TEXAS PARKS AND WILDLIFE

Mule Deer Management in Texas

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by
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Acknowledgements

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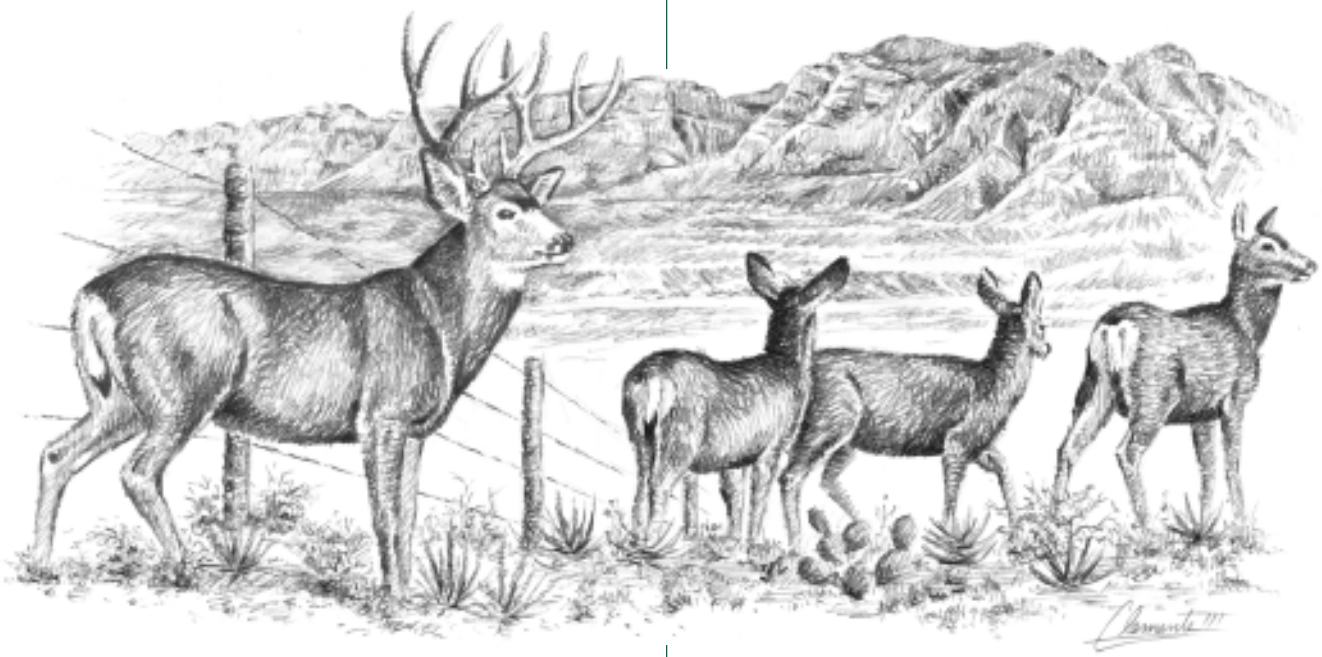
Table of Contents

Mule deer are one of the most valued game animals in the Trans-Pecos and Panhandle regions of Texas. Whether it's their limited distribution, low numbers or their unique appearance and behavior, most landowners view mule deer as a precious resource. Many landowners have recognized mule deer as a financial asset and have capitalized on this value through lease hunting. Other landowners choose not to lease and some do not allow hunting, and yet almost all closely protect this resource. Sportsmen prize this unique species for a number of qualities, including large body size, tasty venison and the ability of mature bucks to develop an attractive and often massive set of antlers.

Introduction

Mule deer differ from white-tailed deer in many respects, including their general behavior, food habits, population dynamics and habitat preferences. Because of the tremendous amount of information available concerning white-tailed deer management, many land managers have applied these management techniques to mule deer herds with inconsistent results. Therefore, it is important to implement management practices that are specific to mule deer. This publication provides useful information about desert mule deer biology, population dynamics and habitat recommendations to encourage sound mule deer management.

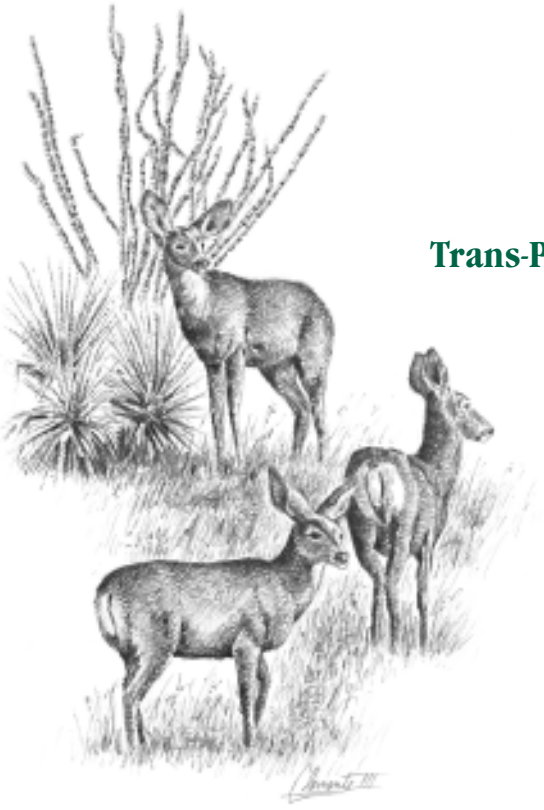


Distribution and Classification

The mule deer population in Texas ranges from about 150,000 during dry conditions to about 250,000 during wet periods. Approximately 80–85 percent of the mule deer in Texas inhabit the Trans-Pecos Region while the remainder are found in the Panhandle and western Edwards Plateau regions (Fig. 1).

Mule deer in the Trans-Pecos and western Edwards Plateau[1] belong to the desert subspecies (*Odocoileus hemionus crooki*). The Panhandle population may represent a mixture of the desert and Rocky Mountain subspecies (*O. h. hemionus*). A small mule deer population, subspecies unknown, existed in the Panhandle prior to the relocation by the Texas Game, Fish and Oyster Commission of 89 desert mule deer in 1949 from the Trans-Pecos to Randall and Armstrong counties. Between 1950 and 1988, 646 desert mule deer were relocated from the Trans-Pecos to the Panhandle counties of Briscoe, Cottle, Floyd, Garza, Kent, Motley, Ochiltree, Oldham and Roberts. Rocky Mountain mule deer from Colorado were released by the Oklahoma Department of Wildlife Conservation in southwestern Oklahoma and probably have expanded into the eastern Texas Panhandle.

Geographic location, climate and topography



Trans-Pecos

The Trans-Pecos Region is located in the extreme western part of Texas and comprises approximately 19 million acres. It includes the region west of the Pecos River bounded by the Rio Grande River on the south and New Mexico on the north. This region is the most ecologically and vegetatively diverse area in Texas. Vegetative types include Chihuahuan desert shrubland at the lowest elevations (2,500 ft.), semi-desert shrub/grasslands, mountain shrub and mountain savannah at the highest elevations (8,500 ft.).

Trans-Pecos weather is characterized by hot summers, mild winters and little rainfall or snow. The average annual precipitation is approximately 12 inches, ranging from

[1]*For the purposes of this publication, future references to the Trans-Pecos Region will also include the western Edwards Plateau without specific reference.*

7 inches in the lower elevations and extreme western part of the region to18 inches in the higher elevations of the Davis Mountains. Peak rainfall occurs during July and August, often as torrential thunderstorms. Frequent droughts and variability in rainfall are key factors influencing deer habitat and populations in the Trans-Pecos.

