

Mule Deer Discoveries in the Trans- Pecos Region of Texas

By Ryan Walser

B&C Grant Recipient

Photographs courtesy of author

As a 5-year-old, I would go for walks with my father behind our house in upstate New York. I saw all kinds of wildlife, but more important, I gained respect and a sense of wonder for nature as a whole. In my teens I also developed a passion for the weather. A big fan of the Weather Channel, I took pride in knowing weather patterns and how they affected my daily life. In particular, I was keenly aware of how the weather affected my favorite pastimes, hunting and fishing.

Those interests of my youth progressed into an adult desire to study relationships between the forces of weather and animal behavior. My dream came true when I had an opportunity to study population trends of mule deer and the effects of precipitation under Dr. Louis Harveson, a professor at Sul Ross State University in Alpine, Texas.

I met Dr. Harveson as an undergraduate at Texas A&M University. While on sabbatical leave, Dr. Harveson was in charge of a research project located at the Johnson



Space Center in Clear Lake, Texas. I volunteered to help capture whitetail does so they could be treated with a contraceptive. When Dr. Harveson offered me the opportunity to join his research team, I jumped on it. Initially, my project was a doctoral study aimed at analyzing landscape-level relationships of mule deer in the Trans-Pecos ecoregion of Texas.

The three objectives were to:

1. evaluate habitat changes such as brush encroachment, habitat fragmentation, and changing land-use patterns relative to population trends of desert mule deer;
2. explore relationships between precipitation indices and trends of desert mule deer populations; and
3. assess trends of harvest characteristics in desert mule deer (e.g., quantity and quality).

I tackled the last two objectives while completing a master's thesis. In my pursuit to understand these relationships, I found out a few things I wasn't expecting.

Drought, Moisture, and Mule Deer

Our study area was the whole Trans-Pecos ecoregion of Texas, including nine counties and approximately 7.3 million hectares. Located within the Chihuahuan Desert, the Trans-Pecos is unique because it also lies along part of the southern Rocky Mountains. Elevations range from 700 to 2,900 meters and "desert islands" are scattered throughout the region. Water is definitely a limiting factor, and the indirect effects on animals often outweigh

the direct effects. Grass cover for fawns, escape cover, and the condition and availability of plant growth are all affected by moisture. Similarly, all are essential factors in the survival of desert mule deer.

Climatologists have devised indices to characterize and measure moisture conditions in the environment. The Palmer Drought Severity Index (PDSI) was developed to assess the severity of dry and wet periods through time. It is based on monthly temperatures, precipitation data, and the water-holding capacity of the soil in a given area. The Palmer Modified Drought Index (PMDI) is similar to the PDSI but uses intermediate parallel monthly index values to assess the probability that a dry or wet spell is beginning or ending. The Palmer Hydrological Drought Index (PHDI) evaluates the hydrological impacts of drought on reservoir levels and groundwater levels based on supply and demand relationships. The PHDI is not as sensitive to changes in precipitation as other indices and is therefore more of a long-term drought indicator. Climatologists also use the Moisture Anomaly Index (ZNDX) to measure short-term drought or wet periods by looking at the variation in monthly moisture conditions from normal.

My study sought to answer several questions about the relationships of precipitation to deer abundance:

1. Are Palmer drought indices a better

Indices to characterize and measure moisture conditions

PDSI	Palmer Drought Severity Index – assesses the severity of dry and wet periods through time. It is based on monthly temperatures, precipitation data, and the water-holding capacity of the soil in a given area.
PMDI	Palmer Modified Drought Index – similar to the PDSI but uses intermediate parallel monthly index values to assess the probability that a dry or wet spell is beginning or ending.
PHDI	Palmer Hydrological Drought Index – evaluates the hydrological impacts of drought on reservoir levels and groundwater levels based on supply and demand relationships.
ZNDX	Moisture Anomaly Index – measures short-term drought or wet periods by looking at the variation in monthly moisture conditions from normal.

indicator of population trends over time than raw precipitation data?

