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REVIEW OF LITERATURE ON THE ENDANGERED MASKED BOBWHITE



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REVIEW OF LITERATURE ON THE ENDANGERED MASKED BOBWHITE

By

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Resource Publication 108
Washington, D.C. • September 1972

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Stock Number 2410-00388



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Masked bobwhite male and female.

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ABSTRACT

The masked bobwhite (Colinus virginianus ridgwayi) once inhabited restricted areas in southern Arizona and middle Sonora, Mexico. It probably never was a widespread and abundant bird. Ornithologists discovered this race in 1884, presumably during its final decline in Arizona due to overgrazing and a series of droughts. It was gone from Arizona by 1900. Apparently the bird was not seriously threatened in Sonora until the 1940's when the cattle industry increased there. Only small and scattered populations remain in Sonora today.

Although behavior of the masked bobwhite is similar to that of the closely-related eastern bobwhite (C. v. virginianus), the desert variety prefers a mesquite-grassland habitat at elevations of from 1,000 to 4,000 feet, has a later and shorter nesting season, and has more striking sexual plumage. The male's black head and "robin's red" breast readily identify the bird. Average annual precipitation in the heart of its Sonoran habitat is 13.5 inches, with 75 percent of that occurring during the 3-month period of July through September. Foods consist of small weed and grass seeds, supplemented with invertebrates and green vegetational growth during the summer rainy season.

Early attempts at reintroduction of masked bobwhites into Arizona failed. Experiments on propagation and reestablishment and a life history study are currently being carried out by the Bureau of Sport Fisheries and Wildlife in cooperation with the Arizona Fish and Game Department.

INTRODUCTION

In 1967, I was assigned to a field station in Tucson, Arizona, to study endangered wildlife of the southwestern United States. The masked bobwhite received top priority and work on this race was begun at once. Initial studies dealt with gathering all existing knowledge, including unpublished information, as a firm base for intensive and extensive research aimed at saving the remaining wild birds and reestablishing the subspecies in areas of Arizona from which it had been extirpated. This initial phase was completed and the findings are presented herein. Field work was also begun in 1967 and is in progress at this time.

Although there has been considerable concern that the masked bobwhite would become extinct, little work (other than collecting) has been done on these birds. Therefore, few facts are known concerning life history and natural ecology of the subspecies.

About 55 papers or notes have been written about the masked bobwhite quail since its discovery. This literature can be divided into two categories, early (1884-1907) and late (1931-present). The early papers described the birds and their nomenclature, distribution, and general habitat. The later papers repeated information from old literature and gave added data on food habits, distribution, and attempts at reintroduction. The bibliography presented here is quite complete, and most papers have been copied for the files of the Endangered Wildlife Research Program at the Arizona Field Station in Tucson. Not all papers listed in the bibliography are mentioned in this review because of their relative unimportance or repetitive nature.

Museum records were also reviewed to supplement the published accounts, particularly in regard to former distribution of the subspecies.

DISCOVERY AND NOMENCLATURE

A remarkable man, Mr. Herbert Brown of Tucson, Arizona, first alerted the ornithological world in 1884 to the existence of a bobwhite quail in southern Arizona. Oldtime residents, however, had considered it a native of the fauna since early settlement of the area (Brown 1885). Brown was originally from West Virginia but moved to the west as a young man. He settled in Tucson in 1873 where he became a prosperous businessman. He apparently had varied business interests, but his major occupation was a newspaper called the Citizen, which he owned and edited (the Tucson Daily

Citizen is still in business). He was also an amateur ornithologist, paying collectors for skins of birds taken in Arizona, and was Curator of the University of Arizona Museum from its inception to his death. He first heard the call of bobwhites at some unknown date while camped out in Sonora with other Americans (Brown 1904). In the spring of 1884, a man by the name of Andrews brought to Tucson a pair of these quail that had been collected from the foothills of the eastern slope of the Baboquivari Mountains southwest of Tucson (Figure 1). Brown published a short note about the find in the Citizen and called the birds by the then current scientific name for the eastern bobwhite, Ortyx virginianus. This article was subsequently republished in Forest and Stream (Brown 1884). Unfortunately, the two specimens were allowed to spoil by a friend in whose care he had left them while on a business trip. However, he did manage to save a mummified body of the female and the head and other parts of the male, which he sent to Dr. G. B. Grinnell, publisher of Forest and Stream, after Mr. R. Ridgway of the National Museum denied the presence of bobwhites in Arizona (Ridgway 1884); Ridgway thought that Brown probably had mistaken a Mearn's quail (Cyrtonyx montezumae) for a bobwhite. Subsequently, Grinnell sent the parts to Ridgway who identified them as Ortyx graysoni, a form that is found in the Mazatlan area of Mexico (Grinnell 1884).

Brown then obtained another pair which were examined by such men as W.E.D. Scott, E.W. Nelson, F. Stephens, and H.W. Henshaw in late 1884 (Brown 1904). In August 1884, Stephens (1885) made an ornithological collecting trip from Tucson into Mexico and back via the Altar Valley and Puerto Lobos, Sonora (some 500 miles). During this trip he collected a male bobwhite 18 miles south of Sasabe, Sonora (a town on the border), and saw others north and south of the border. This bird was eventually sent to Mr. W. Brewster who named the bird Colinus ridgwayi (Brewster 1885 and Allen 1886b). Apparently Brewster was unaware that Ridgway had already identified Brown's birds as O. graysoni, even though collector Stephens had seen them and discussed the names with Brown. Eventually, this male became the type specimen, and it now rests in the British Museum. Much of the confusion was cleared up by Allen (1886b), and the name remained Colinus ridgwayi in the A.O.U. revised second edition Check-list (1895). With the publication of the Supplement to the Check-list in 1944, the name was changed to Colinus virginianus ridgwayi to show subspecific variation from other bobwhites in the U.S. and Mexico. The trinomial continues to be the accepted name.

