immediately. Even so, an incubating female, high in the mountains, never goes into torpor. The construction and placement of her nest provide such good insulation that her metabolic fires burn through the night without abating.

Specimens, 4: Henshaw #470, 7/23/1873, fem.
 #474, " , ad. male
 #488, 7/24/1873, ad. fem.
 #490, " , ad. male.

Order CORACIIFORMES

Family ALCEDINIDAE

Belted Kingfisher

Megaceryle alcyon

In October, 1936 E.Z. Vogt, Jr., reported a kingfisher at the pool. Apparently it stayed for several days, and Vogt speculated it was interested in the "juicy salamanders" in the pool. This is the only record.

The kingfisher's visits are likely to be restricted to this type. Although it is a summer resident in the Zuni Mountain region, adequate nesting habitat

does not exist at El Morro.

Order PICIFORMES

Family PICIDAE

Common (Red-shafted) Flicker

Colaptes auratus cafer

The flicker is a common permanent resident at El Morro. The species was first mentioned by E.Z. Vogt, Jr., in 1936. It ranges throughout the Monument, even out into open country at times. Although no nest has been found, breeding undoubtedly occurs there.

The flicker is a woodpecker, and although it excavates the bark of trees in search of insects, its chief food is ants, which it takes from the ground. Foraging birds are often flushed from open fields. At El Morro they are also seen frequently on top of the rock, and on the sandstone chimney which rises from the floor of the Box Canyon.

Flickers are most interesting in the spring, when they dance. This begins with bill-waving. As intensity increases vocalizations are added and the red-lined wings and tail are spread. These dances are frequently performed on bare snags with three individuals involved. There are gaps when all movement and vocalization cease and the birds hold their poses. Such a tableau is odd-looking indeed.

After pairing, male and female select a nest tree and excavate a hole together. Both birds incubate, brood, and feed the young.

*Lewis' Woodpecker

Melanerpes lewis

The Lewis' Woodpecker was first recorded at El Morro by E.Z. Vogt, Jr., in June, 1936. I found it a common breeding bird there in 1978 and 1979. On July 7-9, 1978 there were young in one nest by a switchback on the north trail to the top of the rock and in two nests in a small side canyon east of the mouth of the Box Canyon. The latter two were within 30 yards of each other. On July

24-26 these three nests were no longer occupied, but three more were located, one north of the rock and two, also very close together, in a small side canyon west of the mouth of the Box Canyon. All six nests were in cavities high in living Ponderosa Pines. Five nests were found in 1979, three north of the rock and one each in the two side canyons at the mouth of the Box Canyon. Only one of these was in a tree occupied in 1978. All nests were active on July 20, 1979.

The Lewis' is a peculiar woodpecker. Its flight is flat and steady, rather than undulating, as with all other American woodpeckers. This attribute and the bird's dark dorsal coloration make it look rather like a small crow. Furthermore, its major food in summer is flying insects, which it takes in aerial sallies from an exposed perch, in the manner of flycatchers. The main winter food of these birds is acorns, which they store and defend. The rarity of acorns in our area may explain their departure in that season.

The semi-colonial nesting habits of El Morro's woodpeckers are hard to explain. It has been suggested that such concentrations occur where free-living insects are in abundance. Another possibility is that the many isolated pine snags are good fly-catching perches. At any rate, there is a limit to their tolerance of each other. Even colonial seabirds, which nest in tight masses, defend small territories around their nests. Lewis' Woodpeckers defend the immediate vicinity of their nest tree. On May 20, 1979 three birds in the west side canyon displayed with head bobbing, sailing flight displays, and a squeal-rattle call. Presumably two of these birds were trying to evict the third. On July 20, 1979 there were active nest in the first two pine snags one encounters on the north side of the north trail. Birds from these trees met in the intervening space and chased each other back and forth.

Williamson's Sapsucker

Sphyrapicus thyroideus

This beautiful woodpecker of western forests is a common breeding bird in

the Zuni Mountains, but it is only an occasional transient visitor to El Morro. Ann Jordan and Char Miller saw a male in the residence area on February 9, 1979. Later that day a dead female was found below the plate glass window at the Visitor Center.

The sexes of this species are so different in appearance that, when they were discovered in the nineteenth century, they were described as separate species.

Specimen, 1: 2/9/1979, fem.

*Hairy Woodpecker

Picoides villosus

This species is an uncommon permanent resident throughout the wooded parts of the Monument. E.Z. Vogt, Jr., recorded it first, in June, 1936. I found a pair feeding young in a nest in the limb of a pinyon, in the campground, July 4, 1974. On April 25, 1979 I saw a male hairy displace a flicker three times from a tree in the Box Canyon, but subsequent visits did not reveal a nest there.

Of the three kinds of woodpeckers occurring at El Morro the Hairy conforms best to the popular conception of how woodpeckers make a living -- by dislodging insects and their larvae from the bark of trees. Males and females occupy mutually exclusive territories during the non-breeding season. In mid-winter the male begins making visits to the female's territory. Up to three months of courtship ensue, with the male doing most of the excavation of the nest cavity, which is located inside the female's territory. The female incubates the eggs and does most of the feeding of the young; the male is chiefly responsible for nest sanitation.

Specimen, 1: Hargrave, 9/6/1959.

Order PASSERIFORMES

Family TYRANNIDAE

Western Kingbird

Tyrannus verticalis

This species was first recorded at El Morro in June, 1936 by E.Z. Vogt, Jr. I also found them uncommon in July, 1978. This species, which is similar in appearance to the following one, is a bird of open country and is not common even in the foothills of the Zuni Mountains.

There is apparently no interspecific aggression between Western and Cassin's Kingbirds.

Cassin's Kingbird

Tyrannus vociferans

The Cassin's Kingbird is one of those species which has been noticed frequently at El Morro. It is a common summer bird there, and noisy. Henshaw took two specimens July 23-24, 1873 for the first records. The only definite record of breeding is a nest with eggs shown me by Superintendent Ted Sullivan on June 6, 1979. The nest was in a large One-seed Juniper between the residence area and the Visitor Center.

In our area this kingbird is more a bird of woodland, while the western prefers open country. These habitat preferences usually result in a certain amount of altitudinal zonation. The two occur together most frequently in riparian situations. The Cassin's Kingbird, however, does not frequent dense woodland or forest. At El Morro it is most likely to be seen and heard at the campground and on the trail north of the rock. It, and the Western, leave the U.S. in winter.

Cassin's Kingbirds, like all flycatchers, get most of their food by catching insects on the wing or by pouncing upon them from above. They usually sit on an exposed perch and make sallies when acceptable prey items come into view.

Specimens, 3: Henshaw #465, 7/23/1873, juv. fem.
 #497, 7/24/1873, ad. fem.
 Hargrave, 1, 9/5-6/1959.

*Ash-throated Flycatcher

Myiarchus cinerascens

Henshaw took a specimen of this species on July 23, 1873, for the first

record at El Morro. I found it fairly common in the wooded parts of the Monument in the summers of 1978 and 1979. On May 19, 1979 I witnessed a boundary dispute between two pairs on the mesa. All four birds were present. The conflict was limited to vocalizing and flying to and fro; I saw no actual combat. On July 20, 1979 I saw a bird (or birds) repeatedly carry food to a nest in a ponderosa snag hard against the rock near the old picnic ground.

The Ash-throated Flycatcher seems, in my experience, to prefer slightly more-densely wooded areas than the Cassin's Kingbird. It is also a bit smaller, and this size difference, the ecological theorists think, is sufficient to prevent, through selection of different sizes of prey, competition between the two.

The genus *Myiarchus* exhibits a major difference from other North American flycatchers: Its members nest in cavities. These are usually deserted woodpecker holes, although sometimes ashthroateds will dispossess a woodpecker just as it completes excavation of a new one. The female builds the nest and incubates the eggs, but the male assists with feeding the young.

Many flycatchers return to the same perch after making a sally. The ash-throat, it is said, usually moves to a new one after each foray.

Specimen, 1: Henshaw #475, 7/23/1873, Juv. fem.

*Say's Phoebe

Sayornis saya

This species was not encountered at El Morro until 1959, when Hargrave took three on September 5-6. It is surprising that it escaped earlier detection, for I found it a conspicuous breeding bird in 1979.

