

**ARIZONA GAME AND FISH DEPARTMENT  
HERITAGE DATA MANAGEMENT SYSTEM**

**Animal Abstract**

**Element Code:** ABNLC21022

**Data Sensitivity:** YES

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Colinus virginianus ridgwayi*

**COMMON NAME:** Masked Bobwhite

**SYNONYMS:** *Colinus ridgwayi*

**FAMILY:** Odontophoridae

**AUTHOR, PLACE OF PUBLICATION:** Brewster (*Colinus ridgwayi*), Auk, 2, no. 2, Apr. 1885, p. 199.

**TYPE LOCALITY:** About 18 miles southwest of Sasabe [50 miles west of Nogales], Sonora, Mexico, 1884.

**TYPE SPECIMEN:**

**TAXONOMIC UNIQUENESS:** Three species of *Colinus* are recognized, of which only *Colinus virginianus* occurs north of Mexico. *Colinus virginianus ridgwayi* is one of 22 subspecies in the species *C. virginianus*. The high degree of variation both within the genus *Colinus* and among the 22 recognized subspecies of Northern Bobwhite has resulted in taxonomic confusion. Genetic analysis of *C.v. ridgwayi* with 6 other subspecies exhibited extreme differentiation from the other subspecies studied, and confirmed that the masked bobwhite is a distinct subspecies (Eo 2008).

**DESCRIPTION:** For the species: This is a small to medium-sized quail, near the size of a Meadowlark, measuring 21.6-26.7 cm (8.5-10.5 in) in length, with weights from 140-170 g; male is slightly heavier than female. Tails are dark and rounded, with 12 retrices that range in length from 4.9-7.0 cm; wing length between 9.0-12.0 cm. Adult male has brownish upperparts, finely barred with tan and black; white forehead, superciliary stripe, and triangular patch on chin and throat, contrasting with chestnut crown and nape; remaining areas blackish, becoming chestnut posteriorly. Lower portions of throat, neck, and nape have white streaks bordered with black. Breast, sides, and flanks white, narrowly barred in zigzag pattern with black; some chestnut streaking on sides and flanks. Wings chestnut to brownish gray; many inner feathers patterned with buff, black, and gray. Male has slight head-crest that becomes erect when head is raised in alert. Adult female similar, but white areas on head replaced with buff, and remaining plumage less boldly marked. Juvenile plumage similar to that of adult female, but much duller and less boldly marked. (Brennan 1999).

Male coloration varies geographically. The dark west Mexican form, “Masked Bobwhite (*C. v. ridgwayi*),” has a cinnamon head and underparts, and partly or entirely blackish face and breast. Males from northeast Mexico and Texas are the most grayish, while males from eastern Mexico have a black collar that widens ventrally. Those from central Mexico have the typical brown and white head pattern, but the underparts below the throat are entirely cinnamon. (Brennan 1999). According to Guthery (1992), “Coloration of the male provides the most striking contrast between masked bobwhites and other races. The head is black, as if hooded by an executioner’s mask.”

**AIDS TO IDENTIFICATION:** *C. virginianus* is 1) distinguished from other quail by browner color; 2) from grouse by small size; and 3) from the meadowlark in flight by lack of white outer tail feathers (Peterson 1961).

*C. v. ridgwayi* is distinguished from other bobwhites by coloration of the male, particularly the dark-colored head, as described above.

**ILLUSTRATIONS:**

Color drawing (Peterson 1990: p. 167)

Color drawing (National Geographic Society, 1999: p. 143)

Color drawing (Brennan 1999: p. 4)

**TOTAL RANGE:** Historically, the masked bobwhite (*C.v. ridgwayi*) formerly ranged from south central Arizona, between the Baboquivari Mountains and Santa Cruz River Valley, south into southern Sonora, Mexico (Hernandez et al. 2006). It is estimated that this quail disappeared from Arizona in the early twentieth century. Existing natural occurring populations are limited to Sonora, Mexico, but have not been located since 2006 (Brown and Clark, 2017). In southern Arizona, these birds have been reintroduced.

For the species: *C. virginianus* ranges throughout eastern North America west to the Great Plains, north to southern New England and extreme southern Canada, and south to southern Mexico. They are also resident in parts of the Caribbean and very locally in portions of the Pacific Northwest. (Brennan 1999).

