

0CLC-6849953

STU

A
0
0
0
7
7
6
4
1
8
6

U.S. GOVERNMENT PRINTING OFFICE



DEPARTMENT OF THE INTERIOR
 JOHN BARTON PAYNE, SECRETARY
 NATIONAL PARK SERVICE
 STEPHEN T. MATHER, DIRECTOR

BIRDS
 OF THE
PAPAGO SAGUARO
NATIONAL MONUMENT
 AND THE NEIGHBORING REGION
ARIZONA

By
H. S. SWARTH

Contribution from the Museum of Vertebrate Zoology
 of the University of California

UNIVERSITY OF CALIFORNIA
 LOS ANGELES

MAR 15 1966



LIBRARY
 GOVT. PUBLS. SERV.

WASHINGTON
 GOVERNMENT PRINTING OFFICE
 1920



DEPARTMENT OF THE INTERIOR
JOHN BARTON PAYNE, SECRETARY
NATIONAL PARK SERVICE
STEPHEN T. MATHER, DIRECTOR

BIRDS
OF THE
PAPAGO SAGUARO
NATIONAL MONUMENT
AND THE NEIGHBORING REGION
ARIZONA

By
H. S. SWARTH

Contribution from the Museum of Vertebrate Zoology
of the University of California



WASHINGTON
GOVERNMENT PRINTING OFFICE
1920

THE NATIONAL MONUMENTS.

ADMINISTERED BY THE NATIONAL PARK SERVICE, DEPARTMENT OF THE INTERIOR.

[Number, 24; total area, 1,815.22 square miles; chronologically in order of creation.]

Name.	Location.	Area (acres).	Distinctive characteristics.
Devils Tower (1906).....	Wyoming.....	1,152	Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Montezuma Castle (1906)....	Arizona.....	1,160	Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnologic interest.
El Morro (1906).....	New Mexico...	240	Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Petrified Forest (1906).....	Arizona.....	25,625	Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Chaco Canyon (chã'kõ) (1907).	New Mexico...	1,20,629	Numerous cliff-dweller ruins, including communal houses, in good condition and but little excavated.
Muir Woods ² (mûr) (1908)....	California.....	295	One of the most noted redwood groves in California, and was donated by Hon. William Kent, ex-Member of Congress. Located 7 miles from San Francisco.
Pinnacles (1908).....do.....	2,080	Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves, and other formations.
Natural bridges (1908).....	Utah.....	1,2,740	3 natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Lewis and Clark Cavern ² (1908).	Montana.....	160	Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.
Tumacacori (tû-mã-kã'kõ-rë) (1908).	Arizona.....	10	Ruin of Franciscan mission dating from seventeenth century. Being restored by National Park Service as rapidly as limited funds permit.
Navajo (nãv'ã-hõ) (1909).....do.....	360	Numerous pueblo, or cliff-dweller ruins, in good preservation.
Shoshone Cavern (shõ-shõ-në) (1909).	Wyoming.....	210	Cavern of considerable extent, near Cody.
Gran Quivira (grãnkë-vë'rã) (1909).	New Mexico...	560	One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains Pueblo ruins.
Sitka (1910).....	Alaska.....	1,57	Park of great natural beauty, and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Rainbow Bridge (1910).....	Utah.....	160	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Colorado (1911).....	Colorado.....	13,883	Many lofty monoliths, and is wonderful example of erosion, and of great scenic beauty and interest.
Papago Saguardo (pã'pã-gõ-sã-gwã'rõ) (1914).	Arizona.....	2,050	Splendid collection of characteristic desert flora and numerous pictographs. Interesting rock formations.
Dinosaur (dî'nõ-sõr) (1915)....	Utah.....	80	Deposits of fossil remains of prehistoric animal life of great scientific interest.
Capulin Mountain (kãp'û-lfn) (1916).	New Mexico...	681	Cinder cone of geologically recent formation.
Verendrye (vër-rõn-drë) (1917)	North Dakota..	253.04	Includes Crowhigh Butte, peculiar mountain formation, from which Explorer Verendrye first beheld territory beyond Missouri River.
Casa Grande (kã'sã grãn'dã) ² (1918).	Arizona.....	480	These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in ruinous condition in 1694.
Katmai (kãt'mi) (1918).....	Alaska.....	1,088,000	Wonderland of great scientific interest in the study of volcanism. Phenomena exist upon a scale of great magnitude. Includes "Valley of Ten Thousand Smokes."
Scotts Bluff (1919).....	Nebraska.....	2,053.83	Region of historic and scientific interest. Many famous old trails, traversed by the early pioneers in the winning of the west, passed over and through this monument.
Yucca House (yûc'cã) (1919).	Colorado.....	9.6	Located on eastern slope of Sleeping Ute Mountain. Ruins of great archaeological value, relic of prehistoric inhabitants.

¹ Estimated.

² Donated to the United States.

³ From Mar. 2, 1889, until Aug. 3, 1918, classified as a National Park.

CONTENTS.

	Page.
The national monuments	2
Introduction	5
Bird life of the Papago Saguaro National Monument contrasted with that of the adjoining cultivated regions.....	11
Birds of the giant cactus.....	13
Birds of Roosevelt Lake and the Tonto National Monument.....	15
Birds of the Sierra Ancha.....	21
General accounts of some birds of the region.....	27
Palmer thrasher	27
Cactus wren.....	29
Verdin.....	31
Western kingbird.....	32
Dwarf cowbird.....	33
Desert sparrow	34
Phainopepla.....	35
Zone-tailed hawk.....	36
Texas nighthawk.....	38
Arizona crested flycatcher	39
Desert quail	40
White-winged dove.....	41
Inca dove.....	43
Mearns gilded flicker.....	45
Gila woodpecker	48
Farallon cormorant	52
Pallid great blue heron.....	53
Black-crowned night heron.....	54
Birds seen on Papago Saguaro National Monument, Ariz., May 30 to June 4, 1917.....	54
Birds seen at and near Tempe, May 30 to June 4, 1917.....	55
Birds seen in vicinity of Roosevelt Lake, June 5 to 11 and July 2 to 5, 1917.....	56
Birds seen in the Sierra Ancha, June 11 to July 2, 1917.....	57
Birds seen at Globe, July 5 to 7, 1917.....	58
Index.....	61

ILLUSTRATIONS.

	Page.
Figure 1. Map showing location of the Papago Saguaro National Monument -----	5
Plate I. General view over the Papago Saguaro National Monument -----	12
II. Giant Cactus or Saguaro, Papago Saguaro National Monument -----	14
III. A. Looking eastward from forested summit of the Sierra Ancha; B. Roosevelt Lake, the Sierra Ancha in the distance -----	22
IV. A. Sierra Ancha, looking northward from the divide near Roosevelt Lake; B. Sierra Ancha, looking southeastward from the divide -----	23
V. Location of nest of the painted redstart; Sierra Ancha ----	26
VI. Closer view of the painted redstart's nest -----	27
VII. A. Plumbeous gnatcatcher on nest; B. Male Gila woodpecker.	48
VIII. A. Nest with five eggs of Gila woodpecker in giant cactus; B. Nesting colony of Farallon cormorant -----	52

INTRODUCTION.

A few miles east of Phoenix, Arizona, between that city and the village of Tempe, lies the Papago Saguaro National Monument, a tract of land set aside primarily to conserve certain types of desert vegetation in a region that is rapidly changing in appearance through increased cultivation of the soil. Some 80 miles from Phoenix, to the northeast, is the Tonto National Monument, containing two groups of cliff dwellings; and adjoining the latter is the

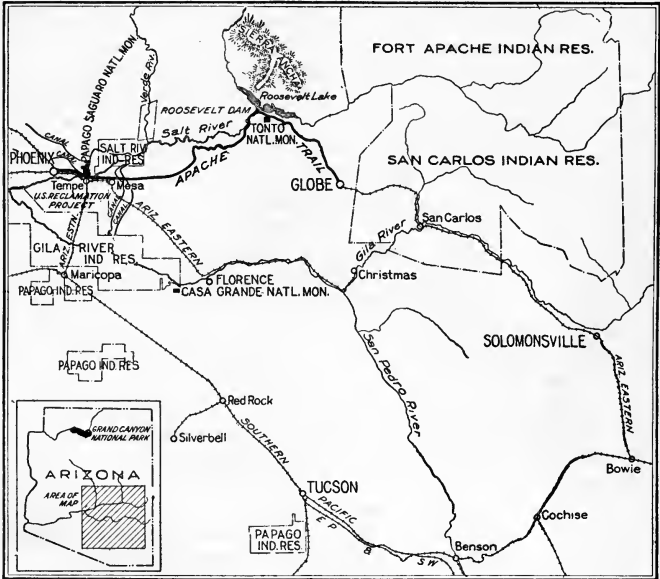


FIG. 1.—Map showing location of the Papago Saguaro National Monument.

Roosevelt Bird Reservation, encircling the shores of Roosevelt Lake. These several points are linked together by the scenic highway known as "the Apache Trail," a road extending between Phoenix and Globe.

The purpose of the present publication is to direct attention to some of the interesting features of the bird life of this region—a section which, although attracting increasing numbers of visitors each year, has not generally been regarded as including many bird species among its attractions. This report is not presented as a

"complete" account of the birds of this part of Arizona, but rather as an outline, partly filled in, of one phase of the subject, treating primarily of the breeding species. It is based upon a trip of six weeks' duration made by the writer during the summer of 1917 under the auspices of the California Museum of Vertebrate Zoology, a trip made possible through the interest of Mr. E. O. McCormick, of San Francisco. The itinerary was as follows: Phoenix, May 29; Tempe, May 29 to June 5; Roosevelt, June 5 to 11, July 2 to 5; Sierra Ancha, June 11 to July 2; Globe, July 5 to 7.

About Tempe trips were made over the Papago Saguaro Monument, in the willow bottoms of the Salt River for several miles east of the town, and through a portion of the farming section for some 4 or 5 miles south of town. At Roosevelt, with headquarters at "The Lodge," excursions were made on foot as far as the cliff dwellings of the Tonto National Monument, some 5 miles from the hotel on the Salt River branch of the lake, and for several miles up the Tonto Creek arm. Trips by motor boat were also taken, on one of which a visit was made to a breeding colony of water birds near the mouth of Tonto Creek. In the Sierra Ancha I stayed at the ranch of Mr. John C. Carr. This lies some 20 miles from the ferry at the south end of the lake, is on the main road through the mountains, and about 3 miles north of the divide, at an altitude of 5,410 feet. From this point I was able to make trips as far as the summit of Aztec Peak (7,500 feet) and to the heads of certain of the canyons on the northeast slope. The birds recorded from Globe were observed on several trips, some on foot and some by rig, along roads within a radius of 4 or 5 miles from the town.

As observations were made during the nesting season, the birds seen were, with few exceptions, those that breed in the places where they were found. One hundred and ten species of birds were noted, nearly a third of the total number (375) known to inhabit Arizona. This is probably a fairly complete list of the summer birds of this section, though there are a few species (the elf owl and ferruginous pigmy owl, for example) that certainly do occur here, but that were not encountered by the writer. Two species were added to the list of birds of Arizona as a result of the trip. One is the indigo bunting (*Passerina cyanea*), of which an adult male was secured June 30 at Carr's Ranch, in the Sierra Ancha. The second species is the Bendire crossbill (*Loxia curvirostra bendirei*), of which two females were taken June 16, also at Carr's Ranch. While the list of species here given is believed to be fairly complete as regards summer birds, there are, of course, many additional species to be looked for during the periods of migration in spring and fall. There is a still different aggregation composed of winter visitants.

It is not possible to give here exhaustive accounts of all the species encountered, but a selection has been made of those especially conspicuous or noteworthy, and of these certain phases of their life history are detailed at some length. There has been no attempt at uniformity in these sketches; they are merely presentations of the several species in the manner in which they are most apt to be encountered. The brief paragraphs entitled "recognition marks" aim to give certain conspicuous features by which the birds may be recognized in life. The nominal lists of species from various localities serve to enumerate those birds actually observed by the writer at the several points indicated.

To the amateur student of birds visiting the region here treated it is suggested that, together with the present publication, use be made of Bailey's Handbook of Birds of the Western United States (Houghton Mifflin Co., publishers) and Swarth's Distributional List of the Birds of Arizona (Cooper Ornithological Club, Hollywood, Calif.). The former, with its detailed descriptions and numerous illustrations, will serve to identify the species encountered; the latter lists the birds of the State with the manner of their occurrence, and also contains an exhaustive bibliography of the literature pertaining to the ornithology of Arizona.

In the following pages the names of birds used are those found in the American Ornithologists' Union Check-List of North American Birds (1910 edition) with the one supplement since added (1912), or, where there is variation from this standard, the names used are from Swarth's Distributional List of the Birds of Arizona. A single exception to this rule occurs in the Bendire crossbill (*Loxia curvirostra bendirei*). In the Check-List this species is included under *Loxia c. minor*. It does not appear in the Distributional List of the Birds of Arizona, as it was not known to occur in the State when the latter was published. As an easily recognizable subspecies it is entitled to the nomenclatural recognition here accorded the race.

The very name of the Apache Trail carries with it a suggestion of the romance of the country the road traverses, while the history of the highway itself is an epitome of the story of the State of Arizona. The road, prosaically built to meet modern needs in the construction of Roosevelt Dam, completed by the Government in 1911, follows the ages-old trail of the Apache Indian, a well-worn pathway from the barren and forbidding mountain fastnesses in which he made his home, to the valley below, where he found his accustomed prey. With the completion of the dam the prime need of the road's existence ceased to be, but in it there was left to the State—a by-product of the reclamation project, as it were—a scenic highway of unrivaled attraction. As such it is bound to draw in-

creasing admiration and use. Other States also have their highways, more or less illustrative of the Commonwealths which they traverse, but it is doubtful if another stretch of road of similar length could be found displaying so perfectly such a varied array of natural features and industries—a cross section of the State, so to speak, and a synopsis of its characteristics.

From Phoenix to Roosevelt, 80 miles, and from Roosevelt to Globe, 40 miles, the Apache Trail cuts through the center of Arizona. Following its course we find the modern city of Phoenix, with the highly cultivated farm lands of the valley about Tempe and Mesa, in close proximity to primitive desert, as illustrated in the Papago Saguaro National Monument; barren rocky hills hemming in lake and river; pine-clad mountains looking down upon cactus-covered valleys below; and farms, cattle ranges, and mines all displayed to the traveler on the biggest possible scale.

In the background is the Apache Indian of the San Carlos Reservation, a quiet spectator now, his previous activities having met with disapproval, and behind him are the brooding structures of the cliff dwellers, striving to tell a tale that no one has as yet interpreted.

Just as this highway gives to the passing tourist a general conception of the various human interests and natural features of Arizona, so, to the student of birds, is offered an outline inclusive of most of the features of the avifauna of the entire State. The ornithologist traversing the region should do so with the following points in mind:

1. For its entire length the Apache Trail passes through the type of country that geographers term the Lower Sonoran Zone, which includes all the low hot valleys of Arizona. The hills about Roosevelt and Globe appear to be at the extreme upper limit of this division, but, except for a few species encountered at these points, the birds of the Apache Trail belong to the highly characteristic avifauna of the Lower Sonoran southwestern deserts.

2. There is a particularly interesting subdivision of this zone constituted by the giant cactus association; and growths of giant cactus possess a peculiar group of birds which go with it over most of the trail.

3. About Phoenix and Tempe may be observed in sharp contrast the original desert avifauna and the very different bird life that has come with farming and all that is implied in extensive irrigation.

4. Just north of Roosevelt Lake are the Sierra Ancha, rising to a height of about 7,500 feet and within easy reach for those who care to devote a few days to a side trip. Here, amid forests of yellow pine marking the Transition Zone, may be observed an assemblage of birds differing as widely from that of the valley 15 miles away as do the

birds of Maine from those of Florida. Hardly a species will be seen that occurs in both places.

5. Southern Arizona is characterized by certain Mexican species of birds, some of which barely cross the boundary line, while others extend somewhat farther north. These for the most part are not birds of the low, hot valleys, as might be supposed, but species of the central plateau region of Mexico. In Arizona they are inhabitants of the higher mountains, and the Sierra Ancha is at nearly the northern extreme reached by any of these birds.

At the eastern approach to the Apache Trail, in the vicinity of Bowie, the train passes through country of a different character from other parts of the State. Here are long stretches of grassland, dotted with yuccas, and in places extensively grown up with scattered mesquite thickets, totally unlike the cactus-covered desert a little farther to the westward. This southeastern corner of Arizona possesses an avifauna that is quite distinctive, as compared with the rest of the State, and the traveler has an opportunity of seeing from the train a few of the more conspicuous species. He is sure to encounter flocks of the white-necked raven and an occasional Swainson hawk, common in this eastern region, but not apt to be seen over the Apache Trail proper.



BIRD LIFE OF THE PAPAGO SAGUARO NATIONAL MONUMENT CONTRASTED WITH THAT OF THE ADJOINING CULTIVATED REGIONS.

The bird student contemplating a trip over the Apache Trail should plan to spend several days in the region about Phoenix and Tempe, for here better than anywhere else in the State can be contrasted the faunas of the desert and of the irrigated farm land, side by side.

For a study of desert birds no more accessible place could be found than the Papago Saguaro National Monument, on the highway between Phoenix and Tempe. This is a tract of approximately 2,000 acres of desert land, about 9 miles east of Phoenix and 3 miles from Tempe. It is a rolling mesa, of gravelly or rocky soil, traversed by a ridge of hills, rising 200 or 300 feet above the level of the surrounding desert. The plant growth is typical sparse desert vegetation, such as occurs over vast stretches of southern Arizona. (Giant cactus) is evenly, though not thickly, distributed over the whole area. Every-where there are clumps of "cholla" cactus, locally known as "jumping cactus," a peculiarly diabolical sort whose thorns penetrate at the gentlest touch. The local name is derived from the ease with which sections break off and adhere to whatever brushes against them, no matter how lightly; the thorny joints give the impression of actually leaping at the passerby. Here and there are leafless palo verdes, or clumps of atriplex, and in the sandy washes thickets of cat-claw or scrubby mesquite. The most generally prevalent plant is the creosote bush (*Croton*), small, rounded bushes of dark green hue, scattered quite uniformly over even the most unprepossessing sections. Many gravelly ridges are grown up with this plant to the exclusion of practically everything else. Along the canal which crosses the Monument, seepage of water has produced limited growths of arrow weed and tules.

In the rocky hills of the central ridge numerous caves have been worn by the elements, in one place an opening extending clear through the hill. This aperture, known locally as "Hole-in-the-rock," is about 15 feet high and 25 feet long, with a broad approach at either side. It is used as a picnic ground by the people of Phoenix and Tempe.

The bird life of the Papago Saguaro Monument is that of the desert purely, and as such must not be judged by the same standards that would be applied to some other sections. A fairly long list of species may be confidently expected, but as a rule there is not an

abundance of individuals. Birds are not as numerous as, for example, they are in the willow thickets of a river bottom, or in some other such place where there is food and shelter for numbers.