Say's Phoebes seem to prefer open country for foraging, and often are seen perched on low shrubs. But, they have become quite partial to man-made structures for nesting sites. The most popular location is on a rafter, under the eaves of a building, but they also have been known to nest in old Cliff Swallow nests, wells, mail boxes, and inside buildings. Of the four nests I found in

1979 two were on man-made structures. One was on a beam under the eaves of the Monument office building. The second was in a more daringly chosen receptacle, the alarm klaxon on the side of the apartment building. Luckily the alarm was never activated during the nesting period, and the phoebes successfully raised several young. The two nests in natural sites were both in niches in the east side of the rock. One requirement of all sites seems to be the presence of an overhang above the nest. Nests may be six inches in height or only one, but always there is about the same clearance between the top of the nest and the overhang. This is one of the few species that is frequently doublebrooded in our region.

The Say's Pheobe is one of the first migratory birds to return and among the last to leave. I have seen them on frigid mornings in March and October near Thoreau. Presumably they stay around as long as diurnal temperatures are high enough to bring out some insects. They winter as nearby as southern New Mexico.

Specimens, 3: Hargrave, 3, 9/5-6/1959.

The Genus *Empidonax*

The numerous species of small flycatchers of the genus *Empidonax* present the greatest difficulties in identification of any North American birds. A few field marks, not mentioned in the field guides, are given here.

Four species of this genus have been recorded at El Morro. All empidonaces have eye-rings, have two wing-bars, and bob their tails. The buff-breasted is the most easily identified. No other species is this color. Its song is also distinctive to the experienced ear. Next easiest is the western: The yellow wash covers the entire underparts, including the throat and the grayish sides. No other western species has this characteristic. Its bill is broad and the lower mandible is light-colored from base to tip. Its song is also quite dis-

tinctive. The gray has virtually no yellow wash. Its bill is narrow and the lower mandible is dusky at the tip. Very similar to the gray is the dusky, which has a greenish back and a yellowish wash on the abdomen. All *Empidonax* jerk their tails upward except the gray, which bobs its gently downward. This is its most dependable field mark.

The slightly larger Western Wood Pewee has no eye-ring and does not bob its tail. However, some Willow Flycatchers lack eye-rings, and the pewee sometimes jerks its tail once for balance when it lands on a perch. Its call is a dead give-away, though.

Dusky Flycatcher

Empidonax oberholseri

On May 7, 1979 I netted and banded a Dusky Flycatcher in the Box Canyon. Away from the breeding grounds examination in the hand is required for positive identification of this species. On September 9 and 10, 1979 I saw several individuals of *E. oberholseri* and/or *E. hammondi*, the Hammond's Flycatcher, on the Monument. Both are probably regular transient visitors.

Gray Flycatcher

Empidonax wrightii

Henshaw collected a specimen of this species, which he mistakenly called *E. obscurus* (now *E. oberholseri*, the Dusky Flycatcher), at El Morro on July 23, 1873. Its true identity was reported to me by J.P. Hubbard. I found the species uncommon in woodland with large pinyons in summer, 1978 and 1979. It appears not to inhabit areas where juniper predominates over pinyon. I saw a bird gathering nesting material on the mesa on May 19, 1979. There was only one pair in that area in 1979, leaving much seemingly suitable habitat unoccupied.

The Gray Flycatcher is one of the distinctive birds of pinyon-juniper woodland. It is frequently the most abundant breeding bird in this plant community. The female constructs her rather bulky nest in the base of a shrub or the fork of a juniper. It is usually well-hidden by foliage.

These flycatchers, though they sing from the highest perch available, usually hunt rather low in the canopy. They often take insects from the ground. Much has been made of potential competition between this species and its closest relative, the very similar Dusky Flycatcher. The two are said to hold mutually exclusive territories where their preferred habitats interdigitate.

Specimen, 1: Henshaw #479, 7/23/1873, ad. male. This was mis-identified by Henshaw as *Empidonax obscurus*, now called *E. oberholseri*.

*Western Flycatcher

Empidonax difficilis

Henshaw also found this species at El Morro on July 23, 1873. His specimen easily could have been a migrant; however, my observations suggest that it may well have been raised locally. I found a singing male in the head of the Box Canyon on July 9, 1978. In 1979 I found a nesting pair. The nest itself was not actually seen, but both birds frequently carried food to a small niche in the wall of the Box Canyon on June 14.

In our region the Western Flycatcher is the common *Empidonax* of montane forests. In such localities it must nest in trees. It is also found at lower elevations where cliffs and rock ledges are present. I found the species nesting in sink-holes in the malpais east of the continental divide in 1977. Canyons, such as El Morro's Box Canyon, also provide the dual requirements of nesting sites and tall trees.

Specimen, 1: Henshaw #467, 7/23/1873, juv. male.

Buff-breasted Flycatcher

Empidonax fulvifrons

Of all Henshaw's finds on July 23-24, 1873, an entire family of Buff-breasted Flycatchers was certainly the most dramatic and important. He reported, "At Inscription Rock, N. Mex., July 24, I observed a pair of old birds feeding the young. These latter were nearly full-fledged, and had evidently been raised in the immediate vicinity." He collected the entire family and his record remains by far the northernmost case of breeding in the state. These birds often nest

in loose colonies, so it is not far-fetched to surmise that others may have been present in that era. Such colonies usually vacate an area after some years, though, and the likelihood the species will occur again at El Morro is slight.

These flycatchers, which are found from the southwestern U.S. to Guatemala, seem to prefer areas with scattered tall pines and with dense brush near the ground. The north side of the rock might fit this requirement, as might other places in the vicinity. The nest is frequently placed on top of a short limb, near the trunk, well up in a tree.

Specimens, 4: Henshaw #480, 7/24/1873, ad. male.
 #481, " , ad. fem.
 #482, " , young fem.
 #483, " , "

It is of interest to note that these flycatchers were the first specimens collected on July 24. The next two species collected were the Grace's Warbler and the Pygmy Nuthatch, both species which are highly dependent upon Ponderosa Pine. I speculate that all three species were collected either on the north side of the rock, or, more probably, within the Box Canyon.

Western Wood Pewee

Contopus sordidulus

Henshaw found the pewee "especially abundant" at El Morro on July 23, 1873, with both young and old present. My observations have done little to clarify the status of the species since then. I heard a bird sing near the residence area on July 9, 1978. This is the only record which is unquestionably within the breeding season. Other sightings were in late summer, 1978, and spring, 1979. The Box Canyon appears to be appropriate nesting habitat for pewees, and their absence there is surprising.

The nest of this species is usually saddled on a branch or in a fork well up in a tree. These low platforms sometimes appear quite flimsy and almost incapable of containing large nestlings. This species is one of the later nesters in our region; it is not unusual to find young in the nest in mid-July.

Olive-sided Flycatcher

Nuttallornis borealis

The Olive-sided Flycatcher, a larger relative of the pewee, nests in the

higher mountains of the state. It has not yet been found in summer in the Zuni Mountains, but it does pass through our region on migration. I found it at El Morro on May 19 and 21 and again in September of 1979.

This bird perches conspicuously on the tallest snag available. Males do not often sing during migration, but should one do so the "quick three beers" call is unmistakable.

Family *HIRUNDINIDAE*

*Violet-green Swallow

Tachycineta thalassina

Early on a mid-summer morning, long before the stars have faded away, the air fills with sound. Robins and flycatchers sing, nighthawks boom, but most noticeable and widespread are the calls of the Violet-green Swallows. The Swallows have hushed their chorus long before dawn, and the late riser would hardly guess they had been abroad in such vociferous numbers.

Violet-greens are less dashing than White-throated Swifts and cannot match the nest-building ingenuity of Cliff Swallows, so they are sometimes overlooked. E.Z. Vogt, Jr., pointed out in June, 1936 that he had assumed for over ten years Cliff Swallows were the only breeding swallows at El Morro, when actually, as close observation revealed, Violet-greens had been there all along.

Violet-greens are woodland swallows, and they are most abundant in the Box Canyon. They nest in cavities, either old woodpecker holes or the narrow cylindrical crevices which are common in the upper level of the Zuni Sandstone. I found two nests of each type in 1979. Like other swallows, these birds feed entirely on flying insects.

