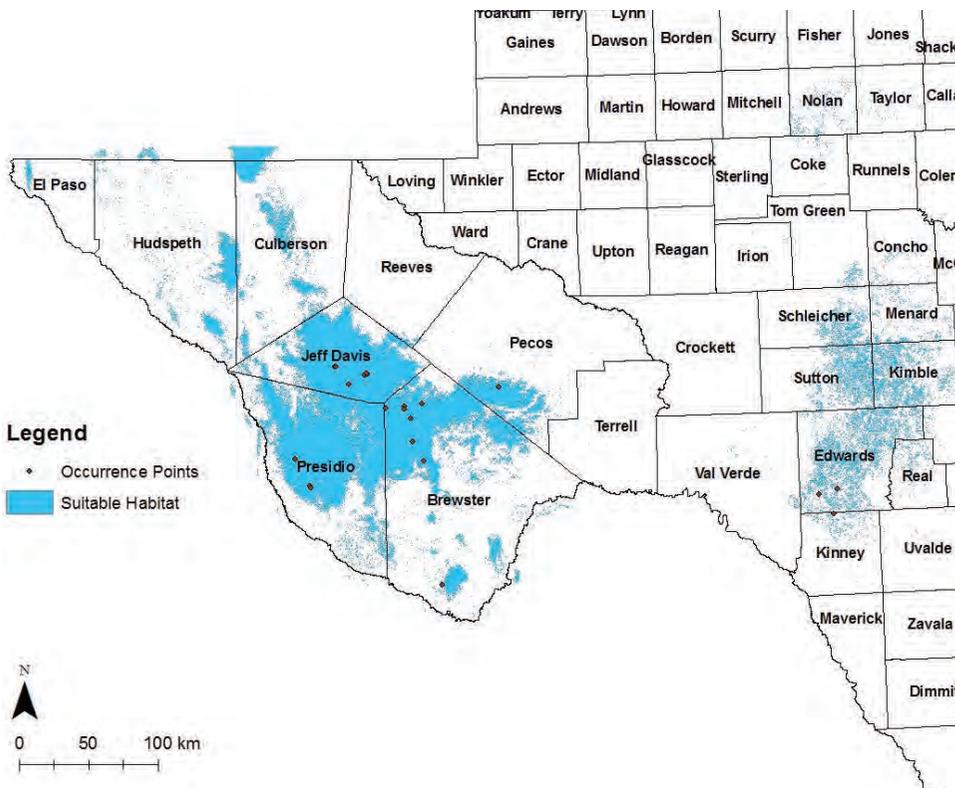




Distribution and Habitat Preferences of Montezuma Quail in West Texas and Southeastern New Mexico

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Quail are one of the most important wildlife resources in the southwest, valued throughout the region for cultural, economic and ecological reasons. Both New Mexico and Texas (particularly the Trans-Pecos region) are host to four species of quail, a distinction shared by only two other states in the U.S. Despite this fact, the geographic ranges and population trends of all four quail species are declining.

Much of the existing quail research has been conducted on Northern Bobwhite Quail, Gambel's Quail and Scaled Quail, but the elusive Montezuma Quail remains one of the most mysterious and understudied quail species in the southwest. The current distribution, abundance and habitat preferences of Montezuma Quail are among the many important aspects of their ecology, but little is known about these characteristics, particularly in Texas.

Montezuma Quail are present in Arizona, New Mexico and Mexico and have a limited geographic distribution

Potential suitable habitat for Montezuma Quail (*Cyrtonyx montezumae*) in West Texas.

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in Texas. Historically (pre-1950), Montezuma Quail distribution was mostly contiguous throughout the Trans-Pecos region of Texas with populations extending into the northern counties of the Edwards Plateau. The expansion of cattle grazing in the early 1900s led to the degradation of much of the suitable Montezuma Quail habitat, resulting in the local extirpation of Montezuma Quail populations.

Montezuma Quail rely on evergreen woodlands and pine-oak forests with abundant (greater than 55 percent) and diverse grass cover. These characteristics are important for providing adequate habitat for nesting, foraging and protection from predators. Modern-day distribution of Montezuma Quail in the Trans-Pecos remains similar to the historical range with a few exceptions. The most apparent decline in Montezuma Quail distribution occurred throughout the Edwards Plateau, where their range

decreased from seventeen counties to five over the last 150 years.

The decline of quail throughout Texas, New Mexico and the rest of the United States has serious economic and ecological implications. Quail hunter participation has faded over the last 30 years in response to the quail's disappearance. Fewer quail hunters means a revenue loss from licenses, equipment, leases and other tourism-related expenditures, most of which supports the economies of rural communities and goes toward wildlife conservation.

Dwindling quail populations also reflect a decline in habitat quality, which extends to other grassland-obligate species as well; therefore, any management efforts to conserve quail and quail habitat will have more broad ecological benefits.

