

EFFECTS OF DROUGHT ON DEER

By Jim Heffelfinger

Last year was a tough time for Texas deer because Mother Nature was not very nice. The most widespread and severe one-year drought in a century dramatically altered deer habitat across the entire state. In arid regions of the country, precipitation is life for wildlife populations that fluctuate wildly with the amount of soil moisture. The 2010-11 winter rains were very sparse and that lack of moisture continued until the very end of 2011.

By the fall of 2011, tanks were drying up, grass was crispy, and the color green was scarce across the landscape. Landowners and managers were reporting a lack of fawns and there were widespread concerns of high adult deer mortality. By January of this year, rains returned to much of Texas; and with it came deer nutrition, water in the tanks, and a return

to normal deer life. Unfortunately the drought continued well into this spring in the Trans-Pecos area and southern Panhandle.

Drought can have profoundly negative effects on a lot of aspects of deer ecology through a host of complex relationships. Let's take a look at the varied impact that droughts have on deer and apply that to how we can better manage our herds in the future.

Food

The three major components of wildlife habitat are food, water, and cover. Most areas of Texas are not lacking the cover component for adult deer, and water is usually well distributed in active rangelands (more on that later). The main impact from serious drought is the effect it has on deer forage and the overall

nutritional level available to deer.

Deer diets are usually at their highest nutritional quality after the early summer and fall rainy periods. These rains, especially during mild winters, create a flush of forbs (weeds) that super-charge the deer population with high levels of energy, vitamins, and phosphorous. This sets the stage for fat deer going into the dry summer months when deer nutrition (especially available energy) is at its lowest in this region. In 2011, the lack of winter and early spring rains created poor conditions going into the summer and that was the beginning of the terrible conditions that only intensified later in the fall.

Browse (shrubs) is a big part of deer diets on an annual basis because of the diversity of nutritious brush in many areas of Texas, especially in the brush



SHAWN GRAY PHOTO

Maintaining a good diversity of woody browse plants that provide nutrition when all else dries up helps deer managers lessen the impact of drought on deer herds. If year-round water sources dry up, deer survival and reproduction may suffer. All deer habitat should be within two miles of water to allow deer to use most of the habitat during dry periods.

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country. This browse is a good source of protein with species like granjeno, guajillo, catclaw, kidneywood, and guayacan, providing levels above the five to 15 percent needed by deer at various life cycle stages. The importance of browse lies in the fact that it does not dry up and blow away like all the little forbs do. Because of that, browse is the consistent staple that gets deer through the dry times. Persistent drought may cause deer to rely on browse for too long and the excessive browsing on shrubs can result in overuse of those resources that may affect deer populations in the future.

Malnutrition is the lack of adequate nutrient intake that, if serious and prolonged, can lead to weakening and death. Deer rarely die directly of starvation; even badly malnourished animals usually have (low quality) food in their stom-

achs. The problem is lack of nutrients necessary to maintain their body condition. Nutrition available to pregnant does is the most important from a population perspective because they need sufficient nutrition to allow sustained growth of the fetuses and, subsequently, adequate lactation.

Water

Open water is usually available to deer in the form of natural seeps, springs, creeks, rock basins, stock tanks, and artificial waters. Water is also contained in food (called "preformed" water), which is also an important source of water for deer. When deer foods are very succulent (high water content), deer may satisfy the majority of their water needs solely from their forage and might not be seen drinking very often. However, when the water content in plants plummets during a drought, deer have a harder time processing the increasingly dry forage without some other source of water.

When biologists hang radio collars on deer in a classic "collar-n'-foller" study, they find that deer stay much closer to water sources during dry periods. If that water dries up, they move to another source of water. Likewise, when rains return, they scatter throughout the habitat almost immediately.

During dry years or dry times of the year, the availability of open water allows them to use a greater variety of foods, including very dry forage. Well-distributed water sources throughout otherwise suitable habitat will distribute deer better, thereby allowing them to occupy previously unused areas. This effectively increases the overall carrying capacity of the habitat and reduces the need for long-range movements out of their normal home ranges, which could decrease deer survival.

Cover

As mentioned above, cover is not normally lacking for adult deer, but drought



Fruits and mast like acorns and mesquite beans can be an important factor in helping deer maintain body condition during drought.

GEORGE ANDRIJKO PHOTO

during the fawning season means newborn fawns don't have the cover they need to conceal themselves from predators and hot or cold temperatures. Unfortunately, coyotes are also a little hungrier during those times because of lower rabbit and rodent populations. This lack of cover contributes to the lower fawn recruitment usually observed after a drought.