DESCRIPTION

The male masked bobwhite is characterized by a rufous-red breast and black head and throat. Most individuals contain some white on the head, particularly through the eye and occasionally on the throat. The male's back is mottled with a combination of black, pale yellow, rufous, gray, and brown with an overall appearance of brown. The female's coloration is very

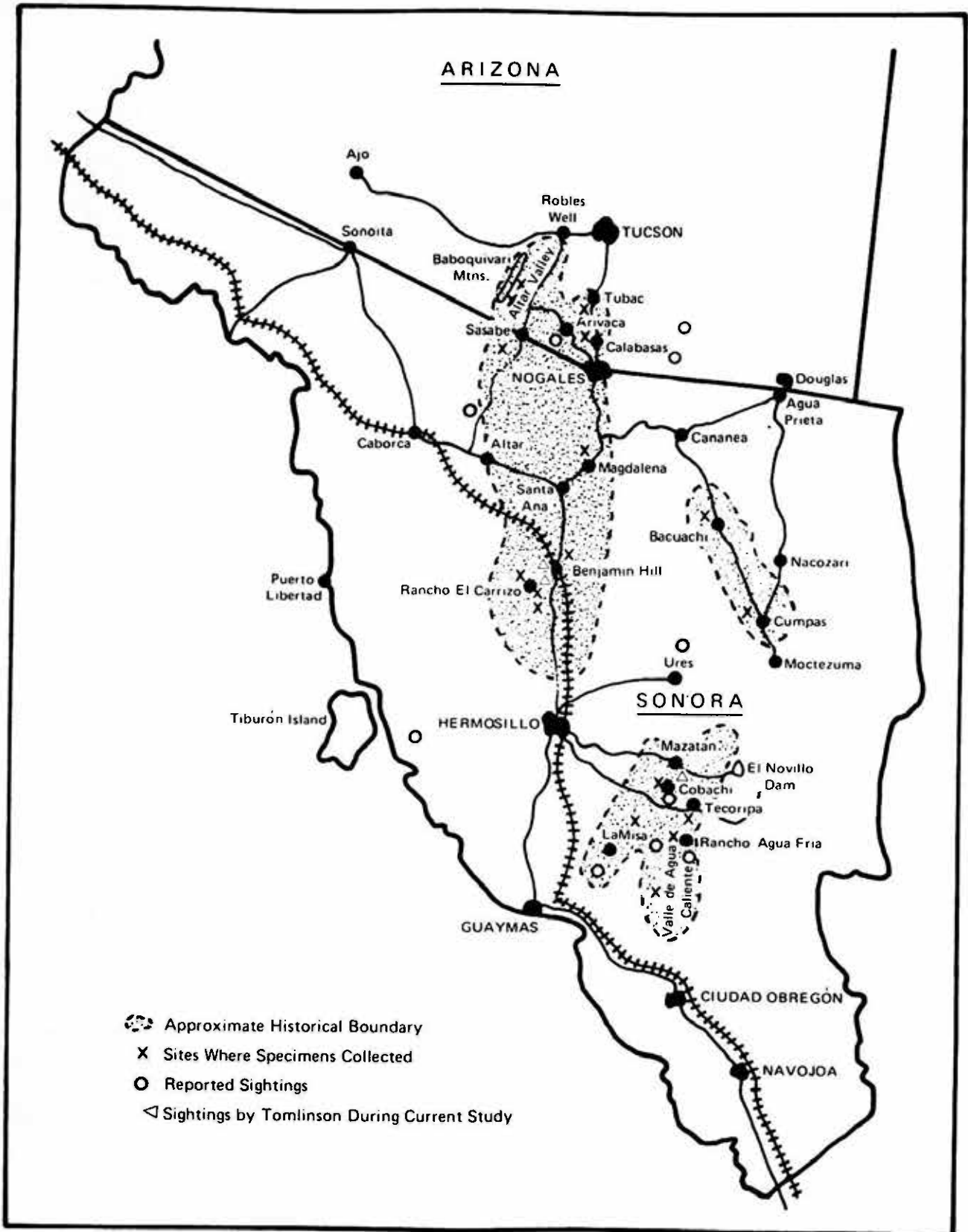


Fig. 1. Past distribution of Masked Bobwhite Quail (1884-1900).

similar to that of the Texas bobwhite (C. v. texanus) but contains slightly more rufous coloration on the upper back and flanks.

The first description of masked bobwhites (other than in general terms) was given by Brewster (1885) from the single, male, type specimen collected by Stephens. The specimen was unusual in that it contained no white on the black head or cinnamon breast. This was pointed out by Allen (1886a, 1886b); and he further described the species from 19 other specimens provided him by Brown (Allen 1886b), adding a note on two others later (Allen 1887). Allen (1886b) suggested that the white markings on head and breast indicate a close relationship to or actual intergradation with the white-throated C. v. graysoni; but Brewster (1887), after examination of 10 birds sent from Sonora by J.C. Cahool, believed that the paler and spotted breasts of some birds indicated that they were young of the year. Preliminary work in the present field study indicates that Brewster probably was right about the breast markings; the white eye stripe, however, probably occurs as individual variation.

