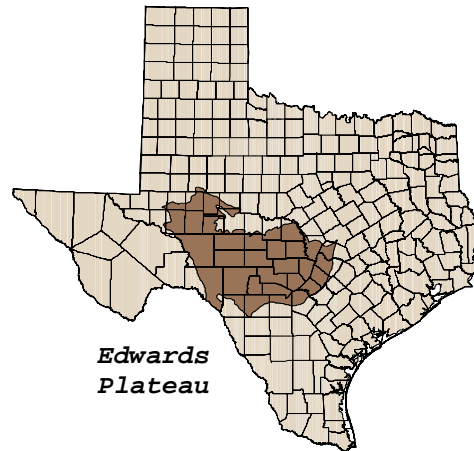


Managing Habitat for White-tailed Deer In The Hill Country Area Of Texas

Background

More than 30 years of management and research on the Texas Parks and Wildlife Department's Kerr Wildlife Management Area has demonstrated that white-tailed deer management is based on three basic cornerstones - nutrition, genetics, and age structure of the herd. Of these factors, nutrition is the most important and is the subject of this discussion. Without proper nutrition and age, deer cannot reach their full genetic potential. Up to 50% of the deer herd in the Texas Hill Country may die each year from causes associated with malnutrition. This mortality is greatest in young white-tailed deer that require a high nutritional level to support growth functions in their young bodies.



Indications of malnutrition in deer include small body size, poor antler development, poor reproduction, and poor fawn survival. An adult deer will consume approximately 4 pounds of dry forage per day; although, this varies greatly depending on the time of the year. Sixty percent of a deer's growth takes place the first year of its life. It is extremely important that young deer receive adequate nutrition from the moment of birth if they are going to attain maximum body size and antler growth. Older deer do not require as much protein in their diet as do young deer.

Managing for proper nutrition can be accomplished through (1) habitat management (2) supplemental feeding and (3) planting of food plots. Supplemental feeding is expensive and can artificially maintain excessive numbers of deer on already overgrazed ranges. Supplemental feeding not a recommended practice unless integrated with other deer population management practices (See Texas Parks and Wildlife Bulletin PWD-BK-7100-033-5/87, *Supplemental Feeding* by J. R. Perkins). Managing the habitat for proper nutrition should be a primary management goal. Supplemental feeding and/or planting of food plots are not a substitute for good habitat management.

Knowledge of the food habits of all grazing animals on the range, their numbers, the carrying capacity of the land, brush management practices and an understanding of grazing systems is essential if one is to manage for adequate deer nutrition and quality habitat.

Food Habits of Deer

Basically, three classes of forage are available to deer. These are forbs, browse, and grass. Forbs are broadleafed plants that most people call wildflowers or weeds. Forbs are generally seasonal plants whose abundance is related to rainfall patterns and are usually high in protein. Forbs are either annuals or perennials. Many of these plants are preferred deer foods and are extremely important to deer for optimum growth and reproduction. Browse plants are woody or shrubby plants. Many are treelike and are usually lower in protein content than forbs. However, they are deeper rooted, more drought resistant plants than forbs and are responsible for providing deer food during periods of poor forb growth. Browse plants are a more dependable food source and are the most important plants when managing for a stable deer herd. Grasses are usually narrow leafed plants with parallel veins in their leaves that do not produce showy flowers. They are usually eaten by deer only when they are young and tender.



FORBS



Browse



Grass

Several studies concerning the food habits of white-tailed deer have been conducted in the Texas Hill Country. The results indicate that deer primarily consume forbs when they are available. As forbs become less available in the late summer and fall period, deer begin to shift their diet to browse. For practical management purposes, deer consume little grass and are unable to digest most grasses well. Grass consumption usually occurs when grasses are in a young, tender growing state when they can be more easily digested. Wheat, oats, and rye are grasses and are exceptions to the rule. These grasses are even more highly preferred when fertilized. Rescuegrass is a cool season native grass and is also readily taken by deer.

For practical habitat management purposes, a deer's diet consists of primarily two classes of forage - forbs and browse. Figure 1 graphically illustrates deer forage preferences by forage class. Acorns and fruits of many browse species are collectively known as mast. Use of mast by deer in the fall and early winter can be quite high in those years when rainfall patterns favor mast production. However, in the Hill Country, mast production is erratic and adequate mast crops are not produced every year. Habitat management decisions should be based on green leaf production and not on mast production. Data for Figure 1 were gathered from food habit studies conducted on the Kerr Wildlife Management Area. Other studies conducted in the Edwards Plateau have indicated similar results.

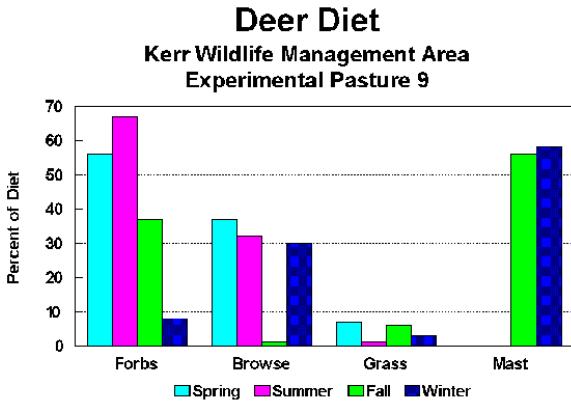


Figure 1. Percentages of forbs, browse, grass and mast in white-tailed deer diet by season. Kerr Wildlife Management Area.