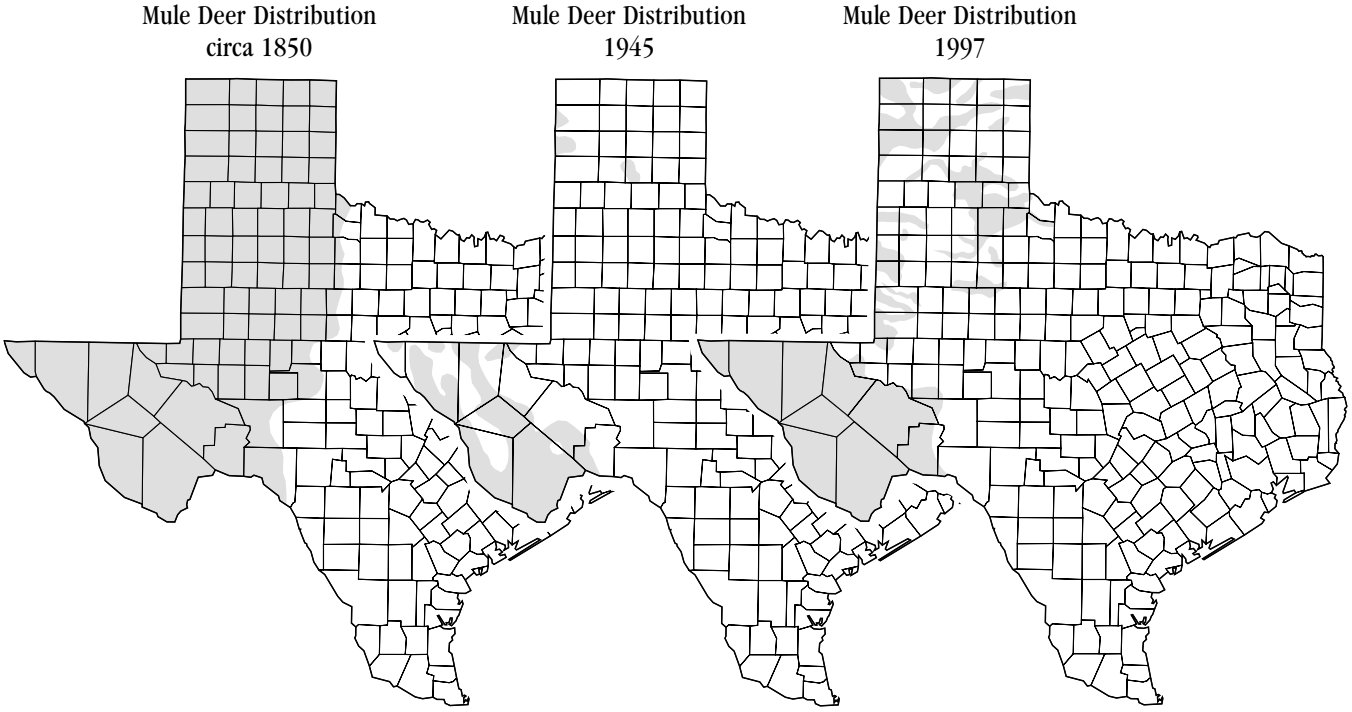
Panhandle

The Panhandle Region consists of the High Plains and Rolling Plains eco-regions and is located in the northwestern part of Texas that lies between Oklahoma and New Mexico. The primary land use in the High Plains is row-crop farming (cotton, corn, sorghum), followed by cattle production on tame pasture (wheat, alfalfa, forage sorghum) and rangeland grazing. The primary land use in the Rolling Plains is cattle production followed by wheat, cotton, peanut and alfalfa production. Pastures seeded to permanent grasses or grass/forb mixtures under the Conservation Reserve Program (CRP) provide forage, cover and travel corridors for deer.

The High Plains is generally flat and contains more than 19,000 playa lakes. Topographical relief exists among isolated stretches of sandhills, shallow draws that meander toward the Canadian River, and drainages that eventually develop into the Pease, Tongue, Red and Brazos rivers. Mule deer populations in the High Plains primarily occur in these sandhill and draw habitats, with some use of mesquite flats. The majority of mule deer in the Panhandle inhabit the rough, broken land of the Rolling Plains, along the Canadian River and Caprock Escarpment.

Weather in the Panhandle is characterized by relatively hot summers, cold winters, windy springs and relatively low precipitation. The average annual precipitation ranges from 16 inches in the west to 21 inches in the east. Most of the rainfall occurs from April through October, with the peak occurring during mid-summer in the form of isolated thunderstorms. The average annual rainfall is approximately 18 inches across much of the mule deer range.

Figure 1. *Changes in distribution of mule deer populations in Texas.*



Trans-Pecos

The wide range of topographical features and weather patterns that occur in the Trans-Pecos has produced a diversity of vegetation types and plant communities. The most important of these, from low elevations to high, are creosote-tarbush desert shrub, grama grassland, yucca and juniper savannahs, pinyon pine and oak forest and a limited amount of ponderosa pine forest.

Predominant woody plants include mesquite, juniper, creosote and several species of acacia which often form extremely dense thickets, particularly along drainage areas. These drainage areas represent only about 5 percent of all vegetation types; however, the quantity and diversity of vegetation produced in these areas make them extremely important as wildlife habitat. Yucca, sotol, lechuguilla, prickly pear, cholla and various species of cacti are also found throughout the Trans-Pecos.

Vegetative composition

Panhandle

Important grasses are little bluestem, silver bluestem, sideoats grama, green sprangletop, Arizona cottontop, bush muhly, plains bristlegrass, indiangrass, vine mesquite, blue grama, black grama, chino grama, tobosa, threeawns and dropseeds (Gould 1975). Important perennial forbs (weeds) include skeleton leaf golden-eye, mariola, bush sunflower and showy menodora. Annual forbs are largely dependent on rainfall and relatively short-lived, limiting their availability during most years.

The dominant grasses found in the High Plains include indiangrass, sand bluestem, switchgrass, sideoats grama, little bluestem, hairy grama, blue grama, silver bluestem, hooded windmillgrass and perennial threeawn. Dominant woody plants include sand sagebrush, skunkbush sumac, sand shinnery oak, mesquite and yucca (Gould 1975). Along the rough breaks in the Rolling Plains, dominant grasses include little bluestem, sand bluestem, sideoats grama, silver bluestem, sand dropseed, switchgrass and indiangrass. The most dominant woody plants are redberry juniper and mesquite. Other important woody plants in this region are skunkbush, catclaw acacia, mountain mahogany, sand shinnery oak, hackberry, four-wing saltbush and feather dalea. A dominant woody plant on sandy sites is sand plum, while mesquite is an important invader on shallow and mixed-land range sites. Important forbs are trailing ratany, sagewort, silverleaf nightshade, spectacle-pod, bladderpod, western ragweed and gaura. Annual forbs tend to be a more reliable source of nutrition in the Panhandle than in the Trans-Pecos because of slightly higher rainfall.

Description

Mule deer are popularly referred to as “mulies” or “blacktails” and can be distinguished from white-tailed deer by differences in facial markings, ears, tail (Fig. 2) and length of the metatarsal gland (Fig. 7). Mule deer antlers are referred to as bifurcated. That is, the antlers usually form a back fork and a forward fork. However, desert mule deer often develop an unbranched beam or tine in place of the back fork, resulting in antlers that resemble those of white-tailed deer. Antler conformation alone is not a reliable means of identification.

The desert mule deer is the largest native deer species found in Texas, reaching peak body size at about 6½ years. In the Trans-Pecos the average field-dressed weight of mature bucks is about 140 pounds, although bucks field-dressing over 200 pounds have been recorded. The average dressed weight for mature does in the Trans-Pecos is about 72 pounds.

Basic deer biology

Many Panhandle mule deer herds have access to energy-rich grain crops during the warm season and rely heavily on high-protein wheat and alfalfa during the winter. As a result, some mule deer attain exceptional body size and bucks can achieve excellent antler development. Field-dressed weights of mature bucks average about 170 pounds, although bucks with access to summer and winter crops can field dress more than 200 pounds. Mule deer does in the Panhandle have an average dressed weight of 87 pounds.

Breeding and Productivity

The breeding season or “rut” for mule deer in Texas takes place at almost the same time every year, usually from mid-November through mid-February peaking during mid- to late-December (Fig. 3). The mule deer breeding season in the Trans-Pecos generally extends over a longer period than the mule deer rut in the Panhandle. Following a 7-month gestation period, most fawning occurs in late June and early July.

Reproductive studies in Texas have shown that about 78 percent of the Trans-Pecos does and 95 percent of the Panhandle does successfully breed each year (Brownlee 1971; Pittman and Bone 1987). Unlike whitetails, mule deer does rarely breed during their first winter and production will average less than one fawn per doe during their second fawning season. A mule deer doe is most productive when she is three years old or older. These older does frequently produce twins when habitat conditions are good, and they may have triplets on rare occasions.

Mule deer fawn crops (number of fawns per 100 does, expressed as a percent) average about 45 percent in the Trans-Pecos and 35 percent in the Panhandle, but they can fluctuate widely from a low of 12 percent to a high of 87 percent.