Beckham (1888) felt that an intergradation was possible among three forms -- the Texas bobwhite (Colinus virginianus texanus), C. v. ridgwayi, and C. v. graysoni -- because of the almost indistinguishable characters of the females. This thinking no doubt led to placing these birds within the same species as races.

Allen (1889) described a young male masked bobwhite, still in first plumage, that had been sent to him for examination. This bird was listed as having been taken October 10, 1888, near Tubal 70 miles south of Tucson (Note: This should have read "Tubac" and "40" miles south of Tucson). The specimen is now in the University of Arizona Bird Collection. His description was complete but he concluded with the following: "On the whole the first plumage of C. ridgwayi much resembles that of C. v. texensis, but the ground color above is darker, and the bars on the jugulum are stronger and better defined, and the ground color more whitish."

Other descriptions of masked bobwhites are given by Elliot 1897, Coues 1903, Bent 1932, Aldrich 1946, and Ridgway and Friedman 1946.

DISTRIBUTION

The past distribution of masked bobwhites was obtained from literature sources and museum records. Twenty-six museums were contacted, of which 18 contained specimens. Six of these museums contained 206 (80 percent) of the 258 specimens known (Table 1). No doubt a few specimens from private and small museum collections have been missed, but it is believed that the majority of records have been uncovered.

Table 1. Masked Bobwhite Specimens from 18 Prominent Museums

<u>Museum</u>	<u>No. Specimens</u>
Mus. Comp. Zool. - Harvard	113
Field Mus. Nat. Hist. - Chicago	29
Amer. Mus. Nat. Hist. - N. Y.	19
L.S.U. Mus. Nat. Science - Baton Rouge	16
National Mus. Nat. Hist. - Wash., D.C.	15
Univ. of Ariz. - Tucson	14
Mus. Vert. Zool. - Univ. Calif., Berkeley	8
Mus. Zool. Univ. of Mich. - Ann Arbor	8
Brit. Mus. (Nat. Hist.) - London	8
San Diego Nat. Hist. Mus. - San Diego	5
Carnegie Mus. Nat. Hist. - Pittsburgh	4
Moore Lab. of Zool., Occid. Coll. - Los Angeles	4
*New Mexico Univ. - Albuquerque	5
Peabody Mus. Nat. Hist., Yale Univ. - New Haven	3
Calif. Acad. of Sciences - San Francisco	2
Univ. of Calif. at Los Angeles - Los Angeles	2
Mus. Nat. D'Hist. Naturelle - Paris	2
Acad. of Nat. Sciences - Philadelphia	<u>1</u>
	258

*Several more game-farm specimens from Ligon's collection are now in the Univ. of N. M. Collection

Figure 1 shows the approximate boundaries of past masked bobwhite distribution, with specific locations denoted for reported sightings and specimen collection sites. Table 2 gives the exact location of each collection by name of collector. Only 15 people have contributed specimens to museum collections and not more than six general areas are known to have supported masked bobwhite populations.

The early literature was concerned mainly with distribution in Arizona. With the disappearance of bobwhites from Arizona, later papers gave more information on Sonoran bobwhite distribution. The range information given by Brown for Arizona (Grinnell 1884, Brown 1885, Brown 1904) is somewhat contradictory. Brown's original statement (1885) was that:

"In the country lying between the Barboquivari Barboquivari range in Arizona and Gulf Coast in Sonora Author's note this is south from about Three Points, Arizona, to Guaymas, Sonora, and more especially between the Barboquivari and the Plumosa, this species is quite abundant. They are found on the Sonoite about 60 miles south of Tucson and perhaps thirty miles north of the Sonora line. From the Sonoite Valley they can be found to the west for fully one hundred miles and through a strip of country not less than thirty miles in width within the territory. Very possibly they may go beyond that both to the eastward and westward."

He later said that he believed the eastern slope of Baboquivari range to be the western limit and the Huachucas the eastern limit of distribution. Brown (1904) felt that the deepest northward penetration of bobwhites into Arizona was in the Altar Valley (about 50 miles), but that they persisted longest in the south end of the Santa Cruz Valley near Calabasas before being extirpated. However, in a letter to Allen (Allen 1886b), he stated that "thirty-three or thirty-five miles is the farthest north of the line that I have ever known this quail".

Literature sources indirectly link bobwhites with the Arivaca, Arizona, area, which is a high strip of mesaland between the Altar and Santa Cruz Valleys. Breninger (1904) reported that an unnamed correspondent traveled through Arivaca in 1904 and later observed: "The Arivaca country where the species was known to occur is now dry and desolate." present author's underlining. Bendire (1892) reported that in May 1890 Brown had obtained 11 eggs "said to belong to the species" near Arivaca. Since it is known that masked bobwhites normally do not begin nesting until July, there is some doubt about the validity of this record. Moreover, Brown later wrote (1904) that "It was never my good fortune to see an egg of this bird." However, it does seem logical that the Arivaca grasslands would once have been inhabited by masked bobwhites.

Table 2. Masked bobwhite specimen collections by location.