On the desert plains the first impression is of a total absence of birds. Then, one by one, species come to view, until at the end of several hours' observation a list of surprising length will have been drawn up. Quite surely among the first will be the Palmer thrasher. As likely as not the shrill whistle of one of these birds will bring the observer up shortly, with a panicky feeling that the sound is a warning against trespass. It is a very human note; as though the whistler were deeply annoyed, and had the power and full intention of making his resentment felt.

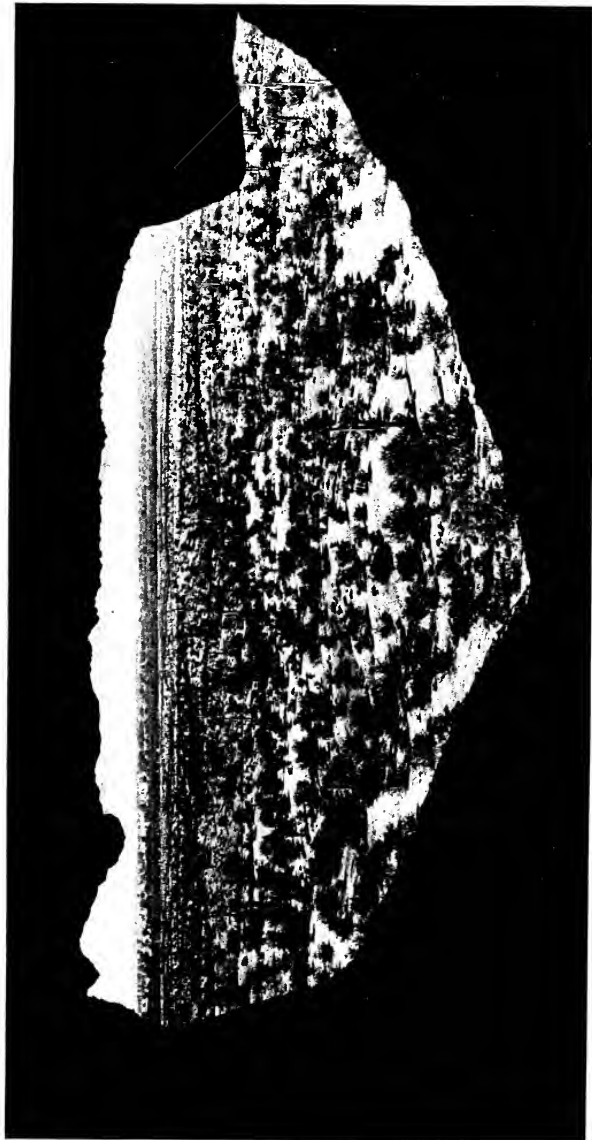
Standing beside a giant cactus, trying vainly to derive some comfort from its slender strip of shade, one becomes conscious of a continuous hissing emerging from within the trunk. There is nothing to be seen, but presently a gilded flicker appears, flying from a distance, and, if not too much startled by the intruder, disappears within some one of the several holes in sight, and the hissing vastly augments.

Then a couple of Arizona crested flycatchers may appear, squabbling riotously over the bushes. In following them a brood of full-fledged cactus wrens is flushed from a clump of cholla cactus, and these disperse in characteristic swooping flight, skimming close over the ground. A passing white-winged dove halts his flight and alights upon the top of a tall saguaro, apparently for the sole purpose of delivering his complicated cooing, for he departs as soon as this rite is finished. Altogether, one presently discovers that a rather surprisingly large number of birds has been observed.

There are many places in the Salt River Valley where the contrasting pictures of desert and farm lands can be viewed side by side, separated, perhaps, merely by the width of an irrigation canal. The transformation is startling and no less complete in the bird life than it is in the vegetation.

A writer in *Motor West* (vol. XXVII, July, 1917, p. 10), describing an auto tour through Arizona, words his impression of the change in phrases so happily chosen that I can not do better than insert them here:

Then, all at once, a transformation so wonderful that it is still hard to believe. We crossed a wide irrigation canal, whose still-flowing waters reflected the red evening sky. It might have been a magic moat whose waters the evil spirits of the desert could not cross; for here was no desert road, but a lane of arching cottonwoods, with fields of alfalfa on either side, vine-covered farmhouses, sleek cattle in the fields, and the smell of newly cut hay instead of choking dust. And out of the green wall of the cottonwoods came a perfect ecstasy of song from orioles and redwing blackbirds, rejoicing over the victory man had won over the desert. Republics may be ungrateful toward the men



GENERAL VIEW OVER THE PAPAGO SAGUARO NATIONAL MONUMENT.

The outlook is from the "Hole-in-the-Rock," one of several caves near the summit of some hills in the center of the monument. This region is a favorite picnic ground of the people of Phoenix and Tempe.

who fight their battles and tame their wildernesses, but, rest assured, the birds are not. If the engineers and the builders who toiled for years under the desert sun on the Roosevelt Dam ever want to hear really adequate praise for their achievement, let them ride as we did down that road into Phoenix at sundown and hear the birds' opinion of it.

There is this to be said, however, as regards the vociferous rejoicing of the birds anent the victory of the waters over the desert. There is no question as to the greatly augmented avian population, for the birds are there, conspicuous to eye and ear, and unmistakably flourishing as one result of this taming of the wilderness. But, on second thought, realization comes that these loud-voiced proclaimers of their happiness are not the original dwellers of the land, exulting in their improved condition and environment, but rather are they upstart newcomers, "nesters" who have entirely replaced the old-time dwellers of the open range.

Thrashers of several species, verdin, desert sparrow, plumbeous gnatcatcher, gilded flicker, and their ilk, too conservative to be content far from their thorny desert, have withdrawn from those sections where green alfalfa and cotton has replaced mesquite, cholla, and creosote bush, and their places are taken by blackbirds, orioles, meadowlark, and kingbird; natives of Arizona, it is true, but formerly restricted to limited areas, mostly along the river beds.

There are a few species that have, to a certain extent, been able to adapt themselves to new conditions. The Gila woodpecker finds himself satisfied with the cottonwood trees which farmers plant for shade or ornament. The cactus wren appears to be more adaptable than I had given him credit for, certainly far more so here than he has been in California, and was seen frequenting brush piles or gardens, where there was cultivated ground on all sides.

The net result of the cultivation of the valleys is, quite evidently, a vastly augmented bird population as regards number of individuals. There is no greater number of species than before, but the proportions are different. It is a replacement of one type of native fauna by another, not an increased number of the original inhabitants. For the most part, birds whose whole organism is adapted to existence in the hot, dry desert, amidst thorn bushes and cactus, can not at once change to life amidst greenery, shade, and abundant water. It is, perhaps, well for the farmer that they can not, for a few desert species which have tentatively sampled some of the results of civilization, as exemplified in vegetable gardens and fruit trees, are already being complained of in some quarters.

BIRDS OF THE GIANT CACTUS.

To the visitor from other sections of the country, entering Arizona for the first time, there is probably no feature of the unfamiliar

landscape that is more impressive than the giant cactus. The great size of this plant gives it rank among its kind comparable to the sequoia among forest trees, while in appearance it seems like a weird intruder from another world or another epoch, among normal and ordinary types of vegetation. To the botanist the giant cactus presents its own problems, comprising peculiarities of distribution, growth, and habits, difficult to understand and fascinating in their complexity. To the student of birds it also makes an appeal, for, aside from the pleasure afforded from working amidst such picturesque surroundings, the groves of giant cactus possess an assemblage of bird species found practically nowhere else.

On the desert, otherwise a land of low shrubs and bushes, this towering cactus takes the place of trees, at least as regards the needs of birds that dwell in hollows of tree trunks. Consequently, in those sections of the country where it grows, we find a peculiar group of birds, desert species purely, but prototypes of woods-dwelling forms of other sections. With them there are associated certain species which elsewhere occupy woodland, and which here find suitable nesting sites within the cactus or in the crotches of its branching arms.

Following are the birds forming the "giant cactus association" in Arizona—that is, those species whose occurrence in a region is dependent entirely, or in large part, upon the presence of the cactus: Saguaro screech owl, elf owl, Gila woodpecker, Mearns gilded flicker, and Arizona crested flycatcher. With these are often associated other birds who gladly take advantage of nesting sites in or upon the cactus, but which also occur in wooded sections in other parts of the country. These are: Western red-tailed hawk, Swainson hawk, American sparrow hawk, western horned owl, ash-throated flycatcher, purple martin, and house finch. I have even found the mourning dove sitting upon eggs in a gouged-out cavity in the side of a Saguaro trunk.

The elf owl, gilded flicker, and Arizona crested flycatcher may occasionally be found nesting in holes in trees where such occur near the giant cactus, but it is useless to look for them in sections of the country where the cactus does not also grow. So closely are these species confined to the neighborhood of the giant cactus that they appear to have been evolved in direct response to the opportunities afforded by this plant to these types of birds. In other words, to put it baldly, here were niches, to be filled in by a hole-dwelling owl, woodpecker, and flycatcher—opportunities not found elsewhere in these desert countries, and promptly taken advantage of by types of birds which in other sections would find suitable homes in the timber. The sparrow hawk and purple martin utilize holes in the cactus as they would in trees or buildings. The cactus wren some-



GIANT CACTUS OR SAGUARO. PAPAGO SAGUARO NATIONAL MONUMENT.

The giant cactus is a conspicuous feature of the landscape over much of southern Arizona. In the absence of trees it is used for nesting purposes by woodpeckers and other hole-dwelling birds. The fruit, seen growing at the ends of the arms, is eaten by many species of birds.

times builds its nest among the arms of the cactus, but it usually prefers a lower situation.

We thus find here examples of hole-dwelling hawk, owl, woodpecker, flycatcher, and swallow, widely different birds, alike only in their choice of nesting sites. It is curious that the desert should also contain one species belonging to a family that elsewhere breeds almost exclusively in cavities, but which here does not follow the traditions of the race. This is the verdin, a titmouse—dwellers in holes the world over, almost—but an accomplished architect, who by reason of his talents finds no need of crawling into a hole for protection.

The labor of excavating the nesting holes must necessarily fall entirely upon the gilded flicker and Gila woodpecker, probably upon the former for the most part; for these are the only birds with the skill and equipment for such labors. Do these woodpeckers of their own choice construct new dwellings year after year, leaving last year's homes to their unskilled neighbors, or are they unfortunate drudges, frequently compelled by more belligerent associates to abandon their completed work? However this may be, the exigencies of the situation frequently bring about an apartment-house-like condition, with several diverse tenants living in close proximity, one above the other.

It will readily be seen in how many respects the birds of the giant cactus afford attractions for the bird student. Some of the species are to be found nowhere save in the vicinity of this plant, and all have peculiarities of appearance or habits well worth special study. The Apache Trail, in sight of giant cactus for nearly its entire length, and passing in places through as fine growths of the plant as are to be found anywhere, affords excellent opportunities for observation of these species. Among the birds of this region are all the species of the "giant cactus association"; besides these there are many of the birds that occur on the Arizona deserts elsewhere than in the vicinity of this plant.

BIRDS OF ROOSEVELT LAKE AND THE TONTO NATIONAL MONUMENT.¹

Roosevelt Lake is the name given the body of water that has resulted from the damming of the Salt River. The two arms of the lake, formed by the Salt and Tonto Rivers, respectively, extend each about 15 miles from the dam. The width varies from a half mile to about 3 miles, the general effect being of a long, sinuous body of water, indented at various points by jutting peninsulas. The narrows of Salt River Canyon, the site of Roosevelt Dam, are hemmed in by towering cliffs, while along the shores of the lake for some 2 miles

¹Tonto National Monument administered by the Department of Agriculture.

above the dam the inclosing mountains are steep and precipitous, leaving a scant margin of room for the road which winds along the water's edge.

To the student of birds the lake makes an especial appeal as the site of the Salt River bird reservation, established by the Federal Government in 1909, a sanctuary wherein the birds are safe from human molestation. This includes a narrow strip of land around the lake, immediately adjoining the water. The impounding of this immense body of water in a desert region has made surprisingly little change in the bird life at this point. The abrupt mountain sides flanking the two former valleys of the Salt and the Tonto Rivers, respectively, and now forming the shores of the lake, are far too steep and rocky to permit of the establishment of growths of aquatic plants such as might be looked for in a place of this sort, and desert vegetation persists to the water's edge. The banks everywhere drop so abruptly as to leave no stretches of shallow water to support such growths as are usual about most lakes, and there are absolutely no nooks or inlets margined with reeds, grass, or willows; there is a consequent dearth of the water-loving birds which customarily seek such places.

Just below the present outlets of the Salt and Tonto Rivers into the lake there are clumps of dead cottonwoods and willows, killed by the rising waters, but with their tops projecting above the surface of the lake. These tree tops have been utilized by Farallon cormorants, pallid great blue herons, and black-crowned night herons as nesting sites, and there are now thriving colonies of these three species of birds at these points. This is the only conspicuous change in the bird life of the region that has been brought about by the creation of Roosevelt Lake. But one other water bird was seen—the killdeer—and the numbers of these nesting about the shores of the lake are probably no greater than the population formerly inhabiting the river valleys in the same region before the lake was made.

The land birds afford the greatest interest. There is a goodly variety of these, and a greater number of individuals than seems apparent at a first inspection of the country.

The account of one morning's observations will give a fairly comprehensive idea of the bird life existent about the lake; for the census of this one forenoon (June 6) included 41 species out of the total of 52 noted by the writer about Roosevelt Lake. Some 5 miles from the hotel, on the south side of the lake, is the Tonto National Monument, where there is located a cluster of cliff dwellings visible from the stage road and relatively easy of access. This is naturally a point to which visitors are directed, and it thus became the objective of my first morning's excursion; while an additional incentive lay in the fact that the road, skirting the shore of the lake, lies within the Salt River bird reservation for nearly the whole distance.

The hotel stands upon a rocky point a few hundred yards above the dam on the north shore of the lake. The road leading to the dam is cut in the rocky slope of a steep hillside, but scantily covered with vegetation. However, despite the lack of trees or bushes, there were usually some birds to be seen about the buildings, and that morning I was able to list several species before starting on my walk. First of all a canyon wren was heard singing from the Apache village on the hillside above the hotel. During the next few days I discovered this particular bird regularly haunting the hotel veranda in the early mornings, gleaning a breakfast of insects from beneath the lights, and giving his striking song at frequent intervals. Human company seemed objectionable to Catherpes, however, and upon the appearance of people he usually withdrew to the rocky slopes of the nearby hillside. A pair of house finches, or linnets, were in evidence, tending their young in a nest in the honeysuckle climbing over the veranda. In an elderberry by the dining-room window an Arizona least vireo was singing.

The walk of several hundred yards to the dam disclosed no additional species, but at the dam itself a halt was made to inspect the unique breeding colony of birds conspicuously in view there. Cliff swallows may have built their nests on the rocky walls of the canyon before the dam was constructed, but this masonry was evidently hailed by them as precisely what was needed, if not, indeed, placed there for their especial benefit. There were a few nests built in crevices in the rock on the towering walls on either side, but the bulk of the colony—75 pairs at the very least—had plastered their mud homes on a ledge of the dam, a long, single row of nests, immediately below a line of electric lights. In the full glare of this illumination by night, and with a soldier of the United States Army on sentry duty at each end of their community both day and night (for the dam was carefully guarded at the time of my visit), there is probably no other bird colony in the country, whether located within a Federal bird reservation or not, that is more secure from enemies.

Over the spillway at the east end of the dam three pairs of white-throated swifts were darting back and forth, of notably swifter flight than the thronging cliff swallows among whom they threaded their way, now skimming low over the water, and now darting into crevices in the rocks. The number of times the birds were seen entering these niches made it seem probable that they were feeding young within. Several pairs of squabbling English sparrows were fussing about the face of the cliff, but whether with designs of ousting the swifts or the swallows from their strongholds was not apparent.

From the dam southward, through the construction camp and among the houses on "Government Hill," English sparrows were everywhere. The species is established at Roosevelt at the present time to the number of 200, at least. How this point was reached is a question, for the arrival here of the sparrow required a journey of not less than 40 miles over desert country. One never sees these birds anywhere save in the towns, or occasionally about ranch houses; yet all the scattered colonies now established in the country have undoubtedly been planted through birds following wagon roads or railroads. Their travels must be carried on in much less ostentatious manner than is their custom when once at home in a place.

About the houses linnets were seen adopting civilization as usual and making the most of such shrubbery as has been planted. A mile or so east of the cluster of buildings occupied by Forest and Reclamation Service officials and employees lies the "new town" of Roosevelt, so called. When the old town was buried beneath the waters of the lake the new town was established here on the hills above, but most of the inhabitants and the business of the place have since moved to points nearer the dam. The sight of a male vermilion flycatcher perched on a watering trough reminded me that I had not before seen that species here; it proved to be of decidedly rare occurrence.

A little farther on a violent hissing by the roadside led to investigation of sundry nooks and crannies in the piled rock of the retaining wall, in one of which cavities a nest full of young rock wrens was finally revealed as the source of the disturbance. The surrounding hills now arose less precipitously from the lake and retreated farther from its margin. At the point where the trail leads from the stage road to the cliff dwellings the valley is broad and gently sloping and well covered with desert vegetation. Mesquite and cat-claw grow quite luxuriantly, interspersed with cholla cactus, ocotilla, and giant cactus, to mention a few of the more conspicuous plants.

From a thicket of mesquite several western tanagers emerged, belated migrants, looking very much out of place in this hot desert. If their destination was the forested summit of the Sierra Ancha, however, their journey was nearly done and they might still linger a little before beginning their summer duties. Palmer thrashers were abundant here, vying with the equally numerous mockingbirds in the beauty of their song. I had been hearing complaints of the lack of birds and of bird music in this region, but surely no one could wish for anything finer than the chorus produced by these two species alone. Both thrashers and mockingbirds were singing from the tops of saguaros, where refreshment of some sort seemed available in the blossoms whenever the singers' throats became dry.

Desert quail scurried out of the bushes from time to time, usually in pairs. On this day and on subsequent excursions the species was found in abundance in suitable localities about the lake, and many broods of young were encountered. The monotonous, tinkling song of the desert sparrow was heard on all sides, and little companies of black-throated adults with their more plainly colored young scattered out of the bushes from time to time. Other birds, too, were noted in some numbers on this mesa: Verdin, dwarf cowbird, plumbeous gnatcatcher, mourning dove, white-winged dove, and phainopepla. A brilliant male Arizona cardinal sang from a distant clump of mesquite, but would not permit a near approach.

A visit to the cliff dwellings entailed a climb up the side of the canyon, a brief ascent and over a good trail, but still in the glare of the Arizona sun, so that the cool shelter of the gray walls became a welcome retreat from the stifling heat. A pair of ravens croaking overhead had evidently found congenial surroundings here, for their footprints were everywhere in the dust of the floors. There could have been no room for ravens when people occupied these caverns, but the pair of white-throated swifts darting in and out of a crevice directly over the ruins would not have been disturbed by any human tenants below. The swifts may well have been among the birds most familiar to the cliff dwellers; in choice of a home they were certainly of like taste.