Figure 2. *Distinguishing characteristics between mule deer and white-tailed deer — facial markings, ear length, tail and antlers.*

Fawn survival is influenced by weather, predation and habitat quality. Early winter fawn crops of at least 30–35 percent are needed to maintain relatively stable populations. Increases in populations are generally associated with fawn crops in excess of 50 percent, and fawn crops of 25 percent or less usually result in a decline. The key to maintaining a productive and healthy mule deer population lies in maximizing reproduction and survival.

Predation and Mortality

Few studies have been conducted in Texas to determine the impact of predation on desert mule deer populations; however, several studies in other states have indicated that predation losses of adult mule deer may be as high as hunter harvest and can suppress mule deer populations under certain conditions (Connolly 1981). A predator control study conducted at the Black Gap Wildlife Management Area in the Trans-Pecos indicated that adult mule deer numbers increased by 55 percent under heavy predator control, while adult mule deer numbers declined by 33 percent in Big Bend National Park where predators were not controlled (Cooke 1990). Fawn survival rates were also higher in the study area where predators were controlled. However, other important factors such as weather may have contributed to the decline in the park. Research conducted in central Brewster County (Trans-Pecos) indicated that predation resulted in about 41 percent of all mortalities of radio-telemetered mule deer (Lawrence et al. 1994).

The average annual mortality of adult desert mule deer is higher for bucks than does. Bucks have larger home ranges, are more solitary and frequent rougher terrain; thus, they are more susceptible to predation, accidents and other mortality factors. If a deer herd is declining, the problem is usually low fawn survival rather than excessive adult mortality. Fawns suffer the highest mortality of any age group, with most deaths occurring within a few days after birth. A study in Arizona indicated that up to 50 percent of desert mule deer fawns were lost during the first 45 days following birth (Swank 1958).

The impact of predation on a mule deer population is directly related to the habitat quality. During most years, good fawning cover can be provided through proper livestock grazing management. During droughts, when plant growth is reduced, predators can have a greater impact on fawn survival because of the lack of fawning cover. The importance of hiding cover for fawns was demonstrated in research that compared fawn survival on two study areas. One study area supported a higher density of predators than the other but yielded a higher fawn survival rate (almost double) because of superior fawning cover (Salwasser 1975).

Predator control may be a valid tool in mule deer management; however, if habitat quality is insufficient, it is unlikely that predator control alone will result in higher deer numbers. No research has demonstrated that predation by coyotes or mountain lions was the exclusive cause of any mule deer population decline. If predator control is the only management tool applied, with no effort placed on developing or maintaining quality habitat, few results should be expected.

There are conflicting opinions concerning predator control in wildlife management. Managers considering predator control as a management option should base their decision on biologically and economically sound principles. Controlling predators to increase deer numbers rarely can be justified on an economic basis. The costs of effective control are high and the results are

only temporary. Unless predator control results in a substantial increase in deer numbers and paying hunters are able to harvest surplus animals, predator control as a deer management practice is neither economically justifiable nor biologically desirable.

While rare, die-offs are inevitable when mule deer numbers exceed the carrying capacity of the range and deplete forage supplies. Deer losses resulting from overpopulation are primarily related to poor nutrition while disease may be a secondary development. Die-offs from starvation affect fawns first. Bucks can be affected by post-rut stress and poor nutrition during winter and early spring. Doe losses usually occur during late summer when poor forage conditions exist and animals are stressed from pregnancy, fawning and milk production. Most losses occur over a period of weeks or months but often go unnoticed because predators and scavengers quickly consume deer carcasses.

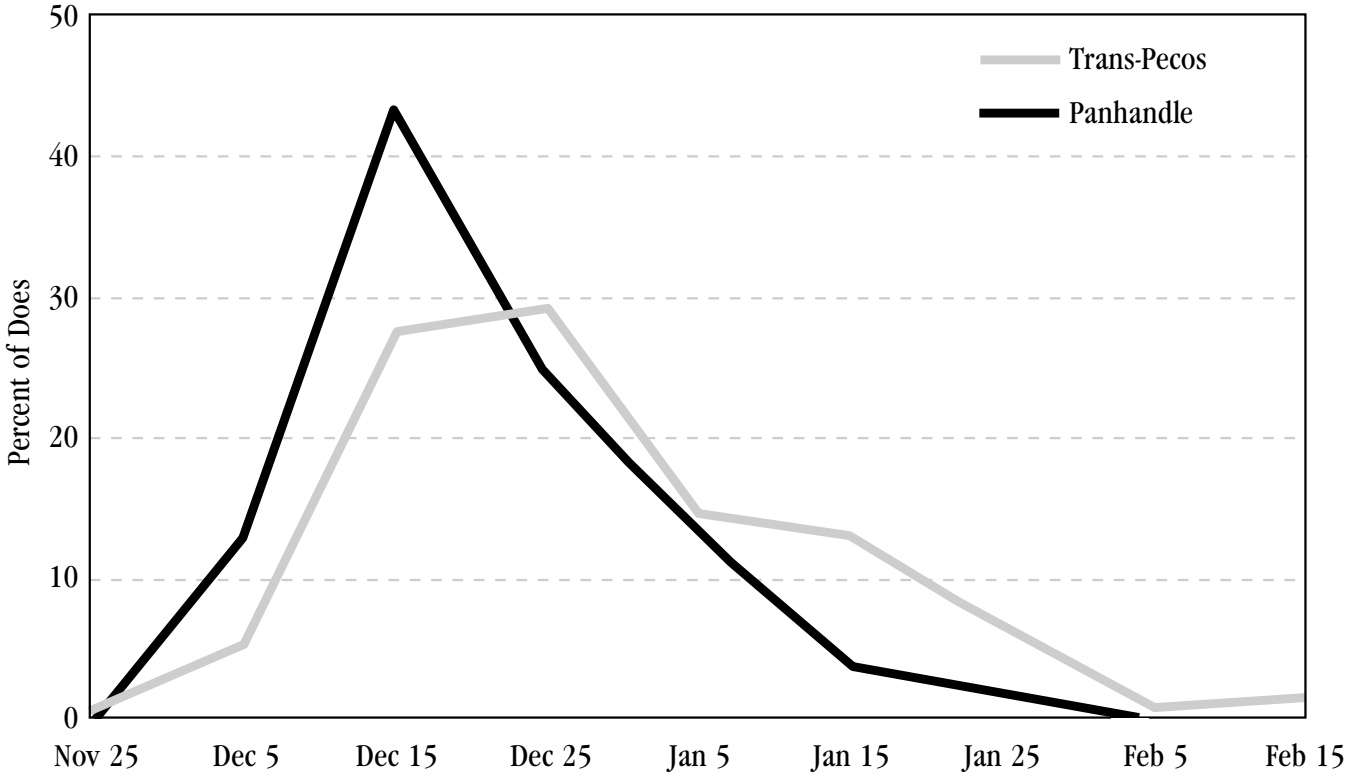
Diseases and Parasites

A study conducted on Texas mule deer (Pittman and Bone 1987) found no positive titers for brucellosis (Bangs disease) or leptospirosis. No evidence of infectious bovine rhinotracheitis was observed, and vibriosis and anaplasmosis were found only in 0.7 percent and 3.3 percent of samples, respectively. These abortive diseases are not considered to be limiting factors in mule deer reproduction. Positive titers for bluetongue in desert mule deer have ranged as high as 76.7 percent of individuals sampled. The most prevalent viral disease in mule deer herds is warts. Although unsightly, warts do not appear to be detrimental to individual deer or the herd. The actual impact of diseases on desert mule deer is poorly understood, but the available information indicates that diseases should not be a major concern of deer managers.

Ticks, lice and nasal bots are parasites commonly found on and in desert mule deer in the Trans-Pecos, occurring to a lesser extent in Panhandle deer. Burdens of these parasites usually are not high enough to be detrimental to the animal. Hibler and Adcock (1971) documented the presence of a nematode, *Elaeophora schneideri*, in mule deer throughout the western U.S. including Texas. Gray (1980) reported the occurrence of this parasite in each mule deer (n=8) collected from Palo Duro Canyon in the Texas Panhandle. This nematode causes circulatory impairment in sheep, elk and several exotic ungulates by occupying the carotid arteries. Tissue damage may occur in these animals to the brain, eyes, muzzle and other portions of the head due to poor blood circulation. However, infected mule deer appear to be healthy and do not exhibit any overt symptoms.

