

# A REPORT ON MULE DEER RESEARCH IN THE CHIHUAHUAN DESERT



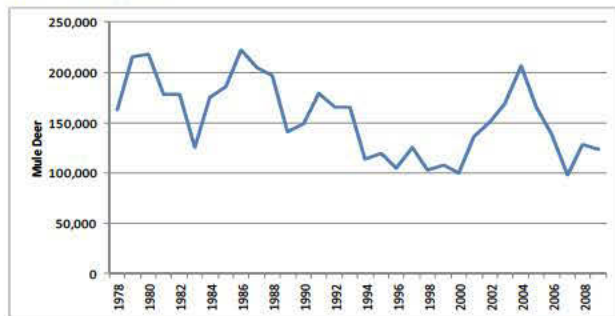
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Photo by P.J. Fouche

## MULE DEER POPULATION TRENDS

Mule deer populations ebb and flow with precipitation but the relationship isn't always simple. To investigate the influence of precipitation on mule deer populations in west Texas, we obtained long-term survey data from Texas Parks and Wildlife Department from 1977-2009. Individual deer were identified by gender and age (adult or juvenile) which produced information on densities, sex ratios, and fawn production.

Mule deer herds in the Trans-Pecos averaged 150,000 individuals and varied considerably (98,000-222,000). Fawn production (fawn:doe) was also highly variable with an average of 48% and ranged from 12-87%. Rainfall levels in the Trans-Pecos ranged from 6 to 21 inches and averaged 13 inches. Precipitation levels could explain 42% of the variation in mule deer numbers.



Trends of mule deer populations in Trans-Pecos, Texas.

In general, long-term drought eventually takes a toll on the west Texas mule deer herd. The strongest influence drought has on mule deer occurs in the winter and spring months, when rainfall is especially sparse. For west Texas, most rainfall occurs in summer and fall resulting in a flush of forbs that are critical to mule deer nutrition. As winter approaches, the availability of forbs decreases and mule deer increase their use of browse. In drought years, forbs are even more rare.



Our analysis of mule deer population trends suggests that fawn production in the Trans-Pecos is most influenced by rainfall received in spring months.

Fawn production was also affected by rainfall where precipitation levels accounted for 40% of the fawn production. From our analysis, fawn production was most influenced by droughty conditions that occurred in spring. Spring is usually the driest season for the Trans-Pecos and has a significant impact on pregnant does. Other studies have demonstrated that poor nutrition in spring can affect the ability of does to carry fawns to term, their ability to produce twins, and affect the weight of fawns (and ultimately fawn survival). Late winter and/or early spring precipitation will generally produce above average fawn crops.

One way to curtail the effects of drought is to ensure that valuable forb and browse resources are available for your deer through proper habitat management. This may mean conducting habitat improvements to promote forbs and quality browse or minimizing competition with livestock and other wildlife. Conservative stocking rates can also help ensure adequate fawning cover which is critical to fawn survival. Creating more permanent water sources will allow also mitigate your losses. Lastly, harvest rates may need to be modified to allow mule deer to recover.

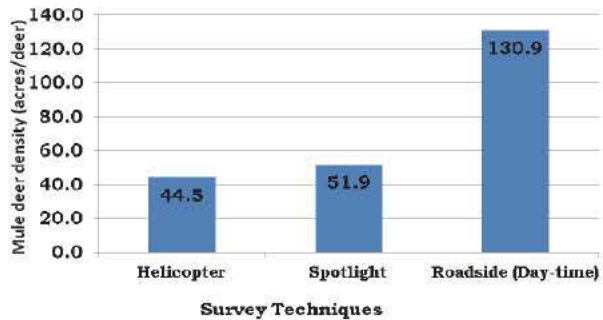
## SURVEY TECHNIQUES

**H**arvest management of mule deer requires managers to have a thorough understanding of herd size and composition through accurate survey techniques. Accordingly, we evaluated the accuracy and effectiveness of different survey techniques including spotlight surveys, roadside (day-time) surveys, aerial surveys, and the use of distance sampling. Population surveys were performed on 3 different study sites in the Trans-Pecos (Sierra Vieja Mountains, Davis Mountains, and Sierra Diablo Mountains) that varied in habitat, elevation, and mule deer densities. Three roadside and 3 spotlight surveys were performed on each route for each study site to determine their effectiveness in estimating mule deer populations and herd composition (e.g., sex ratio, fawn productivity).