In the canyon below a thin line of trees, mostly sycamore, ash, and mesquite, gave promise of water, which was, indeed, found a little farther up, together with a fair abundance of birds. Two sycamore stubs held each a nest of Gila woodpecker, with young, to judge from the noise that issued and from the activities of the old birds, flying back and forth with food projecting from their beaks. A western wood pewee seen here was doubtless an individual in migration, as was also an unidentified small Empidonax, apparently a western flycatcher. A Lucy warbler was also added to the list, first noticed from its simple song, a monotonously repeated single note impossible of description though easily recognizable when heard. From the hillside descended the loud, clear song of the Scott oriole, so like the meadowlark in its tone. This is a rare bird here, only two or three being observed about Roosevelt Lake, beside one seen from the stage near Fish Creek Canyon. Still another species to which attention was drawn by its call note was the Scott sparrow, so like the rufous-crown sparrow of California, and with exactly the same twanging chirp.

By 11 o'clock the glare of the sun was such as to have driven most birds to cover, and census taking was discontinued. In three hours 41 species had been listed, with a total of approximately 370 indi-

viduals. Two species seen had not allowed their identity to be positively determined, for all the hummingbirds encountered were females, which are much alike in the different species, and the *Empidonax* mentioned above did not tarry for close observation.

Observations during the next few days added 11 species to the list gathered in this morning's observations, giving a total of 52 species of birds seen in the immediate vicinity of Roosevelt Lake. At the lower end of the lake, owing to the precipitous nature of the surrounding hills and the scanty vegetation, conditions are not so favorable for birds, but even here some could be found with a little search. A blossoming ocotilla in front of the hotel proved a daily attraction to hummingbirds, and an elder tree by the veranda was frequented by quite a number of birds, among those most constantly present, curiously enough, being several ash-throated flycatchers, who were evidently finding some food about the clusters of blossoms. Arizona hooded orioles were daily visitors, the males, when two came together, going through certain ridiculous evolutions—apparently giving stiff-necked defiance of each other—movements that are calculated to show their gaudy colors to the best advantage, but which are certainly lacking in grace. Little flocks of dwarf cowbirds appeared from time to time, sometimes flying out across the lake, as though bound for distant pastures, then, with no apparent reason, but with one accord, whirling about and back again, to alight at their starting point.

Though there is little apparent difference in the vegetation of Roosevelt Lake and the Papago Saguaro Monument, there are several species of birds not found in both places. There is one conspicuous plant, the ocotilla, that does not grow in the latter place, though it is abundant at Roosevelt. About the lake the canyon towhee replaces the Abert towhee of the lower valleys. The canyon towhee is a foothill bird, Roosevelt Lake lying at about the lower limit of the range of this species. It is not averse to the company of man, being a frequenter of stable yards and camp grounds, when such are available, usually in little companies of three or four, and tame and confiding in their actions. The cactus woodpecker, desert sparrow, and Arizona least vireo are all species observed here, but which I looked for in vain about Phoenix and Tempe.

There is one other bird that, rather oddly, is of especial interest as occurring at this point. On July 3 a solitary crow passed overhead but a short distance away, his repeated "caw" bearing loud assurance that this indeed was not a raven. The sight of this bird was the most exciting event of the day, for crows are scarce in most parts of Arizona; in fact, this was the first of the species that I had ever seen within the State.

BIRDS OF THE SIERRA ANCHA.

The most striking topographical feature of Arizona is the Mogollon Divide, that line of prodigious cliffs which extends diagonally nearly across the State from northwest to southeast, dividing it into two diverse and sharply defined sections. Above this barrier is a high plateau region of pine forests; below, low, hot deserts extend nearly to the foot of the escarpment. South of the divide, smaller isolated mountain ranges carry upon their summits animal and plant life similar to that of the northern plateau region—Boreal islands surrounded by a sea of desert. The Sierra Ancha, forming one of these southern continuations of the Mogollons, are of peculiar interest from their location at the meeting point of two diverse faunas. Birds of the Rocky Mountain region, characteristic of northern Arizona, are here at about their southern limit; while certain species of the Mexican table-land (also dwellers on the mountain tops, and of which many reach southern Arizona) extend this far north and practically no farther. So there are found in proximity such diverse species as the southern Coues flycatcher, Arizona jay, hepatic tanager, painted redstart, and bridled titmouse, contrasted with the more northern Batchelder woodpecker, western tanager, mountain chickadee, and Audubon hermit thrush.

The road to the Sierra Ancha starts northward from a point near the eastern end of Roosevelt Lake, some 10 miles from the dam. From lake to foothills 5 or 6 miles of desert are traversed, a gravelly mesa covered with the usual desert vegetation—saguaro, palo verde, ocotilla, mesquite, etc., a much higher and more luxuriant growth than is seen about the lower end of the lake. Saguaros are not numerous, but some of them are very large. One in particular, not far from the base of the mountains, looms up as a veritable landmark, a giant, even among its kind, of prodigious girth, and extraordinary in the number of its branching arms.

All the way from the lake the road ascends steadily, but once the foothills are reached it begins to climb at a much steeper pitch. This continues until over the "rim", a long exposure of cliff such as is encountered to a greater or less extent in many Arizona mountains, above which gentler slopes prevail. Here we begin to leave the desert brush behind, finding instead extensive grassy areas dotted with yuccas. The last saguaro is seen at about 3,000 feet, the ocotilla persisting some distance higher.

Scrubby oak brush begins to appear, getting thicker as we ascend, until the slopes are well covered. Now, too, as the road dips down into sheltered canyons, crossing to the hillsides beyond, it is momentarily shaded by sycamores and larger oaks, arched over cool mountain streams.

At about 6,000 feet the divide is reached, and here, abruptly as a passage from one room to another, one is plunged into a different world. Toward Roosevelt Lake the hot, southern exposure of the mountains is steep and rocky, sparsely clothed in scattered vegetation that is purely of the desert. To the northward extend forests of yellow pine, mile after mile and ridge beyond ridge, far as the eye can reach, cool and shady, and with running water in every canyon. The startling effects of different exposures and altitudes are, of course, well-known phenomena of our western mountains, but there are few places where there is opportunity of contrasting such an absolute change in so short a distance, especially where such large areas are involved.

Besides the yellow pine the forests contain one or two other conifers, though in lesser numbers. On the warmer hillsides there is a good deal of juniper, while at higher altitudes, especially in deeply cut, shaded canyons, there are many large firs. There is an abundance of oak timber, both large-sized, deciduous white oaks, and live-oak brush. Along the streams are sycamore, maple, alder, ash, and box elder, and on the hillsides thickets of locust, clumps of sumach, with here and there a tangle of grapevines. It is a region of abundant vegetation and running streams. The latter have recently been stocked with trout, promising an added attraction in the near future.

For scenic beauty nothing can excel the canyons on the northeast side of the range, difficult of access at the present time, but abundantly repaying the effort it takes to reach them. Hemmed in by walls of appalling height, so steep that one looks down as from the roofs of buildings, one gorge after another comes into view miles in extent, the very vastness of the outlook forming an obstacle to a full appreciation of it all. On many of these canyon walls there are clusters of cliff dwellings tucked under projecting ledges, inaccessible from above and difficult to reach even from the canyons below. From the higher peaks can be seen, far to the northward, the imposing line of the Mogollons, stretching as far as the eye can reach.

The clearness of the Arizona atmosphere, permitting easy vision over distances unheard of elsewhere, enables one to obtain in such places as this, through concrete examples before the eye, fuller realization of the characteristics and peculiarities of the country than can be learned from many pages of written descriptions and explanations. The Mogollon Divide as a factor in distribution becomes more of a reality when it is actually in view, imposing its presence across the whole horizon. That the desert and the mountain top are different worlds, as far as most animals and plants are concerned, is brought strongly home to one when, sitting in the cool shade of pine trees, he looks down into a scorching valley, but a few miles away in actual distance, and with absolutely no physical obstruction to uninterrupted



Photograph by Southern Pacific Co.

A. LOOKING EASTWARD FROM FORESTED SUMMIT OF THE SIERRA ANCHA.

A suggestion of the contrasts to be found within a relatively short distance. The blistering desert plains and buttes appear to be scarcely more than a stone's throw from the cool pine woods.



Photograph by Southern Pacific Co.

B. ROOSEVELT LAKE. THE SIERRA ANCHA IN THE DISTANCE.

The shores of the lake are too stony and their descent too abrupt to permit of the existence of any marsh land. Desert vegetation extends quite to the water's edge.



A. SIERRA ANCHA, LOOKING NORTHWARD FROM THE DIVIDE NEAR ROOSEVELT LAKE.

The north-facing slopes here shown are densely covered with trees and shrubbery. This is the home of the black bear, mule deer, and Abert squirrel, of the wild turkey and band-tail pigeon. Bird life is abundant, composed mostly of species peculiar to the higher mountains and never seen in the arid valleys but a few miles distant.



B. SIERRA ANCHA, LOOKING SOUTHEASTWARD FROM THE DIVIDE.

This view of the arid and treeless slopes is from a point but a few rods distant from the spot where the upper view was photographed. Animal life is scarce here, and for the most part consists of species that are rarely or never seen on the cool, north-facing hillsides.

passage, of birds at any rate, yet with nothing in common in the animal and plant life of the two regions.

As an object lesson in the puzzling problem of the distribution of animals and plants, it is well worth while to turn aside from the sameness of the highway through the valleys, travel 20 miles into these mountains, and see the changes accompanying a drop in temperature of but a few degrees. Fifty-seven species of birds were observed in the Transition Zone of the Sierra Ancha during June; 52 about Roosevelt Lake. Only 14 species were noted at both places. Of these 14, one (the desert quail) has been artificially introduced at a ranch in the mountains; two (western wood pewee and western tanager) were belated migrants in the valley, on their way to the mountains, and the others are wide-ranging species, such as the mourning dove, turkey vulture, and western red-tailed hawk. For the most part the avian assemblages of the two regions are widely different, though in many cases closely related species replace one another in mountain and valley. Thus there may be contrasted, in the pines of the Sierras and in the valley, respectively, band-tailed pigeon and white-winged dove, red-shafted flicker and gilded flicker, broad-tailed hummingbird and costa hummingbird, Cassin kingbird and western kingbird, mountain towhee and canyon towhee, violet-green swallow and rough-winged swallow, Virginia warbler and Lucy warbler, western gnatcatcher and plumbeous gnatcatcher, to mention some of the more conspicuous.

There are some of the mountain birds that are certain to attract the attention of even the most casual observer, while many others must await the more careful search required for their discovery. The Sierra Ancha constitute one of the few remaining retreats of the wild turkey, and in these mountains this species still occurs in sufficient numbers to guarantee its continued existence as a game bird, provided it receives adequate protection. In June the broods of young were beginning to appear.

Another fine game bird, the band-tailed pigeon, occurs in fair numbers in the higher parts of the range. Usually the first intimation received of the proximity of pigeons is the loud clapping of wings as the birds hurriedly take flight from some oak tree when approached too nearly. Now and then a small flock or a single bird is seen high in the air, crossing from one hillside to another, and occasionally a male bird may be observed going through his courting evolutions. In this performance the bird launches into the air from his perch on some tall tree, and, with wings and tail stiffly outspread, describes a large circle back to his starting point. During this flight he utters a wheezing noise, not audible at any great distance.

Of the four species of woodpeckers that breed in these mountains, the white-breasted woodpecker should be looked for mostly in the pine timber, the Batchelder woodpecker in the maples and alders along the streams, and the red-shafted flicker almost anywhere, though it is not an abundant species. The Mearns woodpecker will reveal itself without any special search. The noisy chatter of this species is heard on all sides, while the birds themselves, in showy red, black, and white plumage, are conspicuous through their manner of repeatedly making short sallies from the trees in pursuit of passing insects. They are not especially shy, but when closely approached have a clown-like habit of dodging behind a tree trunk, where they play hide and seek with bobbing head and chattering tongue. Their white eyes add much to the oddity of their appearance.

On the evening of July 1 a Stephens whippoorwill was heard calling, indicating what is probably the northern limit of the species in Arizona. In the more southern mountain ranges of the State it is a common summer visitant.

There are several interesting flycatchers in the higher mountains. The Cassin kingbird is one of the most common, replacing the western kingbird of the lower valleys, which it so closely resembles in appearance. The Coues flycatcher, a summer visitor from Mexico, which is here at about the northern limit of his range, is less conspicuous and far less numerous. The Mexicans call this bird Jose Maria (Ho-sáy Mar-i-a), a very good rendition of the call note. The Coues flycatcher is, in appearance and habits, very much like his near relative, the olive-sided flycatcher, a much more familiar object to most North American bird students, and, like the olive-sided, should be looked for high in the tree tops, usually at the tip of a dead limb or on some tall dead pine stub.

In the narrow, dark canyons, where densely growing fir trees shade the streams beneath, may be heard the sharp "pee-whit" of the western flycatcher—a note that is heard far more often than the birds themselves are seen.

In the mountain ranges of Arizona the jays are always a conspicuous feature of bird life, with an abundance of individuals, and including several species of notable interest from peculiarities of appearance or of habits. The Arizona jay is, perhaps, the noisiest member of a sufficiently garrulous family, habitually shrieking his disapproval of events and individuals, traveling in companies of 25 or 30 in order to give added force to his objections, and going far out of his way to find trouble that otherwise would not come to him. The long-crested jay is less conspicuous and less abundant. The two species occur together in the Sierra Ancha at about 6,000 feet; on the higher peaks I saw the long-crested, but not the Arizona.

There is a third species in these mountains, the Woodhouse jay, restricted almost entirely to the hot, south-facing slope. Coming up from Roosevelt Lake there is a stretch of road passing through some miles of scrub oak brush, with a few oak trees and junipers scattered over the hills. This is the home of the Woodhouse jay, a bird of the thickets, rather solitary in its habits, and a bit of a sneak in disposition. He may be seen occasionally diving into a bush or heard calling from the hillside, but it is no easy matter to come to more intimate acquaintance with him.

About the ranch house where I made my home in the mountains, the clearing of timber, together with the planting of alfalfa and garden crops, had provided conditions that were evidently suited to certain species of birds seen here, but not elsewhere at this altitude. Green-backed goldfinches were in the garden daily. A pair of western blue grosbeaks was evidently nesting somewhere about the edges of the alfalfa field, rather to my surprise, for I had not seen the species in the valley below, where the surroundings were apparently more favorable for it. Several pairs of lazuli buntings also frequented the alfalfa field. On July 1 there was brought to me for identification a bird that had been killed in the garden the day before by the boy who was working there. This proved to be a male of the eastern indigo bunting—a startling occurrence, as it was the first of the species to be found in Arizona.

A few hepatic tanagers also visited the alfalfa field occasionally, especially toward evening, the red-colored males rather conspicuous against the greenery they frequented. The call note of this bird is a "chuck," so exactly similar to the tone of the hermit thrush that the two sounds are easily confused.

Four species of warblers were found. The Virginia warbler, a tiny, dull-colored bird, frequenting rather dense shrubbery, and nesting on the ground, has no conspicuous markings to catch the eye, but does possess a certain loose-jointed flipping of the tail that serves excellently for identifying the species. The Grace warbler, rather rare, is a bird of the pines, especially of the denser stands of young trees. For recognition dependence must be placed upon an occasional glimpse of the yellow throat, or a flash of white outer tail feathers in flight. The black-throated gray warbler is an inhabitant of the oak thickets mainly.

The visiting bird student will get great joy from the painted redstart, in appearance suggestive of the tropics, abundant in numbers, and not at all shy. Like his cousin of the Eastern States, the painted redstart appears to be constantly posing, with drooping wings and spread tail, in a seeming attempt to show his gaudy colors and markings to the best advantage. Unlike the eastern redstart, how-

ever, the Arizona bird nests upon the ground, building in the cut bank of a road, at the entrance to some prospector's abandoned tunnel, or in some sheltered nook alongside a stream.

The desert wren belies his name by residing in manzanita thickets in the high mountains, not occurring at all (in summer, at least) on the desert below. He is rare and extremely shy, so that special search must be made to catch even a fleeting glimpse of him. The male bird is an assiduous songster, however, and, by careful stalking, may be caught unawares at his perch on some dead twig above the bushes.

The western house wren is everywhere in the mountains, bubbling over with song, as usual. Every pile of brush seemed to have its wren tenants. In the oak trees one occasionally runs across little droves of the bridled titmouse, but not often, for the species is not nearly as common here as in some of the more southern of the Arizona mountain ranges. In fact, the Sierra Ancha must be at nearly the northern limit of the range of this Mexican species, at least in this part of the State. The pointed crest and the peculiar head markings (from which the bird's common name is derived) serve as unmistakable recognition marks.

On the highest peaks there occurs another member of the family, the mountain chickadee, quite scarce, and apparently not descending to lower levels during the nesting season. A third titmouse, the lead-colored bush-tit, is most numerous on the eastern slope of the range, where the slightly different character of the forest, with juniper and agaves among the conspicuous plants, apparently affords more congenial surroundings than the denser pine forest.

To most visitors to the mountains the Audubon hermit thrush will be no more than a melodious voice, heard from dense fir woods or thickly shaded canyons. The birds are not uncommon, and during the summer months may be heard singing on all sides, especially toward evening, but to catch sight of one of the songsters requires the most cautious approach, with much patient waiting.

Western robins and chestnut-backed bluebirds are both familiar objects in the pine forests, the former by far the most abundant, and through its loud song most constantly brought to notice. Robins' nests with young were found during June in alders overhanging the streams.



LOCATION OF NEST OF THE PAINTED REDSTART, SIERRA ANCHA.

Unlike its relative, the Common Redstart of the eastern United States, which nests well up in small trees or bushes, the Painted Redstart places its nest upon the ground.



CLOSER VIEW OF THE PAINTED REDSTART'S NEST.

It was so well hidden in the cavity beneath the tree trunk that it could not have been found except through the sudden flight of the sitting bird.

GENERAL ACCOUNTS OF SOME BIRDS OF THE REGION.

PALMER THRASHER.

Toxostoma curvirostre palmeri (Coues).

Recognition marks.—Bulk about that of a robin; about $11\frac{1}{2}$ inches long. Color, pale grayish-brown, obscurely spotted on the breast; no distinctive markings that are readily apparent in the living bird. Short, rounded wings; long tail; slightly curved bill.

Occurrence.—Arizona is apparently the headquarters of the thrasher family, for whereas in most parts of the United States there is but a single species in any one region, the Arizona valleys contain six of more or less common occurrence, while a seventh (the eastern brown thrasher) has reached the State upon at least one occasion.

The Palmer thrasher is by far the most common of the Arizona thrashers, and of most general distribution. It is one of the most characteristic birds of the Papago Saguaro Monument. About Phoenix and Tempe it is, perhaps, the most abundant single species of bird, and it even ventures into the towns where sheltering brush piles or thickets remain in vacant lots or along roadsides. Cultivated farm lands hold little attraction for the thrasher, however, and it is rarely seen about such places.

