

BIRD BONES FROM ABANDONED INDIAN DWELLINGS IN ARIZONA AND UTAH

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In the course of nine years of excavating in Indian sites in northeastern Arizona and southern Utah, a considerable number of bird bones has been found associated with archaeological material that dates between 700 and 1300 A.D.; material from one locality, Awatobi Pueblo, may be as recent as 1700. The bones from twenty of these sites are here recorded as indicating prehistoric distribution of bird life in the area. There is, of course, a definite association between these bones and the culture of the people who once inhabited the dwellings, a condition which in a measure alters the picture from that which a more natural accumulation would afford.

In the summary of species and sites, two other localities previously reported upon by A. H. Miller (*Condor*, vol. 34, 1932, pp. 138-139) are included, since the material from these sites contribute importantly to the list of species occurring in prehistoric time in the region.

Seven of the sites in the plateau region proper, where Upper Sonoran conditions prevail, are herein treated collectively, since all are now subject to similar environmental conditions. These include Poncho House in Utah; four sites in the Kayenta district—Betatakin Pueblo, Kiet Siel Pueblo, Turkey Cave and Kacody Pueblo; one on Jeditto Wash in Navajo County, Awatobi Pueblo; and Kin Tiel Pueblo, in Apache County, from which bird bones have been recorded by Miller.

The remaining fifteen sites are in the San Francisco Mountain region near Flagstaff. Although the majority of these are also in the Upper Sonoran Zone, the nearness of extensive areas of Transition flora has subjected these localities to ecological factors not found on the plateau. Two of these sites are on the south bank of the Little Colorado River at Grand Falls. Farther back from the river, along the south edge of the valley in the Wupatki National Monument, are three sites, Nalakihi Pueblo, Citadel Pueblo and Wupatki Pueblo. On the dry lower slopes of the mountains are Deadman's Cave, Terrace Pueblo (the other site reported upon by Miller) and Deadman's Fort; and, on benches of Walnut Creek are Turkey Tank, Turkey Tank Cave, Winona Village and Walnut Canyon Pueblo. In the pine forest (*Pinus ponderosa*) are three sites, Medicine Cave, Jack Smith's Tank and Baker's Bluff.

The bones from Walnut Canyon, except for one turkey bone, were collected by Ranger Paul Beaubien. All other bones herein recorded were gathered by members of the staff of the Museum of Northern Arizona. The material is catalogued and deposited in the archaeo-ornithological collection of the Museum. The collections also include several hundred skins and skeletons of modern birds taken in the region at the time the excavations were underway. This material has served as the basis of comparison for the prehistoric avifauna.

I am greatly indebted to Dr. Hildegard Howard, of the Los Angeles Museum, who on many occasions has given me moral and material assistance in this work. Beside personally identifying species for which I had insufficient comparative material, she has a number of times verified my identifications. I also wish to express appreciation to Dr. Alexander Wetmore of the United States National Museum for identifying the parrot bones, and to the Museum of Vertebrate Zoology for the loan of comparative material. Bones identified by Dr. Howard and Dr. Wetmore are listed with their initials in parentheses.

An attempt has been made to determine the number of individual birds represented by the material, since this information will be important later in interpreting the ecology of prehistoric sites. In doing this, the manner of occurrence and the position of each bone in the site have been carefully considered. It is believed that the number of individuals given here is as accurate as circumstances permit.

Podilymbus podiceps. Pied-billed Grebe. Femur, tarsometatarsus and coracoid (HH), probably of a single individual, from Grand Falls.

Branta canadensis. Canada Goose. Femur, coracoid and ulna (HH), representing one individual each from Poncho House, Turkey Tank and Winona Village. The sizes of these bones indicate the race *canadensis*.

Chen hyperborea. Snow Goose. One femur from Turkey Tank Caves. White geese appear to be rare in Arizona. Three unpublished occurrences are as follows: A reliable Hopi Indian informed me that these geese were common on desert lakes of the Little Colorado River valley before 1908, and especially in 1903 or 1904 at Red Lake, lower Polacca Wash, a few miles north of Leupp. During the first half of October, 1928, I saw a large flock flying low toward a small lake in White Cone Valley, Navajo County. The last record is one by Dr. Parry Reiche who told me that he saw a flock of about eighty white geese about three miles east of Red Lake Trading Post on Polacca Wash in early October a few years ago.

Nettion carolinense. Green-winged Teal. Ulna and humerus of one individual from Grand Falls and a humerus from Wupatki Pueblo (HH).