Location	Collector	W.M. Brown	J.T. Wright	H. Brown	J.C. Cahoon	Lt. H.C. Benson	D.M. Gorsuch	J.E. Green	D.R. Wooddell	J.S. Ligon	G. Bancroft, Jr.	A.C. Twomey	F.J. Toussaint	F. Stephens	R. Tomlinson	Unknown	Totals	
Las Arenas		97																
San Marcial		8																97
La Bonancita		7								1								9
Las Capomas		4																7
Valle de Agua Caliente*		2								2		2						4
Tecoripa			28				6			2		2						6
Cobachi										1								34
Cumpas					6	2												1
Bacuachi					4	5												8
Rancho Carrizo			12															9
Magdalena									3		3				1			13
90 mi. South Nogales								5								1		7
Mina Noche Buena			2													1		6
Carbo																		2
Sonora	1					1				1								1
Altar Valley				15						1			1					4
Calabasas				6														15
Tubac				2														6
Arizona						1												2
18 mi. Southwest Sababe																2		3
Unknown, Aviary or Game Farm						1				2				1				1
Totals		119	42	23	10	10	6	5	3	8	3	2	1	1	1	24		258

*Valle de Agua Caliente includes Las Chinchas, Batamote, Agua Caliente, and Agua Fria.

Brown (1904) talked to men who remembered southeastern Arizona in the early days (1860's). These men were confident that the masked bobwhite was common in the Sonoita and Santa Cruz Valleys, in Ramsey's Canyon in the Huachuca Mountains (Brown's eastern limit), and in the Babocomari Valley between the Huachuca and Harshaw Ranges. Bendire (1892) quoted a letter from Otho C. Poling who claimed to have collected three masked bobwhite females in May and early June 1890 in the Canelo Hills and Huachuca Mountains at elevations of 5,000 to 6,000 feet. However, both Brown (1904) and Phillips (1967, personal communication) claimed that Poling was unethical and that this record should be discounted. In addition, Poling's specimens cannot be found in any museum today. Since present day populations are at elevations of 1,700 to 2,400 feet it is extremely doubtful that bobwhites were ever at the altitude reported by Poling. Smith (1907) surmised that masked bobwhites were found in the Whetstone Mountains, but did not see them personally. He also stated that the marshal of Benson, Arizona, F. D. Trask, killed five bobwhites near Lone Mountain in August 1906.

Thus there is considerable doubt about the occurrence of bobwhites east of the Santa Cruz Valley and west of the Altar Valley in Arizona. Brown (1904) was puzzled by the fact that Lieutenant Bendire did not hear or see masked bobwhites while he was stationed at Camp Buchannon on the east side of the Santa Rita Mountains (at about 5,000 feet elevation in the Sonoita Valley) prior to 1870 and Monson and Phillips (1964) flatly state that records for the Huachuca and Whetstone Mountains are not well founded. In a later publication, Phillips et al. (1964) state: "...there is no good evidence that bobwhites ever inhabited the high grasslands above the level of common occurrence of mesquite; that is, the Sonoita Plains, Huachuca or upper Baboquivari Mountains, or the Cananea region of Sonora." Since this country is good Mearns's quail habitat, it is likely that the old timers were confusing the two species. Also, Brown contributed bobwhite specimens from the Altar Valley and Santa Cruz Valley near Tubac and Calabasas, but no specimens are available to document the early presence of bobwhites to the east of the Santa Cruz Valley.

Another recent source (Spaulding 1949) states that the bird was formerly found near Globe, Arizona, but a letter from Seymour Levy to Spaulding (1964) questioning this statement was not answered.

It thus seems clear that the Arizona masked bobwhite once inhabited most of the Altar Valley from Sasabe to Robles Well (now called Three Points), the lower Santa Cruz Valley in the Tubac-Calabasas area, and much of the intervening mesaland surrounding the town of Arivaca. It is possible that they also inhabited some of the lower Sonoita Valley as far east as the Canelo Hills but doubtful that they were found in situations higher than 4,500 feet in elevation.

In Sonora, Benson and Cahoon separately collected birds in and around Cumpas and Bacuachi (northeastern Sonora) in 1886 and 1887 (Brewster 1887, Van Rossem 1945), and W. W. Brown collected birds in and around the Valle de Agua Caliente in 1904-05 (part of the Thayer Expedition). Nothing about bobwhites has been heard from the former area since. However, in the latter area, Johnson Neff and George Peterson saw a covey of more than 30 birds on June 1, 1942, a few miles south of Punta Agua in the north end of the valley (Neff, 1947). J. Stokley Ligon and David Gorsuch trapped more than 100 masked bobwhites near Tecoripa and San Marcial in December 1937 (Ligon 1952). In 1950, Ligon, George Peterson, and Louis Lawson captured 25 birds at two locations: near Cobachi south of Mazatan, and near Agua Fria in the Valle de Agua Caliente (Lawson 1951, Ligon 1952). Wright collected birds at Rancho El Carrizo (100 miles south of Nogales, Sonora) and Tecoripa (75 miles east of Hermosillo) in 1931 (Van Rossem 1945 and personal communication 1968). Thus, the three Sonoran areas shown in Figure 1 are documented by both literature sources and museum records.