The general appearance of the Palmer thrasher is of a plain, earth-colored bird, with no striking feature of form or color to aid in identification. As it flies the whitish colored tips to the tail feathers can sometimes be seen, but it is seldom that the obscure mottling on the breast can be made out without the aid of field glasses. In size, color, shape, and manner of flight, the features most apparent to the field observer, the Palmer thrasher is closely similar to the Bendire and crissal thrashers, and the Abert and Canyon towhees, with any of which species it is frequently associated.

From the towhees the thrasher may be distinguished at a reasonable distance by its long, curved bill, as well as by certain mannerisms, soon learned through observation. The squealing, chattering call notes of the towhees are also quite different from any sound the thrasher produces. The crissal thrasher is slightly darker colored, with no spotting on the breast, and of more slender build. This species occurs in the general region traversed by the Apache Trail, though I did not meet with it myself. Despite their superficial re-

semblance, however, there is little likelihood of the Palmer and crissal thrashers being confused, for the two birds inhabit different types of country. The Palmer thrasher is a denizen of the open, cactus-covered mesa; the crissal thrasher frequents the mesquite thickets of the river beds.

To distinguish between the Palmer and Bendire thrashers is another matter, for the two are found in exactly the same surroundings and resemble each other closely in appearance. The Bendire thrasher is the smaller of the two, perhaps an inch shorter in length, is more definitely spotted on the breast, and has a shorter, less curved bill. It is known to occur about Phoenix, but I did not meet with the species, and it is certainly far less abundant than its larger relative.

The Palmer thrasher is resident the year through in Arizona. Nest building begins before winter is fairly over, and the first eggs are laid late in February or early in March. Sets of eggs may be found until about the middle of May. The usual number of eggs in a set is three, rarely two or four; in color the eggs are pale bluish-green, uniformly dotted with brownish.

The nesting habits of the Palmer thrasher have been described in detail by Brown,¹ from the region about Tucson, and by Gilman,² from Sacaton. The latter makes the following statement:

The Palmer thrasher (*Toxostoma curvirostre palmeri*) showed a decided preference for the cholla cactus as a nesting site. Of 27 nests found, 11 were in the cholla; 7 in the jujube, about as spiny as any cactus; 4 were in mistletoe of mesquite and cottonwood; 2 in *Lycium*; 2 in mesquite; and 1 in a clematis vine trailing over a shrub. The average distance from the ground was 6½ feet, and extremes were 2½ feet and 10 feet. * * * Fourteen of the 27 nests contained 3 eggs each; 2 had 4 eggs; and the rest 2 and 1, some of the complete sets being 2 eggs.

The human investigator can only marvel at the manner in which the cholla cactus is utilized. It is a plant to be approached gingerly always, handled never, yet the birds slip through the interlaced arms with their fiendish array of thorns without hindrance or injury. Not only the thrasher, but the cactus wren also, habitually build nests therein; while other birds (the mourning dove frequently, and even the desert quail at times) utilize last year's thrasher and wren nests, crushed flat, on which to lay their eggs.

The manner in which the desert wood rat uses the cactus in barricading his home is another story, but one sure to be drawn to the attention of the student of desert birds. The marvel of it is that the cactus, while an effective barrier against enemies, should be traveled over and handled with impunity by the animals seeking protection.

¹ Zoe, III, October, 1892, pp. 243-248.

² Condor, XI, March, 1909, pp. 49-54.

The Palmer thrasher is a ground dweller, nesting, as described, in low bushes, and ascending to greater heights only when the top of some cholla or mesquite is resorted to as a vantage point for the delivery of his song. A cousin of the mockingbird, he is no disgrace to the family, but a singer whose performances add distinctly to the attractions of the desert he inhabits. In feeding he remains mostly upon the ground, utilizing his stout, curved bill for digging out burrowing insects or buried seeds. Of recent years this latter habit has brought the thrasher into disrepute in some quarters, for he has invaded the gardens of farms or suburban residences, and, it is asserted, does no little harm therein.

CACTUS WREN.

Helcodytes brunneicapillus couesi (Sharpe).

Recognition marks.—The largest of the North American wrens; about $8\frac{1}{2}$ inches in length. Thrasher-like in appearance and actions. Coloration brownish, obscurely streaked above, spotted on lower parts. The spots on the breast coalesce, forming a more or less "solid" black patch, a marking that is better defined in freshly molted autumn birds than in those in worn summer plumage. The outer tail feathers are spotted with white on the outer edge; the others (except the middle pair) are white tipped. The effect of these tail markings, when the bird takes flight, is to give the spread tail (rounded in shape) a narrow edging of white, a marking that will serve to distinguish the cactus wren from any of the Arizona thrashers (except the sage thrasher, found here in winter only), the birds it most nearly resembles and with which it is most often associated.

Occurrence.—Wherever the cholla cactus grows some of the plants are sure to be decorated with the large, globular nests of the cactus wren. There is no need for concealment in such shelter, and the structures are conspicuous amid the branching arms of the cactus, visible from afar, but not always easy of access. From a distance there is a general resemblance to the nest of the Palmer thrasher, so frequently placed in the same plant, in that both birds accumulate large masses of material. The thrasher's nest is open, however, while the cactus wren's is always covered. It is usually somewhat elongated rather than round, placed on its side, with a relatively small entrance pointing obliquely downward. In making any examination of the nest it is well to insert the hand gently, for there is a reasonable certainty that cactus thorns extend into the cavity at some points. The eggs, usually from three to six in number, are salmon color, obscurely speckled with dusky; there is some variation in the shade of ground color and in the density of the mark-

ings. Eggs are laid from early April into June. During July and August the young birds appear, flitting through the bushes in loosely assembled companies.

This is one case where a bird has received a thoroughly appropriate name, for wren and cactus are almost inseparable. Besides using the cholla for nesting site and sanctuary from enemies, the cactus wren, like many other birds, feeds upon the fruit. This is frequently indicated by the stained feathers of the face. Nests are sometimes placed in the branching arms of the saguaro, high above the ground; sometimes in yuccas or palms, and sometimes, though rarely, in mesquite or other brush; but the cholla is the usual choice.

Like the marsh wren, the cactus wren sometimes builds several nests in close proximity so as to give the appearance of a colony of the birds. Some of the nests are used the year through, presumably for sleeping or shelter, and the wrens may be seen repairing them in midwinter.

House wrens and others of the family are, as a rule, rather tame and confiding in their actions, sometimes prying curiously into their human neighbors' belongings and not strongly resentful when he responds in kind. The cactus wren in his native chaparral, however, is one of the wariest of birds, suspicious to a degree, and showing marked intelligence in eluding observation or capture. At the first suspicion of pursuit he is off, skimming close over the ground to the shelter of some thick bush at a distance. He does not stop there, though, but at once emerges from the far side for another flight. This is repeated again, and yet again, with intervals of short runs, perhaps (for the cactus wren sprints like a thrasher), until the threatening danger is safely outdistanced.

The cactus wren is not a musician, about the only sound to which he gives utterance being a harsh, chuckling call, not at all loud or far-reaching. There is a suggestion of derision in this call note, as given from some dense thicket into which the bird has plunged or from what he deems a safe distance.

In southern California the cactus wren has practically disappeared from those regions that have been cleared of chaparral, but in Arizona I was pleased to note numerous instances where the birds seemed to have become reconciled to changes that had resulted in the removal of all desert vegetation. On the grounds of the State capitol, at Phoenix, on May 29, several were seen foraging on the lawns and pursuing one another through the palms and other ornamental shrubbery.

In cultivated land near Tempe cactus wrens were seen repeatedly in brush piles or shrubbery near the farmhouses, where there certainly was no cactus or other desert vegetation for miles. Instances

came to my notice, too, of the birds coming familiarly about houses, so it seems that this dweller in the wilderness is in this region becoming somewhat used to civilized surroundings.

The cactus wren was seen about Phoenix, on the Papago Saguaro Monument, in and about Tempe, and at many points along the stage road between this point and the foothills. About Roosevelt Lake it is a fairly common species wherever there is sufficient brush to afford shelter. In the vicinity of Globe several broods of young were seen. In all this region the cactus wren remains the year through wherever it occurs.

VERDIN.

Auriparus flaviceps flaviceps (Sundevall).

Recognition marks.—Of small size; in fact, the smallest of desert birds save the hummingbirds and gnatcatchers; about $4\frac{1}{2}$ inches long; short tail. Coloration grayish; adult with yellow head and chestnut patch on shoulder.

Occurrence.—The presence of the verdin will doubtless first become known to most people through discovery of its nests. These structures, old and new, adorn so many of the thorny desert bushes that one can not travel far without having them brought to notice, though the tiny little builders themselves are so shy and inconspicuous as to require careful and persistent pursuit for satisfactory acquaintance.

The verdin has the same notions as the cactus wren as to the proper style of a nest, for the homes the two species build are very closely similar in shape and structure. The verdin, however, does not dwell in the cactus, but suspends his home in other shrubbery, usually far out on the smaller twigs, safe from climbing animals, though conspicuously in view. It is, of course, of smaller size than the cactus wren's nest, being about 8 to 10 inches long and some 5 or 6 inches in diameter in external measurements, and it is rather more compactly woven, though of coarser material, the outside being of relatively large and thorny twigs.

Search for the builder is at first quite apt to be fruitless, but as one walks over the desert there comes to the ear occasionally a faint, lispng note, apparently from some distance. This is the verdin, not nearly so far away as he seems, but keeping well out of sight in the bushes, and, if his shelter be too closely approached, slipping unobtrusively away to a more distant thicket. If, as is often the case, there happens to be a breeze stirring, he is even more elusive than usual, for he seems to prefer those bushes that are being most violently whipped about, and he is so tiny and so inconspicuously colored as to be able to flit from place to place without attracting attention.

The species was fairly common on the Papago Saguaro Monument, but was not encountered on cultivated ground. About Roosevelt Lake it is a common species. At Globe, on July 6, a flock of seven or eight verdins was seen, probably a brood of young, newly emerged from the nest, and still attended by their parents.

WESTERN KINGBIRD.

Tyrannus verticalis Say.

Recognition marks.—Usually seen perched conspicuously on fence post, telephone pole, or other point commanding unobstructed view of the surroundings. About 9 inches long; above, grayish; belly, yellow; tail, black, narrowly edged with white.

Occurrence.—Kingbirds, of whatever species, are much alike in most of their traits, and the western kingbird lives up to the traditions of his tribe. A king among birds, he may serve as the type of a benevolent despot, for, though not especially quarrelsome with small and harmless birds, he will not tolerate the presence of any threatening hawk or soaring eagle about his home and family. The propensity of the kingbird to drive off such enemies is familiar to most farmers, for the species is fond of nesting about buildings; in defending its own home it incidentally serves as watchdog for the chicken yard. Were it not for his unfortunate reputation in some sections as a devourer of bees, the kingbird would doubtless receive everywhere unreserved approbation and protection. Popular legend has it (and the tale is repeated in all parts of the country, though on how substantial grounds I can not say) that his crown of red feathers, sometimes revealed and sometimes hidden, serves, when exposed, as a lure for flower-hunting bees, and perhaps for other insects also, who, when attracted within reach by this gaudy, blossomlike bait, are snapped up with a minimum of exertion on the part of the bird.

Kingbirds are well known to take advantage of the most extraordinary nooks and corners for building sites—fence posts, swinging gates, or in fact almost any such elevation being utilized in a treeless region; but in the cultivated parts of the Salt River Valley the western kingbirds were moved with wondrous unanimity to adopt a site that to the human observer seemed singularly unfitted to the purpose. The species has evidently increased greatly in numbers in those sections now under cultivation, the green alfalfa and cotton fields doubtless supplying a far greater quantity of insect food than the dry desert; but, even so, there seemed to be trees sufficient along the roads to care for the birds' needs without their being driven to the curious expedient they used.

The poles supporting electric wires through this region are of metal, formed of three uprights tapering to a junction some 50

feet from the ground and with connecting crossbars at intervals. On the topmost crossbars there is just room for a nest, wedged in between the uprights, and this is the place universally chosen. It seems a peculiar preference to select a place so exposed to the glaring sun rather than the shady cottonwoods along the roadside; but the kingbirds of the country are so evidently of one mind as to the suitability of their choice that there is a nest, new or old, in every third or fourth pole along the roads.

The western kingbird occurs in some numbers about Roosevelt Lake, and is one of the species that was seen regularly about the hotel. In the near-by Sierra Ancha it is replaced by the closely similar Cassin kingbird (*Tyrannus vociferans*).

DWARF COWBIRD.

Molothrus ater obscurus (Gmelin).

Recognition marks.—About $7\frac{1}{2}$ inches long. Male, glossy black, with brown head; female, uniform dull brownish; eye, brown. No red, white, or other contrasting markings in either sex.

Occurrence.—In all the valleys of southern Arizona the dwarf cowbird occurs in numbers during the summer months. Through the winter it is found commonly in the valley of the Colorado River, but apparently not elsewhere in the State. Cowbirds are common through the country traversed by the Apache Trail, usually seen in small flocks, quite free of the care and worry of family duties. The species is especially numerous, together with the redwings, in the irrigated farming lands, where cultivation of the ground produces an abundance of food; while the presence of cattle and horses provides associations to which the cowbird is especially addicted, as is indicated by the bird's name. The species may be seen also, however, over the most arid desert; in fact, certain of the desert birds are among those most frequently victimized by the cowbird. The plumbeous gnatcatcher is one that seems especially to suffer from the cowbird's visitations; it is an especially pathetic sight to see one of these tiny birds acting as parent, and poking hopelessly inadequate mouthfuls of food into the gaping bill of her enormous foster child. One can imagine the gnatcatcher's feelings of relief when the strain is over and the foundling has betaken himself to his kindred; but with the relaxation following the deliverance there must be a feeling of having passed through a peculiarly wearing summer with nothing to show for it at the end.

The dwarf cowbird does not, as a rule, ascend the mountains above the foothills, but aside from this the species is not closely bound by environmental conditions. As long as other small birds are able to build nests and rear young the cowbird is willing to put up with the

surroundings, and will not place personal prejudices above the general good.

This is one of the species that was of daily occurrence about "The Lodge" at Roosevelt during my visits there in June and July. Small flocks would appear from time to time, especially toward evening, when they would rest a few moments in some of the small trees about the hotel before starting out on what appeared to be a long flight, perhaps to some distant roost.

DESERT SPARROW.

Amphispiza bilineata deserticola Ridgway.

Recognition marks.—About 5 $\frac{3}{4}$ inches long. Frequents the ground or low bushes. Adults with a black area covering chin, throat, and upper breast, pointed below, sharply defined and conspicuously outlined against the whitish lower parts. Two narrow, white lines on side of head, one over the eye, the other extending diagonally downward from corner of mouth. Outer tail feather, edged and tipped with white. As the bird flies the tail appears blackish, as contrasted with the lighter colored upper parts. Young birds lack the black throat; chin and throat white, breast streaked with grayish or brownish markings.

Occurrence.—The desert sparrow, for reasons of his own, does not regard with favor the lowlands west of the Superstition Mountains, and none was seen in this section. The species has been taken here in the winter months, but appears to seek somewhat higher altitudes for nesting. About Roosevelt Lake it is one of the most abundant birds, as it is also along the road to Globe, and, from the latter point, throughout the valleys to the southward.

In June, at Roosevelt Lake, young and old together were gathered in little flocks, scattered through the brush, and taking flight one by one when approached too near. The male birds, presumably, were everywhere perched upon low bushes, giving continual utterance to their tinkling song. The desert sparrow in many ways is very junco-like, the chattering alarm note, the song, and the bird's actions in flight or feeding being all strongly suggestive of his mountain cousin.

The nest is usually placed in some low shrub, from a few inches to 2 feet above the ground, and constructed of shreds of bark, small twigs, or grass. The eggs, three or four in number, as a rule, are white, faintly tinged with bluish green, and sometimes with a few fine black specks at the large end.

This is a bird of the desert, haunting the most barren wastes, frequently many miles from water, and but seldom seen even in the bottom lands of such streams as traverse its desert home. It occurs in

Arizona the year through, though its exact distribution in summer and winter, as well as the local migrations that occur, remain to be worked out. As shown by the manner of occurrence of the species over the Apache Trail, it is not found nesting in every one of the desert valleys. In winter it is apparently of general distribution throughout the lowlands of southern Arizona.

PHAINOPEPLA.

Phainopepla nitens (Swainson).

Recognition marks.—Size small, total length about 8 inches. Both sexes with a long crest on top of head, usually carried erect. Adult male, glossy black; white on inner webs of primaries, showing as a large white spot when the wing is extended, visible usually only in flight. Adult female and young, plain brownish gray, the white wing patch less conspicuously contrasted with the rest of the plumage.

Occurrence.—To the visitor from the east the first view of this bird brings an unfailling thrill of pleased surprise. Restricted to the southwest, of striking appearance, and totally different from any other North American bird, the phainopepla is sure to attract attention. Perhaps the finest written account of such a first impression is that given by Dr. Coues,¹ one of the earliest of Arizona ornithologists:

While roaming about in Arizona, sometimes hunting for birds and sometimes for Indians, I used at intervals to see a bird that I did not then know, and that I came to regard at last as great "medicine," so persistently did it elude me—now I could not get a shot at the shy thing—now a fair shot offered, but we had orders not to shoot for fear of discovery. It was a beautiful jet-black creature, showing a pair of white disks, one on each side, when it flew; generally seen amidst dense chaparral, dashing about with a nervous yet lightsome flight, reminding one of the action of a mockingbird; now for a moment balancing with expanding wings and tail on some prominent spray, then darting into the air to secure a passing insect, or hurrying out of sight in the safe recesses of the covert. A rather harsh and querulous note, which I learned to associate with this wild and restless bird, was sometimes heard; and once I listened to a superb piece of music which I am perfectly sure came from this mysterious stranger. It was growing dusk: the scene, the camp of a scouting-party returning from unsuccessful pursuit of some Indians, who had raided and run off our beef, and men busy gathering for burial the charred and dismembered body of a comrade, who had been killed and burned a few days before on that very spot, where the wolves had afterward fought for the remains. The bird of omen, for good or bad, appeared in somber ceremonies, and sang such a requiem as touched every heart; the camp grew more quiet than usual, and we went to bed early.

It speaks little for the imagination of those familiar with the species in life that so conspicuous a bird should not have been given

¹ Birds Col. Val., 1878, p. 476.

some appropriate vernacular name. In some sections it used to be known as the black mocker, from its appearance in flight, which suggests that of the better known mockingbird, but I have not heard this name used in recent years. The bird is known everywhere, but is always nameless. Of book names there are plenty. "Crested shining-black white-winged flysnapper" is descriptive, but hardly concise enough for everyday use. "Shining ptilogonys" is worse than the name in use. "Phainopepla", in its meaning (shining robe) is appropriate, and it is perhaps the best that we can do. It is, after all, no worse than certain other scientific names of animals and plants that have come into common use.