Food Habits of Livestock and Exotics

The Texas Hill Country has two major growing seasons - spring and fall. Over 70% of the vegetation produced each year grows in the spring of the year and subsequently is the primary food source for the deer herd during the remainder of the year. The key to good deer management is to balance deer numbers with quantity of vegetation produced each year. This would be relatively simple if only deer were utilizing the range. However, Texas Hill Country ranges support herds of domestic cows, sheep, and goats, and a variety of exotic big game species (over 50 species of exotics are found in the Texas Hill Country). Many of these animals prefer and consume the same forage as white-tailed deer. In order to manage white-tailed deer, a range manager must understand the food habits of all animals utilizing the range.



Food habit studies of domestic sheep indicate that they also are primarily forb eaters. However, as desirable forbs begin to decrease, sheep shift their diet to both grasses and browse.

Food habit studies of domestic goats have shown that they are primarily browse eaters but can also utilize forbs and grass in their diets although not as well as sheep.

Food habit studies of axis deer, sika deer, fallow deer, aoudad sheep, and blackbuck antelope indicate that these animals have a preference for forbs or browse but can readily utilize grass in their diets.

Cattle are primarily grass eaters. They will consume some forbs and a surprising amount of browse during stress periods which often occur in the summer and winter. Although there can be direct competition between cattle and deer on heavily grazed ranges, cattle are beneficial for deer forage production when stocked at light to moderate rates in deferred rotation grazing systems. Proper grazing enhances forb production by reducing grass competition.

How to Improve Forb and Browse Production on Deer Range

The majority of Hill Country ranges are overstocked with domestic livestock as well as deer and, in many instances, exotic big game animals. As a result, there are excessive numbers of animals with similar food habits competing for a limited amount of forage. White-tailed deer depend on forbs and browse for their nutritional needs while sheep, goats, and exotics utilize all three forage classes. Forbs are highly preferred plants and are consumed in a relatively short period of time. Deer must then rely on the lower quality



Overgrazed ranges produce little deer browse

browse plants early in the year. As the better quality browse becomes depleted, deer consume poorer quality browse species. During dry years when large numbers of deer are present, significant losses of deer may begin to occur at this time. Even in years of adequate rainfall, overpopulations of deer, domestic livestock, and exotics result in deer surviving on the poorer quality forbs and browse species. As white-tailed deer become malnourished, they have lower body weights, smaller antlers, and poor reproduction rates. Domestic livestock and exotics can supplement their diets with grass under the same range conditions and will not suffer the effects of malnutrition.

Most ranchers feed domestic livestock during stress periods. Supplemental feeding may maintain artificially high populations of animals on depleted ranges. When favorable moisture conditions return, excessive numbers of animals

quickly consume newly emerging vegetation preventing re-establishment of preferred vegetation. This cycle of excessive numbers of animals on overgrazed ranges has resulted in long-term deterioration of Hill Country ranges. Some of the more desirable plant species are no longer found on many ranges. In an attempt to manage for range improvement, the land manager should consider all grazing animals on the range and calculate their numbers into the range carrying capacity. Carrying capacity can be defined as that point at which animal numbers and range food supply are in balance. Any additional animals cause decreased animal performance or range deterioration, which may result in a "die-off". In the Hill Country, livestock stocking rates should vary between one animal unit (AU) per 20 acres to one AU per 50 acres depending on location and rainfall patterns. Deer populations should range between one deer per eight acres to one deer per 35 acres, again depending on location and rainfall patterns. For the proper stocking rates in your location, you should contact your local Soil Conservation Service or wildlife biologist.

Remember, forbs are highly preferred by sheep, white-tailed deer, and many exotics. By reducing the number of sheep, exotics and white-tailed deer on the range, the quantity of forbs available to each individual animal will be greater over a longer period of time.



Proper use on shinoak

Because forb production is highly variable, deer range managers should strive to manage for and produce more stable browse plants. If grazing pressure is reduced on the key browse species, then it can be assumed that deer are getting adequate quantities of forbs in their diets. Appendix A lists the major browse plants found in the Hill Country and their preference by deer. Only light to moderate grazing on the "moderately preferred" species should be apparent at the end of August. Heavy grazing on these plants in August indicates high deer numbers and a probable shortage of winter food will occur. Heavy grazing on live oak and some of the other less preferred browse

species during the late summer period usually signals that a significant deer die-off has begun. Of 150 to 160 fawns born to 100 does each year, only about 50 will remain by September. The primary cause of this loss is malnutrition. Figures 2 and 3 illustrate deer browsing pressure on shin oak. Heavy browsing on shin oak in August indicates moderate to heavy deer losses may be occurring.