LIFE HISTORY, HABITAT AND FOOD HABITS

Very little has been written concerning these important aspects of masked bobwhite biology. Brown (1884, 1904) originally thought that the bird in Arizona was the same as that in the eastern U.S. Upon learning otherwise he was quoted by Grinnell (1884) as saying that they "appear to resemble very closely those of the common quail C. v. virginianus only slightly modified by the conditions of their environment. They utter the characteristic call, 'Bob White,' with bold, full notes and perch on rocks and bushes when calling." The similarity of habits between the two forms was apparent to Brown, particularly the unmistakable bobwhite and covey or hoo-we calls, which he described in 1885. Brown (1885) heard both of these calls during a field trip to the Altar Valley that began on September 26 of that year. The occurrence of the bobwhite call so late in the year implies a later breeding season for the masked subspecies than for the eastern race. He also reported that a scaled quail brood was not more than 2 weeks old at the time the Gambel's quail and masked bobwhites "all seemed fully grown." It is possible that the masked bobwhite broods had not hatched yet and the early-hatching Gambel's quail young had reached adult growth (at least this would appear to be the case judging from my observations of these quail).

Grinnell (1884) continued quoting Brown: "They do not appear to be at all a mountain bird, but live on the mesa, in the valleys, and possibly in the foothills." Brown (1885) elaborated by observing that masked bobwhites were never found in brushy and tangled canyons. He worked the canyons of the Baboquivari foothills for 2 days without finding birds other than those calling from the intervening mesas. His observations were that Gambel's quail were found in rough, canyonlike country; scaled quail in the wide grassy plains; and bobwhites both on the mesas and in the plains but not in the canyons.

Van Rossem (1945) stated that the masked bobwhite was resident of grass plains, river valleys, and foothills in the lower Sonoran Zone. Monson and Phillips (1964) described their habitat as "tall grass-mesquite plains." Ligon (1952) said: "This quail is definitely a dweller of deep-grass-weed habitat, a type of cover incompatible with heavy use by livestock." Gallizioli et al. (1967) stated that: "Early references and recent observations in Sonora indicate that dense stands of perennial grasses are an important component of Masked Bobwhite habitat." Ridgway and Friedman (1946) give "the open grassy plains country (1,000 to 2,500 feet)" as bobwhite habitat in Arizona and Sonora. Bent (1932), in giving the masked bobwhite's range, said that the eastern and western limits are determined by the extent of grassy plains at altitudes of from 3,500 to 4,000 feet. The present author's observation of the terrain from the Altar Valley floor to the nearby mesas in Arizona indicates that it ranges in elevation from about 2,800 feet to 3,900 feet. The habitats surrounding Arivaca and Tubac-Calabasas are within the same altitudinal range.

Both Stephens (1885) and Gallizioli (1964) mention such plant species as sahuaro cactus (Carnegiea gigantea), cholla cactus (Opuntia sp.), mesquite (Prosopis sp.), catclaw (Acacia sp.), and a few other overstory species associated with the terrain of southern Arizona and northern Sonora. There is a tacit understanding, however, that open grasslands with adjoining brushy areas were preferred by masked bobwhites.

It is thus clear that optimum masked bobwhite habitat is composed of desert grasslands at elevations of 1,000 to 4,000 feet. Very few authors identified the grasses within the area inhabited by bobwhites. Stephens (1885) and Brown (1885) both mention that bobwhites hid in clumps of sacaton (Sporobolus sp.) when hunted; in my experience, the coarser grasses like sacaton seem to be used only for hiding, whereas associations of mixed grammas (Bouteloua spp.) and three-awns (Aristida spp.) are preferred for loafing and feeding. In the sandy bottomland of Altar Valley, sacaton can be found today probably just as it was in the 1880's. However, the grama grass plains on the surrounding mesas are (and probably were) more extensive than sacaton grasslands and doubtlessly supported the highest bobwhite density.

Nowhere in the literature is there a reference to annual weather conditions and their effects on bobwhite survival, reproduction, and general habits. I was able to secure information on annual precipitation since 1932 at Rancho El Carrizo, Sonora, (Table 3) where bobwhites still exist. The 39-year average annual rainfall is 13.5 inches, with about 10 inches occurring during the summer months of July through September. This rainfall pattern is thought to affect bobwhite populations by delaying the nesting season until July. Present studies are examining this aspect of the masked bobwhite's life history.

Table 3. Summary of Precipitation Records Taken at Rancho El Carrizo, Sonora Since 1932 (in inches).

Month	Average 1932-1941	Average 1942-1951	Average 1952-1961	Average 1962-1970	Average 1932-1970
January	.47	.60	1.06	.47	.65
February	.24	.34	.21	.29	.27
March	.11	.29	.60	.29	.32
April	.08	.01	.14	.07	.07
May	.00	.04	.00	.01	.01
June	.29	.44	.23	.13	.28
July	3.16	3.71	4.15	4.34	3.83
August	4.94	4.67	5.34	3.99	4.75
September	1.50	1.57	1.11	2.53	1.65
October	.68	.51	.55	.64	.59
November	.30	.11	.39	.86	.39
December	1.02	.50	.47	1.27	.79
Annual Av.	12.79	12.79	14.25	14.89	13.52*
July-	9.60	9.95	10.60	10.86	10.23
Sept.	(75.1%)	(77.8%)	(74.4%)	(72.9%)	(75.7%)
Oct.-	3.19	2.85	3.65	4.03	3.29
June	(24.9%)	(22.2%)	(25.6%)	(27.1%)	(24.3%)

*Total in this column slightly different when added due to method used for deriving overall annual average rainfall.