**RANGE WITHIN ARIZONA:** Extirpated before or soon after 1900 due to overgrazing and a series of droughts. Northern edge of range extended to bottomlands of Altar and Santa Cruz valleys. Habitat restoration and reintroductions efforts, were halted in the late 1970s and early 1980s, but began again on Buenos Aires National Wildlife Refuge (in the Altar Valley) in 1985, where they still occur today.

**SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** The Bobwhite is typically a diurnal bird that feeds and roosts in coveys except during nesting season, forming groups of usually less than 20 individuals. Within coveys,

birds roost together, often in direct contact. When flushed, they fly on noisy wings then glides to cover. Locomotion consists of quick walks and runs on the ground. (Brennan 1999). Populations are typically sedentary, year-round residents, especially in areas of moderate to high quality habitat (Stoddard 1931: 500 in Brennan 1999). Their voice is a clearly whistled *Bob-white!* or *poor, Bob-whoit!* The covey call is a *ko-loi-kee!*, answered by *whoil-kee!* When separated from adults, young give Lost Call, described as anxious piping (*hu-hu-hu-whe-whe-whe-whee-whee*) with rising inflection (Brennan 1999).

For the species: causes of mortality include exposure (deep winter snows and prolonged cold), predation, and pesticides and other contaminants/toxins (in agricultural environments). Nearly every opportunistic terrestrial predator within the range of the bobwhite will prey on eggs, young or adults. Primary avian predators of adult bobwhite are Cooper's hawk (*Accipiter cooperi*), most Buteos, and mid-sized or larger owls that forage in open woodlands and old-field environments. Primary mammalian predators of adults and eggs include raccoon (*Procyon lotor*), opossum (*Didelphis virginianus*), skunk (*Mephitis* spp.), fox (*Vulpes* spp.), and nearly any other terrestrial carnivore. Other important predators include snakes, and domestic cats and dogs. (Brennan 1999). Longevity record in wild is 6 years 5 months (Marsden 1961); with very few individuals exceeding 5 years (Rosene 1969: 191) (Brennan 1999).

**REPRODUCTION:** The nesting season of the masked bobwhite corresponds to summer rains, since high humidity is important to successful egg hatch in quail. Per Ehrlich et al. (1988), "The courtship display of males include feathers erect, wingtips touching ground and elbows thrown forward to produce "feathered wall". It turns its head to side displaying white markings, and makes short rushes toward female. Development and breakdown of pair bonds is a dynamic process in the bobwhite breeding system. Pair bonds seem to be made and broken according to fate of nests and subsequent opportunities to breed with other individuals (Brennan 1999). The nest is a shallow depression lined with grass, etc., concealed by woven arch of vegetation with side entrance. Eggs are white to creamy, occasionally buff and unmarked." Clutch size is 5-15. Breeding typically commences in June, and the season lasts only about 90 days, corresponding to monsoonal rains. At the species level, northern bobwhites average a 120 day breeding season. The shorter breeding season of masked bobwhites makes re-nesting attempts after a failed nesting unlikely, which reduces the reproductive potential of this subspecies, as compared to bobwhite subspecies in less arid environments (USFWS 2014). Hatchlings are covered with natal down, and need active brooding by parents for about 2 weeks after hatching. Hatchlings can walk almost immediately upon hatching. Young birds take their first flight about 14 days after hatching, and usually remain with adults through late winter. (Brennan 1999).

**FOOD HABITS:** Green vegetation and insects contribute substantially to their diet in the spring and summer. Forb and grass seeds are important components of their fall and winter diets. NatureServe (2001) reports that they "eat various legume and weed seeds in fall, winter and early spring; and plant material and insects in summer and early fall. Picks food items from substrate." Young birds are capable of procuring food and grit on first day of life. One or both parents lead chicks to food. (Brennan 1999).

**HABITAT:** Information on habitat ecology of masked bobwhites is incomplete, however, the available information suggests the general habitat requirements are similar to that of the well-studied *C. virginianus* (Hernandez et al. 2006).

Descriptive accounts from the early 1900's identify level terrain, moderate elevation, abundant grass cover, interspersed woody cover, and abundant seed-producing plants as masked bobwhite habitat components (Hernandez et al. 2006).