Mortality that appears to be caused by disease or parasites frequently can be traced to nutritional problems. Declining conditions in forage quantity and/or quality can lead to nutritional stress and can reduce an animal's resistance to disease and parasites. Also, the necessity of feeding closer to the ground on an overgrazed or drought-stricken range

Figure 3. *Average conception dates for mule deer does in the Trans-Pecos and Panhandle Regions, 1983-85.*



increases the chances of picking up spores or parasite eggs. Thus, diseases and parasites that normally occur at low levels in a healthy herd can quickly reach abnormally high levels in a malnourished deer herd and can result in the loss of a significant portion of the herd.

Movement

Mule deer in Texas are not migratory. The typical home range for mule deer in the Trans-Pecos is 2–4 square miles. In a study conducted in Brewster County, bucks had an average home range of 1,956 acres, with an average range of 1,341 acres for does (Lawrence et al. 1994). Mule deer home ranges tend to be considerably larger in the Panhandle. A study in Oldham County indicated that home ranges for mule deer bucks along the Canadian River breaks averaged about 26 square miles (Koerth and Bryant 1982). Long-distance movements up to 12 miles were observed during the rutting season, but considerable movements occurred during all seasons, except in the spring. A movement study of mule deer does at two sites in the Panhandle indicated that home range estimates are between 1,200 and 3,000 acres with an average of 2,400 acres (Koerth et al. 1985).

Home range size may be a product of habitat quality and quantity. The large home ranges of Panhandle mule deer may be related to the limited availability of habitat components in a single area. Conversely, smaller home ranges in the Trans-Pecos may be related to better quality habitat and/or limited sources of permanent water. Fluctuations in home range size and locations may occur because of predators, hunting pressure, land use practices, drought or other factors directly affecting the animal or its habitat.

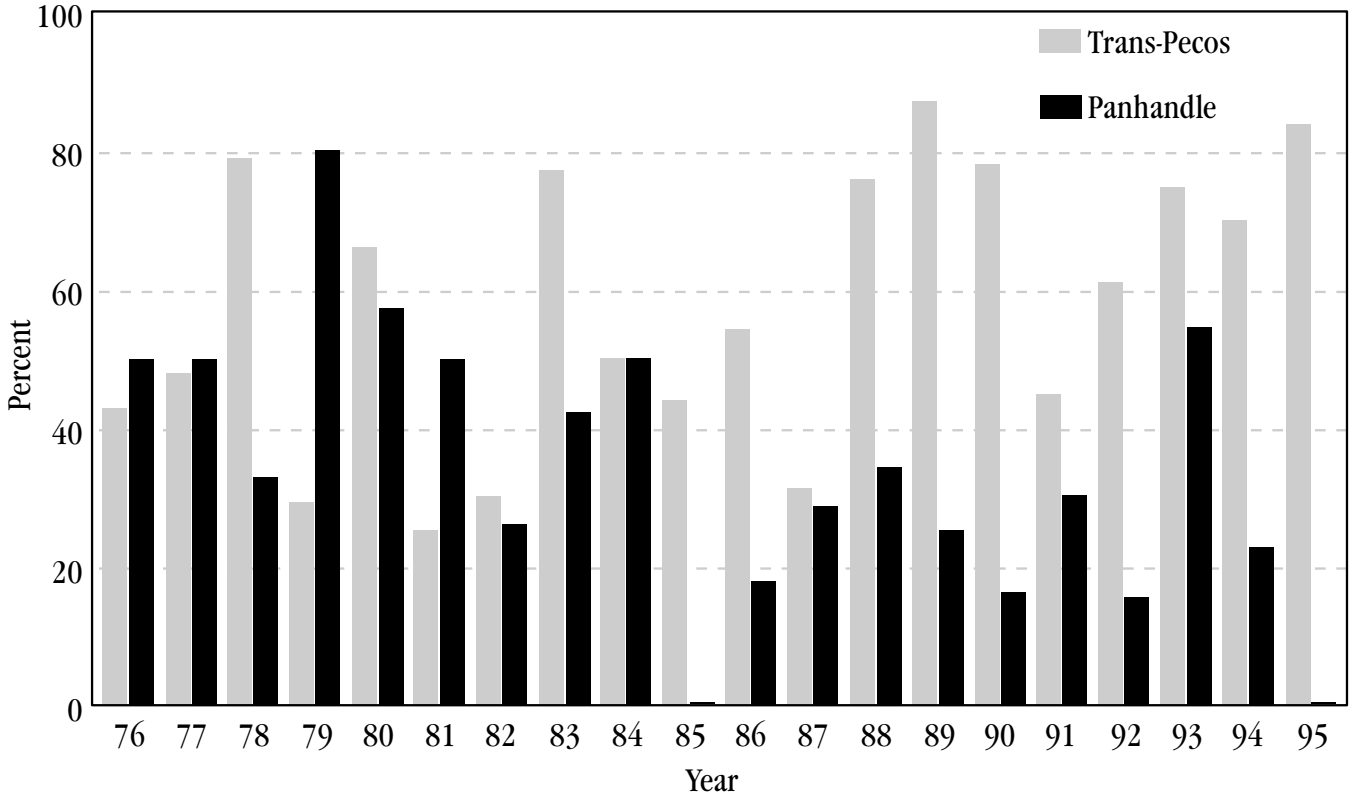
Antler Development

Mule deer bucks in Texas shed their antlers during late winter and early spring and grow a new set of antlers during the spring and summer. Bucks develop fully-hardened antlers by September or October and are capable of breeding at this time. Information collected from hunter-harvested mule deer bucks indicates that antlers continue to improve through at least 7½ years of age. Mature bucks achieve similar antler size in the Trans-Pecos and Panhandle with an average inside spread of 19–20 inches and a basal circumference of about 5 inches. These age classes typically produce antlers with 9–10 points.

The subject of spike-antlered bucks often arises during discussions about harvest management and antler growth. Published information concerning the biology and management of spike-antlered white-tailed bucks has some application in mule deer management. However, it is important for deer managers and hunters to understand both the differences and similarities in white-tailed deer and mule deer biology and management techniques.

Antler growth and development are dependent on nutrition, age and genetics. Because antlers are a product of protein,

Figure 4. *Percent of spikes in the yearling mule deer buck harvest, 1976-1995.*



carbohydrates and fats, Vitamins A and D, calcium and phosphorus, a buck's nutritional intake will directly affect antler growth (Ullrey 1983). Many ranges in the Trans-Pecos simply do not supply food with the protein level (13–16%) needed for optimum antler growth, and yearling mule deer with spike antlers are more common. Although a yearling mule deer buck may have the genetic potential to produce forked antlers, this potential can be masked by nutritional deficiencies. A deer's genetic potential for antler production is realized only when adequate nutrition is available. Because mule deer living in a desert environment typically are on a low nutritional plane, many spike-antlered mule deer bucks in the Trans-Pecos are probably the result of inadequate nutrition rather than poor genetics. The same generalization is true for yearling bucks in the Panhandle except for mule deer herds that have access to cropland.

The incidence of spike-antlered yearlings in the mule deer buck harvest is highly variable. Age and antler development data collected by TPWD biologists from 1976 through 1995 indicated spike-antlered bucks composed 15–87 percent of the yearling buck harvest (Fig. 4). Data collection periods that included a high incidence of spikes were closely associated with low rainfall years. Proper nutrition during late winter through early summer is critical for quality antler development.

A mule deer antler development study conducted by TPWD (Russ 1992) indicated that most spike-antlered yearling bucks are capable of producing antlers at maturity acceptable to many hunters (Fig. 5). However, bucks that had forked antlers as yearlings developed slightly heavier antlers in subsequent years than bucks that were spike-antlered as yearlings. Fork-antlered yearlings also averaged 1 to 2 additional points in subsequent years than the spike-antlered yearlings. Genetics and nutrition are important factors in antler development; however, growing quality antlers also depends on the buck's ability to reach maturity and achieve maximum antler growth. Another factor that may complicate the management strategy of spike harvest is the doe's possible genetic contribution to the "spike characteristic." A study conducted by TPWD on heritability of antler traits in white-tailed deer indicated the doe has some genetic contribution to the antler development potential of her buck fawns (Harmel et al. 1989). No research has been conducted to examine the doe's genetic role in mule deer antler development.