Antlers

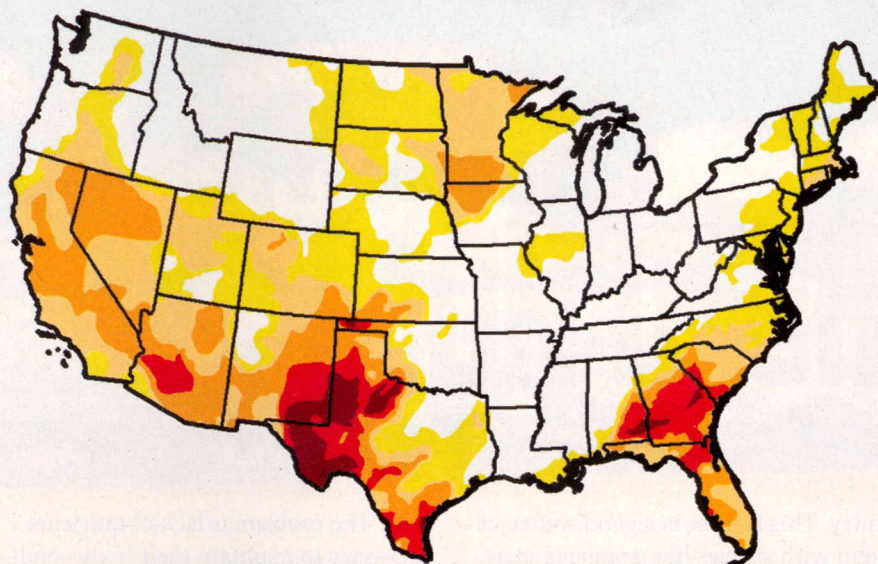
Nutrition is certainly an important component to antler growth and a lack of nutrition in any year will affect the size of the racks brought in to the big buck contests. Some of the work at Caesar Kleberg Wildlife Research Institute (CK-WRI) has shown that spring rainfall—especially around April—is important to boost antler growth. Being in good physical shape before and during the antler growth period is what maximizes the genetic potential for antler growth. Even though there is a direct and measurable connection between groceries and gross score, some bucks have an amazing capacity to produce huge antlers even in the face of terrible range conditions.

Besides the immediate effect on antlers, the reduction in the number of fawns that survive their first year will certainly impact the number of trophy bucks we see 5-7 years later. Even the buck fawns that survive a drought year may have a hard time catching up to their antler potential for several years.

Reproduction and mortality

Populations increase and decrease based on the balance of reproduction and mortality, the same way that the water level in a bathtub depends on the balance of water coming in and draining out. Droughts can severely impact both the input into a population and the rate that animals die and leave the population.

Nutrition means everything to a doe trying to bring twin fawns to full term. Fawns may be resorbed in the womb or even aborted if nutritional conditions worsen during pregnancy; the doe's survival is more important than reproduction. However, embryo resorption and spontaneous abortion of fawns is not as common as people think. When females are nutritionally stressed, fawns are more often stillborn, or born alive but grossly underweight and unthrifty.



A measure of drought (Palmer Drought Severity Index) as it looked at the end of March 2012 showing how the dry conditions continued through the spring in the Trans-Pecos and southern Panhandle. Darker colors mean more serious drought. (www.droughtmonitor.unl.edu/archive.html)

These weakened fawns quickly succumb to a wide variety of interrelated factors, including inadequate quantity of milk from the doe, abandonment, predation, disease, parasites, dehydration, and other factors.

Yearling does are most susceptible to nutritional problems during pregnancy. This is significant, because usually yearling does represent the largest class of breeding age females. Fertility of adult does fluctuates with nutritional level, but not as drastically as that of yearling does. This means the effects of nutrition on overall herd productivity is mostly because of impacts to the breeding success of yearling does.

Deer mortality increases during dry years. One problem I had when studying buck mortality in Duval, McMullen, Webb, and Dimmit counties in the 1980s was that the first year of my study was wet and the bucks wouldn't die for me! During a long-term study in southern New Mexico, researchers monitored radio-collared deer for 10 years and found low mortality rates during a period of average or above rainfall (12 percent), but high during the nutritionally stressful conditions of a drought when mortality rates rose to an average of 34 percent. A later study found the same thing with a high mortality rate (37 percent) during a period of record dry conditions when almost one-quarter of the does died of malnutrition. Clearly, extended droughts affect not only fawn recruitment, but survival of adult deer in the population.

