



Montezuma Quail, photo by © Dave Krueper

Conservation Profile

Species Concerns	
Climate Change (Drought) Unsustainable Grazing	
Conservation Status Lists	
USFWS ¹	No
AZGFD ²	Tier 1C
DoD ³	No
BLM ⁴	No
PIF Watch List ^{5b}	No
PIF Regional Concern ^{5a}	Regional Concern and Stewardship Species BCR 34
Migratory Bird Treaty Act	
Not Covered	
PIF Breeding Population Size Estimates ⁶	
Arizona	100,000 ± 50K pers.comm. K. Bristow
Global	1,500,000 [^]
Percent in Arizona	6.67%
PIF Population Goal ^{5b}	
Maintain	
Trends in Arizona	
Historical (pre-BBS)	Unknown
BBS ⁷ (1968 – 2013)	Not given
PIF Urgency/Half-life (years) ^{5b}	
Insufficient Data	
Monitoring Coverage in Arizona	
BBS ⁷	Not adequate
AZ CBM	Not covered
Associated Breeding Birds	
Arizona Woodpecker, Dusky-capped Flycatcher, Bridled Titmouse, Painted Redstart, Red-faced Warbler, Dark-eyed Junco, Yellow-eyed Junco	

Breeding Habitat Use Profile

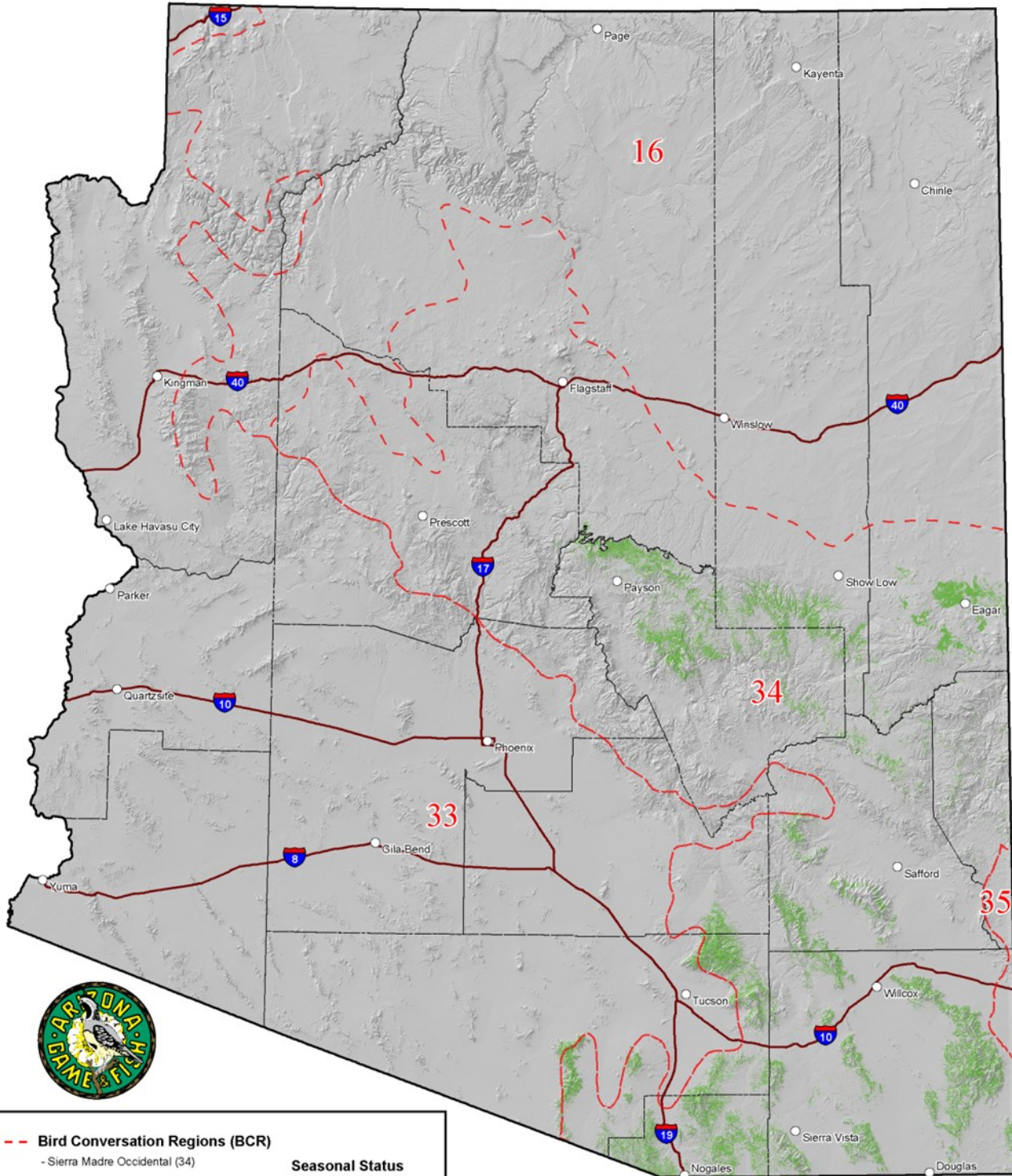
Habitats Used in Arizona	
Primary: Madrean Pine-Oak Woodlands Secondary: Semi-desert Grasslands ⁷	
Key Habitat Parameters	
Plant Composition	Evergreen oaks (Emery, Mexican blue, gray, Toumey); alligator and one-seed junipers; pine or aspen at higher elevations; sycamore, mountain mahogany, mesquite in semiarid grassland; ground cover grama, bluestem, beardgrass, wolftail, sprangletop; also bulb and tuber-producing forbs ⁸
Plant Density and Size	Open woodland (20 – 30% tree cover); dense understory (≥ 50% cover) with bunchgrasses
Microhabitat Features	Tall, native bunchgrasses; overstory trees provide security, thermal cover and a microclimate conducive to forb production
Landscape	North-facing slopes most suitable; connectivity with other suitable areas important, area requirements currently unknown
Elevation Range in Arizona	
3,800 – 9,500 feet, occasionally higher ⁹	
Density Estimate	
Home range: 10 – 25 acres, often < 15 acres Density: 30 – 70 birds/100 acres	