Cathartes aura. Turkey Vulture. An ulna from Awatobi Pueblo (HH).

Accipiter velox. Sharp-shinned Hawk. Femur, ulna and tibiotarsus, representing one individual each from Kiet Siel, Grand Falls, and Winona Village.

Buteo borealis. Red-tailed Hawk. A humerus from Awatobi Pueblo (HH).

Buteo regalis. Ferruginous Rough-leg Hawk. An ulna from Wupatki Pueblo (HH).

Aquila chrysaetos. Golden Eagle. A scapula (HH), carpometacarpus, 2 tarsometatarsi, and 2 pedal phalanges representing six individuals from four sites: Awatobi Pueblo 2, Turkey Tank Cave 2, Nalakihi 1, and Wupatki Pueblo 1.

Haliaeetus leucocephalus. Bald Eagle. An ungual phalanx from Wupatki Pueblo (HH). Although this eagle is occasionally seen at lakes in the San Francisco Mountains, I know of no record as far east as the valley of the Little Colorado River.

Circus hudsonius. Marsh Hawk. An ulna from Wupatki Pueblo (HH).

Falco sparverius. Sparrow Hawk. Coracoid, carpometacarpus, 2 ulnae, 3 humeri, 2 tarsometatarsi and a femur representing eight individuals from three sites: Turkey Tank 1, Winona Village 5, and Wupatki Pueblo 2. Miller (*op. cit.*) has commented upon the small size of sparrow hawk bones, particularly the skull, ulnae and carpometacarpi from Terrace Pueblo. The carpometacarpus from Winona Village is identical in length (24.7 mm.) to one from Terrace Pueblo. The smallest mature historic specimen (a September male, Z8.713) of this element of *F. s. phalaena* in the Museum of Northern Arizona collections is 27.4 mm., a size 0.9 mm. less than that given by Miller for "seemingly an average-sized male" (Mus. Vert. Zool. no. 15548). All prehistoric carpometacarpi of this species yet recovered from northern Arizona are close in size to the carpometacarpi of *F. s. peninsularis*, as first noticed by Miller.

Dr. Miller did not give measurements for other elements, but indications are that the same small size shown by the carpometacarpi characterizes the other elements as well. This particularly is true of the ulnae. Miller reported upon five ulnae. These show a range (measurements taken by me) from 42.9 to 46.3 mm. Bones of *F. s. phalaena* taken in the San Francisco Mountains in very recent time give a range of 46.7 mm. to 47.2 mm. The additional two prehistoric bones recorded herein average larger, 47.0 and 50.3 mm., respectively (the tip of the olecranon of the latter, AO.161, is very slightly chipped). There is an overlap in the size ranges of the tarsometatarsi, also.

Callipepla squamata. Scaled Quail. Five humeri, a carpometacarpus (HH) and a femur, of six individuals from four sites: Winona Village, Deadman's Fort, Terrace Pueblo and Wupatki Pueblo. The range of this species in Arizona during historic time seems to be restricted to the southeastern portion of the state (grassy parts of the Sonoran zones south of the Mogollon plateau and mostly

south of the Gila River valley). Between this and the localities of archaeological occurrences given herein, lies the heavily forested Mogollon Rim and San Francisco Mountain, a probable natural barrier for the distribution of this species. Reference to the occurrence of *Callipepla* in New Mexico, as given by Bailey (Birds of New Mexico, 1928, map 5 and pp. 215-216), however, shows that the Scaled Quail approaches the Arizona line west of Wingate. There is a strip of pure Upper Sonoran flora that passes from Wingate down the Little Colorado River valley to the Grand Canyon. These archaeological occurrences are within this strip. The retreat or extirpation of this species from the east and north slopes of San Francisco Mountain must have occurred between 1150 A.D., a date when Wupatki Pueblo is known to have been occupied, and 1880 A.D., when the country became settled.

It is to be noted, however, that the Scaled Quail may be found in this region today, owing to the fact that on March 13, 1934, I released 22 banded and 2 unbanded Scaled Quail for the State Game Department, at Heiser Spring, about 2 miles from Wupatki Pueblo.