Grass plains, river valleys, and foothills in the lower Sonoran zone between 780- 2500 ft (240-760 m) in elevation is the preferred habitat of the subspecies (Tomlinson 1972, Van Rossem 1945). Masked bobwhites show a preference for mosaic vegetation types, as habitat use varies by time of day and year. Dense grass is selected for protective cover, while sparse grass is preferred for foraging. Grasslands are used more extensively in the summer, while shrubland is selected for during winter (Tomlinson 1972). Forb and insect abundance are also important components of quality masked bobwhite habitat, as both are important food sources (Tomlinson 1984).

Guthery et al. (2001) found that an acceptable range for a particular habitat feature was influenced by other habitat features, suggesting that masked bobwhites are less sensitive to any particular habitat feature when other habitat features were closer to their acceptable values. This is encouraging, as it suggests a deficiency in one habitat feature may be addressed by managing other habitat variables.

From studies conducted on the Buenos Aires National Wildlife Refuge (BANWR) between June 1986 and March 1989, home ranges were estimated to average 10.9 ha and core areas 1.1 ha. Core areas had less bare ground, half-shrub cover, and less vegetation structure in the 5-20 dm height above ground than in non-core areas. Half shrub densities were significantly greater in the non-core areas. Home ranges had more aerial grass cover (all grass spp. combined: *Bouteloua*, *Eragrostis*, *Aristida*, and *Sporobolus*), less half-shrub cover and density, and less cactus density. (Smith, Simms and Eyler, Post 1989).

**ELEVATION:** On Buenos Aires National Wildlife Refuge, elevation ranges from 3,090 - 3,720 ft. (942 - 1135 m). (Non-published data, AGFD, HDMS 2020).

**PLANT COMMUNITY:** Mosaic of Sonoran grassland and scrubland habitat.

**POPULATION TRENDS:** Northern limit of historic range defined by the Altar and Santa Cruz valleys in Arizona. Extirpated from the U.S. by about 1900. Possible factors contributing to extirpation were: control of range fires, brush invasion, and overgrazing (AGFD in prep). They were reintroduced at the Buenos Aires National Wildlife Refuge in southern Arizona; only one of three historic populations is considered extant in Mexico, but has not been observed since 2007. Elevations range from 10-1200 m where mean rainfall is 250 mm to 500+ mm. In the early 1990s, overwintering population at the Buenos Aires NWR was 333 birds in 31 coveys (End. Sp. Tech. Bull. 16[7-8]:6). Total wild population was

believed to be less than 1500 in the early 1990s (Federal Register, 5 May 1994). Brown and Clark (2017) believe all wild populations of the masked bobwhite to be functionally extinct. The captive breeding facility at Buenos Aires National Wildlife Refuge was renovated to improve bird health in 2016. Two additional captive breeding populations have been established, the George Miksch Sutton Avian Research Center in Bartlesville, Oklahoma, and at Africam Safari in Puebla Mexico, near Mexico City.

## **SPECIES PROTECTION AND CONSERVATION**

**ENDANGERED SPECIES ACT STATUS:** LE (USDI, FWS 1967, 1970)  
**STATE STATUS:** 1 (AZGFD, AWCS 2022)  
 [1A (AGFD SWAP 2012)]  
 [WSC (AGFD, WSCA 1996 in prep)]  
 [Endangered, (AGFD, TNW 1988)]  
**OTHER STATUS:** P, Determined Endangered in Mexico  
 (Secretaria de Medio Ambiente, Proyecto de  
 Norma Oficial Mexicana 2000, 2010)

**MANAGEMENT FACTORS:** Drought and cattle grazing led to the near-complete crash of the Sonoran population by 1985 (Ehrlich et al. 1992 *in* NatureServe 2022). Effects of cattle grazing include removal of cover, nesting habitat, and food resources (Matthews and Moseley 1990 *in* NatureServe 2022). Depletion of ground cover prevents fires that kill off invading woody plants, which in turn degrade habitat for bobwhite.

**Threats:** overgrazing of weedy bottom lands, grassy and herb-strewn valleys, and forb-rich plains; spread of non-native plants; overgrazing causing down-cutting of drainages, altering hydrological regime; habitat fragmentation due to agricultural use and the invasion of non-native plants; Exotic grass invasion resulting in decreased habitat and food supply; raptor and mammal predation; increasing temperatures and drought events due to climate change; infection a serious threat to captive populations, although not discerned as a threat to wild populations, possibly competition by other native quail (USFWS 2014).