The phainopepla, while originally a bird of the desert or of the chaparral of the foothills, has no objection to towns as such, and provided there is an abundant supply of pepper tree or elder berries, or similar food, readily becomes tame and familiar in urban surroundings. It can, perhaps, be observed more easily and at a closer range in the parks and gardens of Phoenix and Tempe than out on the desert, where it is apt to be wary and unapproachable.

Phainopeplas were seen practically everywhere along the Apache Trail: in Phoenix and Tempe, on the Papago Saguaro Monument and in the willows of the near-by river bed, at points along the road to Roosevelt, about the shores of the lake, at Globe, and from the train at many points between Globe and Bowie. Wherever encountered the birds were drifting aimlessly about, apparently with no home ties, and no nests were observed.

ZONE-TAILED HAWK.

Buteo abbreviatus Cabanis.

Recognition marks.—A large hawk of the soaring type; somewhat like a redtail in outline and actions, but of different coloration; much more likely to be mistaken for a turkey vulture. Adult, uniform black; tail crossed by three bands, white when viewed from below, gray above. Immature, with tail lacking the distinct bars, but irregularly mottled with white or grayish.

Occurrence.—On June 5, as the stage swung down the steep incline into Fish Creek Canyon, a hawk of jet black hue appeared, circling overhead. He came nearer and nearer, until, turning with wide-spread wings and tail, he was close enough to afford a clear view of the pure white bar across the center of the tail.

About a month later, on July 3, I was walking up the little canyon south of Roosevelt Lake where there is situated a group of cliff dwellings. As I neared the spring that rises a little way up the canyon, a zone-tailed hawk flew hurriedly from the trees overhead. The load of dust shot mistakenly sent after him had no result other

than to make the startled hawk let fall a burden he was carrying. This proved to be an adult male desert quail, still alive, probably having been taken from a flock we heard calling in the bushes nearby.

A zone-tail, shot near the summit of the Sierra Ancha on June 26, had in his stomach the remains of a Gila chipmunk.¹ Although, as he circles about on lazy wings, or drifts slowly across a canyon, the zone-tail appears too sluggish for any rapid action, the capture of the chipmunk by this individual speaks volumes for the speed that can be attained when necessary. If there is any small mammal that is harder to see in the brush or that can get out of sight with greater speed than the Gila chipmunk it should be safe from any danger. Merely to catch sight of one of these animals, though they be heard chipping in the bushes all around, is no small feat; while for a hawk to lay talons on one, in his chosen haunt of underbrush, logs, and rocks, bespeaks a swoop of lightning speed.

Once as a zone-tailed hawk passed overhead several band-tailed pigeons darted out of some oak trees below, so startled that they nearly struck me, two of them separating and passing on either side. At the time I thought their nervousness uncalled for, but in the light of the subsequent discoveries I made as regards the food of the zone-tail they were probably justified in their frantic departure.

In flight this hawk bears a striking resemblance to the turkey vulture. The general dark coloration, of course, is very much the same in the two species, while in addition the outline of the extended wings, color pattern of the under surface of the wing, and manner of flight are all so very similar that the hawk could easily escape recognition. Of course, the white band across the center of the tail is unmistakable, but this marking is not always conspicuous and may entirely escape observation.

The zone-tailed hawk, though quite generally distributed in southern Arizona during the summer months, is not abundant anywhere. It has been found breeding at several points in the State and its nesting habits in this region are described in detail by Dr. Mearns.²

In the history of a nest of this hawk situated in the Rincon Mountains, and possibly still in existence—for hawks' nests sometimes last for many years—there is an incident of considerable historical interest, as illustrative of the dangers accompanying bird study in Arizona in the early days. The first resident ornithologist of Arizona, Herbert Brown, has described the occurrence as follows:

In a small canyon in the western foothills of the Rincon Mountains, about 21 or 22 miles east of Tucson, stands a medium-sized cottonwood tree in which hawks have nested for many years. The old stick pile on which so many generations of birds have been raised has become quite bulky through its annual accretion. In the spring of 1886 I was told by parties coming in from the San

¹ *Eutamias dorsalis*.

² Auk, III, 1886, pp. 60-69.

Pedro that a pair of "black hawks" had taken possession of the old nest. As such birds were not common thereabouts the statement was worth looking into. I reached the tree just before sundown and to my delight I found things as represented and that one bird then occupied the nest. It was black, sure enough, and resented interference with many angry screams as it circled above the tree. It proved to be a male band-tailed buzzard (*Buteo abbreviatus*). Unfortunately the female, although seen at a distance, failed to respond to the cries of her mate, and what was still more unfortunate the nest contained no eggs. It had been newly lined with leaves from the tree and was apparently ready for housekeeping. I waited till noon the day following in the hope of being able to make a closer acquaintance with the mate of the bird I then had, but had to leave without being thus privileged.

I subsequently learned from the late Major Chas. E. Bendire that he had, during the spring of 1872, climbed this same cottonwood tree and had examined the nest in question. He was at that time camped on the Rillito and had, while scouting, seen the nest. Some days later, as no hostile Indians were known to be about, he returned to the tree and climbed to the nest, which is located in a fork of the tree about 40 feet up. While examining the nest he happened to look in the direction of the opposite hill and saw an Indian watching him from behind a giant cactus with which the hills thereabouts are thickly covered. To be caught meant a lingering death at the stake, to escape, under the circumstances, seemed almost impossible, but he did. He pretended not to have seen the Indian and after having apparently satisfied himself about the nest he slowly descended the tree, but no sooner did his feet touch the ground than he made a run for his horse which was tied a short distance below. As he did so about 30 Indians gave chase, but he fortunately got away.¹

TEXAS NIGHTHAWK.

Chordeiles acutipennis texensis Lawrence.

Recognition marks.—Usually seen flying. A medium-sized brownish-colored bird, about 9 inches in length, with long pointed wings. On each wing a round spot, white in the adult male, yellowish in female and young, conspicuous in flight.

Occurrence.—In all the valley towns of southern Arizona the Texas nighthawk is a familiar sight. It has not, as yet, acquired the habit of its eastern relative of nesting upon the flat roofs of buildings, but throughout the summer the birds may be seen in numbers at dusk, hawking about, low over the houses. In walking about on the desert one is sure to flush Texas nighthawks from their resting places under the bushes, where they usually remain during the daytime. Though preferably feeding at dusk, they are by no means helpless in the bright light of day. In fact, they do not appear to be particularly discommoded by the glare of the sun, and may be seen going through their courting antics at any hour.

The male Texas nighthawk performs no such spectacular evolutions as the eastern nighthawk does in the breeding season, but he

¹ Brown, H., Auk, XVIII, 1901, pp. 392-393.

has a comparable, though lesser performance, usually given when in pursuit of the female. Both birds flying low over the bushes, the male repeatedly utters a low, chuckling sound, "tuc-tuc-tuc-a-tuc-tuc—c-r-rooo," a rolling note, the finale very dove-like in effect. While uttering this call the wings are held stiffly extended downward. Then, in ordinary flight, there is repeatedly given a long drawn, nasal "w-a-ng."

The Texas nighthawk is a summer visitant in Arizona, retiring to more southern latitudes during the winter months. It has been observed along the Colorado River from April 9 to October 5; in the central part of the State it is probably some weeks later in arriving, and possibly earlier in departure.

The eggs are two in number, grayish or cream colored, and finely speckled or marbled with darker markings. This coloration is in excellent imitation of the sandy or gravelly ground upon which they rest, for no nest building is attempted. The resemblance of eggs to background is so perfect that the closest scrutiny is required to reveal their presence, even though departure of the brooding female indicates their proximity.

Texas nighthawks are abundant in the Salt River Valley. On the Papago Saguaro Monument they were flushed during the daytime from beneath bushes; in Tempe they were seen of evenings soaring over the town. About Roosevelt Lake several were startled from their resting places beneath the bushes, but the species was not abundant at this point.

ARIZONA CRESTED FLYCATCHER.

Myiarchus magister magister Ridgway.

Recognition marks.—About 10 inches in length, of which the tail is nearly half. In color, above dark brownish, below with gray throat and yellowish belly. Wings and tail appear decidedly reddish when outspread in flight.

Occurrence.—Visitors from the eastern United States comparing the Arizona bird with the eastern crested flycatcher (*Myiarchus crinitus*) will find the two of about the same size, but the Arizona bird with longer tail and of appreciably paler coloration. California bird students, making comparison with the ash-throated flycatcher (*M. cinerascens*), will find the Arizona crested flycatcher very similar in color and proportions, but of greater size. To distinguish between these two latter species is not always an easy matter. The ash-throat inhabits large portions of Arizona where the Arizona crested flycatcher does not occur, but it is also found, apparently, throughout the range of the latter species. The difference in size between the two is readily appreciable when it is possible to make

comparisons, but in the field, seeing one bird at a time, it is easy to make mistakes. This is especially true in a desert region where atmospheric conditions are sometimes such that a coyote may appear as large as a steer or a soaring swallow like an eagle. There is no certain criterion for distinguishing at all times between these two closely-related flycatchers, but a majority of the birds seen may be placed with reasonable certainty. Where both species occur the ash-throat is not as common as the other. In favorable light, or at close range, either species may be readily distinguished by its size. There are differences in the call notes, but both species are noisy, and each has a variety of notes that must be learned by experience to be distinguished one from the other.

The Arizona crested flycatcher is in Arizona a summer visitor only. As during the nesting season it is apparently restricted to the immediate vicinity of giant cactus, its range in the United States is practically restricted to southern Arizona and to only those sections of Arizona where the big cactus occurs. Egg laying takes place early in June. During the first two weeks in June, 1903, the writer examined some 8 or 10 nests found in the vicinity of Tucson. These were all in woodpecker holes in giant cactus from 15 to 25 feet from the ground and contained each from three to five eggs. The nests were composed mainly of hair taken from dead horses and cattle, the cavities in consequence reeking of carrion rather overpoweringly. Usually there were pieces of cast snake skin in the nests, as so often occurs in all the flycatchers of this genus, and occasionally a mummified owl or woodpecker underneath.

The Arizona crested flycatcher was seen on the Papago Saguaro Monument, but not commonly, perhaps 8 or 10 individuals, all told, being observed. About Roosevelt Lake the species seemed scarce. One was seen in the canyon below the cliff dwellings nearest the lake, and one or two others on the mesa between the lake and the foothills of the Sierra Ancha.

DESERT QUAIL.

Lophortyx gambeli Gambel.

Recognition marks.—From the other birds with which it is associated the desert quail is, of course, distinguished by all the attributes common to the quail family, of which the strong, whirring flight is most apt to first draw the observer's attention. Among the several species of quail occurring in Arizona it is at once recognized by its club-shaped top knot. In general appearance, color, and markings it is sufficiently like the California quail so that the two are frequently confused, but the latter does not occur in Arizona, and need cause no trouble in this connection.

Occurrence.—Even the most casual observer, hastening through the country in swift-moving auto, or perhaps never even leaving the railroad coach, can not help but have this abundant game bird brought to his attention. All along the stage road, from Tempe to Roosevelt and from Roosevelt to Globe, single birds, pairs, or little companies of five or six, took flight from either side, or scurried to shelter on legs moving so rapidly as to appear as a fuzzy blur. About Roosevelt, from time to time, broods of tiny young were encountered (this was in June), sometimes buzzing up on all sides, like overgrown bumble bees, in comical imitation of their parents' roaring burst of wings, with bodies not much bigger than sparrows, but well able to fly. Quite often the broods trotted along under the bushes without flying, the old birds somewhat solicitous, and urging the youngsters to cover as rapidly as possible.

At Carr's ranch in the Sierra Ancha (nearly 6,000 feet altitude), Mr. Carr had introduced the species, bringing young birds up from the valley some years before. They had not thrived, however (scarcely a matter for surprise, considering the difference in the surroundings), and at the time of my visit their numbers had been reduced to a pair or two. At least one pair raised a brood this year, however, and the young birds seemed to be doing well. It was a distinct shock to be greeted by the unmistakable call note of this desert species amid yellow pines and white oaks, and, until the explanation came, most disquieting to one's sense of the fitness of things.

The desert quail, as a rule, builds its nest upon the ground as other quail do, but in southern Arizona it has been known occasionally to utilize old thrasher or cactus wren nests, several feet up in cactus or bushes.

WHITE-WINGED DOVE.

Melopelia asiatica trudeaui (Audubon).

Recognition marks.—Unmistakably pigeon-like in appearance and actions; a crescent-shaped white patch on each wing and white band across tip of tail, conspicuous in flight. As compared with the mourning dove, the white-winged dove is of heavier build and with square-tipped instead of pointed tail.

Occurrence.—Throughout the valleys of southern Arizona the white-winged dove, or Sonora pigeon as it is generally known, is an abundant summer visitor. Mesquite-grown bottom lands form the favorite breeding resort, and it is there or in cultivated fields that the white-wings are to be found in numbers. Anywhere on the desert, however, one is apt to see them, passing overhead, feeding, or resting on the giant cactus or in the shade of the thicker bushes. They also invade the towns to some extent, and may fre-

quently be observed in garden shrubbery or perched on fences or electric wires.

The cooing of the white-wing is quite lacking in the melancholy dignity of the mourning dove's notes. There is, on the contrary, in the laboriously pumped-up tootling of the white-wing a touch of the ridiculous that is sure to strike one at first acquaintance. Later on, through interminable reiteration, it becomes commonplace and monotonous, for the birds are most abundant and are assiduous musicians. P. L. Jouy states¹ that in Mexico its doleful song has been transposed by some poetical genius into the following refrain:

Tu! Tu!
 Qué quieres?
 Qué quieres?
 Quiero tu! Quiero tu!

You! you! What do I want? I want (or love) you! I love you!

Besides this long and elaborate refrain there is a short and emphatic call note, sometimes repeated over and over again at frequent intervals. This has been translated as, "Whó cooks for you", a question given with rather insulting emphasis.

In nesting habits the white-wing is much like the mourning dove as regards structure of nest and choice of building site. It does, however, show a decided preference for mesquite, far more nests being placed in this plant than in any other. Cottonwoods and willows are not uncommonly used, while an occasional nest may be found in other trees or shrubs where they provide sufficient shelter.

The birds, as a rule, arrive in southern Arizona about the third week of April. Gilman gives the date of arrival at Sacaton as April 20, while I found a bird sitting on eggs near Tucson as early as April 13. The eggs are two in number, and are for the most part laid during the period from the middle of May until the end of June, occasionally in July. In August the white-wings begin to scatter from their nesting grounds, and at this season may be found in loosely associated flocks in the live oaks of the foothills, at a far higher altitude than that at which they breed. During September they leave, and by the 1st of October are nearly all gone.

The food of the white-winged dove is described by Gilman (Condor, XIII, 1911, p. 52) as follows:

Their coming is coincident with the ripening of the berries of the wild jujube, *Zizyphus lycioides*, upon which they feed greedily as long as the fruit lasts, consuming both ripe and green. . . . They come in such great numbers that the wheat fields suffer and the loss is considerable.

In addition to the wheat, these doves feed on other grains and much weed seed. They are very fond of sorghum seed, and large flocks gather on a field of this plant. The giant cactus (*Cercus giganteus*) furnishes them a large

¹ Proc. U. S. Nat. Mus., XVI, 1893, p. 789.

amount of food also. They may be seen on top of the great columns as soon as the first blossoms appear, thrusting their bills into the trumpet-shaped flowers, but whether for insects, pollen, or nectar was not learned. As soon as the fruit ripens, however, there is no doubt as to what they are seeking. Their actions are a sufficient index even without the tell-tale red stain around their mouths. They frequent the cactus groves as long as any fruit is left, flying a long distance to reach this delicacy.

The white-winged dove is an excellent game bird, of good size, satisfactory for the table, and sufficiently swift of flight to test the skill of the gunner. In flying from feeding ground to watering place, the streams of passing birds give the best of flight shooting.

Along the Apache Trail this bird was seen nearly everywhere. It was repeatedly observed in parks and gardens in Phoenix and Tempe, on the Papago Saguaro Monument, and on the farming land about Tempe. About the shores of Roosevelt Lake a few of the birds were seen, but not in the numbers observed in the lower valleys. The species was also noted about Globe.

INCA DOVE.

Scardafella inca (Lesson).

Recognition marks.—Size small; $8\frac{1}{2}$ inches in length, about half of which is tail. Aside from its diminutive size, like other pigeons in appearance and actions. Chestnut coloration on wing, nearly concealed in the closed wing but conspicuous in flight. Long tail, edged with white. The long, white-bordered tail will serve to distinguish this species from the short-tailed Mexican ground dove, the only bird with which it is apt to be confused.

Occurrence.—The towns of southern Arizona are fortunate in the presence of this little dove, which not only tolerates human surroundings, but flatly declines to reside amid any other. Though a common species in certain sections, it is not of general distribution over the State. It does not occur in northern Arizona, nor does it reach the Colorado River; the region included in the lower Salt River Valley and the Gila Valley immediately to the southward, appears to be the center of abundance. In this section it is a common resident of every town, feeding in streets, roads, and corrals, and nesting in shade trees or garden shrubbery. I have never yet seen the Inca dove away from towns or the immediate vicinity of ranch houses. It is a familiar feature in the streets of Phoenix and Tempe, and was seen in lesser numbers at Globe.

The life history of the Inca dove, as observed in this same general region over a period of years, has been graphically described by Gilman:

The vivacious little Inca dove (*Scardafella inca*) is the cream of the dove family and is in the public eye or ear most of the time. Whether sitting on

a barbed wire fence or a clothes line, with long tail hanging down perfectly plumb, or marching around in a combative manner with tail erect at right angles to the body, or rushing around busily and hurriedly, not to say greedily, feeding with the chickens in the back yard, it shows a decided individuality and arouses interest and affection. If I could transport to my California home the Bendire thrashers to sing to me and the Inca doves to amuse me I would surely do it.

I have never seen them far from dwellings or barns, and even in nesting they show a decided preference for human company. They feed in yards with poultry, perch on back-yard fences, and seem as much part of the establishment as the woodpile. They are rather dainty in their drinking, rarely using the chickens' drinking vessel, but perching on the hydrant and catching the drops of water as they leak from the pipe. To do this they nearly have to stand on their heads, but that does not bother them at all. They eat wheat and other small grains but draw the line at corn, it probably being too large for them to swallow. At our house we always include rations for the Incas when ordering wheat for the poultry.

These little doves are with us the year through, and their hard metallic little coo can be heard every month in the year, though most in evidence during the breeding season. As I write this, I can hear the "coo-coo" which gives them their Pima name of coo-coo. The call is much in evidence also during the heat of July and August, at which trying time people with nerves complain of the constant noise they make, which begins early in the morning and ends late in the evening. There is an insistent, persevering quality about the calling that is quite impressive, and when a lot of them keep at it some people sit up and take notice. They are numerous, too, as I have counted more than 20 feeding with about a dozen chickens in a small yard.