Natural History Profile

Seasonal Distribution in Arizona	
Breeding	July – September (monsoon season), rarely as early as May and into October
Migration	Year-round resident
Winter	Year-round resident, some dispersal in fall
Nest and Nesting Habits	
Type of Nest	Covered “chamber” ⁸
Nest Substrate	Ground
Nest Height	Ground ⁸
Food Habits	
Diet/Food	Acorns and underground tubers ⁸
Foraging Substrate	Ground



Distribution of Montezuma Quail



- Bird Conservation Regions (BCR)**
 - Sierra Madre Occidental (34)
 - Chihuahuan Desert (35)
 - Sonoran & Mojave Deserts (33)
 - Southern Rockies & Colorado Plateau (16)
- Seasonal Status**
 - Year-round
 - Counties

This map represents the predictive distribution for an individual species. AZGFD warrants no guarantees of accuracy or currency of the data represented.

SPECIES ACCOUNT ● MONTEZUMA QUAIL *Cyrtonyx montezumae*



General Information

Distribution in Arizona

In Arizona, Montezuma Quail reach their highest abundance in the southeastern region of the state from the Chiricahua to Baboquivari mountains, north to the Santa Catalina, Galiuro and Pinaleño mountains. (Corman 2005). North of the Gila River, Montezuma Quail are more sparsely distributed where they occur in the White Mountains north locally to Wenima Wildlife Area. They are encountered very locally along the southern edge of the Mogollon Rim as far west as Pine and south to Young, Gila County, and north to near Chevelon Butte, Coconino County, where they are thought to have been more abundant historically (Corman 2005, K. Bristow pers. comm.) The Montezuma Quail is a year-round resident and it reaches the northern and western edge of its global range in Arizona (Stromberg 2000).

Habitat Description

In southeastern Arizona, Montezuma Quail occur almost exclusively in Madrean oak and pine-oak woodlands and nearby grassland savannahs. However in peak abundance years they wander into other vegetation types and into canyons and riparian drainages (Latta et al. 1999, Zornes et al. 2008). At northern and higher elevations, they are often found in or near drainages with various pines, fir, and broad-leaf trees. Montezuma Quail are also encountered occasionally at the edges of alpine meadows (Corman 2005). A key feature of all occupied habitats is a diverse and abundant grass understory of tall perennial bunchgrasses that serve as cover and nesting habitat (Stromberg 2000, Bristow and Ockenfels 2004, Zornes et al. 2008). Although they occasionally nest in the spring following wetter winters, the summer monsoon rains are critical to Montezuma Quail, as these produce the grass and forb cover necessary for successful breeding (Latta et al. 1999). Montezuma Quail also occasionally use riparian areas and meadows if they have abundant grass cover.