Rough-winged Swallow

Stelgidopteryx ruficollis

Hargrave found this swallow on September 5, 1959. His is the only record, but the species probably passes through, at least in small numbers, every spring and fall. Henshaw and Coues found it common in Zuni in summer in the nineteenth

century. It breeds primarily in burrows in earthen banks. As banks of appropriate composition do not exist at El Morro it is not likely to be found as a nester there.

*Cliff Swallow

Petrochelidon pyrrhonota

Far above the water pool the retort-shaped mud houses of this species cling to the sheer face of the massive sandstone cliff. It is inconceivable that any ornithologist who visited this place could have failed to notice these structures, but E.Z. Vogt, Sr., in 1936, was the first to mention them in print. The placement of these little colonies on the cliff seems to be at random, but then one wonders why they are so close together on such a great expanse of suitable substrate. The answer is that not all of the cliff is suitable. Careful observation reveals that the clusters of houses are all under overhanging slabs of rock.

The nests are made of tiny balls of mud, so the swallows are limited not only to localities with appropriate places for erection of the retorts, but also to those where mud with the correct proportions of clay, sand, and moisture are nearby. A proper mudhole may have dozens of these swallows sitting around it, rolling the little balls of mud in their mouths.

These swallows of course take all their food on the wing. But, unlike the swifts, they do not mate in mid-air. In fact the males often mount the females while they are in an indefensible position rolling mud balls. All swallows leave the Zuni Mountain region for winter, but they return early in spring. Budlong noted them one year in March.

Purple Martin

Progne subis

This largest of the swallows is an uncommon breeding bird in the southern part of the Zuni Mountains. Hargrave found it at El Morro on June 25-26, 1959. It seems highly likely that it will be seen again from time to time.

Purple Martins nest in cavities, and are well-known habitues of barnyards

in the East, where they nest in wooden apartments or gourd houses provided them for that purpose. The western subspecies have not adopted this habit very extensively. The many pine snags on the Monument seem to be excellent potential nest sites for martins, but as yet nesting has not been demonstrated.

Family CORVIDAE

Steller's Jay

Cyanocitta stelleri

The Steller's Jay is a common and conspicuous resident of the pine forests of New Mexico, but it does not inhabit El Morro's pines. The only record is an individual I saw on June 14, 1979 on the rim of the Box Canyon.

Scrub Jay

Apelocoma coerulescens

The Scrub Jay is a permanent and rather common resident at El Morro. It was first recorded by E.Z. Vogt, Jr., in October, 1936. The probable reason he did not find it earlier that year is *not* that it does not breed locally. It very probably does. But jays, which are among the noisiest and most obvious of birds outside the breeding season, are quiet and stealthy while attending their nests. It seems appropriate that these inveterate nest-robbers would be so solicitous of their own eggs and young.

In the Zuni Mountain region Scrub Jays inhabit the drier, brushy areas and the pinyon-juniper woodland but give way to the Steller's Jay in the ponderosa pine forest. At El Morro the latter species does not appear to be resident even though the Box Canyon contains appropriate habitat and these jays are undoubtedly resident as near as Oso Ridge, on the northern horizon. In their absence Scrub Jays occupy all wooded areas on the Monument.

Jays exemplify all kinds of social systems from communal breeding to conventional one-pair territoriality. In the Florida subspecies of the Scrub Jay there are group territories with several juvenile helpers attached to each nesting pair, but as far as is known New Mexican pairs are more conventional and

defend territories without the assistance of helpers.

Specimen, 1: Hargrave, 9/5-6/1959.

*Common Raven

Corvus corax

The Common Raven is probably the most easily, regularly, seen bird, day for day, at El Morro. Yet it was never recorded until 1959, when Hargrave took a specimen on September 5. It is always there in the sky, soaring like a hawk, dashing before the wind, or flying low over the ground giving its hoarse croak of a call. I too have neglected to write "raven" in my notes every time I have seen one. It is such a part of the setting that one takes it for granted.

Ravens are omnivores, with a preference for getting their food as easily as possible. Consequently one often finds them picking at a carcass on the highway. They are also not above policing a campground for scraps. They nest usually in small caves and on ledges on cliffs. Such places exist in quantity at El Morro, and one was in conspicuous use in 1979. A pair of ravens nested on a small ledge high in the most inaccessible part of a rift in the northeastern point of the rock. Sunlight reached this nest for only a few minutes each day, and the nest could be seen from only one small area below. But the inhabitants made themselves known to all the Monument's visitors for several weeks in late May and early June with their raucous cries for food. These could be easily heard from the campground. The parents answered the insistent entreaties with morsels which they gleaned from the Monument's dump. After fledging, the young birds walked about presumptuously on the trail below the inscriptions.

Specimen, 1: Hargrave, 9/5/1959

Common Crow

Corvus brachyrhynchus

The crow is known to everyone, better, even in this country where it is less common, than the Raven. It is not, however, very common in the vicinity of El Morro. E.Z. Vogt, Jr., recorded it in October, 1936, and I saw five blown

before a heavy wind on the morning of October 31, 1978. Another flock passed by on the evening of May 5, 1979.

Crows stay in flocks most of the year, and when the pairs split off for nesting they still stay relatively close to the area occupied by the flock outside the breeding season.

Pinyon Jay

Gymnorhinus cyanocephala

Probably the most distinctive bird of the pinyon-juniper country which El Morro typifies is the Pinyon Jay. It was not recorded there until 1936, by E. Z. Vogt, Jr., but its life cycle is intimately tied to pinyon trees, and it undoubtedly has passed occasionally through the area occupied by the Monument for many centuries.

These jays, which look like small blue crows, go about the year around in huge noisy flocks looking for their favorite food, the large, edible seed of the pinyon pine. While birds of many species jealously guard their food supplies from others of their kind, Pinyon Jays take a different tack. When seeds are found they are in abundance, and the birds sound a feeding call. The birds fill their throats with them and carry them back to a communal storage area, where they cough them up and store them in the ground.

Nesting takes place in a traditional area, near the seed caches, in late winter. After fledging, the young are fed by other adults as well as by their parents. In years when the pinyon crop fails the flock deserts its home range and nomadically searches for a new area. Sometimes they breed opportunistically in autumn following good pinyon crops.

Family PARIDAE

Mountain Chickadee

Parus gambeli

Hargrave first recorded this species at El Morro September 5-6, 1959, but it is so common it probably simply was not mentioned by earlier observers. I

saw a bird carry nesting material on April 25, 1979, in the Box Canyon. Although a nest has not been found, I have no doubt that Mountain Chickadees breed at El Morro. They are permanent residents.

Chickadees nest in natural cavities or old nuthatch holes, and may lay as many as 8-10 eggs if the cavity is spacious enough. The young emerge after 18 days and look very nearly like adults after this long nestling period. They typify cavity-nesting birds in this respect and in the large clutch size. Open nests are exposed to predators; cavity nests are much safer. Natural selection has favored a much longer nestling period in the latter case.

Chickadees have a very interesting social system. Juvenile birds stay with their parents for a few weeks after fledging, then the parents become belligerent and the young disperse to other areas. In early fall flocks form from resident adults and immigrant juveniles. A dominance hierarchy is established through inter-individual encounters wherein males are dominant to females and adults are dominant to juveniles. Within these subgroups a one-way linear hierarchy is established. In early spring the birds pair off. By then the flock has been much reduced in size. The dominant male chooses a breeding territory within the flock's winter territory. Other males may do the same. Excess individuals leave the area.

Chickadees are omnivorous, feeding largely on insects they glean from needles and bark in summer and on the same foods plus seeds in the winter.

Specimen, 1: Hargrave, 9/5-6/1959.

Plain Titmouse

Parus inornatus

These titmice were first recorded at El Morro by Hargrave, who took one on September 5, 1959. Like chickadees, they were certainly present long before then. They are permanent residents and undoubtedly breed on the Monument. I have found territorial birds but no nests. Their habitat is pinyon-juniper

woodland.

Titmice and chickadees are very closely related, despite the former's being twice the size of the latter and their having crests. Titmice may join with chickadees and nuthatches in mixed-species flocks during winter.

Titmice have a variety of songs, but unlike those of most species of songbirds, they are given by members of both sexes. Titmice nest in cavities, usually in trees, but I found a nest once in a steel pipe.

Specimen, 1: Hargrave, 9/5-6/1959.