The Inca dove could never have inspired the term "dove of peace," as they are pugnacious to a fault and fight like little fiends. Two of them will face each other with one wing on guard, held straight above the body; then close in and mix it, buffeting with wings till the sound of the blows is audible at a distance of 50 yards. The bill is also used with bloody results about the head. I have been told that one will sometimes kill the other, but never saw such an extreme case. When arranging for a fight, the combatants utter a sort of growl, if it may be so described: a very guttural, anger-expressing sound. In animated talk, gossip perhaps, they excitedly utter sounds something like "cut-cut-ca-doo-ca-doo." In all, quite a vocabulary is at their command. In motion they are quick and lively, and have the same jerky flight as do the ground doves.

The nests of these doves are nearly always placed near a dwelling or a barn. I have never seen a nest more than 100 yards from a building of some kind, and many of them are as close as they can find a tree in which to build. A row of umbrella trees close to a dwelling has for three years been a favorite place for nests, and also a row of cottonwood trees along the front yard. These two kinds of trees are most frequently used, probably on account of their nearness to houses. Mesquite trees and fruit trees are also drawn on for home-steads. The nest is a little more elaborate than that of the two large doves and shows more of a depression or cup in the center. Rootlets, twigs, grass, and leaf stems are materials used in the construction. The birds are generally quite tame on the nest, rarely flying off till the intruder comes closer than arm's length. I have placed my hand as close as 10 inches to a brooding bird, but have never quite been able to pet one on the nest. They are so accustomed to human presence that the broken-wing subterfuge is rarely resorted to. The

average distance from the ground of a number of nests was 12 feet, and they ranged from 7 to 20 feet.

Fighting and cooing begins about the 1st of February, but the earliest nesting date I have recorded was April 11, when fresh eggs were found. The latest date was September 25, when a nest containing eggs slightly incubated was found. At least two, and possibly three, broods are raised during the year. The past season I noted four cases where two broods were raised in the same nest, and two cases where a last year's nest was relined and used. Two nests found were built on top of old cactus wrens' dwellings.

Though so tame and accustomed to human presence, when caught the doves are violent in their attempts to escape. I trapped two at different times to have a friend take their photograph. I placed them in a cage to await the coming of the camera man, but they used the same jerky motions to escape that they do in flying, and went at it with the same vim that they do in fighting. They were fast in injuring their heads, and I released them after a few minutes.¹

MEARNS GILDED FLICKER.

Colaptes chrysoides mearnsi Ridgway.

Recognition marks.—A large woodpecker; length about 11½ inches. Rump white, and under surfaces of wings and tail yellow, conspicuous in the flying bird. The gilded flicker will probably be recognized at sight by anyone at all familiar with birds, either in the East or the West, for it has the unmistakable flicker characteristics of voice, flight, and markings. From the red-shafted flicker, which occurs in the same region in winter, it is readily distinguished by the possession of yellow, instead of red, shafts of wing and tail feathers. From the eastern yellow-shafted flicker the gilded flicker may be distinguished by its red "mustache" (in the male bird), and by the absence in either sex of the red crescent at the back of the head.

Occurrence.—So closely is the gilded flicker restricted to the vicinity of the giant cactus that it is useless to look for the species save in the neighborhood of that plant. It is true that an occasional flicker builds its nest elsewhere than in the trunk of the cactus, but in such case it will be a tree growing in a giant cactus region.

The species is resident the year through wherever it occurs, but in the winter it is joined by the larger red-shafted flicker. The latter species is restricted to the higher mountains during the summer.

The gilded flicker was seen in fair numbers on the Papago Saguaro Monument. Two nests placed high in towering saguaros were found there on May 30, both containing noisy young assiduously fed by their parents. About Roosevelt Lake the species was seen daily, though not in any large numbers.

¹ Condor, XIII, 1911, pp. 55-56.

Following are quotations from an article by M. French Gilman, treating of the life history of the gilded flicker, as observed about Sacaton, Arizona:

Mearns gilded flicker (*Colaptes chrysoides mearnsi*) is abundant throughout this region and is found in cottonwood and willow groves as well as wherever the giant cactus grows. The giant cactus is to this flicker and the Gila woodpecker what the bamboo is to the inhabitants of some of the eastern islands. The cactus could get along without the flickers, though it probably would not feel properly ventilated without a few nest holes, and it would not look at all natural without them. The cactus furnishes the birds with home, shelter, food, and possibly drink. They roost in the holes and seek them as retreat from rainstorms. More than once when driving through a heavy rain have I seen a flicker's head thrust from a hole in an inquiring way, as though to say, "Look, who's here."

The gilded flickers are much quieter than the Gilas and are not so much in evidence around homes, though they do not appear to be very timid. They are simply less sociable, I presume. They resort regularly to the Indian corncribs and are seen in cornfields, though I have never noticed them actually engaged on an ear of green corn as I have the Gilas. They probably attack the green corn, but are quiet about the work instead of advertising their presence. They eat largely of the cactus fruit and possibly of the pulp at certain lean seasons. They are very fond of watermelon and eat freely of it when it is placed on bird tables or on the ground in shade of tree or shed. They appear to feed frequently on the ground in the way the red-shafted does and are probably after ants most of the time. I have seen them at work on an ant hill and even pecking into the ground after the insects. When melon is placed both on the tables and on the ground they resort more often to that on the ground, while the Gilas prefer the tables. However, I have never seen the flickers drink from the pool of water provided, though the Gilas occasionally do.

They are peaceable and impress me as being eminently practical and matter of fact. Each one minds his own business, as the Gilas do sometimes, but are solitary or in pairs. They have the same habit of pecking the walls of buildings as have the red-shafted flickers, and one has worked spasmodically at the shingled gable of the schoolhouse here for the past three years. I take it to be the same individual, for he is rather tame and roosts each night above one of the window casings. A few times I have seen a Gila woodpecker at work at the same point in the wall, but usually his time is put in on a telephone pole in the yard. The notes of this flicker are quite similar to those of the red-shafted, but not so frequent nor quite so loud.

The nests are found in giant cactus, cottonwood, and willow, and in that order as to frequency, the giant cactus leading. Nests are in the giant cactus or Saguaro, as it is called, far from water, and in cottonwood and willow along the river, on banks of the canals, or even standing in stagnant water pools. Of 27 nests examined containing eggs or young, 21 were in the Saguaro, 4 in willow, and 2 in cottonwood. Others were seen in cottonwood, but too difficult of access, and many in the cactus were out of reach. If careful work were made I believe about 90 per cent would be found in the cactus. Nests in cottonwood and willow ranged from 5 to 25 feet from the ground and in Saguaros from 11 to 25 or 30 feet.

April is the month for flicker nesting, as 19 of the 27 occupied nests were noted during that month; 11 contained eggs, and 8 had young. Of 8 nests found in May, 4 had eggs and 4 contained young. April 11 was the earliest

date for a complete set, and April 19 date of first young found. May 17 was the latest date of nest with eggs. * * *

The entrance to the nest holes varies much, as may be seen from the figures given. The smallest entrance measured $2\frac{1}{4}$ inches and the largest $4\frac{1}{4}$ inches. The shallowest hole was 10 inches, and the deepest 18 inches. The average diameter of entrance to 36 holes measured was 3.28 inches, and average depth of same holes was 12.75 inches. The entrance to the 18-inch hole was $3\frac{1}{2}$ inches in diameter, and while the ratio is not constant, the shallower holes tend to have smaller entrances and the deeper holes have larger entrances. It was difficult to measure the diameter of the bottom of the nest holes without destroying the nest, and this was not to be considered when the hole was occupied, so very little data was secured. From the few measurements taken it may be stated that the bottom of the nest hole is from $4\frac{1}{2}$ to 6 inches in diameter. It is hardly correct to use the term diameter, as many of the hole bottoms were not nearly circular, one I measured being 4 inches one way and 6 the other. This variation seemed to be governed by the size of the cactus, as in the smaller plants there was not room to excavate a large circular bottom, and it had to be stretched one way. How the four young find growing room in some of the nests is a puzzle; I have never been able to fit them back when once removed, unless it was done soon after they hatched.

The gilded flickers do not object to using a hole after the entrance is enlarged. Two years ago I cut into a hole occupied by a Gila woodpecker, and the following season a flicker used it. In the same tree at the same time I cut into a flicker's nest, and the following year a sparrow hawk occupied it with four eggs.

While speaking of Gila woodpeckers I mentioned catching one at work excavating a hole in a stump. A short time afterwards I examined the hole and found a gilded flicker at home there with three tiny young and two infertile eggs. She had taken the hole and enlarged it sufficiently to accommodate her family.

The young when first hatched are not very prepossessing to anyone, except, perhaps, the parents. At first glance they remind one of the pictured restoration of the Plesiosaurus, with their long twisting naked necks. The lower mandible was more than an eighth of an inch longer than the upper, and on the tip of each was the hard white growth used in opening the shell. At this nest the parents showed more solicitude than any others I had seen, coming as close as 4 feet from me. In most instances they are rather indifferent, even when the young loudly protest at being handled. One nest examined contained four nearly grown. When disturbed one of them flew from the nest and landed about 100 yards distant, coming to the ground very awkwardly, but flying as well as though he were a graduate from a school of aviation. Two others then left the nest but made only short flights. I caught and tried to keep them still enough for a photo, but did not have enough hands to hold them still and operate the camera. They made enough noise to attract attention but neither parent put in appearance to investigate the disturbance.

They are not close sitters, and usually leave the nest before the tree is reached or the ladder placed against the trunk. As soon as an intruder's footsteps become audible the landlady pokes her head from the entrance and soon after departs, never giving opportunity for capturing her on the nest. Deserted flicker nest holes are made use of by several other birds. In these holes I have often found sparrow-hawks and Saguaro screech owls. Once a Bendire thrasher made her nest in one with a crack in one side that let in light enough for her. In a partly excavated hole I found the nest of a western kingbird, and in another the nest of a house finch. Occasionally the cactus wren builds

in the deserted hole. In one Saguaro I found occupied nests of the gilded flicker, Gila woodpecker, and ash-throated flycatcher. A cactus wren was in an ironwood at the base of the cactus and beyond reach of the ladder were holes giving signs of occupancy by owls.¹

GILA WOODPECKER.

Centurus uropygialis Baird.

Recognition marks.—A medium-sized woodpecker, about 10½ inches long. Upper parts barred with black and white, in zebra-like fashion. A large, white spot on each wing, conspicuous in flight; white markings on middle tail feathers, also rather conspicuous on the flying bird. Quite noisy when disturbed, with all the call notes of a whining, querulous character.

Occurrence.—The Gila woodpecker has its center of abundance in the United States in the valley of the Gila River. It is a familiar inhabitant of the lowlands of southern Arizona, both on the desert mesa and along the wooded river bottoms; and an excellent example of a desert bird that has taken kindly to civilization and the cultivation of the land. It is a common species about Phoenix and Tempe, as also about Roosevelt Lake. Nests were found in giant cactus on the Papago Saguaro Monument, in cottonwood trees along irrigation ditches near Tempe, and again in a canyon near Roosevelt Lake. These all contained young birds at the time of observation.

The habits of the Gila woodpecker, as observed at Sacaton, Arizona, have been set forth by Gilman in part as follows:

Were it not for the Gila woodpecker (*Centurus uropygialis*) what would become of the several species of birds that use already prepared cavities for their domiciles? In some cases these tenants do not even await the pleasure of the excavators, but take forcible possession. In holes excavated by Gila woodpeckers there may regularly be found nesting the elf owl, ferruginous pigmy owl, ash-throated flycatcher, and Arizona crested flycatcher. Occasionally a cactus wren makes use of the handy hollow, and once I saw one occupied by the nest of a Lucy warbler. A big "rough-neck", scaly lizard frequents the holes when not too high in the cactus, and in two holes in willow trees I found snakes. It is not pleasant to insert one's hand and have a big lizard or snake crawl up the arm to escape. Rats and mice are sometimes found in the deserted holes, especially if the tree be much decayed and with cracks and hollows connecting holes at different heights in the tree or branch. So these woodpeckers may be considered among the class of innocent or unintentional benefactors.

As a neighbor, the Gila woodpecker is permanently on the map, and is afraid neither of being seen nor heard. He is much in the public ear with a variety of notes and calls. His sociable conversational notes somewhat resemble those of the California woodpecker, but are shriller. In such of his notes as are directed at humanity there is a peevish complaining tone, especially if closely approached when feeding on fruit or some other delicacy. In such cases there is only one term that exactly describes his attitude and utterances, and that

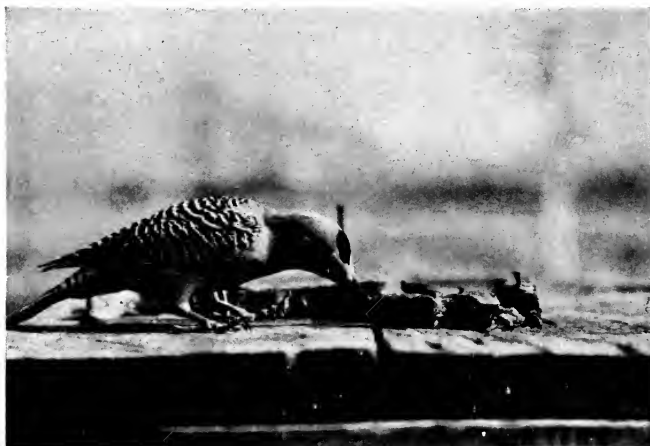
¹ Condor, XVII, 1915, pp. 160-163.



Photograph by M. French Gilman.

A. PLUMBEOUS GNATCATCHER ON NEST.

This is a characteristic species of the deserts of the Southwest. It is much like the Blue-Gray Gnatcatcher of the Eastern States and the Western Gnatcatcher of California, from which it differs mainly in the possession of a black cap, worn by the male during the summer months. This marking may be seen on the bird in the picture.



Photograph by M. French Gilman.

B. MALE GILA WOODPECKER.

Distinguished from the female by the red spot on the crown. This is a common species of the valleys of southern Arizona, and one that nests frequently in the giant cactus.

is the phrase "belly-aching." In fact, all of his talk at us has a distinctly "colicky" tone and one feels like giving him something to whine about. His ordinary call slightly resembles that of the flicker, but is not quite so loud; altogether he is quite a conversationalist.

This woodpecker frequents houses and yards, and with slight encouragement comes regularly for food, not hesitating to call loudly for it if breakfast be much delayed. The Indians store corn in the ear on the flat tops of their houses and sheds, and each home has one or more of woodpecker retainers or pensioners hanging about most of the time. This corn provides an abundant and sure source of food, and the birds make the most of it. I have never seen any indication of food storage on the part of the Gila woodpecker as with the California woodpecker, for they live in a claw-to-beak fashion. They peck at a kernel until it comes off the cob, when it is carried to a post or tree and placed firmly in a crack. Here it is pecked to pieces and eaten. They seem never to swallow the kernel whole, but always break it up. They seem to be allotted on the ratio of a pair of birds to a home, and it is but rarely that more than two are seen at the same corner. During the breeding season they are shyer and are not seen around the homes very much; but when the young are grown they "bring them out" and present them, as it were.

The food of this woodpecker is varied, nearly everything being grist that comes to his mill. He pecks around decayed and dying trees as well as green ones, and presumably gets the insects usually found and eaten by such birds. The giant cactus is pecked into very frequently, and I believe some of the pulp is eaten. The small punctures made are not enlarged, and in some cases quite an area is bitten into. The fruit of the giant cactus is eaten as long as it lasts, and berries of the lycium are also freely eaten. The Gila woodpecker frequents cornfields and pecks through the husks into the ears of corn. The birds may peck in at first to get a worm, but it is a case similar to the discovery of roast pig as portrayed by Lamb. They alight on the ground and feed upon table scraps thrown to chickens, three of them being regular morning visitors—star boarders—to a pen of chickens I fed. They are very fond of peaches and pears and volubly resent being driven from a tree of the fruit. They peck holes in ripening pomegranates and then the green fruit beetle helps finish the fruit. They relish grapes, both white and colored, and will spear one with their bill and carry it to a convenient crevice, where it may be eaten at leisure. On bird tables I have tried them with various articles of food and found very little that they rejected. They would not eat cantaloupe at all, but were regular watermelon fiends, eating it three times a day and calling for more. They did not care for oranges, and I had no success in trying to teach them to eat ripe pickled olives. I tried the olive diet on them because two mockingbirds in our yard in California learned to eat this fruit. Meat, raw and cooked, was eaten, and they ate suet greedily. Their favorite cut of beef was the T-bone steak, and we always left some meat on the bone for them. They picked it clean, and if a new supply was slow in coming the softer parts of the bone were devoured. This T-bone steak diet, however, was prior to the balloon ascension of beef. The bone was always nailed fast to the table and it furnished the birds with food and exercise and us with edification. Mr. Frank Pinkley, custodian at the Casa Grande Ruins, told me of a pair of these woodpeckers that stayed around his home and became quite tame, coming into the shed to drink from a can of water. He said they got into the habit of sucking the eggs in the chicken house, or, at least, pecking into them and eating of the contents. As the eggs were from blooded Wyandotte hens, he had to break the woodpeckers of the habit. I did not ask him how he did it, but fear that it

was in the same way that he broke some horned owls of dining on the same brand of hens. Water seems to be the least of their worries; perhaps it is supplied by the giant cactus they peck into so freely.

This woodpecker has not the best disposition in the world, for he is very quarrelsome and intolerant. He fights his own kin and all the neighbors that he dares. He, or she, is a great bluffer, however, and when "called" frequently sidesteps, subsides, or backs out entirely. I saw one approach a Bendire thrasher that was eating and suddenly pounce on him. He had the thrasher down, and I was thinking of offering my friendly services as a board of arbitration, when the under bird crawled from beneath and soon gave the woodpecker the thrashing of his career. Several times I have seen the woodpeckers start to attack Bendire and Palmer thrashers, but they were always bluffed or beaten at the game. With the bronzed cowbirds it is a drawn battle, sometimes one and then the other backing down. Most other birds, such as cardinals, Abert towhees, dwarf cowbirds, and cactus wrens, do not attempt to assert their rights, but always take a rear seat. When it is woodpecker versus woodpecker it seems not to be a case of "Thrice armed is he who hath his quarrel just," but rather "Four times he who gets his blow in fust."

I had two bird tables about 20 feet apart, and frequently one woodpecker might be peacefully assimilating watermelon when another one would come hurrying up and make a dive at him, causing a retreat to the other table. Frequently the newcomer would then follow and drive him from the second table. He seemingly would rather fight than eat if another one was eating at the same time. One day I saw him, or her, I forget which, hanging to the edge of the table busily eating steak, when another one perched on the table and made a vicious stab at him. He dodged backward clear under the table, though retaining his hold, and then bobbed up again, just like the Punch and Judy show. The attack was renewed, and the dodging as well; but this time he did not "come back." Another day one of them was at work on a piece of melon, when one of his fellows came and perched on the end of the table. The diner made a pass at the newcomer, and seizing him by the feathers of the neck held him suspended over the end of the table for a few seconds.