Microhabitat Requirements

Optimal tree cover in areas occupied by Montezuma Quail is 20 – 30% and consists of species such as Emory oak, Mexican blue oak, Arizona oak, and less commonly, gray oak, Toumey oak, alligator juniper, and one-seed juniper. The understory typically comprises bunchgrasses such as sideoats grama, beardgrass, sprangletop, and Texas bluestem (Latta et al. 1999, Zornes et al. 2008). In the Huachuca Mountains, wolfstail and plains lovegrass were found to be important ground cover species that recovered after livestock removal (Brady et al. 1989, cited in Stromberg 2000). While Montezuma Quail occasionally range out of woodlands, they prefer at least some tree cover (Zornes et al. 2008).

Montezuma Quail nest on the ground, often in dense clumps of bunchgrasses or other ground cover (Stromberg 2000). At night they roost on the ground, usually on hillsides with 50% grass cover and overhead cover of grasses or rocks (Stromberg 2000). Montezuma Quail forage on plants of bulb and tuber-producing species such as yellow nutsedge and woodsorrel, as well as other forbs, but acorns and insects are also important (Zornes et al. 2008). They generally forage under cover of shrubs or trees (Stromberg 2000).



Landscape Requirements

Most areas used by Montezuma Quail are on hillsides, particularly north-facing, rather than in flat terrain (Stromberg 2000). Cover of tall bunchgrasses and the presence of open woodlands appear to be the most important landscape features (Zornes et al. 2008). Minimum area requirements have not yet been studied for this species. However, connectivity between suitable areas has been cited as a critical element of landscape conservation for Montezuma Quail (Zornes et al. 2008).

Conservation Issues and Management Actions

Threats Assessment

This table is organized by Salafsky et al.'s (2008) standard lexicon for threats classifications. Threat level is based on expert opinion of Arizona avian biologists and reviewers. We considered the full lexicon but include only medium and high threats in this account.

Threat	Details	Threat Level
Residential and Commercial <ul style="list-style-type: none"> Housing and urban areas Commercial and industrial areas 	Expansion of these areas	Medium
Agriculture <ul style="list-style-type: none"> Livestock farming and ranching 	Unsustainable grazing practices	High
Human Intrusions and Disturbance <ul style="list-style-type: none"> Recreational activities Work and other activities 	Border activities	Medium
Natural System Modifications <ul style="list-style-type: none"> Fire and fire suppression 	Flash-flood scouring of drainages after fires	Medium
Invasive and Problematic Species <ul style="list-style-type: none"> Invasive non-native/alien plants 		Medium
Climate Change <ul style="list-style-type: none"> Ecosystem encroachment Changes in precipitation and hydrological regimes 		High

In the following section we provide more detail about threats, including recommended management actions. Threats with similar recommended actions are grouped.

Residential and Commercial Development:

- Housing and urban areas
- Commercial and industrial areas

Urban sprawl is a threat to Montezuma Quail habitat, particularly in the oak woodlands of the San Pedro Basin, which has experienced losses of grassland cover (Stromberg 2000).



Recommended Actions:

1. Set large oak-grassland areas aside for open space and greenbelts adjacent to current urban and rural developments in key conservation areas for Montezuma Quail (see recommendations below).
2. Encourage city planning strategies that emphasize infill development over sprawl.

Agriculture:

- Livestock farming and ranching

Human Intrusions and Disturbance:

- Recreational activities
- Work and other activities

Natural System Modifications:

- Fire and fire suppression

Invasive and Problematic Species:

- Invasive non-native/alien plants

Unsustainable livestock grazing may be the land use of greatest concern for degradation of Montezuma Quail habitat, as it leads to loss of cover and forage plants. Areas of chronic unsustainable grazing that resulted in losses of > 50% of grass productivity led to the local disappearance of Montezuma Quail populations (Stromberg 2000). Introduction of invasive weeds, such as non-native lovegrasses, further reduces habitat suitability for Montezuma Quail, which generally avoids non-native vegetation (Stromberg 2000). However, livestock grazing that is light enough to maintain dense grass cover and which takes place outside the main growing season of native grasses can be compatible with Montezuma Quail habitat conservation (Zornes et al. 2008).

Recommended Actions:

1. Work with permittees and landowners to create conservation easements for light grazing or no grazing, and use conservation incentive programs to achieve protection measures.
2. Conserve areas that serve as dispersal corridors between subpopulations of Montezuma Quail.
3. Develop a conservation plan for Montezuma Quail habitat that staggers prescriptions on land uses according to annual rainfall, and which takes into account the occurrence of low-precipitation years.
4. Explore, test, and evaluate use of prescribed low-intensity fires and other weed control measures to reduce invasive shrubs and weeds in areas occupied by Montezuma Quail.
5. Manage land use in Montezuma Quail habitat to achieve: a) > 50% grass cover at a height of 8 – 20 inches for escape, nesting, brood rearing, and roosting cover; b) native plant species richness that includes at least five native perennial bunchgrasses and multiple native forbs; and c) 25 – 75% cover from native trees (Zornes et al. 2008).