Researchers at Borderlands Research Institute used data collected from captured birds along with different

modeling techniques to determine the distribution and habitat preferences of Montezuma Quail in West Texas. Montezuma Quail were also captured in southeastern New Mexico to determine their habitat preferences.

We began by collecting occurrence points of Montezuma Quail to use in the models. Graduate students and professors at Sul Ross State University collected GPS points from 2007 to 2018 using a variety of different methods, most of which involved using pointing dogs to survey for and capture quail. Quail that were captured were fitted with a GPS backpack and then released. This allowed researchers to track the birds and gather information on movement, home range, roost and foraging site preferences and other aspects of their ecology.

To determine the distribution of Montezuma Quail in Texas, we combined the GPS points with environmental data such as elevation, vegetation and



Photo by Elizabeth Oaster

A male Montezuma Quail utilizing a brush pile as a calling perch during the breeding season.



Photo by Karlee Cork



A male Montezuma Quail after being caught, banded and fitted with a GPS backpack.

annual precipitation and used different computer programs to produce maps of their likely distribution throughout the state. Results from this model predicted that suitable habitat for Montezuma Quail may exist outside of their expected range, suggesting that Montezuma Quail may have a more extensive distribution throughout Texas than what is currently reported.

It is difficult to survey for Montezuma Quail given the limited access to private lands and the birds' secretive nature, so it is possible that undetected populations exist across the Trans-Pecos and Edwards Plateau. Our model results also gave insight into what environmental variables are most important in predicting suitable Montezuma Quail habitat on a large (statewide) scale.

We found that of the six environment variables used in the model elevation and vegetation were the most important environmental factors for predicting the distribution of Montezuma on a statewide scale. Montezuma Quail are more likely to inhabit grasslands above 5,200 feet with at least 20 percent canopy cover of trees or shrubs that are 16.4 feet or less.

Researchers also used the location points to determine habitat preferences of Montezuma Quail on a local scale. Using the GPS points from birds captured in New Mexico, we found that average tree height and the average distance to the closest tree influenced Montezuma Quail selection of foraging sites. The most commonly selected tree height was 16.4 feet, with an average of 10.1 feet.

The most commonly selected average distance to closest tree ranged from 32.8 feet to 65.9 feet, with an average of 65.6 feet. This equates to a canopy cover percentage of 29 percent tree cover (as classified by the BLM) compared to the average available cover of 38 percent as assessed by random vegetation surveys.

Potentially, these selection preferences are due to escape strategies. During nighttime trapping efforts, researchers noted Montezuma Quail often fell to the ground stunned after flushing into trees. Based on this observation, Montezuma Quail could have similar difficulties during the day if caught off guard with their heads down, as when foraging. For that reason, they select for sites that create an easier escape route (shorter trees), while still utilizing the cover and forage provided by trees.

Distance to the closest tree was also a factor in roost site selection. We found that Montezuma Quail were more likely to select roosting sites further from trees 3.3 – 9.8 feet in height rather than roost close to them. Selection of roost sites away from trees 3.3 – 9.8 feet tall is probably a way of avoiding predation. By roosting away from trees 3.3 – 9.8 feet tall, Montezuma Quail have a clear line of sight to see incoming nocturnal threats.

When examining other factors influencing roost site selection, we found that Montezuma Quail avoided areas dominated by forbs and bare ground,



but selected for areas with a high visual obstruction index. Montezuma Quail were most likely avoiding roost sites with forbs because forbs do not provide screening cover and protection from the elements. Unlike grass or shrubs, forbs are normally low-lying forms of vegetation, which provide very little screening cover for predator avoidance.

In addition to looking at habitat preferences for Montezuma Quail, we were also able to use the data collected from radio-transmitted quail to gain insight into their home ranges, movements and survival. In one of our studies, we found that Montezuma Quail have home range sizes from 41.5 acres to 38,922.5 acres and an average home range size of 5,311.3 acres. Maximum straight-line distances between known locations within home ranges varied from 0.37 miles to 7.9 miles. Both home range sizes and distances of movements were greater than expected.

Survival estimates from two previous studies estimated Montezuma Quail survival to be 13 – 75 percent; results from these studies indicate that more research on Montezuma Quail survival should be conducted; few other studies have been able to document the survival rates of these quail due to the difficulty of capturing and keeping them alive.

Overall, it appears that vegetation composition (tree height, grass and bare ground cover, etc.) of desert grasslands has the largest impact on the distribution and habitat selection of Montezuma Quail in both Texas and New Mexico. Understanding the driving factors behind quail distribution and habitat selection can be an informative tool for landowners or ranchers wishing to sustain or increase their existing quail populations. A holistic approach to creating suitable quail habitat, in which a variety of environmental and anthropogenic variables are considered, may be the most successful way to achieve those goals. ☺

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