Bushtit

Psaltiriparus minimus

Bushtits are common inhabitants of pinyon-juniper woodland. They were first discovered at El Morro by Hargrave, on September 6, 1959. I found a pair on the mesa in 1979, but did not find their nest.

Bushtits are highly social. They spend most of the year in large flocks which move incessantly over the landscape. The integrity of the flock is maintained by the regularly-voiced contact notes of its members. Should a bird become isolated it ascends to an exposed perch and gives a distress call. The answering calls of its flockmates lead it back to the others.

Pairs break off from these flocks just long enough to breed. They build a deep, tubular nest with a hooded entranceway, and the female lays 6 to 12 eggs. Soon after fledging-time family groups begin to join one another, and eventually large winter flocks form again. Bushtits glean tiny insects and spiders from twigs and leaves, and eat berries and seeds occasionally.

Specimen, 1: Hargrave, 9/6/1959.

Family SITTIDAE

White-breasted Nuthatch

Sitta carolinensis

These nuthatches are fairly common and widespread throughout wooded parts of the U.S. At El Morro they occur anywhere trees grow. They were first men-

tioned by E.Z. Vogt, Jr., in July, 1935.

A nuthatch may remind one of a miniature woodpecker as it climbs up the trunk of a tree, but when it turns around and comes down headfirst the resemblance ends. The ability to do this is limited to the nuthatch family. Also, while woodpeckers hitch and use their stiff tails as braces, nuthatches literally walk vertically and do not use their short tails for support. The liability of this limitation is that when they peck they are not able to generate nearly as much force as the larger woodpeckers.

Courtship takes place on winter mornings. The female assumes dominance over the male in claiming roost holes for nesting. She also initiates copulation. Both sexes incubate, brood, and feed the young. In winter White-breasted Nuthatches join mixed-species flocks, but there is seldom more than one pair in a flock which contains many Pygmy Nuthatches and chickadees.

Pygmy Nuthatch

Sitta pygmaea

If there is a typical bird of ponderosa pine forest this is it. Not only are they abundant there, they are virtually restricted, in the Rocky Mountain states, to forests in which the ponderosa is represented. Kennerly found this species to be abundant in the Zuni Mountains, and Henshaw collected one at El Morro on July 24, 1873. I found this species in the Box Canyon in summer, 1978, but not at all in 1979. Local populations of the Pygmy Nuthatch were decimated by the severe winter of 1978-79. This may explain their absence in the subsequent breeding season. However, they may simply be sporadic in occurrence at El Morro. Only further study will tell.

These tiny nuthatches excavate their own nest holes and seem to reuse old ones less frequently than the white-breasted. One unusual feature of their social system is that sometimes a third bird will join a pair and assist in the raising of their young. They are gregarious and in winter several family groups

band together in flocks that cover all the combined territories of their members. These flocks frequently mix with flocks of Mountain Chickadees and with Plain Titmice and White-breasted Nuthatches, and occasionally Hairy Woodpeckers and Brown Creepers. There has been much discussion among ecologists as to the adaptive value of mixed-species flocking. One synthetic hypothesis is that more individuals provide a better chance of detecting predators, while being of different species lessens competition for flock members. Although very sociable with their own kind, Pygmy Nuthatches, the smallest major members of these flocks, are clearly dominant to the other species. They frequently displace chickadees and White-breasted Nuthatches from a feeding site, and sometimes try to steal food from them. All these species forage in fairly similar ways. The chickadee is mostly a foliage- and twig-gleaner, and the larger nuthatch searches trunks and large limbs. The Pygmy practices both these foraging techniques. Specimen, 1: Henshaw #486, 7/24/1873, juv. fem.

Family TROGLODYTIDAE

House Wren

Troglodytes aedon

Evon Z. Vogt, Jr., reported the House Wren in July, 1936. I found it an uncommon visitor during May, 1979. It probably passes through in autumn, also. House Wrens are common nesters in the higher parts of the Zuni Mountains.

This little bird is known for its bubbly, melodious song, and its fierce methods in seeking nest sites. It frequently destroys the nests of other cavity-nesters and expels the parent birds, often of larger species.

Bewick's Wren

Thryomanes bewickii

The Bewick's Wren is a brush-inhabiting species with a secondary preference for pinyon-juniper woodland. I found it in this habitat at El Morro first on July 9, 1978. It was rather common in woodland in the summer of 1979, the males singing their vigorous songs from the tops of pinyon trees.

This species will nest almost anywhere that provides a little overhead shelter. Wrens, however, do not have sufficiently stout bills to excavate their own nest sites in wood. They take mostly insect food. This species has a tremendously varied vocal repertoire.

Canyon Wren

Catherpes mexicanus

Any summer day, or even on a warm day in winter, the El Morro visitor may have his reverie, whatever its subject may be, interrupted by a clear ringing whistle which runs down a whole scale, delivered ventriloquially from somewhere on top of the rock. Likely he will never see the bird, and when told that such a small creature delivered such a robust song he will scarcely credit the identification. The singer will have been a male Canyon Wren, and the famous headland is the archetype of his habitat, for he requires steep cliffs for his song perches and his mate prefers crevices and crannies for her nest. This bird is known by voice to all who frequent canyon country. Those who get a view of it are doubly rewarded, for it is the handsomest wren of all.

The Canyon Wren was first recorded at El Morro in June, 1936, by E.Z. Vogt, Jr. It has been recorded frequently since then, so I was surprised not to find it a breeding bird in 1979. Perhaps a resident population was wiped out in the preceding winter, one of the most severe in recent years.

Specimen, 1: Hargrave, 9/6/1959.

*Rock Wren

Salpinctes obsoletus

If the Canyon Wren is the songster of the rock the Rock Wren is its clown. Along the path on top of the rock the observant summer visitor is likely to see this bird as it hops around from rock to rock, doing several deep knee-bends between each hop. The Rock Wren doesn't require cliffs, but it must have rock, and the more the better. It is a summer resident at El Morro, first encountered by E.Z. Vogt, Jr., in June, 1936. In 1979 two nests were found in crevices

in the wall of the Box Canyon.

The Rock Wren's nesting habits are a bit peculiar. That it nests in covered places is not unusual. That the female builds a soft cup of plant fibers is not, either. But the paving of the floor with a foundation and entrance walkway of flat pebbles is strange indeed. No one knows for sure what function this practice serves, but it seems invariably to be done. I have seen such nests, and I must say that it is even more wonderfully amusing to behold than to contemplate. One Californian nest, disassembled by the observer, contained 1,665 items, including fish hooks, bones, and shells, as well as rocks.

The Rock and Canyon Wrens are closely related and occur side by side at El Morro. Although they have similar call notes, and both bob, a habit shared with no other North American wren, there are some significant differences in ecology and behavior. The Rock Wren's nest has already been mentioned. Canyon Wrens place their nests in larger openings, usually on ledges. Rock Wrens forage mostly in the open, and in so doing usually run about. Canyon Wrens creep and hop about in the shade as they seek their food. In southern Arizona, where the species have been intensively studied, Canyon Wrens usually nest on north-facing slopes. Rock Wrens show no preference. In our area all Rock Wrens leave for the winter, while at least a few Canyon Wrens are resident all year.

Specimen, 1: Hargrave, 9/6/1959.

Family MIMIDAE

Mockingbird

Mimus polyglottos

Henshaw "procured a young of this species at Inscription Rock, N. Mex., from among half a dozen others," on July 23-24, 1873. It has been seen sufficiently frequently since for me to conclude that it is a summer resident and a probable breeder. It is nowhere common in the Zuni Mountain region, however, and migrates to the south for the winter.

The Mockingbird is of course best known for its vocal virtuosity. It not only mimics the calls of other birds, it sings frequently at night. It is given to acrobatic flight displays during courtship, and the courtship dance, in which the partners, tails held high, make stately sidesteps, might be likened to a minuet.

