



Predicting Habitat Overlap Between Montezuma Quail and Feral Pigs in the Davis Mountains of West Texas

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Photos courtesy of **BORDERLANDS RESEARCH INSTITUTE**



BRI researchers conducting feral pig presence surveys at the Davis Mountains Preserve, owned by The Nature Conservancy.

Montezuma quail inhabit the piñon-juniper woodlands of the southwestern United States and much of Mexico. Anecdotal reports suggest Montezuma quail historically had greater distribution throughout Texas. However, because they prefer rugged terrain and their diets and habits are similar to other quail, Montezuma quail are considered the most understudied quail species in the United States. As such, their populations have not been monitored in Texas outside of a relatively few dedicated studies.

Feral pigs are highly intelligent, adaptive ecological generalists, capable of surviving in a wide variety of habitats. In North America, feral pigs have been reported in 44 states and in portions of Mexico and Canada. In Texas, they have been documented in every county but one, El Paso County.

The movement of feral pigs into West Texas is fairly recent, beginning in the 1980s, and might have been caused by populations simply expanding their territories westward or by intentional introduction for hunting. Regardless, feral pigs

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are known for their destructive and system-altering nature and are especially destructive when they occur in high numbers in localized areas.

One of the biggest issues regarding feral pigs is the extensive damage they cause to natural and agricultural resources. Nationally, crop damage is estimated to cost producers about \$800 million annually.

The damage is caused by rooting as they forage for food and is the most common sign of their presence. Through rooting, feral pigs disturb the soil, which potentially reduces plant cover, alters soil composition, and ultimately causes nutrient loss and altered vegetation communities that other native species depend on.

Although scientists predict that feral pig densities are relatively low in West Texas compared with the rest of the state, there is concern about the damage to sensitive resources, such as the limited, free water sources found throughout the Trans-Pecos. A previous study conducted in the Davis Mountains found that feral pigs preferred open-canopy evergreen woodlands, evergreen savannah grasslands, and sensitive riparian habitats. These sensitive ecosystems and water sources occur predominantly in the sky island mountain ranges of West Texas.

Sky islands are high-elevation mountainous habitats that are isolated from other nearby mountain ranges. Some of the mountain ranges found in the West Texas sky island complex include the Davis Mountains in Jeff Davis County, the Chisos Mountains in Brewster County, and the Guadalupe Mountains in Culberson County.

Sky islands generate topographically diverse habitats that occur along an elevational-climatic gradient. With the increase in elevation, there's an increase in precipitation and generally cooler temperatures compared with the lower elevations, which in turn generates increased habitat variability.

There are plants and animals that thrive within specific spaces of this elevation gradient, like the Montezuma quail in the Davis Mountains. The woodland habitats in the Davis Mountains support a biodiverse ecosystem that creates what we believe to be some of the most contiguous habitat for Montezuma quail in Texas.

In West Texas, Montezuma quail occupy open evergreen and oak woodlands, savannahs, grasslands, and riparian habitats. Though they have been documented in hilly, desert grassland habitats in lower elevations around 4,000 feet, Montezuma quail tend to occur in higher densities in the elevations from 5,249 feet and higher with more tree and grass cover. They depend on sloped areas with dense herbaceous cover for general use and foraging.

Montezuma quail forage on roots, tubers, and bulbs of certain plants, as well as seeds, mast, insects, and green leaf material. Their diet composition highly depends on season and land use.

Across their range, overgrazing has been identified as one of the biggest contributing factors to population decline due to loss of ground cover and reduced forage availability. Increased feral pig densities may alter the plant communities in a similar way as overgrazing. This could reduce forage resources in addition to the ground cover that Montezuma quail utilize for nesting, temperature regulation, and predator avoidance.