Meleagris gallopavo. Turkey. There are 230 bones representing 101 individuals from twelve sites: Poncho House 4, Betatakin Pueblo 1, Kiet Siel Pueblo 77, Turkey Cave 3, Kacody Pueblo 7, Awatobi Pueblo 1, Grand Falls 2, Walnut Canyon 2, Winona Village 1, Wupatki Pueblo 1, Baker's Bluff 1, Medicine Cave 1. A number of specimens included herein could be determined correctly only as *Meleagris*, but the large number of bones having species characters would seem to justify the assignment of all turkey bones to *M. gallopavo*, especially as no other species of *Meleagris* is known from the area.

Those sites from which came the greatest number of individuals are located in areas where historically the wild turkey is not known. Archaeological data, I believe, are sufficiently convincing to permit the statement that the turkey was under domestication by the people who occupied the Kayenta district area between 1272 and 1300 A.D. Of all the bones taken at Kiet Siel Pueblo those of the turkey are apparently most abundant. In sites in or near San Francisco Mountain where turkeys are still common, turkey bones are no more abundant than the bones of many other species of birds recovered. I do not believe the turkey was domesticated in this area.

Grus canadensis. Crane. Coracoid, ulna and radius (HH) of three individuals from two sites; Turkey Tank 1, and Wupatki Pueblo 2. I do not know of the occurrence of cranes in the immediate vicinity of these archaeological finds in historic time.

Fulica americana. Coot. A tarsometatarsus from Wupatki Pueblo.

Zenaidura macroura. Mourning Dove. A sternum, 2 carpometacarpi, 2 coracoids, 2 humeri, 1 ulna, and 1 tibiotarsus of seven individuals from three sites: Turkey Tank Caves 1, Winona Village 4, Wupatki Pueblo 2.

Rhynchopsitta pachyrhyncha. Thick-billed Parrot. One nearly complete skeleton (AW), and a sternum, coracoid and tibiotarsus of three other individuals. These four parrots came from Wupatki Pueblo.

Although this parrot is known from southern Arizona in late historic time (Vorhies, Condor, vol. 36, 1934, p. 180; Wetmore, Condor, vol. 37, 1935, p. 18) its occurrence in northern Arizona is indicated as early as 1583 (Wetmore, Condor, vol. 33, 1931, p. 35). That the Thick-billed Parrot was native so far north as San Francisco Mountain prior to 1250 A.D., however, is not necessarily established by these archaeological occurrences, since bones of the Red-blue-and-yellow Macaw (*Ara macao*, identified by A. W.), obviously a trade product, also have been found at Wupatki Pueblo. Even today macaws are valued by the Pueblo Indians for their colorful feathers. *Rhynchopsitta* may or may not at one time have been indigenous to the pine forests of San Francisco Mountain, but the presence of *Ara* can be explained satisfactorily only through human agencies.

Bubo virginianus. Horned Owl. Nearly complete skeletons of two individuals, one from Grand Falls and one from Nalakihi Pueblo; and 2 coracoids, 1 humerus, 1 tarsometatarsus and 1 tibiotarsus of three other individuals from Poncho House (1), Awatobi Pueblo (1), and Deadman's Cave (1).

Asio wilsonianus. Long-eared Owl. One nearly complete skeleton from Nalakihi Pueblo; and a humerus, ulna, femur, tarsometatarsus and carpometacarpus representing two individuals, one from Wupatki Pueblo and one from Jack Smith's Tank.

Asio flammeus. Short-eared Owl. One humerus from Nalakihi Pueblo (HH). This species has not been recorded from the San Francisco Mountain region in historic times.

Cryptoglaux acadica. Saw-whet Owl. A feathered foot with part of a tarsus from Kiet Siel Pueblo (a cave deposit). I know of but two other occurrences of this species from northern Arizona, one

from San Francisco Mountain recorded by Mearns (Auk, vol. 7, 1890, p. 54) and another from the same mountain, found dead by Randolph Jenks on August 11, 1934. This latter specimen is number Z8.540 in the Museum of Northern Arizona Collection.

Chordeiles minor. Nighthawk. An ulna from Deadman's Cave.

Colaptes cafer. Red-shafted Flicker. One incomplete, desiccated body from Betatakin Pueblo (a cave site), and an ulna and radius of one individual from Winona Village.

Cyanocitta stelleri. Crested Jay. A humerus from Kiet Siel Pueblo.