Based on this information, how are spike-antlered mule deer bucks to be managed? Cull or keep? When considering the harvest of spikes in a management program, it is important to be aware of weather conditions and the resulting effect on forage conditions during the antler growing period. Because droughts are the norm in Texas mule deer country, the culling of spike-antlered mule deer should be approached with caution. The practice of harvesting all spikes possible, especially during a drought, may substantially reduce the number of bucks in an age class and result in a relatively low number of mature bucks in subsequent years. Bucks with

Figure 5. *This buck was a spike as a yearling. At maturity many spike-antlered yearlings are capable of producing antlers acceptable to many hunters.*

spikes longer than 12 inches probably are not yearlings and should be harvested if producing quality antlers is an objective. Harvesting spikes can be a tool to help increase the age structure of bucks if a harvested spike substitutes for the harvest of an older deer. Obviously, this strategy will not work if spikes are harvested in addition to the recommended number of mature bucks.

Deer Foods and Deer Diets

Whether a mule deer herd is being managed for quality antler production or high deer numbers, nutrition is the most important factor to consider. Deer require a diet of approximately 16 percent protein along with carbohydrates, fats, vitamins and a variety of trace minerals. No single forage provides adequate levels of all these requirements, which emphasizes the importance of managing for a wide variety of shrubs/succulents, forbs and grass. The Trans-Pecos Region has a tremendous diversity of vegetation types which can provide excellent nutrition for mule deer, especially when rainfall is adequate. Vegetation in the Panhandle is less diverse, but some mule deer herds are on a high nutritional plane because of a combined diet of native forages and crops such as wheat, alfalfa, corn and/or sorghum.

Deer are selective feeders, eating a wide variety of the most nutritious foods available during each season of the year (Table 1). Deer food plants can be classified as shrubs/succulents, forbs and grasses. The leaves, twigs and blooms of woody plants eaten by deer are called browse. Succulents such as cactus, lechuguilla and cholla may be included in this category. Water obtained from succulents is important in the arid Southwest and perhaps critical if free water is not available. The bulk of Texas mule deer diets consists of browse, representing approximately 70 percent. Many browse

Table 1. Forage Plants Used by Mule Deer in the Trans-Pecos and Panhandle Regions of Texas[1].

Trans-Pecos

Class/Species	Spring	Summer	Fall	Winter	Preference
Forbs					
Euphorbias	X	X	X		High
Bladderpods	X			X	High
Gobemallow	X	X	X		Medium
Filaree	X			X	High
Milkwort	X	X			Medium
Plantains	X		X	X	High
Sagewort	X	X			Medium
Goldeneye	X	X	X		Medium
Daleas	X	X			Medium
Bluets	X			X	Medium
Browse					
Apache plume	X		X	X	Medium
Acacias	X		X	X	Medium
Ceonothus	X	X	X	X	Medium
Ephedra	X		X	X	Med-High
Hackberry	X	X	X		High
Oaks	X	X	X	X	Med-HIgh
Mesquite	X	X	X		Low
Redberry Juniper	X			X	Med-Low
Skunkbush sumac	X	X	X		Med-High
Saltbush	X	X		X	Med-High
Littleleaf sumac	X	X	X		Medium
Snowberry	X	X		X	Med-High
Tarbush				X	Low
Mt. mahogany	X	X	X	X	High
Creosotebush				X	Low
Succulents					
Lechuguilla	X	X	X	X	Medium
Pricklypear		X	X		Med-Low
Sotol	X			X	Med-High
Candelilla	X			X	Med-High
Yucca	X			X	Med-Low

Panhandle

Class/Species	Spring	Summer	Fall	Winter	Preference
Forbs					
Bladderpods	X		X	X	High
Globemallow			X	X	Medium
Silverleaf nightshade	X		X	X	Medium
Primrose		X	X		High
Trailing ratany	X	X	X		High
Croton (doveweed)	X	X	X		Medium
Spectacle-pod		X	X		Medium
Camphorweed	X	X	X		Medium
Ragweed	X	X		X	Medium
White sage	X	X	X		Med-High
Milkwort	X	X	X		Medium
Browse					
Skunkbush sumac	X	X	X	X	High
Hackberry	X	X	X		High
Sand shinnery oak	X	X	X		Med-High
Sand sagebrush	X			X	Med-Low
Juniper spp.	X		X	X	Med-Low
Half-shrub sundrop	X	X	X	X	Med-High
Mesquite	X		X		Low
Mt. mahogany	X	X	X	X	High
Four-wing saltbush	X			X	Medium
Littleleaf sumac	X	X	X		High
Grass					
Silver bluestem	X	X			Med-Low
Blue grama	X		X		Med-Low
Winter wheat	X		X	X	High
Succulents					
Pricklypear		X	X		Low
Yucca				X	Med-Low

[1]Summarized on a collective basis (Anderson 1949, Anderson et al. 1965, Boecker et al. 1972, Keller 1975, Krysl et al. 1980, Rollins 1990, Sowell et al. 1985).

species are deciduous, losing most of their leaves after the first frost; therefore, evergreen browse is an important food source during the fall and winter period. Juniper (an evergreen) is not highly palatable or nutritious, but it can be an important source of energy and Vitamin A during winter when higher quality foods are absent.

Forbs are annual or perennial broadleaf plants and are highly preferred by deer when available. Although their availability is highly variable, forbs average about 25 percent of a deer's diet. Forbs are usually the most nutritious and palatable class of plants, often exceeding 14 percent crude protein. Annual forbs are seasonal plants, and their abundance depends on soil moisture. As a result, they may be virtually non-existent during times of prolonged drought. For deer management purposes, annual forbs are not considered a reliable source of mule deer nutrition. Perennial forbs provide a more reliable source of forage, and they generally will be present on properly managed ranges. However, some of the higher quality perennial forbs may be scarce or lacking on many ranges, as livestock overgrazing and excessive deer numbers can limit their availability.

Abundant throughout the Trans-Pecos and Panhandle, native grasses are not a preferred mule deer food and usually represent no more than 5 percent of most mule deer diets. Although not important on an annual basis, tender grass shoots may be very important on a seasonal basis during brief periods when other forage is unavailable. Grass consumption by deer normally occurs while grasses are in the sprout stage during the spring or immediately following a drought. While grasses are sprouting, lignin and cellulose levels are low and nutrient levels are relatively high. Micro-organisms in a deer rumen which help digest food are not capable of breaking down the lignin and cellulose found in mature grass. Tame, fertilized "grasses" such as wheat and triticale are the exception to this rule and may become an important part of a deer's diet if available during winter months (Fig. 6).

Deer herd nutrition, as it relates to reproduction, is important to the land manager. Successful breeding depends largely upon the doe's health during the rut. The ovulation rate is strongly affected by the doe's level of nutrition and physical condition just prior to and during the rutting period. The

doe's nutritional condition during gestation has an effect upon the size and survival of fawns at birth.

Mule Deer and White-tailed Deer Interactions

The expanding range of white-tailed deer into historic desert mule deer range is a management concern of some land managers in Texas. A question often asked by landowners and hunters is "Are white-tailed deer driving out the mule deer?" White-tailed deer do not physically "drive out" mule deer from an area; however, in some areas mule deer numbers are declining while white-tailed deer numbers are increasing, giving the appearance that the mule deer are being physically displaced. What actually is occurring in these habitats is a gradual change in the vegetation that favors white-tailed deer.

In areas where the height and density of brush is increasing, the habitat is becoming more suitable for white-tailed deer and less desirable for mule deer. Research indicates that mule deer in Texas prefer a brush canopy cover of 40 percent or less, while white-tailed deer numbers increase dramatically in areas with a brush canopy exceeding 50 percent (Wiggers and Beasom 1984). The greatest white-tailed deer numbers were found in areas that consisted of about two-thirds brush cover. When the two species occupy the same area, they often are segregated – mule deer preferring the high, rougher canyons and open hillsides and white-tailed deer occupying the brushy draws and lowlands.

Where mule deer and white-tailed deer coexist, interbreeding does occur. The long-term effects are unknown, and for most areas, the extent of hybridization is not known. The highest incidence of hybridization in the Trans-Pecos occurs in the eastern part of the region where high populations of mule deer and white-tailed deer coexist. It has been estimated that up to 15 percent of deer may be hybrids where both species occupy the same range (Stubblefield 1985). DNA sequencing techniques were used to determine the extent of hybridization in the Panhandle (Donley County) where the ranges of both species overlap. Results indicated a hybridization frequency of 8 percent (F. Bryant pers. comm.).