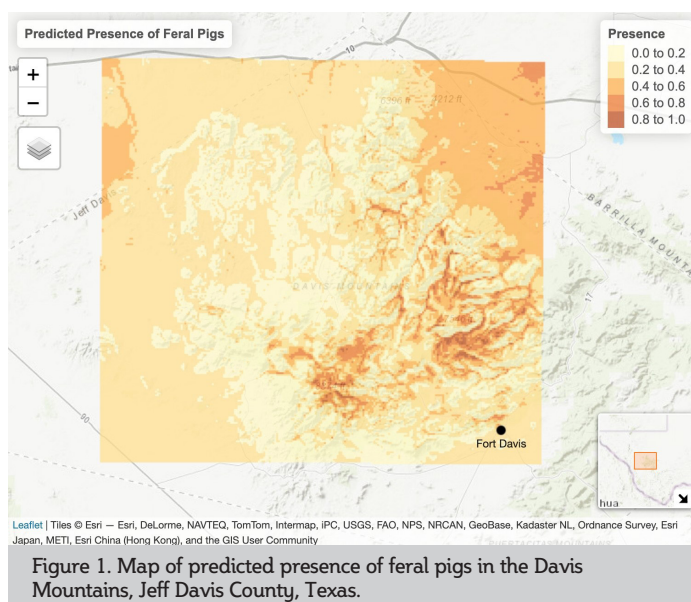


Figure 1. Map of predicted presence of feral pigs in the Davis Mountains, Jeff Davis County, Texas.

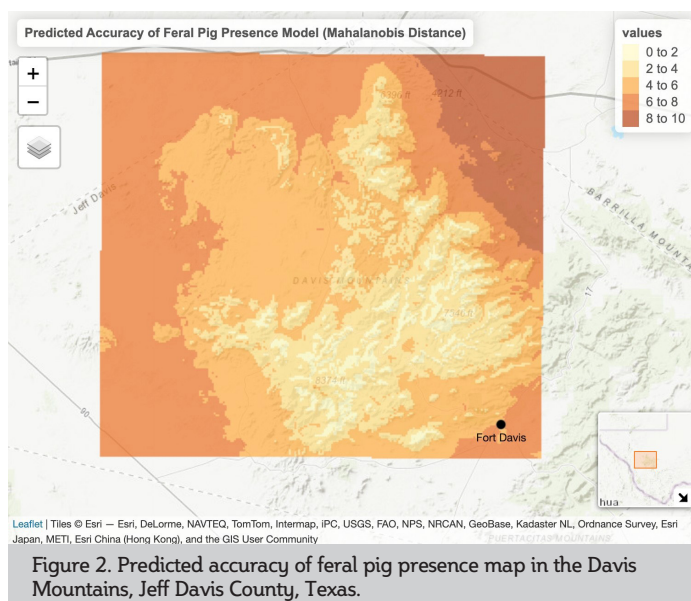


Figure 2. Predicted accuracy of feral pig presence map in the Davis Mountains, Jeff Davis County, Texas.

Though these birds are assumed to be relatively “immune” to regular droughts and changes to their environment, Montezuma quail might be vulnerable to more aggressive, generalist competitors, like feral pigs, that alter their environment and change or reduce choice resources.

Through this study, we wanted to predict feral pig presence and then compare it with suitable habitat for Montezuma quail in the Davis Mountains. Examining where these species overlap is the first step in understanding whether feral pigs could be affecting Montezuma quail populations.

To estimate feral pig presence in the Davis Mountains, we surveyed 65 plots measuring 250 square meters across the southern portion of the Davis Mountains Preserve, owned by The Nature Conservancy. Each of the 65 plots had 25 sampling points at which any observation of feral pig presence was recorded.