**The terrain of the Trans-Pecos makes surveying desert mule deer populations challenging. Survey routes should be well-designed, regardless if the habitat will be surveyed by air or land.**

Helicopter surveys provided the most consistent and precise population and herd composition data when compared to the spotlight and roadside surveys. Roadside (day-time) surveys generally yielded a lower deer density compared to the other survey techniques but herd composition estimates



**A comparison of mule deer density estimates for one of the research sites. Roadside counts tend to underestimate mule deer density compared to helicopter and spotlight surveys.**

were similar to helicopter surveys. Spotlight surveys generally yielded the most variable herd composition estimates; however, population estimates were similar to helicopter surveys.

Precision of helicopter surveys are rarely questioned. However, disadvantages to this technique are high costs and sightability. Many studies have confirmed that helicopter surveys generally under estimate deer populations by only observing a portion of deer that inhabit the surveyed areas. In fact, data from a recent mule deer sightability study conducted on several ranches throughout west Texas indicated that only about half of the mule deer flown over are actually observed.

We found roadside (day-time) surveys to provide reliable herd composition estimates but generally yielded much lower population estimates because of the nature of mule deer and sightability issues. Lastly, spotlight surveys (which are popular for their affordability and simplicity) provided reliable population estimates but often yielded variable herd composition data because of the difficulty of identifying age and sex classes at night. Spotlight surveys when designed and utilized correctly are very effective in providing reliable population and herd composition data.

## EFFECTS OF SPIKE 20P ON HABITAT

**S**pike 20P (or tebuthiuron) is a herbicide that is growing in popularity in the Trans-Pecos. Resource specialists prescribe Spike 20P for controlling invasive brush species and increasing grass production. Despite the increased interest in Spike 20P, few data exist on its impact on mule deer habitat.



**Spike 20P is effective in controlling creosote and tarbush, however its effect on mule deer habitat (forbs and browse) are unknown.**

To evaluate the impacts of the herbicide Spike 20P on mule deer habitat, we conducted a study on a private ranch 20 miles east of Van Horn, Texas. Spike 20P was applied at a rate of 0.75 lb./acre by a fixed wing aircraft during winter. Riparian areas with higher brush diversity were left untreated as well as steeper slopes, which are more prone to erosion. Each year following application, light rains allowed the pelleted herbicide to dissolve into the soil.

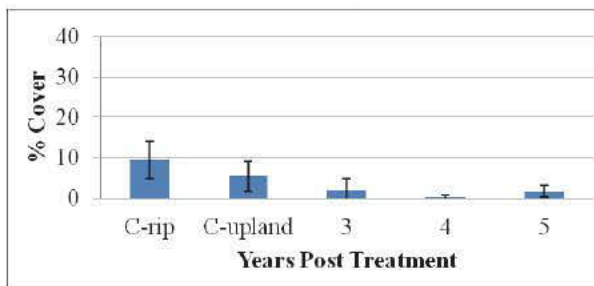
Spike treated areas were effective in controlling creosotebush and tarbush resulting in 94-100% mortality. Likewise, canopy cover of brush was reduced from approximately 17% on control sites to 2% on treated sites. The reduction of brush species allowed grasses to flourish from 388 pounds/acre (control sites) to 635 pounds/acre (5-year post treatment).

However, Spike treated areas showed noticeable reduction in forbs between control sites. Forb diversity was 60% less than forb diversity

on control sites. Forbs had not recovered to pretreatment levels even 5 years later.

Riparian areas (which were not treated with Spike) had the highest value to wildlife with respect to forb and brush diversity and abundance. Browse assessment also supported the importance of riparian habitats compared to other habitats evaluated for desert mule deer.

Our study demonstrates the effectiveness of controlling two invasive brush species using Spike 20P resulting in a substantial increase in grass production. However, the effectiveness of Spike 20P may come at a price to important wildlife foods including annual and perennial forbs and important browse species (e.g., range ratany, sumac species). We noted reduced forbs on our treated sites which still had not recovered after 5 years to pretreatment levels.



**Forb production (%cover) was greatly reduced by Spike 20P even 5 years after initial application compared to control areas (C-rip, C-upland) where herbicides were not applied.**

If resource managers are interested in applying Spike 20P in the Trans-Pecos, they need to consider the habitat needs of desert mule deer and other wildlife. We recommend (1) using mosaic patterns rather than uniform application, (2) avoiding riparian and other diverse habitats, (3) deferring livestock grazing for a minimum of 2 growing seasons post-treatment, and (4) contacting your local natural resource specialist for specific application rates that are best suited for your goals.