Antler characteristics, tail coloration and ear length are not reliable in recognizing hybrids. Hybrids can be identified by the length of the metatarsal gland that is located on the outside of the rear leg between the hock and the hoof. It typically will measure about 3/4 inch long in whitetails and about 4 inches long in mule deer (Fig. 7). The metatarsal gland of hybrids is intermediate in length, measuring about 2 inches long. It has been theorized that occurrences of hybridization are initiated by white-tailed bucks, but interbreeding also can occur between mule deer bucks and white-tailed does. Hybrids appear to have at least a limited degree of fertility (Stubblefield 1985).

Hybridization is a concern to managers who see it as a threat to their mule deer herd. Habitat management is the most effective, long-term means for maintaining the integrity of the mule deer population. Habitat enhancement practices that reduce the amount of brush cover to 40 percent or less may improve the value of habitat for mule deer and discourage the encroachment of white-tailed deer. Liberal harvest of white-tailed deer through legal means is an additional management option that can help favor a mule deer herd where both species coexist.

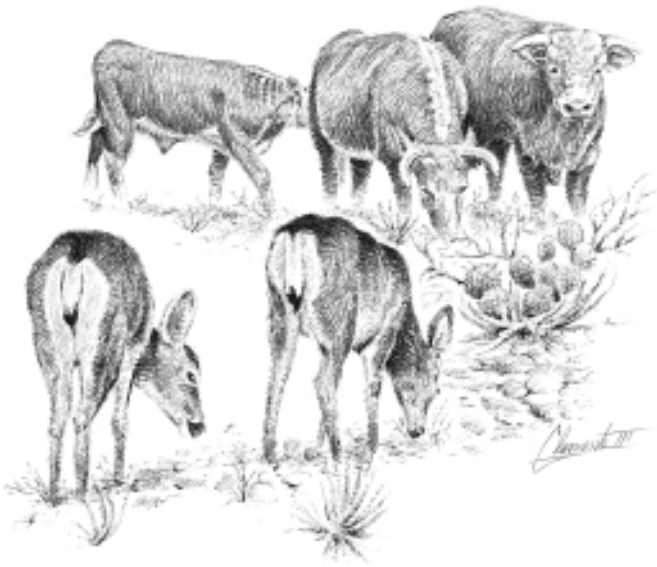
Figure 6. *Wheat fields often attract deer from several miles during winter. These concentrations can give the impression that deer numbers are excessive.*

Figure 7. *Difference in the length and appearance of the metatarsal gland of the mule deer (top) and the white-tailed deer (bottom).*

There are many environmental factors that are beyond a manager's control and yet strongly influence habitat quality. The more important factors include soil type, elevation, topography, temperature and precipitation. Weather in West Texas has a tremendous impact on habitat quality. Because of inconsistent weather patterns that normally result in low rainfall and recurring drought, some habitat improvement practices commonly used in other areas of the state such as food plots and prescribed burning often produce inconsistent results in West Texas. There are other important influences that can be managed, including livestock stocking rates, grazing systems, other wildlife species, water distribution, cover availability and food availability. Management practices such as rotational grazing, proper stocking levels, water development and brush management are the keys to providing and maintaining quality habitat for desert mule deer in Texas.

Habitat management

Grazing Systems and Stocking Rates



The primary objective of most land managers is achieving an acceptable level of sustained income from their rangelands. Livestock management and marketing are the primary tools used by most landowners to achieve this goal, while wildlife is considered secondary. With proper management, livestock and mule deer can do very well on the same range; however, when livestock numbers are excessive, they will compete with deer for available forage. As the competition for forage increases, the quantity and quality of plants available for deer (and livestock) decline, causing decreases in reproductive rates, body size and antler quality. Deer are usually at a disadvantage on overgrazed ranges because livestock will normally receive supplemental feed. Reducing livestock numbers is the preferred management alternative and the only way of allowing the habitat to recover.

Livestock management practices can be beneficial or detrimental to deer nutrition. Sheep and goats have foraging habits similar to deer and often compete with deer for available forage. The grazing practice that is least compatible with deer management is continuous, year-long grazing. This type of grazing results in overuse and elimination of the most palatable and nutritious plants and increases undesirable, less palatable plants (Fig. 8). Continuous grazing causes a gradual decline in range condition, reducing livestock nutrition and habitat quality for deer.

Most North American rangelands evolved under grazing by nomadic animals such as bison, elk and pronghorn, whose herd movements resulted in a crude form of seasonal grazing deferment. Rangelands respond best to grazing systems that closely mimic the behavior of these nomadic herds. A deferred grazing system that incorporates rest and graze periods to regulate the intensity and duration of forage plant use helps to maintain plant vigor, and allows seed production and seedling establishment.

The absence of livestock grazing (or fire) over long periods of time can be as detrimental to deer habitat as overgrazing. Total protection of rangelands in western Texas from livestock has failed to restore the vegetation and wildlife populations because these plants evolved under a natural system of periodic fires and grazing. With this in mind, it is easier to understand why ungrazed plants are not as healthy, vigorous or productive as properly grazed plants. Even the browsing of woody vegetation stimulates branching of highly palatable new growth.

Land managers should not rely on traditional or historic stocking rates. Stocking rates should be based on annual and seasonal forage production and adjusted periodically to balance forage availability with livestock and deer numbers. Planning and flexibility are the keys to proper range management. For example, the manager that plans ahead can temporarily limit grazing in pastures traditionally used as fawning grounds. Also, a flexible grazing system is essential to insure proper use of forage, the production of which is highly variable in West Texas. This is not only economically important to the rancher but necessary for maintaining habitat quality. If mule deer production is a priority, a flexible grazing plan will allow managers to adjust stocking rates when necessary and use kinds of livestock that are compatible with mule deer management (Fig. 9).

Managing livestock grazing activity during the summer growing period is an important tool for improving mule deer habitat. A decline in the quality of summer range and habitat affects livestock and mule deer nutrition and eventually the range's "carrying capacity." Short-term, intensive livestock grazing in early summer can effectively increase vigor and production of browse plants valuable as winter forage. This can be achieved with a rotational grazing system. Heavy grazing during late summer and fall can be detrimental to mule deer by removing forage which would be utilized during the winter months.

Water Development

Water is a critical component of mule deer habitat in West Texas. Because of slightly higher rainfall amounts and better distribution of permanent, natural and man-made water sources in the Panhandle, water is more of a concern in the Trans-Pecos. Studies of mule deer water requirements indicate that their home range is closely associated with permanent water sources. Research in New Mexico and Texas showed that desert mule deer numbers increased significantly in habitats where permanent water was developed. The greatest increases in deer numbers occurred in areas where water had been most scarce. In areas where water sources deteriorated, a concurrent reduction in deer numbers occurred (Brownlee 1979).

The tendency for mule deer and livestock to congregate around permanent water sources often results in excessive use of forage plants in the surrounding area, while other areas receive little use (Fig. 10). This can be corrected by distributing water sources throughout the deer herd's range. Permanent water sources should be no greater than 2.5–3 miles apart for optimum distribution of mule deer. The feasibility of developing additional water sources should be explored if permanent water is limited or absent. Conventional methods such as windmills and pipeline systems will work for most areas; however, they usually become cost-prohibitive in rough, inaccessible terrain. An effective solution is a water development system for wildlife called a "guzzler" (Fig. 11). Guzzlers are adaptations of cisterns used in many arid regions to catch and store rainfall. These rainfall catchment devices are generally designed to stay recharged with 8 inches of annual rainfall. Water catchment devices can effectively enhance deer

Figure 8. *Continued overuse of browse plants (i.e. apache plume) can result in damage and eventual death of the plant.*

Figure 9. *Cattle grazing is very compatible with mule deer management, especially when conducted in a well-planned but flexible grazing system.*

habitat if properly located and periodically maintained. For additional information on the construction and placement of watering systems, contact the Texas Parks & Wildlife Department to obtain a copy of *Water for West Texas Wildlife* (PWD BK N7100-32-7/93).