Sage Thrasher

Oreoscoptes montanus

Woodhouse (August, 1851), Kennerly (November, 1853), and Henshaw (July, 1873) all commented on the abundance of this species in the Zuni Mountain region. Hargrave saw one October 5, 1956, and I found them abundant, and singing, in open areas on the Monument July 24-26, 1978. I found them again April 23-24, 1979. None of these records indicates breeding, and in fact the species was conspicuously absent during May and June of that year. At the same time a ride through the sagebrush country between Zuni and Pescado would produce several of these birds. Another locality where they occur in summer is Ft. Wingate, where a nest was found in 1873. The reason they occur at these places and not at El Morro or Cottonwood Gulch, a place I have studied intensively, is apparently the presence in the former places, and the absence in the latter, of Big Sagebrush (*Artemisia tridentata*). Why Sage Thrashers prefer stands of *A. tridentata* to the physiognomically similar Rabbitbrush (*Chrysothamnus* spp.)-Horsebrush (*Tetradymia canescens*) association escapes me. Perhaps this is one of the few cases in which birds select territories on the basis of the identity of the vegetation rather than merely its structure. This interesting question is certainly worthy of further study.

Family TURDIDAE

American Robin

Turdus migratorius

The familiar robin was first recorded at El Morro in June, 1936, by E.Z. Vogt, Jr. I found juveniles around the campground July 24-26, 1978. In 1979,

all my records were from the campground or residence area. Robins seemingly do not inhabit the Box Canyon, a place one might expect to find them. A plausible explanation for this puzzling distribution is that only at the sites mentioned above, with their artificial abundance of water, do robins find the mud required for fashioning their nests. In winter they are much more common. Flocks of them feed primarily on juniper berries.

Robins build their bulky nests of mud and grass low in a tree or bush. At El Morro the favorite site is probably a crotch near the center of a juniper. They occupy a variety of habitats, but seem to prefer foraging in open areas. They may fly as much as a mile from the nest for this purpose. Robins are early risers, and the males add their voices to the dawn chorus with great vigor. And, they are among the last diurnal birds to be heard from at the end of day. Often, long after silence has settled over the dark landscape and the first owl has begun to hoot, the stillness will be broken by the screams of robins in chases through the woods.

Western Bluebird

Sialia mexicana

Remarked Henshaw in 1873, "This species was not observed until July 23 at Inscription Rock. This appeared to be a favorite locality, and large numbers of both old and young were congregated in the pinon and cedar trees." Western Bluebirds may be seen at any season at El Morro, and they almost certainly nest there, as I saw adults carrying food in the Box Canyon in June, 1979. In summer they prefer the more densely wooded areas, but in winter they range over the entire Monument. One favorite location is the scattered pines on the southeast slope of the rock.

Bluebirds pair very early in the spring and may lay their eggs in April. This early nesting allows them time to raise a second brood in mid-summer, as they often do. The nest is made of juniper bark and is built in a natural cavi-

ty, old woodpecker hole, or bird house. In our area they usually lay five eggs. The female does all incubating and brooding, but the male stands guard throughout these periods and assists with the feeding of the young. The fledglings are often still begging for food when the female begins to lay the second clutch. As Henshaw noted, they band together in large flocks throughout the winter.

Bluebirds sit on exposed perches and plunge to the ground to take their summer food of insects. In winter they consume mostly berries.

Mountain Bluebird

Sialia currucoides

Mountain Bluebirds were first noted at El Morro by E.Z. Vogt, Jr., in June, 1936. They seem to be not quite as common as Western Bluebirds. I found a family near the sewage lagoon on July 24, 1978, and they occurred regularly in several places in summer, 1979, so local nesting is highly probable. This species is a permanent resident in the Zuni Mountain region, but whether the breeding population stays during winter or is replaced by more-northerly-nesting birds is not known.

Mountain Bluebirds seem to require open expanses within their summer foraging ranges, but the dispersion of nest sites sometimes requires them to nest as much as half a mile away from such areas. Their breeding biology is similar to that of the Western Bluebird, but the two species do not seem to provide any competitive problems for each other. I have found nests of the two within 30 yards of each other.

All blue feathers produce their color through scattered reflection of blue light by specialized cells in the feather. There is no blue pigment, and a blue feather held before a light will appear uniformly gray. Considering this, it is all the more amazing to see a male Mountain Bluebird flying along through a March snowstorm, his beautiful blue plumage almost glowing as though illuminated from within.

Townsend's Solitaire

Myadestes townsendi

Woodhouse found the solitaire abundant in the Zuni Mountains in August, 1851, but he does not mention El Morro in his account. It was first recorded there on October 5, 1956, by Hargrave. I have found it abundant throughout the winter months and into late spring. This species may breed sparingly in the nearby Zuni Mountains, but at El Morro it is strictly a winter bird. At this season it does something rather strange for the time of year—it sings. Most species sing only in the spring and summer, for these are the only times they defend territories, and song is intimately associated with territorial defense. Why then should solitaires sing in the winter? It has only recently been learned that solitaires defend territories in the winter, a most unusual habit for migratory birds. Some individuals are territorial and sing to advertise the fact. Others are not. The former seem to have an advantage obtaining juniper berries, which are their favorite food. Their melodious songs, delivered from exposed perches, can be truly enspiriting on a cold winter day.

Family SYLVIIDAE

Blue-gray Gnatcatcher

Polioptila caerulea

Hargrave found this species at El Morro September 5-6, 1959, and I have encountered it in July, 1978 and in late April and early May of 1979. It was not present during the summer of 1979, so must be considered only a transient visitor to the Monument. This gnatcatcher is a widespread breeding bird in the U.S. and occupies a variety of habitat-types. In New Mexico it inhabits desert, brushland, and pinyon-juniper woodland. It is not common in the latter plant community in our region.

Gnatcatchers, though very small, are very noisy and pugnacious. It is difficult to get a good look at one because they move around so quickly. Both sexes take part in the nesting chores, and the male is strongly territorial.

An abundance of food is necessary to successfully raise a brood. The relative nutritional poverty of pinyon-juniper woodland may explain their rarity in our region.

Ruby-crowned Kinglet

Regulus calendula

This species was first recorded at El Morro by Hargrave, who found it on September 5, 1959. I have found it during spring and fall migrations. The bird nests in the higher parts of the adjacent Zuni Mountains, and males disperse from such areas in mid-July. A male singing his robust song at that time cannot be assumed to be on territory.

Although limited to dense coniferous forest in the nesting season, these little birds frequent many kinds of habitat, even shrubland, on migration. They may join flocks of chickadees, titmice, and nuthatches, but their small size, frequent movements, and the habit of flicking their wings open and closed serve readily to distinguish them.

Family LANIIDAE

Northern Shrike

Lanius excubitor

The Northern Shrike was not found at El Morro until 1978, when I saw an adult on March 6, 1978 and another, possibly the same bird, on October 31 and December 19. This is a far northern species and visits New Mexico sporadically in winter. The winters of 1976-77, 1977-78, and 1978-79 were major invasion years, with many Northern Shrikes reported in the northern counties.

The birds I saw at El Morro inhabited the open juniper savannah along the entrance driveway. They usually perched at the highest point on a juniper. Shrikes hunt birds and mice, and are very efficient predators.

I heard one of these birds give the typical, odd assortment of screeches, rattles, and tweets that highlights its vocal repertoire on March 6, 1978.

Loggerhead Shrike

Lanius ludovicianus

This species has been recorded only once at El Morro, on September 5, 1959, by Hargrave. It is an uncommon permanent resident in the lowlands surrounding the Zuni Mountains.

The shrikes are something of an anomaly: They are raptorial songbirds. Their bills are powerful, and adapted for tearing meat, but the feet have not been dramatically modified from the typical perching-bird model. Perhaps for this reason, they make their kills with a sharp blow by the beak, usually on the back of the skull or in the neck region of the prey. They feed on small rodents, lizards, birds, and large insects. One of their best known and peculiar habits is impaling unconsumed pieces of food on thorns or hanging them in crotches of shrubs. These appear to be caches, but frequently the food is not consumed.

Shrikes nest very early in the spring.

Family VIREONIDAE

Solitary Vireo

Vireo solitarius

This bird was first recorded by Hargrave on September 6, 1959. I found it common and typically conspicuous in pinyon-juniper woodland and in the Box Canyon in the breeding season of 1979. Although no nest was found, it almost certainly breeds in these areas.

Vireos suspend their tightly-woven nest from a horizontal crotch of a limb. It is sometimes so well concealed that the male bird has the audacity to sing while incubating. They are insectivores, and take their food from foliage and twigs of trees and shrubs, through which they forage with rather deliberate movements.