Food habits are likewise generally ignored in the literature. Brown (1885) examined the stomachs of three masked bobwhites that he collected in the Altar Valley in September 1885. He stated:

"No. 1 contained a species of mustard seed, a few chaparral berries, and some six or eight bugs and beetles ranging in length from a half inch down to the size of a pin-head. No. 2 was similarly provided, but had in lieu of the mustard seed a grasshopper fully an inch in length. These two were taken on the mesa. No. 3 was taken in the valley, and contained about twenty medium-sized red ants, several crescent-shaped seeds and a large number of fleshy green leaves."

Cahoon told Brewster (1887) that the birds he collected in northeastern Sonora "were haunting patches of weeds in gardens and barren sand wastes, where they fed on the seeds of a plant called red-root." Cottam and Knappen (1939) analyzed the crop contents of 10 masked bobwhites collected by D. M. Gorsuch near Tecoripa, Sonora, in October 1931. They found that the birds were mainly vegetarian, with 79.1 percent of the food being vegetable matter and 20.9 percent of the food being animal matter. Gravel formed 11.4 percent of the gross stomach content. The following foods were most important:

<u>Plant Seeds</u>	<u>No. Birds</u>	<u>% of Total Food</u>
Acacia (<u>Acacia angustissima</u>)	8	18.8
Ground cherry (<u>Physalis sp.</u>)	10	16.3
Panic grass (<u>Panicum</u>)	8	
<u>P. halli</u>		12.0
<u>P. stramineum</u>		2.3
<u>P. arizonicum</u>		.3
Misc. grasses		3.4
Day flower (<u>Commelina elegans</u>)	9	10.8
Wild bean (<u>Phaseolus ritensis</u>)	4	3.8
Indian mallow (<u>Abutilon</u>)	9	
<u>A. crispum</u>		1.9
<u>A. incanum</u>		1.0
<u>A. arizonicum</u>		tr.
Partridge pea (<u>Cassia leptodena</u>)	6	2.5
Morning-glory (<u>Ipomoea sp.</u>)	5	2.3
Milk pea (<u>Galactea sp.</u>)	2	1.5
16 species	-	2.2
<u>Acanthus</u> , <u>Meibomia</u> , <u>Waltheria</u> , <u>Acalypha</u> , <u>Evolvulus</u> , <u>Calliandra</u> , etc.		

<u>Animal Foods</u>	<u>No. Birds</u>	<u>% of Total Food</u>
Grasshopper (<u>Melanoplus</u> sp.)	1	8.8
<u>Romalea</u> sp.	3	7.1
Undetermined	4	2.5
Misc. Orthoptera	4	.9
Misc. animal - stink bug, undet. Pentatomidae, cutworms, Coleoptera, ant, and fly		1.6

REASONS FOR DECLINE

The masked bobwhite was apparently extirpated from Arizona by the turn of the century. The last specimens were taken for Herbert Brown at Calabasas, December 29, 1897 (Phillips, et al. 1964). Brown stated in his 1904 article that "unfortunately there are none left to protect." In 1904, a correspondent with G. F. Breninger was told by people in former bobwhite range that none had been seen for 8 years. However, Ligon (1942) wrote that: "Reports of masked bobwhites having been observed in the Arivaca section and on the Baboquivari range west of Altar Valley, persist to this day (Musgrave, Gorsuch, Peterson, and others)." He said that Gorsuch and Peterson (both of whom definitely knew masked bobwhites) claimed to separately have seen bobwhites near Arivaca. Peterson's sighting was in 1937, northeast of Arivaca and Gorsuch's observation was about the same time, 7 miles east of Arivaca. No specimens were ever taken, and these observations were never substantiated. Even if correct, the sightings probably represented a remnant population that has since died out. For all practical purposes, then, masked bobwhites had disappeared from Arizona by the early 1900's.

In Sonora, the decline was somewhat slower, but by the late 1920's and early 1930's, ornithologists were concerned that the bird might be extinct. Bancroft wrote Bent in 1928 saying that the bobwhite was virtually extinct (Bent 1932). Bent then concluded that the subspecies was "nearly or quite extinct in Sonora." Ligon (1942), however, captured 132 masked bobwhites in 1937, and later concluded (1952) that the birds were "still fairly numerous locally as late as 1937 in central and southern Sonora, Mexico." By 1949 and 1950 the picture had changed, and Ligon (1952) wrote that: "Ranchmen who had formerly known of the presence of the birds advised that they seemed to have vanished overnight."

Gallizioli et al. (1967) speculated: "While it is impossible to speak authoritatively about causes of its demise, the evidence strongly suggests that severe drought and excessive cattle grazing probably were responsible." Brown (1904) said: "The causes leading to extermination of the Arizona Masked Bobwhite (Colinus ridgwayi) are due to the overstocking of the country with cattle, supplemented by several rainless years. ...This

combination practically stripped the country bare of vegetation." Hollon (1966) reports that censuses of livestock revealed approximately 5,000 cattle in Arizona in 1870. By 1880 this figure had risen to 135,757, and by 1890 it had soared to 927,880. The following is a quotation from Brown (1900):

"During the years 1892 and 1893 Arizona suffered an almost continuous drouth, and cattle died by the tens of thousands. From 50 to 90 percent of every herd lay dead on the ranges. The hot sun, dry winds, and famishing brutes were fatal as fire to nearly all forms of vegetable life. Even the cactus, although girdled by its millions of spines, was broken down and eaten by cattle in their mad frenzy for food. This destruction of desert herbage drove out or killed off many forms of animal life hitherto common to the great plains and mesa lands of the Territory. Cattle climbed to the tops of the highest mountains and denuded them of every living thing within reach."