Nesting sites in this locality are restricted to giant cactus (*Cereus giganteus*), cottonwood, and willow, as they are the only suitable material for a nest excavation. More nests are found in the giant cactus, as these plants are more numerous than the others and more "peckable," though the willows and cottonwoods along the river and the canals are well patronized when sufficiently decayed. Of the nests I examined I should say that 50 per cent were in the cactus and the rest equally divided between the other trees mentioned. * * *

Usually the nest hole runs straight in for a short distance before turning downward, the distance seemingly depending on the texture of the wood. * * * The depth horizontally is usually about 3 inches. In the giant cactus it varies according to the diameter of the trunk, the smaller the trunk the less distance before turning downward. The softness of the material is not a factor, as it is the same in small and large trunks. In only two cases have I found nest holes that penetrated through the ribs of the cactus into the inner pith. In both cases the trunk was too small to furnish room for the nest between the outside and the ribs. The holes are dug in the soft pulp of the cactus, and the raw surface becomes calloused, as it were, forming a tough woody lining to the hole, which persists when the rest of the pulp decays. In this way the nest holes may be found intact, the hole being outlined by the hardened pulp, while the surrounding pulpy tissues have entirely decayed. * * *

The nests were placed at different heights, those in the giant cactus ranging from 14 feet to the limit of the plant, about 35 feet. As my ladder was only 14 feet long, the nests higher than 20 feet were inaccessible, except in the special cases already mentioned. Many of the nests seen were more than 20 feet from the ground, and as a rule the Gila woodpecker seemed to place the nests higher in the cactus than did the gilded flicker. They appear to select large plants and to patronize the same one for several years, as many unoccupied holes may be seen in it. Unoccupied—that is, as far as the woodpecker is concerned, for the old holes are often used by other birds. I have never found two of these woodpeckers occupying the same tree, but frequently a gilded flicker, elf owl, and ash-throated flycatcher might be next-door neighbors, and all housed under the same roof, as it were. In cottonwoods and willows there could not be so much choice as to height, for the site was decided by the location of soft or decayed wood, and sometimes the nest would be closer to the ground. In some stumps I have found the nests only 5 feet from the ground, in other cases as high as 30 feet or more. * * *

The height of the nesting season is evidently from the middle of April to the middle of May. Of 13 occupied nests examined, 12 were found in May, 8 of them containing young. May 10 was the latest date that eggs were found. July 10 I found three young about half grown, which might indicate that a second brood was sometimes raised. * * *

It is not easy to determine just what food the young in the nest are given, but insects play a prominent part, as I have seen them frequently carried to the young. Fruit is also used, as I watched one parent carry ripe Lycium berries several times to the nest; after emerging from the hole she would halt at the entrance each time and "lick her chops."

The old birds show much concern when the nest is approached, and remonstrate most volubly; if the young are handled and caused to cry, the old ones use terrible language. The birds are not very close sitters as a rule, but I cut into one nest without seeing any owner around and found her on the nest with three young just hatched and one egg pipped. She was not sick or stupid either, judging from the noise she made and the fight she put up, but was merely on the job and surely "on the peck." A new-looking hole in a cottonwood stump only 5 feet from the ground was noticed, and, quietly approaching, I placed my fingers over the entrance. I soon received a vigorous peck from the lady of the house, who was "coming up" with a mouth full of sawdust. I took her by the chin and drew her as gently as possible from the hole, but after petting her awhile released her, for she made more noise than a sitting hen. Mr. Pinkley, at the Casa Grande ruins, showed me a giant cactus that had been moved to their yard from a distance of a quarter of a mile. The cactus at the time of removal contained a nest of young woodpeckers, and the mother followed it up and raised the family to maturity, with the exception of one youngster that became impaled on a thorn at the entrance to the nest.

The young are fed by the parents for a long time after leaving the nest, and they are regular little beggars. One pair stayed around our house for several months and became quite tame. They were missed during the breeding season, but soon came back with three youngsters to share the good things found on the bird tables in the yard. The young, although as large as their parents, would flutter their wings and sit with open beak, as though the old ones told them to "open your mouth and shut your eyes," etc. The old ones would try to get them to eat watermelon placed on the tables, but the babies would not be shown; the parents had to put it in their mouths. They followed the parents

from perch to perch begging for food until I expected to see them chastised. The pair in question stayed with the three juvenals until they had them broken to eat for themselves and then left. After a proper interval they came back with two more young ones, thus indicating that a second brood is sometimes raised. The abundant supply of food may have been a determining factor in the number of broods raised.

The Gila woodpecker is so prone to adapt himself to different kinds of food that he seems fitted to persist in the face of settlement and civilization. Lack of suitable nesting sites might be thought to prove a stumbling block, but any old stump appears to answer, no matter whether high or low, so that difficulty might be surmounted. He might prove a pest to certain fruits if present in sufficient numbers, but that danger is remote, though I have known several to suffer through too much devotion to the succulent peach and pear.¹

FARALLON CORMORANT.

Phalacrocorax auritus albociliatus Ridgway.

Recognition marks.—Coloration of adults, black; of young birds, brownish, with lighter colored breast. Size of a small goose (about 3 feet in length); and goose-like in general appearance when flying, though with a quirk in the outstretched neck, whereas a flying goose extends its neck to its full length. When swimming the body is sunk low in the water and the bill pointed obliquely upward.

Occurrence.—When the waters of Roosevelt Lake rose to their appointed level, flooding so many miles of bottomlands of the Salt and Tonto Rivers, there was at least one species of bird that was able to move into the altered country and find conditions to its liking. Cormorants probably occurred sporadically along the rivers before the lake existed, but it is doubtful if these streams supplied sufficient food or if there were proper nesting sites to permit the establishment of breeding colonies. At each end of Roosevelt Lake—that is, just below the mouths of the Tonto and Salt Rivers—stand cottonwood and other trees, killed by the rising flood, partly submerged but with their tops out of the water. In some of the larger of these trees the cormorants have built their nests. On June 8 I visited the colony at the head of the Tonto River branch of the lake. Great blue herons and black-crowned night herons were there, as well as the cormorants, and it was not always possible to tell to which birds the nests observed pertained, though as a rule the three species seemed to nest in colonies apart. The cormorants were in greater numbers than the herons. One tree held 16 nests, most of them occupied by partly grown young cormorants. Near-by were two other trees holding, respectively, three and four nests, and farther on a number of single nests were scattered, some cormorants' and some herons'. Besides the cormorants on the nests, single birds and flocks of three or four were seen at various points near the head of the lake. Altogether about 40 or 50 of the

¹ Condor, XVII, 1915, pp. 152-159.



Photograph by M. French Gilman.

**A. NEST WITH FIVE EGGS OF GILA WOODPECKER
IN GIANT CACTUS.**

The side of the cactus has been cut away to expose the nest.



**B. NESTING COLONY OF FARALLON CORMORANTS NEAR MOUTH OF TONTO
RIVER, ROOSEVELT LAKE.**

birds were seen. Near the head of the Salt River branch of the lake cormorants were seen in about the same number as on Tonto River. I did not examine any nests here, but in all probability the two colonies are of about the same size.

During the nesting season the cormorants appeared to remain close to the nests, none being seen during June at the lower end of the lake. A month later, during the first week in July, several were observed in the vicinity of the dam.

At the present time conditions are certainly favorable to the cormorants, and the colony will probably increase in numbers from year to year. Nesting on a Federal bird reservation, they are secure of injury from man, their nests are safe from ordinary danger, and in the lake there is abundance of food. The dead trees serving for their present nesting sites, however, are certain to disappear in the course of time, and the cormorants will then have a problem to solve.

Besides those seen at Roosevelt Lake, cormorants were noted near Tempe on May 31. First a flock of 29 birds was seen, flying in V-shaped formation, like wild geese, and headed straight up the Salt River. A little later six birds appeared, circling about over the river bottom, flying low above the willows.

PALLID GREAT BLUE HERON.

Ardea herodias treganzai Court.

Recognition marks.—Size large; length about 4 feet. Relatively small body and short tail, with long legs, neck, and bill, and broad, widespreading wings. Flight slow and laborious. The live bird generally appears bluish or grayish in color. Sometimes the streakings on the breast can be seen, but as a rule the birds can not be approached near enough for their markings to be distinguished. Known to most people under the name of "blue crane."

Occurrence.—Hérons existed along the rivers before Roosevelt Lake was in existence, but the coming of this body of water has unquestionably resulted in a considerable increase in their numbers. At the present time the great blue heron forms a pleasing and picturesque feature of the lake, whether perched on some rocky point or flapping slowly over the water, for the birds are present in numbers.

The herons were nesting below the mouth of Tonto River, in company with the Farallon cormorants. In one dead tree top on June 8 there were 10 nests, mostly occupied by young great blue herons, while nearby others were scattered, one, two, or three in a tree. The parent birds were wary, as usual, most of them taking flight when our boat was still some distance away. From several of the nests young birds departed on what were evidently their first flights.

A single great blue heron was seen flying over the river at Tempe on June 2, and one or two others, from the stage, along the Salt River some miles below the dam. The species doubtless nests all along this stream wherever there are trees large enough to meet its needs.

BLACK-CROWNED NIGHT HERON.

Nycticorax nycticorax naevius (Boddaert).

Recognition marks.—The strongly contrasting colors, black crown and back against the white neck and lower parts, will usually serve to distinguish the adult of this species at any reasonable distance. At close range a glimpse may be had of the long, slender, white plume, depending from the back of the head down the neck. Young birds, for the first year at least, are quite different in appearance, dull colored, brownish or gray, and coarsely striped with dusky. They also lack the white plume. Length about 26 inches; of more "chunky" build than the great blue heron, with relatively heavier body and not so long a neck or legs.

Occurrence.—There were a number of black-crowned night herons present in the heronry at the head of the Tonto River branch of Roosevelt Lake, and there can be no doubt, I think, but that the birds were nesting there. They were not so numerous as the great blue herons, with which they were associated, perhaps 20 birds, all told, being seen during our visit to the colony. No nests were identified with certainty as belonging to this species, but none of them was examined closely through fear of seriously disturbing the birds.

While there may at times be uncertainty as to the identity of herons seen at a distance, there can be no doubt about this bird once it gives voice to its peculiarly unmelodious call note. The "squawk" is known the country over to people who have never heard the more dignified book name.

The species is doubtless a permanent resident about Roosevelt Lake, as it has been observed along the Verde River during the winter months.

BIRDS SEEN ON THE PAPAGO SAGUARO MONUMENT, ARIZONA, MAY 30 TO JUNE 4, 1917.

1. Killdeer (*Oxyechus vociferus*).
2. Desert quail (*Lophortyx gambeli*).
3. Western mourning dove (*Zenaidura macroura marginella*).
4. White-winged dove (*Melopelia asiatica Trudeaui*).
5. Turkey vulture (*Cathartes aura septentrionalis*).
6. Western red-tailed hawk (*Buteo borealis calurus*).
7. American sparrow hawk (*Falco sparverius sparverius*).
8. Burrowing owl (*Speotyto cunicularia hypogaea*).

9. Roadrunner (*Geococcyx californianus*).
10. Gila woodpecker (*Centurus uropygialis*).
11. Mearns gilded flicker (*Colaptes chrysoides mearnsi*).
12. Texas nighthawk (*Chordeiles acutipennis texensis*).
13. White-throated swift (*Aeronautes melanoleucus*).
14. Black-chinned hummingbird (*Archilochus alexandri*).
15. Western kingbird (*Tyrannus verticalis*).
16. Arizona crested flycatcher (*Myiarchus magister magister*).
17. Ash-throated flycatcher (*Myiarchus cinerascens cinerascens*).
18. Say Phoebe (*Sayornis sayus*).
19. Dwarf cowbird (*Molothrus ater obscurus*).
20. Sonora red-winged blackbird (*Agelaius phoeniceus sonoriensis*).
21. House finch (*Carpodacus mexicanus frontalis*).
22. Cliff swallow (*Petrochelidon lunifrons lunifrons*).
23. Rough-winged swallow (*Stelgidopteryx serripennis*).
24. Phainopepla (*Phainopepla nitens*).
25. White-rumped shrike (*Lanius ludovicianus excubitorides*).
26. Western mockingbird (*Mimus polyglottos leucopterus*).
27. Palmer thrasher (*Toxostoma curvirostre palmcri*).
28. Cactus wren (*Heleodytes brunneicapillus couesi*).
29. Verdin (*Auriparus flaviceps flaviceps*).
30. Plumbeous gnatcatcher (*Polioptila plumbea*).

BIRDS SEEN AT TEMPE AND ON SURROUNDING FARM LANDS, MAY 30 TO JUNE 4,
1917.

1. Farallon cormorant (*Phalacrocorax auritus albociliatus*).
2. Pallid great blue heron (*Ardea herodias treganzai*).
3. Anthony green heron (*Butorides virescens anthonyi*).
4. Killdeer (*Oxyechus vociferus*).
5. Desert quail (*Lophortyx gambeli*).
6. Western mourning dove (*Zenaidura macroura marginella*).
7. White-winged dove (*Melopelia asiatica trudeau*).
8. Mexican ground dove (*Chaemepelia passerina pallascens*).
9. Inca dove (*Scardafella inca*).
10. Turkey vulture (*Cathartes aura septentrionalis*).
11. Western red-tailed hawk (*Buteo borealis calurus*).
12. American sparrow hawk (*Falco sparverius sparverius*).
13. Gila woodpecker (*Centurus uropygialis*).
14. Texas nighthawk (*Chordeiles acutipennis texensis*).
15. Black-chinned hummingbird (*Archilochus alexandri*).
16. Western kingbird (*Tyrannus verticalis*).
17. Black phoebe (*Sayornis nigricans*).
18. Western wood pewee (*Myiochanes richardsoni richardsoni*).¹
19. Traill flycatcher (*Empidonax trailli trailli*).
20. Dwarf cowbird (*Molothrus ater obscurus*).
21. Sonora red-winged blackbird (*Agelaius phoeniceus sonoriensis*).
22. Western meadowlark (*Sturnella neglecta*).
23. Arizona hooded oriole (*Icterus cucullatus nelsoni*).
24. Bullock oriole (*Icterus bullocki*).
25. House finch (*Carpodacus mexicanus frontalis*).
26. English sparrow (*Passer domesticus*).

¹ Migrant.

27. Green-backed goldfinch (*Astragalinus psaltria hesperophilus*).
28. Desert song sparrow (*Metospiza melodia saltonis*).
29. Abert towhee (*Pipilo aberti*).
30. Arizona cardinal (*Cardinalis cardinalis superbus*).
31. Rough-winged swallow (*Stelgidopteryx serripennis*).
32. Phainopepla (*Phainopepla nitens*).
33. White-rumped shrike (*Lanius ludovicianus excubitorides*).
34. Long-tailed chat (*Icteria virens longicauda*).
35. Pileolated warbler (*Wilsonia pusilla pileolata*).¹
36. Western mockingbird (*Mimus polyglottos leucopterus*).
37. Cactus wren (*Heleodytes brunneicapillus couesi*).

**BIRDS SEEN IN THE IMMEDIATE VICINITY OF ROOSEVELT LAKE JUNE 5 TO 11, AND
JULY 2 TO 5, 1917.**

1. Farallon cormorant (*Phalacrocorax auritus albociliatus*).
2. Pallid great blue heron (*Ardea herodias treganzai*).
3. Black-crowned night heron (*Nycticorax nycticorax naevius*).
4. Killdeer (*Oxyechus vociferus*).
5. Desert quail (*Lophortyx gambeli*).
6. Western mourning dove (*Zenaidura macroura marginella*).
7. White-winged dove (*Melopelia asiatica trudeaui*).
8. Turkey vulture (*Cathartes aura septentrionalis*).
9. Western red-tailed hawk (*Buteo borealis calurus*).
10. Zone-tailed hawk (*Buteo abbreviatus*).
11. American sparrow hawk (*Falco sparverius sparverius*).
12. Cactus woodpecker (*Dryobates scalaris cactophilus*).
13. Gila woodpecker (*Centurus uropygialis*).
14. Mearns gilded flicker (*Colaptes chrysoides mearnsi*).
15. Texas nighthawk (*Chordeiles acutipennis texensis*).
16. White-throated swift (*Aeronautes melanoleucus*).
17. Costa hummingbird (*Calypte costae*).
18. Western kingbird (*Tyrannus verticalis*).
19. Arizona crested flycatcher (*Myiarchus magister magister*).
20. Ash-throated flycatcher (*Myiarchus cinerascens cinerascens*).
21. Say Phoebe (*Sayornis sayus*).
22. Black Phoebe (*Sayornis nigricans*).
23. Western wood pewee (*Myiochanes richardsoni richardsoni*).¹
24. Vermilion flycatcher (*Pyrocephalus rubinus mexicanus*).
25. American raven (*Corvus corax sinuatus*).
26. Western crow (*Corvus brachyrhynchos hesperis*).
27. Dwarf cowbird (*Molothrus ater obscurus*).
28. Scott oriole (*Icterus parisorum*).
29. Arizona hooded oriole (*Icterus cucullatus nelsoni*).
30. House finch (*Carpodacus mexicanus frontalis*).
31. English sparrow (*Passer domesticus*).
32. Green-backed goldfinch (*Astragalinus psaltria hesperophilus*).
33. Desert sparrow (*Amphispiza bilineata deserticola*).
34. Scott sparrow (*Aimophila ruficeps scotti*).
35. Canyon towhee (*Pipilo fuscus mesoleucus*).
36. Arizona cardinal (*Cardinalis cardinalis superbus*).
37. Western tanager (*Piranga ludoviciana*).¹

¹ Migrant.

38. Purple martin (*Progne subis subis*).
39. Cliff swallow (*Petrochelidon lunifrons lunifrons*).
40. Rough-winged swallow (*Stelgidopteryx serripennis*).
41. Phainopepla (*Phainopepla nitens*).
42. White-rumped shrike (*Lanius ludovicianus excubitorides*).
43. Arizona least vireo (*Vireo belli arizonae*).
44. Lucy warbler (*Vermivora luciae*).
45. Sonora yellow warbler (*Dendroica aestiva sonorana*).
46. Western mockingbird (*Mimus polyglottos leucopterus*).
47. Palmer thrasher (*Toxostoma curvirostre palmeri*).
48. Cactus wren (*Heleodytes brunneicapillus couesi*).
49. Rock wren (*Salpinctes obsoletus obsoletus*).
50. Canyon wren (*Catherpes mexicanus conspersus*).
51. Verdln (*Auriparus flaviceps flaviceps*).
52. Plumbeous gnatcatcher (*Poliophtila plumbea*).

BIRDS SEEN IN THE SIERRA ANCHA, JUNE 11 TO JULY 2, 1917.