## SEASONAL HOME RANGES

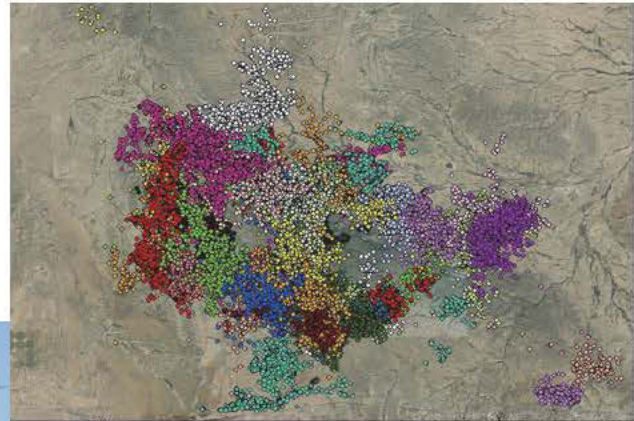
A home range can be defined as the area needed for an animal to conduct normal activities such as foraging, mating, and caring for young. Within this space, habitat requirements include food, escape cover, and water. In arid environments like the Trans-Pecos region, resources are limited so mule deer require large home ranges to survive.



Mature mule deer bucks were captured with helicopters and netguns, restrained, radioed with GPS collars, and released.

From 2006 – 2011, we captured 40 mature (4.5-7.5 years old) mule deer bucks from 2 ranches near the Apache Mountains in west Texas. GPS collars were placed on each deer, which collected locations every 5 hours for up to 2 years. The use of supplemental feed (protein pellets) was utilized on one property, while the other ranch did not feed. We estimated annual and seasonal home ranges for the radioed bucks.

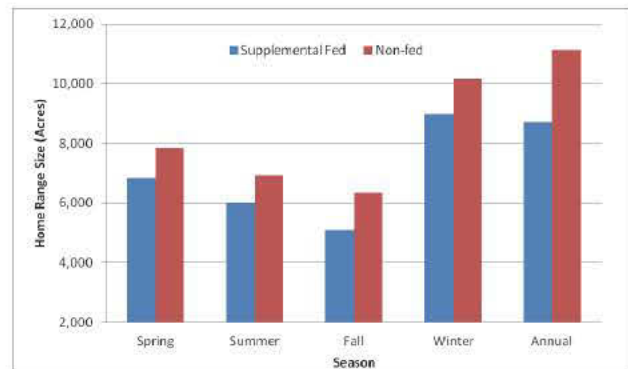
The average annual home range for mature mule deer bucks on the ranch with supplemental feed was 8,723 acres, while home ranges averaged 11,130 acres without supplemental



We recorded almost 100,000 GPS points from 40 mature mule deer bucks over the 5-year study.

feed. Winter home ranges, (Dec–Feb) which includes the breeding season, were significantly larger than any other season with home range averages of 8,970 acres (fed) and 10,157 acres (unfed). Seasonal home ranges were smallest during the fall at 5,097 acres (fed) and 6,350 acres (unfed).

We also learned that mule deer bucks have the ability to move over tremendous amounts of terrain in a very short periods of time. On average, bucks may move 5-6 miles away from the center of their home range, but are capable of moving over 20 miles in a 24-hour time period.



A comparison of seasonal and annual home range sizes (acres) for mature mule deer bucks on ranches with and without supplemental feeding program.

## USE OF FEED AND WATER

In the Trans-Pecos and other arid environments of the Southwest, food and water availability are primary concerns for many wildlife species including mule deer. Throughout most of the year west Texas receives very little rainfall with most of the precipitation occurring during the late summer months (Jul-Sep). This means that both food and water can be limiting resources and are particularly scarce during times of extreme drought.

The use of supplemental feed for wildlife has been used throughout Texas for many years but only recently have land owners began making it available to mule deer. The use of supplemental feed and water could alleviate drastic fluctuations in fawn crops during drought, increase body mass, maximize antler potential, and increase deer densities. However, the effect of supplemental feed and water on mule deer herds has not been documented.

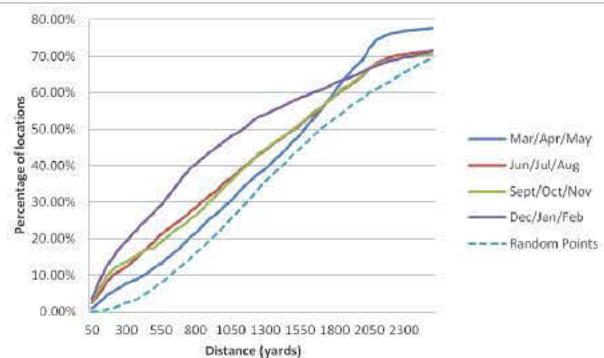


Researchers with the Borderlands Research Institute evaluated the movements of mature mule deer bucks relative to supplemental feed and water sites using GPS radiocollars on 40 bucks.