Climate Change:

- Ecosystem Encroachment
- Changes in precipitation and hydrological regimes

The effects of prolonged droughts as a result of climate change rank among the most important concerns for the conservation of Montezuma Quail, particularly when combined with habitat degradation and loss (Stromberg 2000). Montezuma Quail is tied to vegetation that results from a successful growing season. They use vegetation for cover, nesting, foraging, and roosting, and this is threatened by loss of plant productivity and vigor.

Recommended Actions:

1. Delineate key conservation areas for Montezuma Quail that have suitable habitat and reasonable connectivity to adjacent conservation areas in order to provide options for periods of prolonged drought.
2. Encourage reduction in land use that degrades key areas, particularly during drought years.

Research and Monitoring Priorities

1. Determine area requirements, disturbance distances, and landscape mosaics most suitable for Montezuma Quail populations.
2. Conduct population monitoring or regular inventories that allow for trend estimation and detection of local extirpation of Montezuma Quail.
3. Determine best habitat enhancement strategies, including weed control and livestock management for areas that are degraded.
4. Determine environmental thresholds for food plants and nest and roost sites to develop a staggered land use plan based on annual precipitation and other meteorological variables.

Literature Cited

⁴Arizona Bureau of Land Management Sensitive Species List – March 2017.

²Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan: 2012 – 2022. Arizona Game and Fish Department, Phoenix, AZ.

Brady, W.W., M.R. Stromberg, E. F. Aldon, C. D. Bonham and S. Henry. 1989. Response of a semidesert grassland to 16 years of rest from grazing. *Journal of Range Management* 42:284 – 288.

Bristow, K.D. and R.A. Ockenfels 2004. Pairing season habitat selection by Montezuma quail in southeastern Arizona. *Rangeland Ecology & Management* 57(5):532 – 538.

⁹Corman, T.E. 2005. Montezuma Quail. *In: Arizona Breeding Bird Atlas*. Corman, T.E., and C. Wise-Gervais (eds.) University of New Mexico Press. Albuquerque, NM.

³Department of Defense. 2012. DoD PIF Mission-Sensitive Priority Bird Species. Fact Sheet #11. Depart-



ment of Defense Partners in Flight Program.

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona Partners in Flight Bird Conservation Plan. Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Arizona Game and Fish Department, Phoenix, AZ.

^{5a}Partners in Flight. 2019. Avian Conservation Assessment Database, version 2019. Accessed on March 31, 2020.

⁶Partners in Flight Science Committee. 2019. Population Estimates Database, version 3.0. Accessed on March 31, 2020.

^{5b}Rosenberg, K.V., J.A. Kennedy, R. Dettmers, R.P. Ford, D. Reynolds, J.D. Alexander, C.J. Beardmore, P. J. Blancher, R.E. Bogart, G.S. Butcher, A.F. Camfield, A. Couturier, D.W. Demarest, W.E. Easton, J.J. Giocomo, R.H. Keller, A.E. Mini, A.O. Panjabi, D.N. Pashley, T.D. Rich, J.M. Ruth, H. Stabins, J. Stanton, T. Will. 2016. Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee.

Salafsky, N., Salzer, D., Stattersfield, A.J., Hilton-Taylor, C., Neugarten, R., Butchart, S.H.M., Collen, B., Cox, N., Master, L.L., O'Connor, S. and Wilkie, D. 2008. A standard lexicon for biodiversity conservation: unified classifications of threats and actions. *Conservation Biology* 22(4): 897 – 911.

⁷Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2016. The North American Breeding Bird Survey, Results and Analysis 1966 – 2013, Version 2016. USGS Patuxent Wildlife Research Center, Laurel, MD. Accessed on July 1, 2016.

⁸Stromberg, M.R. 2000. Montezuma Quail (*Cyrtonyx montezumae*), *The Birds of North America Online* (A. Poole, ed.) Ithaca: Cornell Lab of Ornithology.

¹U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, VA. 85 pp.

Zornes, M., D. Budeau, D. Kemner, T. Blankenship, D. Southerland, M. Hunnicutt, S. LISPINOSA, D. Schoelling, E. Gorman, M. Cope, R. M. Perez, M. Mitchener, and L. Kamees. 2008. Western quail management plan. Wildlife Management Institute, Washington, D.C.

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