Warbling Vireo

Vireo gilvus

This widespread species, which is a common breeder in many parts of New

Mexico, has only been seen at El Morro in late Summer, 1978. It is probably a regular transient there, but for nesting it prefers deciduous woods, a habitat-type lacking on the Monument. In habits it does not differ substantially from the Solitary Vireo.

Family PARULIDAE

Orange-crowned Warbler

Vermivora celata

I observed this nondescript warbler in the Box Canyon on May 7-8, 1979. The ones seen were among a wave of migrants which contained many species. The orange-crown is a common migrant in the Zuni Mountain region, but it does not nest there.

Virginia's Warbler

Vermivora virginiae

I heard one of these little birds sing in the oaks at the east base of the cliff along the south fence on July 9, 1978. However, I did not find the species in 1979 until September 9. As there are no other records, this warbler's status remains completely undetermined. This is a bird of montane brushland, especially oaks, and scattered suitable habitat exists at El Morro.

The Virginia's Warbler is typical of warblers in being an insectivorous foliage gleaner. It nests on the ground.

Yellow-rumped (Audubon's) Warbler

Dendroica coronata auduboni

The Audubon's Warbler of older field guides is now considered a subspecies of a biological species which also includes the bird formerly known as the Myrtle Warbler. It is another of the species which breeds commonly in the mixed coniferous forest of the neighboring Zuni Mountains but does not nest as low as El Morro. Hargrave recorded it there on September 6, 1959. I found it abundant in spring and fall of 1979.

Black-throated Gray Warbler

Dendroica nigrescens

This is one of the characteristic species of pinyon-juniper woodland, a

type of vegetation which El Morro has in abundance. It is baffling that it seems not to nest there. My assistants and I have searched for it specifically, but have found none. The only record is of several seen by me on August 7, 1978.

Grace's Warbler

Dendroica graciae

This species is on El Morro's list solely on the authority of a specimen taken by Henshaw on July 24, 1873. At that date the bird may have been a transient visitor, but the Box Canyon's forest is prime habitat and the possibility that a few pairs breed there should not be ignored. However, I did not detect it at all in my census of the Box Canyon in 1979.

The Grace's Warbler is a bird of the pinewoods of the Southwest and of the Mexican Highlands. It places its nest well out in the branches high in a pine. The male usually sings from within the canopy, so it is difficult to get a good look at one.

Specimen, 1: Henshaw #485, 7/24/1873, ad. fem.

MacGillivray's Warbler

Oporornis tolmiei

This is a common transient visitor in the Zuni Mountain region. I found it May 19 and September 9, 1979. During summer it is an inhabitant of dense thickets along mountain streams.

Wilson's Warbler

Wilsonia pusilla

Hargrave found this species common September 5 and 6, 1959. It has been recorded subsequently in both spring and fall. These birds were migrants. The Wilson's Warbler breeds in willow thickets at high altitudes. This habitat-type does not occur in the Zuni Mountains and the species is only a transient visitor here, albeit an abundant one.

Specimens, 4: Hargrave, 4, 9/5-6/1959.

Family ICTERIDAE

Western Meadowlark

Sturnella neglecta

The Western Meadowlark is a permanent resident in grassland in the Zuni Mountain region and has been recorded at El Morro at all times of year except winter. E.Z. Vogt, Jr., noted it first, in June, 1936. Sufficiently dense grassland does exist at El Morro for it to breed locally, but no nests have been found.

Meadowlarks build their covered nests on the ground and do all their foraging there. In summer their food is mostly insects, in winter, seeds. Males, however, prefer to sing from the highest perch in their territories. They are commonly seen on fence posts. In the flat, treeless prairie they frequently settle for the eminence of a "cow pie." They may be polygynous, that is, one male may pair with two females simultaneously.

The most interesting aspect of meadowlark biology in west-central New Mexico is the relationship between the Western and the Eastern Meadowlark (*Sturnella magna*). The eastern subspecies of the latter, where it meets *S. neglecta* in the Great Plains, prefers moister sites than the Western. In the desert grasslands of the Southwest, however, another subspecies, *S.m. lilianae*, is found, and in those localities it occupies the desert while *S. neglecta* is left to the few moist sites. In our area *S. neglecta* is definitely the common breeding bird, but *S.M. lilianae* has been found as close by as Fence Lake and the east side of the malpais. Further clarification of the identity of meadowlarks at El Morro is called for, but differentiating the two is difficult. It can be done at distance only by recognizing differences in the vocalizations.

Northern (Bullock's) Oriole

Icterus galbula bullockii

I saw a first-year male of this species on May 20, 1979. These orioles breed at lower elevations in our region and may be expected to occur occasionally at El Morro in spring and late summer.

Brown-headed Cowbird

Molothrus ater

This cowbird is widespread in North America and throughout much of this area it is the only brood parasite, a species which characteristically lays its eggs in the nests of other birds. It chooses hosts which are smaller than it, so the young cowbird frequently ousts or causes the starvation of its host's progeny. Some host species are acceptors, they do not recognize the intruder for what it is and raise it to maturity; others are rejectors and either destroy the cowbird egg or reneest when they find one in their nest.

I saw a juvenile of this species on July 25, 1978 in an open area near the campground. It was perched in the same bush with a Say's Pheobe, but I did not see it beg food from the phoebe. In my experience, phoebes are not parasitized in this area, and it seems unlikely that they were the foster parents. Many vulnerable species, notably the Chipping Sparrow, do nest commonly at El Morro, however, and it is highly probable the young cowbird was raised on the Monument. I saw adults occasionally in 1979. This species appears to be an uncommon summer resident.

Family *THRAUPIDAE*

Western Tanager

Piranga ludoviciana

This tanager is a bird of open pine forests. At El Morro it was first seen by E.Z. Vogt, Jr., in August, 1936. A pair was resident in the Box Canyon in the summer of 1979, and probably nested there. All tanagers leave the state for the winter season.

In the breeding season tanagers consume insects which they take from foliage and twigs of trees. Afterwards, they feed on berries too, and in our region whole families may be found around currant bushes late in the summer. The male sings from conspicuous perches while he is establishing his territory in early summer, but once nesting begins he is quiet, and both he and the female become quite stealthy.

Hepatic Tanager

Piranga flava

E.Z. Vogt, Jr., reported that in late July, 1935, "A pair of Arizona Hepatic Tanagers were seen for the first time on the Monument. The brick red male and dull yellow female were quietly chirping in a western yellow pine." I found a pair, also, throughout the summer of 1979, in the Box Canyon. Thus this species, as well as the western, probably breeds in the canyon. It is surprising that such closely-related, similarly-sized species should co-exist without evident differences in ecology. They do just this, however, not only at El Morro but at many other places.

This species occupies the southern part of the Zuni Mountains in summer. I do not know the exact limits of its range, but it unquestionably more common in the vicinity of Highway 53 than higher in the mountains.

Family FRINGILLIDAE

Black-headed Grosbeak

Pheucticus melanocephalus

In the Zuni Mountains the Black-headed Grosbeak is found in summer from Mt. Sedgwick down to the riparian cottonwood groves of the foothills. El Morro is thus within the ecological range of this species. But the birds I saw around the campground July 24 and 25, 1978, the only extant record for the Monument, do not in themselves support an hypothesis of local breeding. If they do not breed, these birds are certainly at least common transient visitors.

While they are in the state in the warm season these grosbeaks consume both insects and fruit. They do some damage in orchards. They build a flimsy nest, and the male helps with brooding and feeding of the young.

Evening Grosbeak

Hesperiphona vespertina

Monument staff member Ann Jordan has reported to me the occurrence of this species at her bird feeder in winter. Evening grosbeaks do visit the Zuni Mountain region sporadically. They are so distinctively colored that I have no reason

to doubt the identification.

House Finch

Carpodacus mexicanus

The House Finch was first mentioned as a bird of El Morro by E.Z. Vogt, Jr., in June, 1936. I found it common in the Box Canyon and around the housing area in 1979. It is one of the species which may have benefitted from the development of the area as a National Monument, for House Finches are partial to man-made structures for nest sites.