Corvus corax. American Raven. A carpometacarpus, ulna, radius, and wing phalanx of one individual; coracoid, 2 ulnae, radius, femur, tibiotarsus and tarsometatarsus of another; one nearly complete skeleton; and a single mandible, 2 humeri, 4 ulnae, 1 radius, 1 carpometacarpus, 1 femur, 2 tarsometatarsi and 1 pedal phalanx, each bone representing an individual bird. Total of 117 bones of 16 individuals from 8 sites: Betatakin Pueblo 1, Kiet Siel Pueblo 2, Awatobi Pueblo 3, Walnut Canyon Pueblo 1, Winona Village 2, Citadel Pueblo 1, Nalakihi Pueblo 2, and Wupatki Pueblo 4.

Corvus brachyrhynchos. Crow. One humerus from Walnut Canyon Pueblo.

Cyanocephalus cyanocephalus. Pinyon Jay. A carpometacarpus of one individual and a humerus of another, both from Winona Village.

Nucifraga columbiana. Nutcracker. Lower mandible and premaxillary from Wupatki Pueblo.

Lanius ludovicianus. Loggerhead Shrike. One humerus from Wupatki Pueblo.

SUMMARY

The new material treated herein consists of 599 complete or broken bird bones of 186 individuals and 30 species. These bones are from prehistoric human habitations in northeastern Arizona and southeastern Utah. The area in which these sites occur is divided into two major ecological regions, the plateau region and the San Francisco Mountain region.

The following list summarizes the prehistoric material from these two regions.

Species	San Francisco		Species	San Francisco	
	Plateau region	Mountain region		Plateau region	Mountain region
<i>Podilymbus podiceps</i> .....	.....	1	<i>Zenaidura macroura</i> .....	.....	7
<i>Branta canadensis</i>	1	2	<i>Rhynchopsitta pachyrhyncha</i> .....	.....	4
<i>Chen hyperborea</i> .....	.....	1	<i>Bubo virginianus</i>	2	4
<i>Nettion carolinense</i> .....	.....	2	<i>Otus asio</i> .....	.....	1
<i>Cathartes aura</i>	1	.....	<i>Asio wilsonianus</i> .....	.....	3
<i>Accipiter velox</i>	1	2	<i>Asio flammeus</i> .....	.....	1
<i>Buteo borealis</i>	1	1	<i>Cryptoglaux acadica</i>	1	.....
<i>Buteo regalis</i> .....	.....	1	<i>Chordeiles minor</i> .....	.....	1
<i>Aquila chrysaetos</i>	2	4	<i>Colaptes cafer</i>	1	2
<i>Haliaeetus leucocephalus</i> .....	.....	1	<i>Cyanocitta stelleri</i>	1	.....
<i>Circus hudsonius</i> .....	.....	1	<i>Pica pica</i> .....	.....	1
<i>Falco mexicanus</i> .....	.....	1	<i>Corvus corax</i>	6	10
<i>Falco sparverius</i>	1	10	<i>Corvus brachyrhynchos</i> .....	.....	1
<i>Lophortyx gambeli</i> .....	.....	3	<i>Cyanocephalus cyanocephalus</i> .....	.....	2
<i>Callipepla squamata</i> .....	.....	7	<i>Nucifraga columbiana</i> .....	.....	1
<i>Meleagris gallopavo</i>	96	8	<i>Turdus migratorius</i> .....	.....	1
<i>Grus canadensis</i> .....	.....	3	<i>Lanius ludovicianus</i> .....	.....	1
<i>Fulica americana</i> .....	.....	2			

All species represented by bones from the plateau region are known there today with the exception of the Saw-whet Owl and the turkey. It is believed that the turkey was a domestic bird. Such a supposition would logically account for the large number of individuals from this region.

The situation in the San Francisco Mountain region is different. Of the species reported from dwellings in this area there are seven that are not known to occur naturally there today. These are: *Callipepla squamata*, *Lophortyx gambeli*, *Grus canadensis*, *Rhynchopsitta pachyrhyncha*, *Asio flammeus*, *Otus asio* and *Pica pica*. Four others, *Chen hyperborea*, *Falco mexicanus*, *Asio wilsonianus* and *Cryptoglaux acadica*, are of rare occurrence; and five, *Podilymbus podiceps*, *Branta canadensis*, *Nettion carolinense*, *Haliaeetus leucocephalus* and *Fulica americana*, are not now found in the vicinity of the sites from which the material came. Only 19 of the 35 species from these sites are now of common occurrence, a surprisingly small number. Obviously the ecology at some of these sites has changed considerably since they were occupied by Indians, but to what extent cannot be determined until more material has been gathered and identified. There is sufficient data, however, to indicate that a change in conditions may have been a cause for the abandonment of the area by the human inhabitants of these sites.

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