Brush Management

Woody plants are important to mule deer in providing security cover, shelter from weather extremes and escape from predators and hunters. They are also a key food source; however, woody cover can become too dense for optimum mule deer habitat, can reduce forage production and create livestock management problems. The management of woody plants or "brush" is a common range improvement practice on West Texas rangelands. Brush management can be beneficial or detrimental to deer, depending on how it influences deer food and cover. The impact of brush management on deer habitat will depend on several factors: (1) brush species, (2) brush density, (3) method used, (4) amount removed, (5) pattern of removal, and (6) the site (soil, slope, drainage, etc.). When considering brush management as an option, other factors that may be important are terrain, management objectives and economics.

Range improvement practices in some areas of the arid Southwest have included the broad scale destruction of cactus and woody plants, followed by perennial grass seeding. This type of range improvement is not only costly, but it is incompatible with mule deer requirements.

Mechanically treating dense stands of brush in small, mosaic patterns, followed by prescribed burning, can improve perennial grass production, and increase plant diversity, browse palatability and nutrient content of plants (Fig. 12). Mechanical methods such as tree grubbing, roller chopping or discing are recommended over chemical means. These methods are more selective, remove the brush canopy and promote a variety of forbs and grasses through soil disturbance and decreasing competition. Most brush species will quickly re-sprout unless their roots are removed (i.e. grubbing).

Top-removal methods such as roller-chopping, discing and shredding will temporarily improve the quality of browse (regrowth) for deer and other browsing animals. These methods do not reduce the density of woody plants and produce only a short-term reduction in height and canopy cover. Also, frequent treatments are required to maintain browse quality and low brush height.

Prescribed burning is gaining popularity throughout Texas as a brush management and habitat enhancement tool. In addition to being the most economical brush control method, burning can produce a desirable vegetation mosaic and increase forage palatability and nutrient content. Most prescription burns are conducted in late winter (February–March) with the objectives of suppressing woody plants (e.g., mesquite, redberry juniper), improving forage plant health and improving plant species composition. The brush suppression effects of cool-season fires are temporary because most brush species re-sprout from the base. The historical expanses of grasslands and savannahs were maintained by wildfires that primarily occurred during summer dry periods. These summer fires were often caused by lightning strikes, although Native Americans frequently set fires to attract game animals. Grasses certainly require a longer period to recover after a summer burn compared to a cool-season fire, but the long-term benefits may be worth the tradeoff. Woody plants are often stressed during dry summers, and when this stress is combined with the intense heat of a summer fire, the result is an increased mortality of large woody plants and a high mortality of young woody plants. Also, seed germination of some of the more desirable plant species (e.g., sideoats grama, bluestems, legumes) is often stimulated by the intense heat associated with a summer fire. Because of the hazardous nature of summer burns, they should be conducted cautiously and by an experienced burn crew.

Rainfall is often scarce in West Texas, and it may take months or longer for treated country to recover. Managers can minimize the risk of wind and water erosion if brush removal is conducted in small patches and during periods of adequate

Figure 10. *Mule deer and livestock can congregate around water sources during dry periods, resulting in excessive use of forage in the surrounding area.*

Figure 11. *Guzzlers are an efficient means of providing wildlife water in remote, arid locations.*

soil moisture. A pasture should not be burned more frequently than every 3 to 5 years in the Panhandle and every 5 to 10 years (or more) in the Trans-Pecos. During droughts, low fuel amounts and lack of soil moisture may require postponement of a scheduled burn.

Prescribed fires must be carefully planned, while considering the area to be burned, brush species, season, weather patterns, soil moisture, fuel load, topography, safety, neighbors and applicable laws. Land managers should seek experienced assistance from the Texas Parks and Wildlife Department, the Texas Agricultural Extension Service or the Natural Resource Conservation Service if prescribed burning is selected as a brush management tool.

Supplemental Feeding

The practice of "feeding" deer is popular in Texas, especially in whitetail country. Primary reasons for supplemental feeding include improving harvest opportunity (baiting), increasing antler quality and/or improving animal condition during stress periods.

When considering a supplemental feeding program, remember the key word is SUPPLEMENTAL. Providing supplemental feed is not a substitute for proper range management. The objective of supplementation is providing additional nutrients to the deer's diet during times when native forage is either lacking in quantity or quality. "Baiting" deer to a particular area during the hunting season is not a supplemental feeding program. Baiting is usually discontinued when the hunting season ends. This time period is one of the most nutritionally stressful for deer in West Texas. The most commonly used deer "bait" is corn. Corn is an excellent energy supplement that can be very beneficial in winter and late summer when carbohydrates decline in native forages. However, corn contains only 7–9 percent protein, which falls considerably short of the 13–16 percent protein range considered optimum for proper muscle, bone and antler development in deer. Although corn is a good source of phosphorus, it lacks many of the trace minerals that are essential for proper body and antler growth.

In a supplemental feeding program, high-protein pellets are superior to corn as a feed choice. A desirable pellet formula contains 16–20 percent protein, along with proper amounts of minerals (calcium, phosphorus, potassium, manganese, magnesium, etc.) and Vitamins A, D and E. To prevent an automatic feeder from clogging, a $^{3}/_{16}$-inch pellet size should be used.

Cost is an important factor for many land managers when considering a supplemental feeding program. Feeding programs are very expensive; and generally the costs far exceed the benefits, including financial returns that might be recovered through an increase in the hunting lease price.

In many areas of Texas, food plots are a less costly alternative for providing supplemental year-round nutrition for deer. Food plots can improve deer performance if a balance is maintained between forage and deer numbers. Considering the unreliable rainfall patterns common in West Texas, food plots are not practical during most years without irrigation. Except in the driest years, small grains such as wheat or triticale are successful options in the Panhandle. The chances of establishing food plots in the Trans-Pecos without irrigation are minimal. With irrigation, commercial crops such as alfalfa, small grains and sorghum can provide excellent sources of supplemental feed for mule deer. Although cropland areas can be extremely important to deer, excessive deer numbers can cause economic losses to agricultural businesses. Food plots are most beneficial as scattered plantings of 5–10 acres, located adjacent to existing brush cover or rough terrain.

Figure 12. *Root plowing drastically reduces brush density and canopy, but it can be a good deer management tool if used properly.*

Deer management is sometimes viewed as two separate phases: habitat management and population management. Habitat management primarily involves the manipulation of food, water and cover to improve deer nutrition and survival. Population management manipulates deer numbers, sex ratio, age structure and genetics. In reality, the two "phases" are inseparable. The habitat quality has a direct influence on deer numbers just as excessive deer numbers can impact the habitat quality. Deer population management is discussed separately in this section from habitat management, but the foundation of any mule deer management program is the development of quality habitat. Some improvement to a deer herd can be achieved by only managing deer numbers and herd structure, but greater success can be achieved by managing for quality habitat that produces quality animals.

Population management

The most important component of a deer management plan is establishing a goal for the ranch. The goal must be realistic and practical for the acreage and associated resources. The next step is listing a specific set of objectives to help the manager accomplish the long-term goal. These objectives may include habitat improvements, harvest rates, deer densities, antler size and other herd characteristics. Whether the goal includes increasing income from a hunting lease or providing recreation for family and friends, it would certainly hinge upon producing quality animals in quality habitat. A quality deer herd leads to higher reproductive rates, increased body weights, larger antlers by age class and an overall improvement in the deer herd's age structure.

Once a management plan has been developed, the manager can begin to "manage" his deer herd. Population management is similar to conducting a business. You must first inventory the product (census), then sell the product (harvest) and keep records (age, weight, antler measurements) to evaluate management decisions. This process allows the manager to determine the deer herd status at a given point in time, as well as evaluate the herd trend over a period of years. Without records, management decisions are only guess work.

Information Collection

Population analysis requires the collection of the following representative data:

A. Population Information
   1. Deer Density (Acres/Deer)
   2. Buck: Doe Ratio
   3. Fawn Survival/ Mortality
   4. Age Structure

B. Harvest Information By Age Class
   1. Number harvested
   2. Field Dressed Weights
   3. Antler Measurements
   4. Body Condition
   5. Percent of Does Lactating

Deer Survey

A deer survey provides an estimate of the number of deer occupying a range, but more importantly, it provides an indication of trend in deer numbers over a period of years. This information is essential for balancing deer numbers and the food supply, as well as in allowing managers to monitor progress in their deer management plan. Other information that can be obtained includes sex ratios and fawn survival estimates.