We conducted a study on a private ranch in Culberson County to evaluate the use of supplemental feed and water stations by mule deer. We were specifically interested in how deer used habitats near feed and water sta-

tions relative to areas away from feed and water stations.

In general, mule deer did prefer areas closer to feed and water stations across all seasons. There was variation among individual deer where some deer were located near feed and water stations only occasionally while others spent more than 20% of their time within 100 yards of feed and water station during the fall.



Seasonal analysis of supplemental water and feed sites used by mature mule deer bucks. For example, 60% of the winter locations (orange line) were found within 1,600 yards of supplemental water and feed sites.

Use of feed and water stations also varied greatly between seasons. Only 12% of deer locations were within 500 yards of feed and water stations during the spring while 27% of deer locations were within 500 yards during the fall.

The most limiting resource for mule deer in the Trans-Pecos is water. It is important to have permanent water sources available for mule deer throughout the year. Studies have shown that deer will travel up to 3 miles in search of water but prefer that it be within 1.5 miles of any point within its home range. Mule deer will leave its home range in search of water if sources become unavailable in that area.

# RESTORING DESERT MULE DEER IN MEXICO

Mexico's wildlife historically has been impacted by land use patterns influenced by socioeconomic and political factors that have resulted in mismanagement of its wildlife resources and a marked decrease in biodiversity. The major threats to diversity are deforestation, mismanagement of livestock, unregulated agricultural enterprises, drainage of wetlands, dam construction, industrial pollution, and illegal exploitation of plant and animal resources.



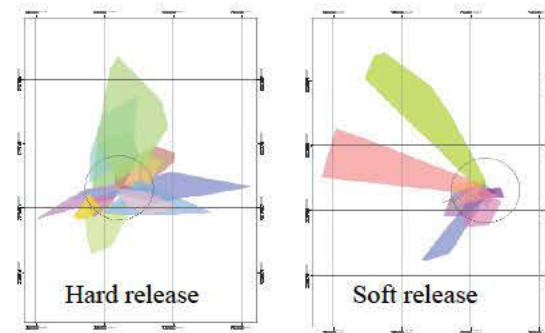
Graduate students with the Borderlands Research Institute transport a recently captured mule deer doe from Texas as part of an effort to restore their populations in northern Mexico.

Desert mule deer are one of the most economically and socially important animals in western North America. However in Mexico, populations have shown declines to an extent where they were considered to be in danger of extirpation. Landowner perspectives have shifted now realizing the value and economic importance of mule deer. This has translated

into protection of the species from illegal hunting and in turn, better conservation. Big game hunters' interest in mule deer has contributed to the monetary value of managing for wildlife.

In an effort to better understand the results of mule deer translocations in the Chihuahuan Desert of Northern Coahuila, Mexico, we began a study that would compare 2 different release methods (hard release vs. soft release) and the development of 2 translocated populations of desert mule deer.

Site fidelity was expressed as the average linear distance between the release site and individual deer locations. Deer were considered "loyal" if the majority of their locations (>50%) were within a 3-mi radius from the liberation site.



Home ranges of translocated desert mule deer were smaller and showed more site fidelity using soft-release methods compared to hard release.

Soft-release deer had small home ranges (7,185 acres) and more were loyal (75%) to the release site than hard release deer that had larger home ranges (8,800 acres) and less were loyal (42-60%). Soft-released deer also had higher survival rates (84%) compared to hard released deer (13-57%). Mortality was variable across years and release methods, with mountain lions being the primary cause of death for the 2007 hard-release where 46% of deer were predated by mountain lions. In general, most mortality occurs within the first 6 weeks after release.

## FUTURE RESEARCH INITIATIVES

**D**esert mule deer are one of the cornerstone wildlife species of the Chihuahuan Desert Borderlands. The Borderlands Research Institute strives to be a national leader in desert mule deer research and management. We are currently seeking partners to broaden our research focus on the following topics relative to desert mule deer:

- Understand antler development as it relates to genetics, nutrition, and harvest management
- Evaluate the effects of expanding elk populations on mule deer herds
- Assess mule deer behavior and movements relative to reproductive behavior
- Evaluate the effects of feed programs on mule demography, habitat utilization, range size, and dispersal distances (pre- and post-treatment)
- Refine mule deer survey techniques
- Document the effects of habitat management practices on mule deer food and cover
- Understand the prevalence, distribution, and movement of Chronic Wasting Disease in mule deer



**For more information about the desert mule deer research program, please contact:**

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**Many of the projects included in this report were conducted in cooperation with and supported by the private landowners of west Texas.**



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