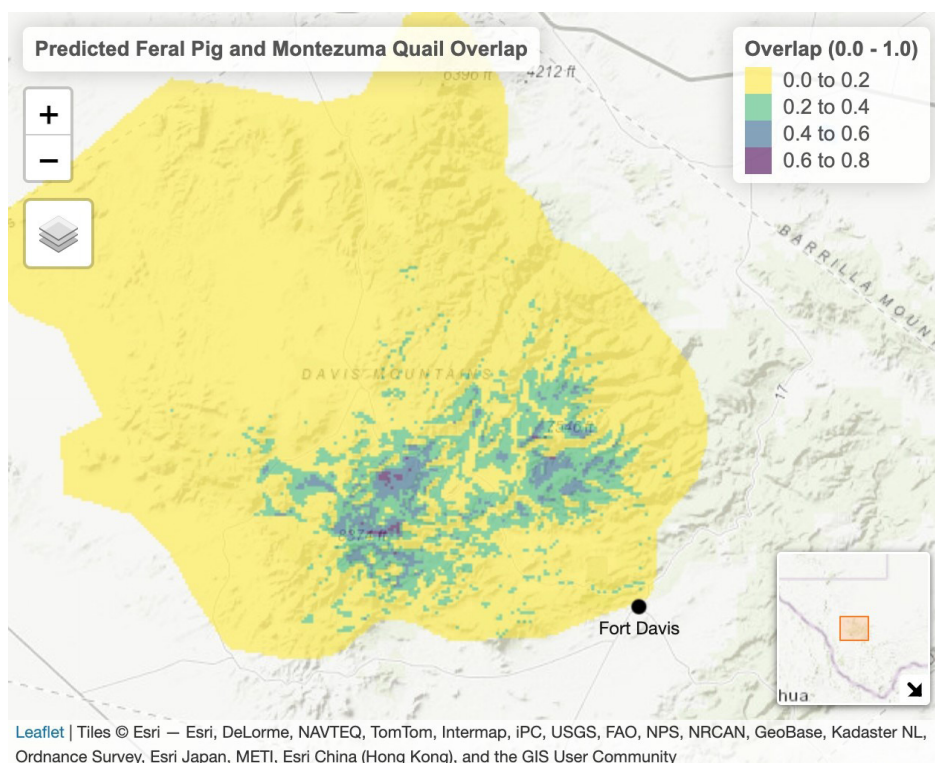


Figure 3. Map of predicted overlap between Montezuma quail habitat and feral pig presence in the Davis Mountains, Jeff Davis County, Texas.

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From these data, we fit a model to predict presence at other locations across the Davis Mountains Preserve. Elevation, slope, and tree cover had the most influence on the predicted presence of feral pigs. We then applied that model to the entire range of the Davis Mountains (Figure 1).

When we mapped this prediction outside of the Davis Mountains Preserve, we made inferences from the model, so the more dissimilar the environment is from the Preserve, the less confident our prediction is. This measure of confidence is mapped in Figure 2 where the lightest color indicates the most confidence.

Once we created a map of predicted feral pig presence, we were able to calculate how that overlapped with predicted Montezuma quail habitat (Figure 3). Comparing these resulted in a predicted overlap of 51 percent for predicted feral pig presence and predicted Montezuma quail habitat in the mapped region.

Feral pig presence doesn't completely overlap with predicted Montezuma quail habitat but occurs in areas that are considered critical for Montezuma quail when their populations are low and resources are scarce. This opens the door to question if feral pigs might have an effect on Montezuma quail resources and habitats.

Overall, researchers know very little about Montezuma quail, especially the populations in Texas. It's recognized that habitat loss and reduced ground cover from overgrazing are potentially the main causes for population decline.

When resources become limited, it's predicted that their range might be more restricted to higher elevations where our model showed higher overlap with feral pigs. In areas of overlap, feral pigs may affect the limited choices available to Montezuma quail for food and habitat, especially during periods of resource scarcity.

Further fine-scale research is required to better understand which Montezuma quail resources are being affected by feral pigs and if their foraging niches and habitat selection overlap at any capacity.

This project represents the first time researchers have studied Montezuma quail and feral pigs for potential habitat overlap in Trans-Pecos, Texas. 🐾