1. Desert quail (*Lophortyx gambeli*).
2. Merriam turkey (*Meleagris gallopavo merriami*).
3. Band-tailed pigeon (*Columba fasciata fasciata*).
4. Western mourning dove (*Zenaidura macroura marginella*).
5. Turkey vulture (*Cathartes aura septentrionalis*).
6. Cooper hawk (*Accipiter cooperi*).
7. Western red-tailed hawk (*Buteo borealis calurus*).
8. Zone-tailed hawk (*Buteo abbreviatus*).
9. Bald eagle (*Haliaeetus leucocephalus leucocephalus*).
10. American sparrow hawk (*Falco sparverius sparverius*).
11. White-breasted woodpecker (*Dryobates villosus leucothorectis*).
12. Batchelder woodpecker (*Dryobates pubescens homorus*).
13. Mearns woodpecker (*Melanerpes formicivorus aculeatus*).
14. Red-shafted flicker (*Colaptes cafer collaris*).
15. Stephens whippoorwill (*Antrostomus vociferus macromystax*).
16. White-throated swift (*Aeronautes melanoleucus*).
17. Broad-tailed hummingbird (*Selasphorus platycercus*).
18. Cassin kingbird (*Tyrannus vociferans*).
19. Ash-throated flycatcher (*Myiarchus cinerascens cinerascens*).
20. Black phoebe (*Sayornis nigricans*).
21. Coues flycatcher (*Myiochanes pertinax pallidiventris*).
22. Western wood pewee (*Myiochanes richardsoni richardsoni*).
23. Western flycatcher (*Empidonax difficilis difficilis*).
24. Long-crested jay (*Cyanocitta stelleri diademata*).
25. Woodhouse jay (*Aphelocoma woodhousei*).
26. Arizona jay (*Aphelocoma sieberi arizonae*).
27. Bendire crossbill (*Loxia curvirostra bendirei*).
28. Green-backed goldfinch (*Astragalinus psaltria hesperophilus*).
29. Black-chinned sparrow (*Spizella atrogularis*).
30. Red-backed junco (*Junco phaeonotus dorsalis*).
31. Mountain towhee (*Pipilo maculatus montanus*).
32. Black-headed grosbeak (*Zamelodia melanocephala melanocephala*).
33. Western blue grosbeak (*Guiraca caerulea lazula*).
34. Indigo bunting (*Passerina cyanea*).
35. Lazuli bunting (*Passerina amoena*).
36. Western tanager (*Piranga ludoviciana*).

37. Hepatic tanager (*Piranga hepatica*).
38. Purple martin (*Progne subis subis*).
39. Northern violet-green swallow (*Tachycineta thalassina lepida*).
40. Western warbling vireo (*Vireosylva gilva swainsoni*).
41. Plumbeous vireo (*Lanivireo solitarius plumbeus*).
42. Virginia warbler (*Vermivora virginiae*).
43. Grace warbler (*Dendroica graciae*).
44. Black-throated gray warbler (*Dendroica nigrescens*).
45. Painted redstart (*Setophaga picta*).
46. Canyon wren (*Catherpes mexicanus conspersus*).
47. Desert wren (*Thryomanes bewicki eremophilus*).
48. Western house wren (*Troglodytes aedon parkmani*).
49. Rocky mountain nuthatch (*Sitta carolinensis nelsoni*).
50. Pigmy nuthatch (*Sitta pygmaea pygmaea*).
51. Bridled titmouse (*Baeolophus wollweberi*).
52. Mountain chickadee (*Penthestes gambeli gambeli*).
53. Lead-colored bush-tit (*Psaltriparus plumbeus*).
54. Western gnatcatcher (*Polioptila caerulea obscura*).
55. Audubon hermit thrush (*Hylocichla guttata auduboni*).
56. Western robin (*Planesticus migratorius propinquus*).
57. Chestnut-backed bluebird (*Sialia mexicana bairdi*).

BIRDS SEEN AT GLOBE JULY 5 TO 7, 1917.

1. Desert quail (*Lophortyx gambeli*).
2. Western mourning dove (*Zenaidura macroura marginella*).
3. White-winged dove (*Melopelia asiatica trudeaui*).
4. Inca dove (*Scardafella inca*).
5. Turkey vulture (*Carthartes aura septentrionalis*).
6. American sparrow hawk (*Falco sparverius sparverius*).
7. Cactus woodpecker (*Dryobates scalaris cactophilus*).
8. Western kingbird (*Tyrannus verticalis*).
9. Ash-throated flycatcher (*Myiarchus cinerascens cinerascens*).
10. Say phoebe (*Sayornis sayus*).
11. Dwarf cowbird (*Molothrus ater obscurus*).
12. Bullock oriole (*Icterus bullocki*).
13. House finch (*Carpodacus mexicanus frontalis*).
14. English sparrow (*Passer domesticus*).
15. Green-backed goldfinch (*Astragalinus psaltria hesperophilus*).
16. Western lark sparrow (*Chondestes grammacus strigatus*).
17. Desert sparrow (*Amphispiza bilineata deserticola*).
18. Canyon towhee (*Pipilo fuscus mesoleucus*).
19. Rough-winged swallow (*Stelgidopteryx serripennis*).
20. Phainopepla (*Phainopepla nitens*).
21. White-rumped shrike (*Lanius ludovicianus excubitorides*).
22. Western mockingbird (*Minus polyglottos leucopterus*).
23. Palmer thrasher (*Toxostoma curvirostre palmeri*).
24. Cactus wren (*Heleodytes brunneicapillus couesi*).
25. Rock wren (*Salpinctes obsoletus obsoletus*).
26. Verdin (*Auriparus flaviceps flaviceps*).

INDEX.

	Page.		Page.
Abert towhee.....	20, 56	Black-throated gray warbler....	25, 58
Accipiter cooperi.....	57	Bluebird, chestnut-backed.....	26, 58
Aeronautes melanoleucus.....	55, 56, 57	Bridled titmouse.....	21, 26, 58
Agelaius phoeniceus sonoriensis..	55	Broad-tailed hummingbird.....	23, 57
Aimophila ruficeps scotti.....	56	Brown thrasher.....	27
American raven.....	56	Bullock oriole.....	55, 58
sparrow hawk.....	14,	Bunting, indigo.....	6, 25, 57
	54, 55, 56, 57, 58	lazuli.....	25, 57
Amphispiza bilineata deserti-		Bush-tit, lead-colored.....	58
cola.....	34, 56, 58	Buteo abbreviatus.....	36, 56, 57
Anthony green heron.....	55	borealis calurus.....	54, 55, 56, 57
Antrostomus vociferus macro-		Butorides virescens anthonyi....	55
mystax.....	57	Burrowing owl.....	54
Aphelocoma sieberi arizonæ....	57	Buzzard, band-tailed.....	38
Aphelocoma woodhousei.....	57		
Archilochus alexandri.....	55	C.	
Ardea herodias treganzai.....	53, 55, 56	Cactus woodpecker.....	20, 56, 58
Arizona cardinal.....	19, 56	wren.....	12, 13, 29, 55, 56, 57, 58
crested flycatcher..	12, 14, 39, 55, 56	Calypte costae.....	56
hooded oriole.....	20, 55, 56	Canyon towhee.....	20, 23, 56, 58
jay.....	21, 24, 57	wren.....	17, 57, 58
least vireo.....	17, 20, 57	Cardinal, Arizona.....	19, 56
Ash-throated flycatcher.....	14	Cardinalis cardinalis superbus..	56
	20, 55, 56, 57, 58	Carpodacus mexicanus fron-	
Astragalinus psaltria hespero-		talis.....	55, 56, 58
philus.....	56, 57, 58	Cassin kingbird.....	23, 24, 33, 57
Audubon hermit thrush.....	21, 26, 58	Cathartes aura septentrionalis..	54,
Auriparus flaviceps flaviceps....	31,		55, 56, 57, 58
	55, 57, 58	Catherpes mexicanus consper-	
B.		sus.....	57, 58
Baeolophus wollweberi.....	58	Centurus uropygialis.....	48, 55, 56
Bald eagle.....	57	Chaemepelia passerina palles-	
Band-tailed buzzard.....	38	cens.....	55
Band-tailed pigeon.....	23, 57	Chat, long-tailed.....	56
Batchelder woodpecker.....	21, 24, 57	Chestnut-backed bluebird.....	26, 58
Bendire crossbill.....	6, 7, 57	Chickadee, mountain.....	21, 26, 58
Bendire thrasher.....	27	Chondestes grammacus striga-	
Blackbird, Sonora red-winged..._	55	tus.....	58
Black-chinned hummingbird.....	55	Chordeiles acutipennis texensis..	38,
Black-chinned sparrow.....	57		55, 56
Black-crowned night heron..._	16, 54, 56	Cliff swallow.....	17, 55, 57
Black-headed grosbeak.....	57	Colaptes cafer collaris.....	57
Black phoebe.....	55, 56, 57	chrysoides mearnsi.....	45, 55, 56
		Columba fasciata fasciata.....	57

	Page.		Page.
Cooper hawk.....	57	ash-throated.....	14, 20, 55, 56, 58
Cormorant, Farallon.....	16, 52, 55, 56	Coues.....	21, 24, 57
Corvus brachyrhynchos hes-		eastern crested.....	39
peris.....	56	olive-sided.....	24
corax sinuatus.....	56	Traill.....	55
Costa hummingbird.....	23, 56	vermillion.....	18, 56
Coues flycatcher.....	21, 24, 57	western.....	24, 57
Cowbird, dwarf.....	19, 20, 33, 55, 56, 58		
Crissal thrasher.....	27	G.	
Crossbill, Bendire.....	6, 7, 57	Geococcyx californianus.....	55
Crow, western.....	20, 56	Gila woodpecker.....	13, 14, 19, 48, 55, 56
Cyanocitta stelleri diademata.....	57	Gilded flicker.....	12, 13, 23
		Gnatcatcher, plumbeous.....	13,
D.		19, 23, 55, 57	
Dendroica aestiva sonora.....	57	western.....	23, 58
graciae.....	58	Goldfinch, green-backed.....	25,
nigrescens.....	58	56, 57, 58	
Desert quail.....	19, 23, 40, 54, 55, 56, 57, 58	Grace warbler.....	25, 58
song sparrow.....	56	Green-backed goldfinch.....	25, 56, 57, 58
sparrow.....	13, 19, 20, 34, 56, 58	Grosbeak, black-headed.....	57
wren.....	26, 58	western blue.....	25, 57
Dove, Inca.....	43, 55, 58	Guiraca carulea lazula.....	57
Mexican ground.....	55		
mourning.....	14,	H.	
19, 23, 54, 55, 56, 57, 58		Haliaeetus leucocephalus leuco-	
white-winged.....	12,	cephalus.....	57
19, 23, 41, 54, 55, 56, 58		Hawk, American sparrow.....	14,
Dryobates pubescens homorus.....	57	54, 55, 56, 57, 58	
scalaris cactophilus.....	56, 58	Cooper.....	57
villosus leucothorectis.....	57	Swainson.....	9, 14
Dwarf cowbird.....	19, 20, 33, 55, 56, 58	western red-tailed.....	14,
		23, 54, 55, 56, 57	
E.		zone-tailed.....	36, 56, 57
Eagle, bald.....	57	Heleodytes brunneicapillus	
Eastern crested flycatcher.....	39	couesi.....	29, 55, 57, 58
Empidonax.....	19	Hepatic tanager.....	21, 25, 58
difficilis difficilis.....	57	Heron, Anthony green.....	55
trailli trailli.....	55	black-crowned night.....	16, 54, 56
English sparrow.....	17, 55, 56, 58	pallid great blue.....	16, 53, 55, 56
		House finch.....	14, 17, 55, 56, 58
F.		Hummingbird, black-chinned.....	55
Falco sparverius sparverius.....	54,	broad-tailed.....	23, 57
55, 56, 57, 58		Costa.....	23, 56
Farallon cormorant.....	16, 52, 55, 56	Hylodichla guttata auduboni.....	58
Ferruginous pigmy owl.....	6		
Finch, house.....	14, 17, 55, 56, 58	I.	
Flicker, Mearns gilded.....	14, 45, 55, 56	Icteria virens longicauda.....	56
red-shafted.....	23, 24, 57	Icterus bullocki.....	55, 58
yellow-shafted.....	45	cucullatus nelsoni.....	55, 56
Flycatcher, Arizona crested.....	12,	parisorum.....	56
14, 39, 55, 56, 57		Inca dove.....	43, 55, 58
		Indigo bunting.....	6, 25, 57

J.	Page.		Page.
Jay, Arizona	21, 24, 57	Myiochanes pertinax pallidiven-	
long-crested	24, 57	tris	57
Woodhouse	25, 57	richardsoni richardsoni	55, 56, 57
Junco phaeonotus dorsalis	57		N.
Junco, red-backed	57	Nighthawk, Texas	38, 55, 56
		Northern violet-green swallow	58
		Nuthatch, pigmy	58
		Rocky Mountain	58
		Nycticorax nycticorax naevius	54, 56
			O.
		Olive-sided flycatcher	24
		Oriole, Arizona hooded	20, 55, 56
		Bullock	55, 58
		Scott	19, 56
		Owl, burrowing	54
		elf	14
		screech	14
		western horned	14
		Oxyechus vociferus	54, 55, 56
			P.
		Painted redstart	21, 25, 58
		Pallid great blue heron	16, 53, 55, 56
		Palmer thrasher	12, 18, 27, 55, 57, 58
		Passer domesticus	55, 56, 58
		Passerina cyanea	6, 57
		amoena	57
		Penthestes gambeli gambeli	58
		Petrochelidon lunifrons lunifrons	55, 57
		Pewee, western wood	19,
			23, 55, 56, 57
		Phainopepla	19, 35, 55, 56, 57, 58
		nitens	35, 55, 56, 57, 58
		Phalacrocorax auritus alboellatus	52, 55, 56
		Phoebe, black	55, 56, 57
		Say	55, 56, 58
		Pigeon, band-tailed	23, 57
		Pigmy nuthatch	58
		Pileolated warbler	56
		Polioptila caerulea obscura	58
		plumbea	55, 57
		Pipilo aberti	56
		fuscus mesoleucus	56, 58
		maculatus montanus	57
		Piranga hepatica	58
		ludoviciana	56, 57

	Page.		Page.
Planesticus migratorius propinquus	58	Speotyto cunicularia hypogaea	54
Plumbeous gnatcatcher	13,	Spizella atrogularis	57
	19, 23, 55, 57	Stelgidopteryx serripennis	55,
vireo	58		56, 57, 58
Polioptila plumbea	55, 57	Stephens whippoorwill	24, 57
Progne subis subis	57, 58	Sturnella neglecta	55
Psaltriparus plumbeus	58	Swallow, cliff	17, 55, 57
Purple martin	14, 57, 58	northern violet-green	58
Pyrocephalus rubinus mexicanus	56	rough-winged	23, 55, 56, 57, 58
		violet-green	23
		Swainson hawk	9, 14
		Swift, white-throated	17, 19, 55, 56, 57
Q.			
Quail, desert	19, 23, 40, 54, 55, 56, 57, 58	T.	
R.			
Raven, American	19, 56	Tachycineta thalassina lepida	58
white-necked	9	Tanager, hepatic	21, 25, 58
Red-backed junco	57	western	18, 21, 56, 57
Red-shafted flicker	23, 24, 57	Texas nighthawk	38, 55, 56
Redstart, painted	21, 25, 58	Thrasher, brown	27
Roadrunner	55	Bendire	27
Robin, western	26, 58	crissal	27
Rock wren	18, 57, 58	Palmer	12, 18, 27, 55, 57, 58
Rocky Mountain nuthatch	58	Thrush, Audubon hermit	21, 26, 58
Rough-winged swallow	55, 56, 57, 58	Thryomanes bewicki eremophilus	58
Rufous-crown sparrow	19	Titmouse, bridled	21, 26, 58
S.			
Salpinctes obsoletus obsoletus	57, 58	Towhee, Abert	20, 56
Say phoebe	55, 56, 58	canyon	20, 23, 56, 58
Sayornis nigricans	55, 56, 57	mountain	23, 57
sayus	55, 56, 58	Toxostoma curvirostre palmeri	27,
Scardafella inca	43, 55, 58		55, 57, 58
Scott oriole	19, 56	Trail flycatcher	55
sparrow	19, 56	Troglodytes aedon parkmani	58
Selasphorus platycercus	57	Turkey vulture	23, 54, 55, 56, 57, 58
Setophaga picta	58	Turkey, wild	23, 57
Shrike, white-rumped	55, 56, 57, 58	Tyrannus verticalis	32, 55, 56, 58
Sialia mexicana bairdi	58	vociferans	33, 57
Sitta carolinensis nelsoni	58	V.	
Sitta pygmaea pygmaea	58	Verdin	13, 15, 19, 31, 55, 57, 58
Sonora red-winged blackbird	55	Vermilion flycatcher	18, 56
yellow warbler	57	Vermivora luciae	57
Sparrow, black-chinned	57	virginiae	25, 58
desert song	56	Vireo, Arizona least	17, 20, 57
desert	13, 19, 20, 34, 56, 58	plumbeous	58
English	17, 55, 56, 58	western warbling	58
rufous-crowned	19	Vireo belli arizonae	57
Scott	19, 56	Vireosylva gilva swainsoni	58
western lark	58	Virginia warbler	23, 58
		Violet-green swallow	23
		Vulture, turkey	23, 54, 55, 56, 57, 58

W.		Page.			Page.
Warbler, black-throated gray		25, 58	White-rumped shrike	----	55, 56, 57, 58
Grace		25, 58	White-throated swift	----	17, 19, 55, 56, 57
Lucy		19, 23, 51	Wilsonia pusilla pileolata	-----	56
pileolated		56	Wild turkey	-----	23
Sonora yellow		57	Woodhouse jay	-----	25, 57
Virginia		23, 25, 58	Woodpecker, Batchelder	----	21, 24, 57
Western blue grosbeak		25, 57	cactus	-----	20, 56, 58
crow		56	Gila	-----	13, 14, 19, 48, 55, 56
flycatcher		24, 57	Mearns	-----	24, 57
gnatcatcher		23, 58	white-breasted	-----	24, 57
house wren		26, 58	Wren, cactus	----	12, 29, 55, 56, 57, 58
kingbird		23, 32, 55, 56, 58	canyon	-----	17, 57, 58
lark sparrow		58	desert	-----	26, 58
meadowlark		55	marsh	-----	30
mockingbird		55, 56, 57, 58	rock	-----	18, 57, 58
mourning dove		54, 55, 56, 57, 58	western house	-----	26, 58
red-tailed hawk		14, 23, 54, 55, 56, 57			
robin		26, 58	Y.		
tanager		18, 21, 56, 57	Yellow-shafted flicker	-----	45
warbling vireo		58			
white-winged dove		12,	Z.		
19, 23, 41, 54, 55, 56, 58			Zone-tailed hawk	-----	36, 56, 57
wood pewee		19, 23, 55, 56, 57	Zenaidura macroura marginella	----	54,
Whippoorwill, Stephens		24, 57	55, 56, 57, 58		
White-breasted woodpecker		24, 57	Zamelodia melanocephala	-----	57

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
10 CENTS PER COPY

▽



A 000 776 418 6