On the north slope of the Zunis they vacate the higher elevations during winter and form flocks which scatter through the towns and open country of the lowlands. They may also do this in the El Morro area, but if so they return early in the spring. I heard one sing at El Morro on March 7, 1978. Surprisingly, this bird was oblivious of a Pygmy Owl which was calling nearby. The owl might easily have made the finch his breakfast. House Finches frequently sing even in the dead of winter. Their bubbly, cheerful-sounding song is a welcome sound on a cold, dreary day. Their nesting habits are not so agreeable, though. They especially prefer placing their nests of sticks on rafters under the eaves of buildings, and because of their untidiness these can be a nuisance. Like most finches and sparrows, these birds eat insects in summer but subsist primarily on seeds at other seasons.

Pine Siskin

Carduelis pinus

This little finch, a close relative of the goldfinches, travels about in flocks, looking for seeds, throughout the winter. I encountered them on March 6 and 7, 1978. It breeds in the higher parts of the Zuni Mountains, but flocks can still be found in the foothills in June. For this reason it is unwise to attribute nesting solely on the basis of date of sighting. Siskins probably do not nest at El Morro, but are undoubtedly frequent, if irregular, visitors in winter.

Lesser Goldfinch

Carduelis psaltria

Henshaw took a female of this species on July 23, 1873. There are other records for late summer, and an exceptionally late one for October, 1936, by E.Z. Vogt, Jr. Goldfinches frequently breed in late summer, so it is possible some of these records represent nesting birds. Lesser Goldfinches depart this part of the state for winter.

Goldfinches are highly social and form flocks outside the breeding season. At the time of pairing, females are usually dominant over males. Breeding territories are very small. In the Zuni Mountains these birds breed both in pine forest and in riparian woodland.

Specimen, 1: Henshaw, 8/23/1873, ad. fem.

Red Crossbill

Loxia curvirostra

Red Crossbills were first recorded by me on March 7, 1978, but they probably visit the Monument every winter and perhaps at other seasons. Crossbills travel in flocks and are semi-nomadic most of the year. The peculiar anatomical feature from which their name was taken is designed for extracting seeds from cones. Their time of nesting is not synchronized with the seasons. Instead, when their food supply of cones is abundant they begin breeding. Nests with eggs have been found in December and January. I have seen juvenile birds at Cottonwood Gulch in June, and I assume they were raised in the Zuni Mountains. But there is no proof for my supposition, as indeed there is no proof they nest in New Mexico, although they certainly must.

Green-tailed Towhee

Pipilo chlorurus

Hargrave added this towhee to the El Morro list on September 6, 1959. In 1979 it was fairly common in summer throughout the open shrublands of the Monument. It undoubtedly breeds in these places.

The Green-tailed towhee occupies areas that are more open than those favored

by the closely related Rufous-sided Towhee. In higher parts of the Zuni it is common in meadows with scattered clumps of currant (*Ribes*). At the elevation of El Morro it is found in juniper savannah and shrubland of rabbit-brush (*Chrysothamnus*). Where its habitat overlaps that of the Rufous-sided the two species may be mutually territorial, with the latter apparently dominant.

Towhees scratch in the litter below shrubs for their characteristic food of seeds and insects. This species leaves this part of the state for winter.

Specimen, 1: Hargrave, 9/6/1959.

Rufous-sided Towhee

Pipilo erythrophthalmus

This is a fairly common bird in oak thickets and riparian associations in the Zuni Mountains. There is only one record for El Morro, a bird I saw scratching in the oak leaves of the Box Canyon on May 8, 1979. The oaks of the canyon seem to be appropriate nesting habitat, but clearly they are not.

Brown Towhee

Pipilo fuscus

The Brown Towhee is a permanent resident of El Morro. Hargrave reported it first September 5-6, 1959. I have found it throughout the year. Singing males were located in March, May, and July. At El Morro it is most likely to be seen near the buildings. In the Zuni Mountain region this species occupies brushland and pinyon-juniper woodland up to about 7,200 feet. I have never found it very common, nor in the presence of the other two towhees.

The towhees build their nests against the main trunk of a small tree or shrub. They are well-concealed and hard to find. A sign that incubation has commenced is incessant singing by the male. He sings only early in the morning during other phases of the breeding cycle. Brown Towhees forage on the ground exclusively as do other species of *Pipilo*.

An unusual characteristic of these towhees is their curiosity and propensity for entering enclosures. At my former residence in southern Arizona they

frequently perched on the wheels of my car and explored inside it whenever the window was open. They also entered my house when the door was open and searched the floors for food. As a result of their curiosity I took to leaving food out for them in the living room.

*Vesper Sparrow

Pooecetes gramineus

The Vesper Sparrow is a bird of open shrubland in our region. Probably most, if not all, of them leave for the winter. It was first recorded at El Morro by Hargrave September 5 and 6, 1959. It was the most common nesting bird of open shrubland in 1979. I found two nests.

Males setting up territories sing persistently from the tops of shrubs and from fence posts. A male will frequently sneak into another's territory, then pop up on a bush and begin singing, as though to challenge the resident. The latter usually flies at the intruder, who quickly retires to his own domain. These territories are set up in April and early May at El Morro. After that time the incidence of singing diminishes dramatically. By July one would never guess, on the evidence available at that time, how many of these birds lurk in the fields.

This sparrow builds its nest on the ground, sometimes in a small excavation below ground level, under the cover of a shrub. Most foraging appears to be done on the ground also. It will nest in areas with only scattered shrubs, but must have some for nesting and for song perches. The young are fed insects but seeds are consumed outside the breeding season.

Specimen, 1: Hargrave, 9/5-6/1959.

Lark Sparrow

Chondestes grammacus

The Lark Sparrow is the most handsome of the sparrows and among the most interesting of them. I found it common in juniper savannah at El Morro in the summers of 1978 and 1979. Males frequently sang from the tops of junipers, and breeding undoubtedly took place. However, I found no nests. Lark Sparrows

leave the region during winter.

The male is flamboyant in courtship. He sings from the ground, in trees, or in flight. If a Lark Sparrow of either sex enters his territory he approaches it, raises his head, and points the bill skyward. If the intruder is a male he performs the same display and the two fly at each other. If it is a female she does not respond in kind and the resident male, if unmated, may strut with bill up and tail spread, fluttering his wings. During copulation the male may pass a twig from his bill to that of the female. Or, the female may hold a twig in her beak throughout the activity. Both sexes share in nest-site selection, the male dropping a grass stem in suggested locations, the female making the final decision and building the nest. Nests are on the ground or in shrubs or low trees. Only the female incubates, but both sexes feed the young.

Dark-eyed (Oregon) Junco

Junco hyemalis oregonus

All the forms of juncos in the United States interbreed fairly extensively with those contiguous to them, and all, even the Gray-headed, will eventually be lumped together under the name "Dark-eyed." The slate-colored form does not seem to occur in our area, but the Oregon and pink-sided forms are abundant in winter. They breed no closer than northern Utah. These birds travel about in large flocks with Gray-headed Juncos. In March 1978 I found this species far more numerous than Gray-headed Juncos in the flats of the eastern part of the Monument, while the reverse was true in the Box Canyon. They are amusing as they walk across the snow, then leap up and grab the tip of a grass stem in the beak. This they pull back to earth, then stand on it as they strip the seeds from the inflorescences. A whole flock of juncos doing this presents a picture of rebounding grass stems and leaping birds which is truly ludicrous.

Gray-headed Junco

Junco caniceps

This is the resident junco of our region. They breed in the mountains down to the lower limit of ponderosa forest. The Box Canyon possibly contains suitable breeding habitat, but ^{it} has yet to be recorded at El Morro in summer. This

is definitely a common bird at El Morro in winter, although not so abundant as the dark-eyed form. The Gray-headed Junco was first recorded locally by Hargrave, on October 5, 1956.

Juncos build their nests on the ground, in a depression under the cover of a bush. They eat insects during the summer but consume seeds during the remainder of the year. They often launch into song on a warm winter day, and, as they are in flocks at the time, a small area may resound with bird music.

*Chipping Sparrow

Spizella passerina

This is the most abundant sparrow in wooded portions of our region, and El Morro has a representatively large population. Henshaw took a specimen there on July, 23, 1873, for the first record. On July 24, 1978 I found a pair feeding two well-feathered young in a nest in a low juniper near the campground. This is a late date, but at this time I have no evidence to confirm Henshaw's statement that they raise two broods. Nest failures are sufficiently frequent for such late dates merely to result from re-nesting. Most nests I have found in this area were within six feet of the ground in junipers, even when taller trees were available.