Apparently, heavy stocking of cattle in Sonora did not occur until the 1940's and 1950's. Ligon's (1952) experience in 1937 and 1950 and that of Wright (personal communication) between 1931 and 1950 indicate that the once beautiful, grassy plains were denuded within that time span. The bobwhites disappeared concurrently with the grasses.

ATTEMPTS AT REINTRODUCTION AND PRESERVATION

Most, if not all, early attempts to reintroduce masked bobwhites to Arizona were initiated by J. Stokley Ligon. Ligon made three separate trips to Sonora to obtain stock for reintroduction and propagation (Ligon 1942, 1952; Lawson 1951). The first trip was made in December 1937 with D. M. Gorsuch, and the last two were in November and December 1949 and 1950 with George Peterson and Louis Lawson. In 1937, 132 bobwhites were captured, and in 1950, 25 were captured. In restocking experiments following the 1937 trip, Ligon released 112 birds (including wild and propagated birds) in six areas of Arizona (Ligon 1942). The following is a resume of these releases:

1. Heady-Ashburn Ranch (San Rafael Valley, sec. 30, T. 33 S., R. 17 E.) - December 1937; 23 wild-trapped birds.
2. Nogales Ranger Station - Late December 1937; 10 wild-trapped birds.
3. Jalisco Canyon (7 miles east of Arivaca where Gorsuch had reported seeing birds) - January 1939; seven wild-trapped birds that had been held in captivity for 1 year.

4. Charles Beach Ranch (southeast of Tucson) - May 1941; 24 birds of propagated stock.
5. Brophy Refuge (Elgin) - May 1941; 24 birds of propagated stock.
6. Seep Tank (Wm. Riggs Ranch west of Chiricahua Mtns.) May 1941; 24 birds of propagated stock.

These releases failed for a number of reasons given in Ligon's report. In New Mexico, Ligon released 58 masked bobwhites in the Animas Valley (Campbell 1968), 13 and 16 miles south of Animas, a community in extreme southwestern New Mexico. Sometime in early 1940, an additional release of 20 bobwhites was made at one of the original sites. These releases also failed to reestablish the birds.

Restocking experiments following the 1950 trip are less precisely documented. Ligon made at least one release in Black Bill Canyon (Campbell 1968), and probably released more propagated birds in southwestern New Mexico near the Peloncillo Mountains. Lawson (Arizona Game and Fish Department) kept 15 birds (seven males and eight females), and Steve Gallizioli released these birds (Lawson 1951) in lower Garden Canyon (Fort Huachuca) after 3 days in a holding pen. These releases also failed to establish masked bobwhites in the U. S.

Gallizioli et al. (1967) speculate that: "One possibility for failure of the releases is that imperfect knowledge of habitat requirements and of limits of historical range resulted in their being released in unsuitable habitat."

In 1964, after 14 years without a sighting record of masked bobwhites, Gallizioli and the Levy brothers, Seymour and Jim, relocated a population of birds on the El Carrizo Ranch in Sonora where Wright had collected the birds in 1931 (Gallizioli 1964). This discovery led to an attempt to buy, lease, or set aside a piece of land on this ranch owned by Sr. Juan Pedro Camou (Gallizioli 1967). The purpose of the venture was to establish a sanctuary that would be free from grazing by livestock. For unknown reasons, this attempt was thwarted by Sr. Camou, who was apparently reluctant to obligate any part of his extensive land holdings for any extended period of time. Fortunately, he practices good range management and the bobwhites are holding their own without the protection.

In 1961 and 1962 a project was begun by the Arizona-Sonora Desert Museum located in Tucson, Arizona, with several cooperating agencies (Walker 1964). With 30 birds that had been obtained from Ligon, these groups began a program of propagation and habitat manipulation in the Avra Valley. Unfortunately, three Papago Indian children entered the

holding pens in 1964 and killed many of the precious bobwhites. In addition, the Museum experienced difficulty in obtaining reproduction from the birds, and the project was reluctantly abandoned. The few remaining birds were sent to the University of California at Davis to attempt to discover the reasons for poor reproduction and in hopes of increasing the stock (L. W. Walker, personal communication 1967).

At about the same time, the Levy brothers were also attempting to raise masked bobwhites in Tucson with stock obtained from Ligon (Gallizioli et al. 1967). Realizing that the Bureau of Sport Fisheries and Wildlife was better equipped to raise the rare bobwhites, they generously donated four pairs to that agency in 1965. However, in 1968 after one moderately successful year of propagation at the Patuxent Wildlife Research Center facilities in Laurel, Maryland, the egg production and egg fertility fell considerably. Bureau biologists believed that the problem was caused by inbreeding of the stock during 18 years in captivity. Additional wild stock was captured in Sonora in 1968 and 1969 by the author and shipped via a quarantine station to Patuxent. Production by the new birds in 1969 and 1970 was much higher than during all previous attempts at propagation. At the present time, masked bobwhite reintroduction attempts are being made with progeny of the wild stock (Tomlinson and Brown 1970).

