



Anthropogenic Effects on Scaled Quail Habitat Selection on an Active Oil & Gas Field

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Photo by Jason Brooks, ConocoPhillips wildlife biologist.

A scaled quail that shares its home with oil and gas development perches in front of a pumpjack in the Permian Basin where this research was conducted.

Energy development can reduce biodiversity as habitat is further fragmented by increased energy demands. While energy sources are being diversified to include renewables as humans feel compelled to combat climate change, oil and gas continue to be the largest sources of energy development world-wide and will likely continue to hold that distinction for decades to come.

Recent technological advancements, such as horizontal drilling coupled with hydraulic fracturing, have made extraction of shale resources more economically practical. Since the early 2000s, this has led to a significant increase in unconventional drilling practices in the United States. U.S. oil production, in turn, began to flourish, and we now produce the most oil in the world.

Oil and gas development impacts wildlife in a variety of ways across species and ecoregions. First, it directly contributes to habitat loss and fragmentation through constructing roads, well pads, buildings, transmission lines, fences, surface pipelines, compressors, evaporation ponds, and reserve pits. Additional wildlife mortality related to oil and gas development is linked to roads, fences, gas flares, contamination, and powerlines.

Conversely, indirect effects of oil and gas development on wildlife such as avoidance can be much harder to measure. Researchers have documented examples of displacement and avoidance behavior of several groups of taxa on land developed for oil and gas. However, these studies illustrate several

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inconsistencies in how wildlife responds to oil and gas development across space, species, and habitat types. Because of this, it is especially important for wildlife managers to reference studies conducted in their target species' immediate or surrounding areas.

How quail react to oil and gas development is largely understudied. Understanding the impact on quail is important for many reasons including their role as prey species and seed dispersers in the ecosystem, their contribution to conservation revenue through game bird hunting, and their decreasing populations. These factors highlight the importance of advancing this area of research.

Quail management practices in the Permian Basin, home to most of the state's oil and gas development, are often borrowed from research conducted in the Trans-Pecos and Rolling Plains ecoregions. However, the Permian Basin spans three ecoregions: the Trans-Pecos, the Edward's Plateau, and the High Plains. The Permian Basin is unique in its vegetative communities, soil types, and the intensity of the energy development which covers the landscape.

The scaled quail's range, which covers a portion of the southwestern United States, completely overlaps with the continuously developing Permian Basin. Therefore, it is imperative to determine whether or not energy development in the Permian Basin is contributing to behavioral changes in scaled quail which could negatively affect their already declining populations.

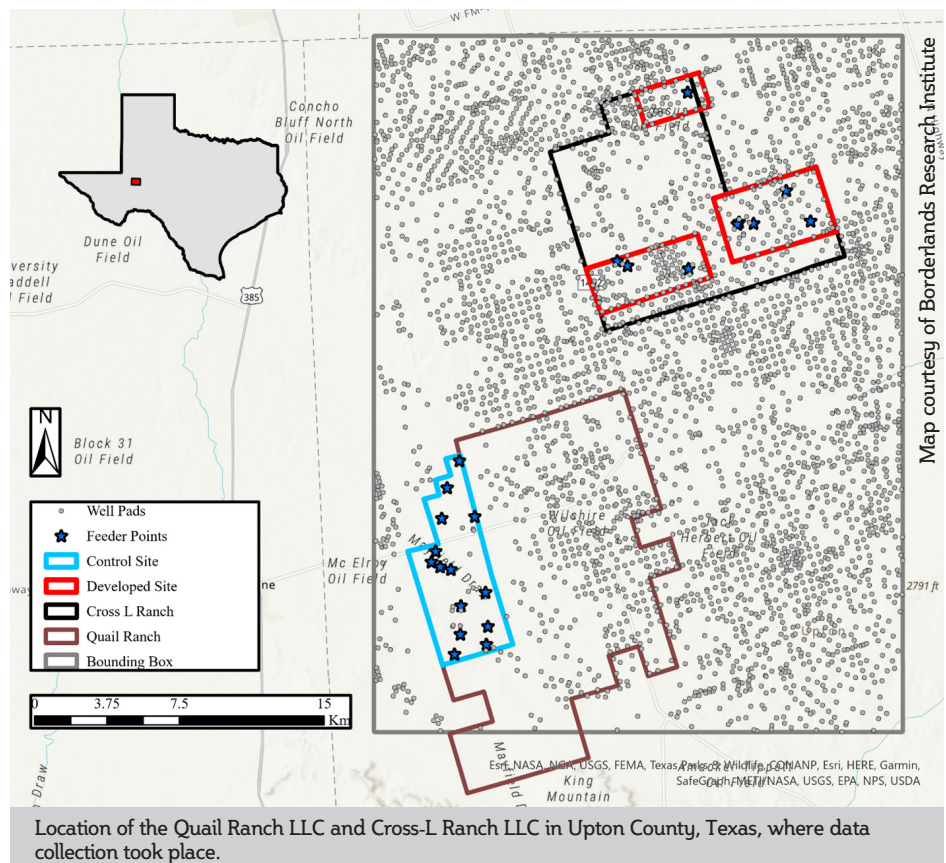
Our research team found this topic interesting because West Texas oil and gas development is predicted to expand. In particular, we were interested in habitat selection and movement behavior in response to this development.