The Chipping Sparrow is the most frequent victim of the Brown-headed Cowbird in this region, probably for the dual reason that it is abundant and is not very careful about concealing its nest.

The males sing nearly incessantly in April while they are setting up territories. The female does all the nest building, and incubating, and most of the brooding. The male procures most of the food for the young during their first few days. As with most other sparrows, Chipping Sparrows eat insects during summer and seeds the rest of the year. They leave this area for winter.

Specimens, 3: Henshaw #466, 7/23/1873.
Hargrave, 2, 9/5-6/1959.

Brewer's Sparrow

Spizella breweri

This sparrow, which is very closely related to the better-known Chipping Sparrow, is a typical bird of the sagebrush flats of the Great Basin. In our region, toward the southern edge of its breeding range, it also occupies shrubland dense in rabbitbrush (*Chrysothamnus*). Hargrave took a specimen on September 5, 1959 for the first record. I found only two singing males in 1979. I had expected the species to nest in the shrub plot, but these birds were in dense rabbitbrush west of the savannah plot. This species is abundant in rabbitbrush stands to the north and I expect the cause of its rarity at El Morro is more geographical than ecological in nature.

These birds place their compact nests of grasses in a shrub. They are not secured to the branches but merely rest among them. Up to four eggs are laid. The birds forage in shrubs rather than on the ground. In this way they do not compete with the ground-feeding Vesper Sparrows whose territories overlap theirs. In early summer males sing frequently at dawn and dusk from many perches within their territories. When the young hatch the males become silent and help with their feeding. Adults approaching the nest with food are very stealthy and cautious. Unpaired males may continue to sing throughout the summer.

Specimen, 1: Hargrave, 9/5/1959.

White-crowned Sparrow

Zonotrichia leucophrys

This is among the largest of the sparrows, and the adults are among the handsomest. It does not breed in our region, being restricted in this state to timberline situations. But it is an uncommon transient visitor. White-crowns were first recorded at El Morro on October 5, 1956, by Hargrave. They prefer dense brush or low junipers for cover. These and other sparrows of the non-breeding season can be brought quickly into view by kissing the back of the hand or by making an unvoiced "pish" sound.

APPENDIX I

HAND-LIST OF THE BIRDS OF EL MORRO

<u>Species</u>	<u>Status</u>
Bufflehead	O-W
Turkey Vulture	C-S
Goshawk	O
Sharp-shinned Hawk	U-M
Cooper's Hawk	C-P
Red-tailed Hawk	U-P
Golden Eagle	formerly C-P, now O
Prairie Falcon	O
American Kestrel	C-S
Scaled Quail	formerly U-P
Killdeer	U-S
Mourning Dove	U-S
Screech Owl	O-P
Flammulated Owl	U-S
Great Horned Owl	C-P
Pygmy Owl	O-P
Common Nighthawk	C-S
White-throated Swift	A-S
Black-chinned Hummingbird	O-M
Broad-tailed Hummingbird	C-S
Rufous Hummingbird	A-M
Calliope Hummingbird	O-M
Belted Kingfisher	O
Common (Red-shafted) Flicker	C-P
Lewis' Woodpecker	C-S
Williamson's Sapsucker	U-M
Hairy Woodpecker	U-P
Western Kingbird	U-M
Cassin's Kingbird	A-S
Ash-throated Flycatcher	C-S
Say's Phoebe	C-S
Dusky Flycatcher	U-M
Gray Flycatcher	U-S
Western Flycatcher	U-S
Buff-breasted Flycatcher	O-S
(only recorded in 1873)	
Western Wood Pewee	U-S
Olive-sided Flycatcher	U-M
Violet-green Swallow	A-S
Rough-winged Swallow	O-M
Cliff Swallow	C-S
Purple Martin	O-S
Steller's Jay	O
Scrub Jay	C-P
Common Raven	C-P
Common Crow	O (P in vicinity)
Pinyon Jay	U-P
Mountain Chickadee	C-P

<u>Species</u>	<u>Status</u>	
Plain Titmouse	C-P	
Bushtit	U-P	
White-breasted Nuthatch	U-P	
Pygmy Nuthatch	O(A-P in vicinity)	
House Wren	U-M	
Bewick's Wren	C-S	
Canyon Wren	U-P	
Rock Wren	C-S	
Mockingbird(Northern)	U-S	
Sage Thrasher	C-M	
American Robin	U-P	
Western Bluebird	C-P	<u>KEY</u>
Mountain Bluebird	C-P	
Townsend's Solitaire	C-W	A - Abundant
Blue-gray Gnatcatcher	C-M	C - Common
Ruby-crowned Kinglet	C-M	U - Uncommon
Northern Shrike	O-W	O - Ocassional
Loggerhead Shrike	O-S	
Solitary Vireo	U-S	
Warbling Vireo	U-M	P - Permanent resident
Orange-crowned Warbler	U-M	S - Summer resident
Virginia's Warbler	U-S	W - Winter resident
Yellow-rumped (Audubon's) Warbler	A-M	M - Migrant
Black-throated Gray Warbler	U-M	
Grace's Warbler	U-M	
MacGillivray's Warbler	U-M	
Wilson's Warbler	C-M	
Western Meadowlark	U-S	
Northern(Bullock's)Oriole	O-S	
Brown-headed Cowbird	U-S	
Western Tanager	U-S	
Hepatic Tanager	U-S	
Black-headed Grosbeak	U-S	
Evening Grosbeak	O-W	
House Finch	C-P	
Pine Siskin	U-W	
Lesser Goldfinch	C-S	
Red Crossbill	O-W	
Green-tailed Towhee	C-S	
Rufous-sided Towhee	O-M	
Brown Towhee	U-P	
Vesper Sparrow	A-S	
Lark Sparrow	C-S	
Dark-eyed Junco	A-W	
Gray-headed Junco	A-W	
Chipping Sparrow	A-S	
Brewer's Sparrow	U-S	
White-crowned Sparrow	U-M	

APPENDIX II

HYPOTHETICAL LIST

The following species are named on a check-list of unknown authorship which is in the files of El Morro National Monument. Since they have not been otherwise confirmed they must be placed on a hypothetical list. Estimates of likelihood of occurrence are based on the geographic ranges of the species and how sedentary they are. All those in the "Possible" category are found elsewhere in the Zuni Mountain region on a regular basis.

Possible

Yellow-bellied Sapsucker
Barn Swallow
Red-breasted Nuthatch
Evening Grosbeak
Roadrunner

Unlikely

Black-capped Chickadee
Gray Vireo

Highly Unlikely

Bridled Titmouse*
Olive Warbler
Peregrine Falcon

* Reported by L.L. Hargrave on October 5, 1956. Deleted by him September 25, 1959.

APPENDIX III

SPECIES OF BIRDS IDENTIFIED FROM ARCHAEOLOGICAL MATERIAL

The following 13 species were attributed to El Morro National Monument by Lyndon L. Hargrave in his "Report on Bird Bones Identified at Southwest Archaeological Center" (unpublished MS, Southwest Archaeological Center, U.S. National Park Service, Globe, Arizona, July 29, 1959). The species marked "A" are currently of regular year-round occurrence in the immediate vicinity of El Morro. All those marked "B" may be expected in the Zuni Mountain region during some part of the year. The Black Hawk is an unexpected member of this collection. Currently this uncommon species occurs no nearer to El Morro than the San Francisco River valley, some 200 miles to the south. This identification was confirmed by Alexander Wetmore of the U.S. National Museum.

B Canada Goose (*Branta canadensis*)

B Shoveler (*Anas clypeata*)

A Red-tailed Hawk (*Buteo jamaicensis*)

B Swainson's Hawk (*Buteo swainsoni*)

Black Hawk (*Buteogallus anthracinus*)

A Golden Eagle (*Aquila chrysaetos*)

B Bald Eagle (*Haliaeetus leucocephalus*)

A Prairie Falcon (*Falco mexicanus*)

A Turkey (*Meleagris gallopavo*)

B Mourning Dove (*Zenaida macroura*)

A Screech Owl (*Otus asio*)

A Great Horned Owl (*Bubo virginianus*)

A Common Raven (*Corvus corax*)