**Management needs:** Manage grazing of grasslands to maintain and enhance foraging and nesting habitat; reduce shrub invasion of native grasslands by maintaining natural fire regime; test effectiveness of habitat enhancement techniques such as discing and planting to promote growth of food and insect-bearing plants, and half-cutting and chaining to reduce shrub invasion; establish two viable populations within the United States; cooperate with Mexico to survey and map habitat and potential population occurrences in Mexico, and reintroduce two or more additional populations in Mexico (USFWS 2014).

Captive populations need data management systems developed to manage population genetics, as well as captive management and reintroduction protocols to be developed and standardized across the new and existing facilities (USFWS 2014).

**PROTECTIVE MEASURES TAKEN:** Development of two additional captive breeding populations, in Oklahoma and Mexico. Construction of a new captive breeding facility on Buenos Aires National Wildlife Refuge and adoption of new protocols. Implementation of a habitat improvement and predator management program on Buenos Aires National Wildlife Refuge (Mesta, 2012).

**SUGGESTED PROJECTS:** Research needed on effects of climate change, food preferences, landscape configuration for cover and food plantings, the effectiveness of habitat treatments, effect of buffelgrass invasion, insect abundance on brood survival, effects of supplemental water on survival and reproduction, effects of competition with other quail, impacts of predators, temperature tolerances, and relative relatedness of various Mexican races of bobwhites.

Suggested projects include; assessing the status of the wild population in Arizona and Mexico, extensively surveying high quality habitat identified in Mexico by , identifying additional potential release sites, improving habitat in the United States and Mexico, developing partnerships with landowners in the United States and Mexico, revising the recovery plan for the subspecies, and pursue funding for recovery (USFWS 2014).

**LAND MANAGEMENT/OWNERSHIP:** U.S. Fish and Wildlife Service, Buenos Aires National Wildlife Refuge.

## **SOURCES OF FURTHER INFORMATION**

### **REFERENCES:**

- American Ornithologists' Union (AOU). 1957. The A.O.U. Check-list of North American Birds, 5<sup>th</sup> ed. Port City Press, Inc., Baltimore, Maryland. p. 141.
- Arizona Game and Fish Department (AGFD). 1988. Threatened native wildlife in Arizona. Arizona Game and Fish Department Publication, Phoenix, Arizona. p. 15.
- Arizona Game and Fish Department (AGFD). 1996 in prep. Wildlife of special concern in Arizona. Arizona Game and Fish Department Publication. Phoenix, Arizona. p. 15.
- Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan 2012-2022. Arizona Game and Fish Department, Phoenix, Arizona. 233 pages.
- Arizona Game and Fish Department. 2022. Arizona Wildlife Conservation Strategy: 2022-2032. Arizona Game and Fish Department, Phoenix, Arizona. 378 pages.
- Brennan, L.A. 1999. Northern Bobwhite (*Colinus virginianus*). In: A. Poole and F. Gill, editors. The Birds of North America, No. 397. The Birds of North America, Inc., Philadelphia, Pennsylvania.
- Brown, D.E. and Clark, K.B., 2017. The saga of the Masked Bobwhite: lessons learned and unlearned. National Quail Symposium Proceedings. 8(1):102.
- Cohan, D., Hunnicutt, M., Gall, S. and Gutierrez, J., 2012. Review of the Masked Bobwhite recovery effort. National Quail Symposium Proceedings 7(1): 119.
- Dobrott, S.J. 1990. Continuing the "Maskerade". Wildlife Views, Arizona Game and Fish Department, Phoenix. pp. 4-5.

- Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. Birds in Jeopardy: the imperiled and extinct birds of the United States and Canada, including Hawaii and Puerto Rico. Stanford University Press, Stanford, California. 259 pages. *in*: NatureServe Explorer: An online encyclopedia of life [web application]. 2022. Version 2.0. Arlington, Virginia, USA: NatureServe. Available: <https://explorer.natureserve.org/>.
- Eo, S.H. 2008. Integrating phylogenetic relationships and population structure for conservation planning in galliformes. Dissertation, University of Georgia, Athens, Georgia.
- Guthery, F.S. 1992. La Perdiz Mascarita, The Masked Bobwhite. Quail Unlimited. pp. 28-33.
- Hernandez, F., W.P. Kuvlesky Jr, R.W. DeYoung, L.A. Brennan, and S.A. Gall. 2006. Recovery of rare species: case study of the masked bobwhite. *The Journal of Wildlife Management*, 70(3):617-631.
- LeFebvre, R.A. 1995. Struggling with the Masked Bobwhite. *Wildlife Views*, Arizona Game and Fish Department, Phoenix, Arizona. pp. 8-9.
- Matthews, J.R., and C.J. Moseley (editors). 1990. The official World Wildlife Fund guide to endangered species of North America. Volume 2. Birds, reptiles, amphibians, fishes, mussels, crustaceans, snails, insects, and arachnids. xiii + pp. 561-1180. Beacham Publications, Inc., Washington, D.C. *in* NatureServe Explorer: An online encyclopedia of life [web application]. 2022. Version 2.0. Arlington, Virginia, USA: NatureServe. Available: <https://explorer.natureserve.org/>.
- Mesta, R., 2012. Masked Bobwhite: status of an endangered subspecies. *National Quail Symposium Proceedings* 7(1):118).
- NatureServe Explorer: An online encyclopedia of life [web application]. 2022. Version 2.0. Arlington, Virginia, USA: NatureServe. Available: <https://explorer.natureserve.org/>.
- Secretaría de Medio Ambiente, Recursos Naturales y Pesca. 2000. Proyecto de Norma Oficial Mexicana, PROY-NOM-059-ECOL-2000.
- Secretaría de Medio Ambiente y Recursos Naturales. 2010. NORMA Oficial Mexicana NOM-059-SEMARNAT-2010, Protección ambiental-Especies nativas de México de flora y fauna silvestres-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo.
- Smith, N.S., K.M. Simms, and M.L. Eyler. Post 1989. Unpublished data: Habitat selection and use, movement, home range and mortality of reintroduced masked bobwhite. Arizona Cooperative Fish and Wildlife Research Unit.
- Tomlinson, R. E. 1972b. Current status of the endangered masked bobwhite quail. *Transactions of the North American Wildlife and Natural Resource Conference* 37:294-311.
- Tomlinson, R. E. 1984. Habitat needs of the masked bobwhite in Mexico. Pages 12-14 *in*: M. R. Stromberg, T. B. Johnson, and S. W. Hoffman, editors. Masked bobwhite biology and conservation: proceedings of a symposium, Arizona Game and Fish Department, Tucson, Arizona, USA.
- USDI, Fish and Wildlife Service. 1967. Native fish and wildlife, endangered species. *Federal Register* 32(48):4001.
- USDI, Fish and Wildlife Service. 1990. Endangered and threatened species recovery program: report to Congress. 406 pages. *in* NatureServe Explorer: An online encyclopedia of life

[web application]. 2022. Version 2.0. Arlington, Virginia, USA: NatureServe. Available: <https://explorer.natureserve.org/>.

USDI, Fish and Wildlife Service. 2014. Masked Bobwhite (*Colinus virginianus ridgwayi*) 5-year review: summary and evaluation. Buenos Aires National Wildlife Refuge, Sasabe, Arizona.

Van Rossem A. J. 1945. A distributional survey of the birds of Sonora, Mexico. Occasional Papers Louisiana Museum Zoology 21:1-379.

#### **MAJOR KNOWLEDGEABLE INDIVIDUALS:**

Leonard A. Brennan, Director of Research at Tall Timbers Research Station, Route 1, Box 678, Tallahassee, FL, 32312. E-mail: [brennan@ttrs.org](mailto:brennan@ttrs.org).

#### **ADDITIONAL INFORMATION:**

Per LeFebvre (1995), "Reintroduction efforts in 1969 and 1970, failed. In 1985, the Buenos Aires National Wildlife Refuge was purchased to reestablish the bird in the most suitable habitat available. Management centered on removing livestock from the refuge, restoring habitat, and using wild adult Texas bobwhites to foster pen-reared masked bobwhite chicks. Winter surveys were used to monitor the refuge population." Since 1985, more than 21,000 masked bobwhites have been released on the refuge. To date they have not been self-sustaining.

**Revised:** 2001-08-27 (SMS)  
2020-07-24 (KSL)  
2022-12-22 (MBL)

To the user of this abstract: you may use the entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX (= **year of last revision as indicated at end of abstract**). X...X (= **taxon of animal or plant**). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. X pp.