Disease and parasites

Direct mortality, however, is not the only way inadequate nutrition can affect deer populations. Malnutrition suppresses a deer population in more subtle ways by increasing a deer's susceptibility to other mortality factors. Although both internal and external parasites are common in deer populations, they rarely cause widespread mortality. Like many diseases, parasites may be present in the population and only become a significant source of mortality when the deer population is under stress for another reason, such as nutritional deficiency during an extended drought. When deer die from disease or with heavy parasite infestations, it may be difficult to assign the real cause of death, because such animals may have been malnourished and predisposed to many other sources of mortality. There were reports last fall of hemorrhagic disease sweeping through some populations in the western Edwards Plateau, undoubtedly due in part to the stressed condition of the deer.

Weathering the [lack of] storms

Statewide whitetail deer populations seem to have weathered that drought better than most people expected. Alan Cain, TPWD White-tailed Deer Program Leader, provided the whitetail survey data from the fall/winter of 2011. Although the number of fawns per doe was 36 percent below the average of the previous 6 years, the overall statewide whitetail deer population estimate was

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3.33 million deer, which is only nine percent below last year. Putting this in local perspective, the deer density measured by TPWD this year is about 30 deer per 1,000 acres compared to the average of about 35 for the previous 6 years.

The number of whitetail does per buck seems to have increased this year (especially in South Texas), which sometimes happens after a drought. One thing that can cause this ratio shift is a disproportionate number of bucks dying, perhaps due to the lack of spring forbs, which are important for recovering from the rigors of rut. Also, a higher number of does per buck may be simply a mathematical result of not getting a large influx of fawns added to the population in a 1:1 ratio. In other words, if you have three does per buck and add a huge fawn crop at 1:1, you will bring the ratio closer together. If you have a fawn crop failure during a drought, you will not experience that annual improvement in the buck-to-doe ratio.

This was not the first drought Texas deer have weathered and they seem to be able to make adjustments to get through it. According to Cain, the fact that the most-dire predictions didn't come true may be due to several factors working together. First, the previous year (2010) was fairly wet and even though there was a decided lack of spring forbs in 2011, deer entered the spring in good shape and that helped carry them nutritionally for a while.

Also, Cain explained that mast crops like mesquite beans and acorns can be very important in putting on fat and maintaining body condition and the contribution of mast may have been overlooked or underestimated. In addition to a probable increase in supplemental feeding, many managers are simply doing a much better job of managing their na-

tive habitat and their deer herds.

Not all deer herds emerged from the drought unscathed. There are some local areas such as the western Edwards Plateau where whitetail populations may have taken a hit. Mule deer in the Trans-Pecos and the Panhandle are still suffering with the drought continuing through the spring of 2011. These areas did not receive the rain that started in the rest of the state in January 2011 and the habitat reflects that.

Mule deer fawn production and deer densities were both down significantly this year because of the drought. According to Shawn Gray, TPWD Mule Deer and Pronghorn Program Leader, the raw helicopter surveys showed a 40-50 percent decrease in deer density in both the Panhandle and Trans-Pecos. Although there was some adult mortality reported, much of this decrease was due to fawn recruitment that was dramatically lower than normal.

Managing for drought

Drought is usually defined as a period of dryness with below average soil moisture. But what most people don't think about is that rainfall is "below average" half of the time. We can't be below average more than half the time or the average would be different. The reality is that there is no such thing as a year with "average" rainfall.

We are always above or below the long-term average. These wide swings in annual rainfall and lack of winter-kill is what makes deer ecology in the Southwest so unique. Deer have learned to adapt to a volatile environment with a high reproductive rate so they can recover from bad years with large pulses of reproductive output when conditions are good. These pulses in fawn crops are usually best enjoyed when aged for about

six or seven years.

Although many factors such as disease and predation can affect deer population fluctuations, habitat quality is the main driver of deer abundance over the long term. Habitat quality in the more arid regions of deer range starts with precipitation and is maintained with proper land management. Good habitat relegates other mortality factors to secondary importance because good nutrition is the best medicine against all sorts of environmental stresses.

Ranges chronically overstocked with cattle will shift in plant composition and become less productive. Having too many deer on the landscape can also reduce the number and diversity of forbs because that is what will be repeatedly eaten before other types of plants. So the first step in managing for drought is to maintain livestock, deer, and other hoofed stock at densities that are appropriate for the habitat. Secondly, managing for a diverse assemblage of woody browse plants is a useful strategy to reduce the impact of drought because it is available to deer during dry periods when green forbs are not. During droughts, do not back off on your harvest plans. Deer populations have the capacity to bounce back rapidly if they are in good shape. Carrying too many deer through a drought will not only result in high mortality and low reproduction, but may cause long-term degradation to the quality of the deer habitat.

Droughts are not going away and many projections forecast an increasing frequency of dry conditions in the future. There is not much we can do about the frequency and severity of drought, but we can manage the habitat and the deer population to lessen its impact and help deer populations rebound from these setbacks. 🐾