Scaled quail are the most ecologically and economically important quail species in West Texas because of their extensive distribution and the distinctive challenge they present hunters by running instead of flying. In the past, scaled quail populations in West Texas were more robust and widespread. However, their populations have been decreasing since the early 1960s due to changes in



Photo courtesy of Borderlands Research Institute

This scaled quail was caught during a night capture to collect GPS data from an attached tracking device. It is easier to recapture tagged individuals when they are roosting rather than when they are active during the day.



land use practices which trigger desertification and woody brush encroachment, rangeland deterioration from overgrazing, frequent drought conditions, and disease.

Scaled quail favor nesting in native grasses and ingest more grass seeds than

other quail species. Shrub cover is also necessary for feeding, loafing, escape, and night-roosting. Therefore, they prefer habitat comprised of arid and semi-arid grasslands that contain about 10-15 percent shrub cover. West Texas landscapes have dramatically changed from luxuriant grassland savannas interspersed with shrubs to shrubland savannas interspersed with grass.

Properties that practice wildlife management alongside energy development may apply strategies, such as supplemental feeding, to help alleviate direct losses of food resources on the landscape from habitat loss and fragmentation. In the southwestern United States, supplemental feeding is often practiced, helping bolster scaled quail populations.

The effects of supplemental feeding on scaled quail have not been adequately studied; however, thesis research completed in the Trans-Pecos region suggests that scaled quail home range size shrinks when supplemental feeding is implemented.

To identify whether environmental change caused by people, known as anthropogenic factors, influence habitat selection and movement behavior in scaled quail inhabiting the Permian Basin, this study was conducted on two ranches owned and managed by ConocoPhillips in Upton County, Texas. A control site with minimal oil and gas development and developed sites with intense oil and gas development were identified as scaled quail trapping locations.

Backpack-style global positioning system (GPS) loggers were deployed on selected individual quail which recorded latitude and longitude coordinates every four hours from 2021 - 2022. The data allowed us to identify which environmental and anthropogenic factors significantly affected scaled quail as they select habitat and move across the landscape.

Monthly vegetation greenness was the most impactful factor affecting scaled quail habitat utilization across intensities of development. Scaled quail are more likely to use habitat with a higher greenness value than habitat with a lower greenness value during all months of the year. In fact, scaled quail are 35 percent more likely to use habitat

that has greener vegetation than habitat with less green (or no) vegetation. This highlights the importance of healthy, green vegetation to scaled quail in the study area.

Distance to well pads and to supplemental feeders affected scaled quail habitat selection and movement behavior in our study area at different scales. For example, at a 10-kilometer landscape scale (large in comparison to our target species' step-by-step movement capabilities), scaled quail would likely choose habitat far from well pads. However, in their immediate vicinity (at a 1-meter selection scale), this preference is negligible, meaning they will choose habitat with and without well pads similarly.

Supplemental feeders affected quail selection and movement more strongly than well pads. When choosing habitat on a step-by-step basis (at a 1-meter scale), they are more likely to choose habitat close to feeders. Furthermore, supplemental feeders had such a strong effect on quail that a repeating movement pattern was observed across both oil and gas intensities. Scaled quail chose habitat closest to feeders around 2:00 a.m. and 2:00 p.m. and chose habitat farther from feeders at around 8:00 a.m. and 8:00 p.m.

This study is the first to assess anthropogenic effects on scaled quail habitat selection and movement behavior in the Permian Basin. Wildlife biologists who work in conjunction with oil companies to conserve scaled quail populations should focus on reseeding disturbed areas with native, herbaceous vegetation and adding supplemental feeders to their properties.

In addition, wildlife managers should continue setting aside land which harbors healthy quail habitat from development. While our study suggests that well pads only slightly affect scaled quail, more studies should be conducted with larger sample sizes of birds, longer duration periods, and at larger scales to determine whether or not this is true across the Permian Basin. As energy needs and development expand across the United States, studies such as this will continue to be important for wildlife conservation in these shared spaces. 🐾



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