2. How accurate are Palmer drought indices at estimating deer population trends?
3. What patterns of correlation might be detected between mule deer abundance, precipitation, and Palmer indices?

Precipitation data for our study in the Trans-Pecos region were obtained from the National Climatic Data Center. The data set consisted of annual raw precipitation, PDSI, PMDI, PHDI, and ZNDX values for 1978–2003. Moisture conditions measured by all Palmer drought indices reflect the influence of weather conditions that happened months prior to and after the time period in question.

My source for data on deer population trends was annual spotlight surveys that had been conducted in all nine counties over 26 years, from 1978 to 2003. I converted monthly data for the Palmer indices and raw precipitation to annual data by summing the data for the October–September



period for the year prior to each spotlight survey. In crunching through the analysis, I looked for yearly correlations of precipitation levels to buck, doe, and fawn numbers as well as total population numbers. I knew I was likely to find some broad correlations between moisture conditions and deer abundance, but wanted to see if there were specific times in the year that precipitation is crucial to mule deer in west Texas.

I found that the effects of precipitation on mule deer in west Texas differed in interesting ways compared to mule deer in the Rocky Mountains. In Texas, the timing of summer rains is important for next year's grass growth and, even more important, for forb development. In the western Rocky

Mountains, the amount of snowfall in a given winter has major impacts on the lives and population levels of resident deer. If there is too much snow, predators have a greater chance of success while deer suffer food shortages. Conversely, too little snow may cause drought conditions in spring and early summer.

My analysis revealed that while the total amount of yearly precipitation is important, the timing and the type of precipitation events also have significant effects. For example a two-inch rainfall in one hour is less beneficial for soil moisture content and plant growth than four half-inch rainfall events. Abundant rainfall in July and August can provide good fawn cover the following year. In west Texas,

October through February can be extremely dry, and it is not uncommon to have less than one inch of precipitation during this period. Although some precipitation falls as snow, it almost always melts within a couple of hours except in the higher elevations above 2,000 meters, where snow cover may persist for a couple of days. Snowpack is not a major factor in the ecology of west Texas mule deer. Rather, I found that soil moisture from October through January was most strongly related to population trends, which means that summer rainfall is extremely important to the mule deer herd in west Texas. My finding that February through May soil moisture is more important for fawn production suggests that ground cover may be a limiting factor to fawn survival.



LEFT: Ryan Walser, pictured here with a mule deer buck, is a soil conservationist with the USDA-NRCS in Marshall, Texas. His master's research on *Influence of Precipitation and the Effects of Season Change on Desert Mule Deer Populations in Trans-Pecos, Texas* was assisted by a conservation grant from the Boone and Crockett Club. **BELOW:** The Trans-Pecos Region of Texas is located within the Chihuahuan Desert and is unique because it also lies along part of the southern Rocky Mountains.

Mule Deer Debates

While analyzing precipitation data I was surprised to find how changes in hunting regulations can affect mule deer populations. What got me started in this line of inquiry was a public debate I attended in Alpine concerning a proposed change in regulations for mule deer under the Managed Lands Deer Permits (MLDP) program. The Texas Parks and Wildlife Department was proposing to change from the 16-day mule deer season to a 60-day season for landowners who joined and followed the MLDP guidelines.

The MLDP program is incentive-based and habitat-focused. It gives participating landowners access to the state's most flexible seasons and increased harvest opportunities. The original driver behind this program was an objective to increase habitat values for all wildlife. Initially, the program focused on whitetail deer because high population densities and skewed sex ratios were having extreme negative impacts on habitat and, subsequently, on the other wildlife in the affected areas. Landowners with MLD permits could take a larger number of deer, specifically does, and get an extended season to fill the quota in accordance with the program's guidelines.