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Masked bobwhite male giving "bobwhite" call from heavy grass cover. Males frequently call from elevated positions, such as a tree or fence post.



The masked bobwhite female closely resembles other subspecies of the bobwhite, particularly the Texas race.



Typical masked bobwhite habitat in Sonora, Mexico.



Ideal masked bobwhite habitat showing heavy stands of annual grasses with adjacent mesquite trees.



Acacia angustissima is a small shrub which bears seeds that are a preferred food of the masked bobwhite.



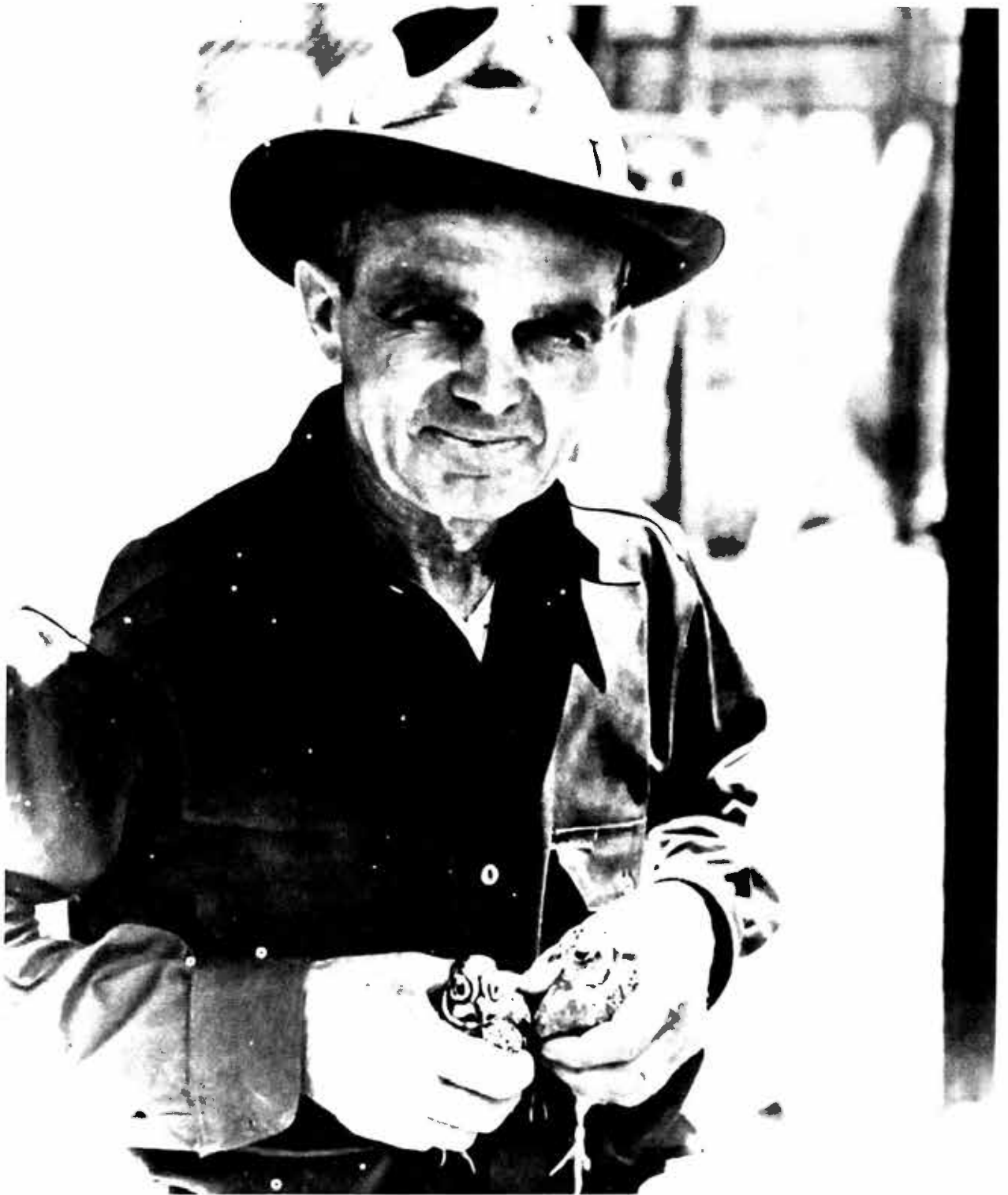
A 1964 photograph showing extremely heavy grazing by livestock in former masked bobwhite range in Sonora. Man in photograph is J. J. Levy. (Photo courtesy of Steve Gallizioli, Arizona Game and Fish Department).



Grazing pressure is still extremely heavy in most areas of southern Arizona. This photograph was taken in 1971 and shows contrasting conditions on grazed and ungrazed land near the town of Arivaca, Arizona.



Mr. Herbert Brown, first man to discover masked bobwhites in Arizona and owner of The Tucson Daily Citizen during the late 1800's. (Photo courtesy of The Tucson Daily Citizen).



Mr. J. Stokley Ligon, former Bureau of Biological Survey biologist, made several attempts in the period 1938-55 to save the masked bobwhite from extinction. Birds in the picture are Mearn's quail. (Photo courtesy of New Mexico Game and Fish Department).

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