Several methods are available to estimate deer numbers. The most commonly used technique in West Texas is the spotlight survey. After an appropriate route is determined, the route is driven after dark and deer are counted with the aid of spotlights. Visibility estimates are taken to calculate the area observed during the survey. Based upon the area observed and the number of deer observed, a density estimate can be produced (acres/deer). Because of variations in deer movement patterns, the route should be counted on three separate nights to develop an average. When properly conducted, this method can produce a reliable estimate of deer numbers; and when supplemented with day-time observations of bucks, does and fawns, it can also provide an indication of the herd composition.

The most common error using the spotlight survey technique is failing to establish the route through representative habitats. The route should proportionately sample all the representative habitat types on the ranch. In much of the Trans-Pecos, ranch roads have been established through the lowlands (between hills and mountains) connecting livestock watering and feeding areas. Because the more productive lower slopes and lowlands often act as magnets (especially during drought), attracting deer out of the uplands, mule deer numbers are often overestimated. Survey routes in the Panhandle that include winter wheat fields can result in overestimates of deer numbers just as survey routes on adjacent rangelands can result in underestimates. In this situation, it is best to conduct spotlight surveys prior to wheat emergence.

Helicopters can be used to conduct a partial survey or a total ranch count. This technique is generally conducted only once per survey period. Helicopter surveys allow the manager to estimate deer density, herd composition and buck quality in a relatively short period of time. The primary disadvantage is cost. Managers often believe that they are seeing every deer on the ranch when conducting a "total count;" however, research has shown that only 35–85 percent of the deer are observed from a helicopter, depending on terrain and canopy cover (Beasom et al. 1981, DeYoung 1985, Beasom et al. 1986, Rollins 1989).

No survey method is 100 percent accurate; however, either of the two methods described can provide valuable information on deer numbers and herd composition trends. Managers should understand the limitations of the method they decide to use. The information collected during a survey is an "estimate" and should be treated as such. Knowing population trends is more useful than knowing the exact number of deer on the ranch. The land manager must choose the most appropriate survey method by considering ranch size, vegetation, terrain, finances, management objectives, available manpower and time constraints. Surveys should be conducted during September and October when the fawns are following the does, and bucks have hardened antlers that are more visible at night. For additional information on survey techniques, refer to TPWD booklet 7000-83 *Deer Census Techniques*.

Harvest Management

A basic tool in the management of a mule deer herd is a regulated harvest during the hunting season. The appropriate harvest level and resulting age-class distribution in the herd depend largely on the land manager's objectives. Mule deer tend to be more susceptible to hunter harvest than whitetails because mule deer inhabit more open terrain and are more hesitant to flee than whitetails. This vulnerability to harvest, combined with lower reproductive rates, result in the potential for overharvest of a mule deer herd. This is especially true in areas where fawn recruitment is low.

Except in very limited areas of the Trans-Pecos, mule deer hunting in Texas is allowed for bucks only. With the relatively low harvest rate of bucks and the control maintained by most landowners, hunting is rarely detrimental to mule deer populations. However, the suppression of mule deer populations through harvest has been documented in areas where many small land tracts exist. Because landowners with small tracts have little management influence over an entire deer herd and receive little benefit from attempts at herd management, they may hunt their acreage more heavily than the population can sustain. If these landowners or their hunters harvest every buck they see, this will result in excessive hunting pressure and an overharvest of bucks. The best alternative in this situation is to form a landowner cooperative and manage the deer herd in a group effort, with strict enforcement of harvest limits.

Improving antler size of mule deer bucks requires a harvest strategy which allows them to reach maturity (Fig. 13). Antler characteristics of desert mule deer continue to improve through at least $7^1/_2$ years of age; thus, a majority of the bucks harvested should be at least $5^1/_2$ years old. This can generally be accomplished by harvesting no more than 10 percent of the estimated total buck population.

The harvest of doe mule deer in Texas is carefully regulated through the issuance of antlerless deer permits. Protection of the doe segment of the herd is often necessary to offset low

fawn recruitment rates. Permits are issued to landowners to reduce mule deer herds in areas where natural mortality is insufficient to control overpopulation. The harvest of antlerless mule deer is justified where population levels are approaching or have surpassed the habitat's carrying capacity.

Land managers and hunters often are concerned about the proper buck:doe ratio for mule deer. This concern and much of their knowledge about sex ratio management is based upon white-tailed deer management literature. While the sex ratio in a mule deer herd is important, most of the current literature about proper ratios for "deer" management does not apply to West Texas mule deer. Whitetails are often managed for buck:doe ratios ranging from 1:1 to 1:2. The appropriate buck:doe ratio for mule deer depends on overall herd numbers, relative to the carrying capacity of the habitat and fawn survival rates. A 1:3 buck:doe ratio is desirable for mule deer when fawn production and survival is relatively low. In areas where natural mortality is high and deer densities are low, a higher number of does may be needed to maintain or increase the population.

The importance of collecting adequate herd composition data cannot be stressed enough when considering the harvest of mule deer. Mule deer in the Panhandle often concentrate on winter wheat fields or in a particular area during the fall and winter. These concentrations often give the impression that there is an excessive number of deer. Managers need to keep in mind that mule deer may travel several miles to these areas; therefore, a harvest rate based upon the temporary and artificially high deer density can impact the deer population far beyond the land manager's property.

Harvest Records

Ranchers are able to observe livestock closely when feeding or "working" them, and thus are able to constantly monitor livestock health and detect problems. Obviously, a manager doesn't have this advantage with deer. Harvested deer provide an excellent opportunity to collect biological information as well as valuable answers concerning harvest strategies, harvest rates, nutrition and management decisions. Information collected from each harvested deer should include age, field-dressed weight, antler measurements and body condition. An example of an information record sheet is shown in Table 2. Provided that managers control or are aware of their hunters' harvest strategy, age data can provide important information about the herd's age structure. In other words, "shoot the first buck sighted" versus "trophy hunting" will give different age-structure results. Weights, body condition and antler quality will provide important information about management decisions and their effect on

Table 2. Example of record sheet for collecting deer population data (modified from Davis, 1990).

MULE DEER

Hunting Season_____ Ranch Name _____

_____ Sex: Antlered Buck

City County

Sample Number	Date of Kill		Hunter	Pasture	Age	Dressed Weight (lbs.)	Antler Development			
	Mo.	Day					Total Points	Spread	Antler Base	Beam Length

deer herd nutrition. This information, when combined with annual survey information, can be used to guide habitat management decisions and adjust harvest rates. It is also important to compare harvest information over a period of years to evaluate the deer herd trend. Trend information can be used to determine if current management practices will achieve the established goal.

Through 4½ years of age, mule deer ages can be determined by tooth wear and replacement techniques established for white-tailed deer. Results from a TPWD study in the Trans-Pecos involving a small sample of known-age mule deer indicated that lower-jaw teeth in mule deer may wear differently than whitetails (Russ 1993). Several mature mule deer (5½ years and older) showed less tooth wear than described for whitetails of the same age. Until a larger sample of known-age mule deer can be examined, the tooth wear and replacement technique may require adding one year to age class estimates for mature mule deer. However, identifying the proportion of mature bucks in the harvest is more important than determining exact ages among mature bucks.

Antler measurements that will provide a good indication of desirable characteristics and overall quality include the number of points, inside spread, main beam length and the basal circumference. If does are harvested, then data such as age, field-dressed weight, body condition and signs of lactation (an indication of fawn survival) should be recorded.

Figure 13. *A key ingredient in producing quality bucks is a conservative harvest that allows many of them to reach maturity.*

The key to mule deer management in Texas is habitat management. Successful deer managers are aware of food, cover, water, and spatial needs and understand how management practices impact these requirements. Providing adequate foods for mule deer means balancing the forage supply with animal numbers, which includes both deer and livestock. Because of the generally low fawn recruitment rates among Texas mule deer herds, providing adequate hiding cover for fawns can be the difference between success and failure in a management program. Regulated harvest during the hunting season can be an effective tool in achieving personal ranch objectives; however, a sound deer management program must consider the long-term needs of a mule deer herd with an emphasis on developing and maintaining quality habitat. The primary tools available to the manager for enhancing mule deer habitat are grazing management, brush management (including prescribed fire) and water development. This approach will produce a quality deer herd which exhibits good reproduction, body growth and antler development.

Summary

This publication provides information needed to begin a mule deer management program. Mule deer management assistance is available to interested land managers through the Private Lands Enhancement Program. Land managers are encouraged to contact TPWD by writing Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, TX 78744 or calling toll-free at 1-800-792-1112.

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