Here's an example of how this works. Suppose a landowner has 1,000 acres but only allows hunting by family members because he does not want to deal with liability issues and does not need the additional income. This landowner will be limited as to the numbers of deer that can be harvested (for instance, four family members may take a total of only 12 deer if the land occurs in a one-buck and two-doe county). With the sex ratio as high as 7:1 to 10:1 does per buck and densities as high as one deer per five acres, the landowner has no effective



means to get the sex ratio and density down to reasonable levels. MLD permits provide the means to improve sex ratios and deer densities through increased harvest.

The MLDP program for whitetail deer has been in place for some time. Would a similar approach work for mule deer? This was not clear given the differences between mule deer and its versatile cousin. Mule deer do not exhibit the skewed sex ratios of whitetails, and a normal density is one deer per 50 to 100 acres. Most landowners in west Texas own large tracts of land and usually do a good job of managing the resident mule deer. Many of these landowners did not perceive problems with mule deer densities or sex ratios and therefore opposed a change in regulations that could lead to increased buck harvest. Their specific concern was that more deer would be shot with an extended season and the bucks harvested would be younger.

A heated discussion ensued at the Alpine meeting with people either strongly for or strongly against the proposed changes. Good points were brought up on both sides. Some expressed concern that indiscriminate harvesting of mule deer would result in younger deer taken. Other landowners recognized it as an opportunity to get an extended season allowing for a more selective harvest and an overall better herd management strategy.

Alleviating Concerns through Analysis

Would the landowners' fears come to pass if MLD permits were implemented for mule deer in west Texas? I decided to investigate this question by examining harvest changes made by the Texas Parks and Wildlife Department in 1988, when the season had been lengthened from 9 days to 16 days. I sought to determine whether the longer season had caused any significant changes in the number of bucks harvested, in age of bucks harvested, or in antler measurements such as basal circumference, spread, and number of points. To do this I broke down the year into three categories: the February–May fetal growth period; the June–September period of antler development and birthing; and the October–January breeding period.

The argument that more young bucks would be taken with a longer season didn't hold water under my analysis of 1988 harvest data. The change in season length



appeared to have no negative impacts on the harvest. No differences were found in antler spread, basal circumference, or number of points. No change was found in the number of bucks harvested, although the buck-to-doe ratio increased. There was no evidence that an extended season caused a decrease in quality or an increase in quantity of bucks harvested.

Interestingly, the average age of harvested bucks increased from 4.5 years old to 5.5 years old, a significant change. I believe this finding can be explained by hunter behavior enabled by the longer season. Hunters could be more selective in

opportunity to take management deer and mature bucks. The opportunity to shoot a good trophy buck was increased.

The Rewards of Discovery

My investigations of harvest data, precipitation variances, habitat differentiation, and impacts of hunting season changes all proved to be enlightening and rewarding. A careful analysis often provides answers you don't expect.

As a hunter, I've always looked forward to the time spent in the field and the opportunity to harvest an animal for the dinner table or the wall. As a scientist, I love the pursuit of knowledge to clear up assumptions based on anecdotal evidence. You don't need to be a wildlife biologist to appreciate what truth can arise from analysis. I think all would agree that the more we know about what can affect the health of mule deer populations, the better we'll be able to achieve favorable outcomes for everyone involved.

My interest and passion for wildlife research and management began during my days afield as a boy.

It seems today that more and more youth are becoming isolated from the natural world. The best way to educate youth about nature is to give them meaningful outdoor experiences. As hunter numbers decrease, the involvement of youth in any outdoor activity, whether it involves hunting or not, will be the key to preserving the future of land and the wildlife that live there. ■

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the animals they harvested, passing up more 3.5- and 4.5-year-old bucks, whereas in the past those animals would have been killed. A nine-day season gave most hunters only one weekend to hunt, and shooting a buck was more important to them than shooting a really big buck. The extended season offered more time to the hunters. As well, it gave ranch managers and hunting guides more