The harvest of antlerless deer provides a means of balancing deer numbers to range carrying capacity. This will reduce the number of reproductive units on the range. The primary purpose of doe harvest is to reduce animals and thus increase food supply. If ranges are overstocked with exotics and domestic livestock, the expected increase in food supply may not result. The sheep, goats, and exotics remaining on the range may realize some additional forage but no measurable increase in white-tailed deer quality will result. All animals on the range must be considered and proper numbers maintained to provide for an adequate nutritional level. A range that can support 100 browsing animals may support 90 goats and 10 deer or it may support 90 deer and 10 goats. A range

that has 150 goats and 50 starved deer will not benefit by harvesting 20 doe deer because the range still has an excess of 80 total animals.

If white-tailed deer management is the primary objective of the overall management program, then two management strategies are necessary. The first is the reduction or removal of animals that are in direct competition with white-tailed deer for forbs or browse plants. This objective would include the removal or dramatic reduction in the numbers of sheep, goats, and exotics. Reductions in cattle numbers are, likewise, often necessary. The second management strategy would be to balance the remaining animal numbers, including deer, to the available food supply. Only by balancing the kinds of animals and animal numbers to available food supply can both the quality and quantity of food resources be increased.

How to Improve Forb and Browse Production on Deer Range

To improve range conditions for deer in the Hill Country, the landmanager must (1) control deer numbers (2) regulate/reduce numbers of domestic livestock and exotics, and (3) regulate the composition of livestock (based on forage preferences). Other factors of major importance in improving deer range include use of deferred rotation grazing systems, planned brush management, and prescribed burn programs.



Regrowth Texas Oak

A very important deer management tool is a planned livestock grazing system that allows adequate rest periods for plants to recover after grazing. Most domestic livestock are selective grazers and consume the most nutritional and preferred plants first. Whenever a grass plant is eaten, there is not only a reduction in plant top growth but also a reduction in root growth. This reduces the plant's ability to rapidly regrow following defoliation by grazing animals. During the growing season, grass plants need approximately 30 to 60 days of rest to recover from grazing. This recovery period depends upon the severity of defoliation, moisture conditions, and temperature.

During continuous year-long grazing when livestock are left in the pasture for 65 days of the year, many preferred plants do not have time to recover. Frequent, repeated use will not allow seed production or plant recovery.

Continuous grazing, even at light to moderate stocking rates, will remove the more desirable plants, reducing plant diversity, which is an important element of habitat management. Continuous grazing does not allow for adequate plant recovery and should not be used as a grazing method if the land managers desire is to improve habitat for white-tailed deer.

Several livestock grazing methods and systems have been developed which provide adequate periods of rest and allow vegetative recovery. These vary from relatively simple systems that require little expertise to complex systems which require knowledge of basic ecological principals. Recommended rotational grazing systems to consider, listed in order of preference for optimum white-tailed deer management are:

1. Short duration grazing (12-20 small pastures with one herd of livestock)
2. High intensity-low frequency (6-8 pastures with one herd of livestock)
3. 4 pasture - 1 herd
4. 3 pasture - 1 herd
5. 4 pastures - 3 herd (this system is actually not recommended if the land manager's primary objective is quality white-tailed deer management)

There are many variations of these systems and to select one that best fits your particular situation, contact your local conservation agency or wildlife biologist.

Pastures, which have not been grazed for a long period of time, become dominated by relatively few species of plants and exhibit limited variety and diversity. Therefore, total deferment from livestock grazing is not normally recommended for optimum range and habitat management.



Rotational grazing systems are beneficial to deer management

In summary, a planned grazing system of some type is preferable to no grazing system at all. Grazing systems, which provide adequate rest, are highly preferred and strongly recommended in a deer management program. The more intense grazing systems require a greater degree of skill and more effort to operate. Grazing schedules and carrying capacities for pastures within the grazing system need to be flexible and continually re-evaluated based on rainfall patterns, seasons of the year, and local range conditions.

Noxious Brush Management

Livestock, white-tailed deer, and exotics are selective grazers, preferring to eat desirable plants and leaving less palatable species. This selectivity applies to grasses, forbs, and browse. Over time, selective grazing has left much of the Hill Country dominated by plants such as cedar, mesquite, agarito, persimmon, and whitebrush because livestock and deer do not readily eat these plants. Forage of these species are little used by deer, although the fruits may be readily eaten. When densities of any individual species precludes or prevents the establishment of other desirable plants, that particular species may be considered noxious. The land manager may then need to consider a noxious brush management program.

Deer have a certain requirement for cover. Cover provides a means of protection from predators and for a sense of security. (See TPWD Booklet 7000-35 Basics of Brush Management for White-tailed Deer Production). When planning brush control programs, patterns of brush should be left for deer cover. These brush patterns or strips should be wide enough so that an observer cannot see from one side to the other during winter months when deciduous species are bare of leaves. Deer should not have to move over 1/4 mile to find cover and the cover strips should be as continuous as possible to provide travel lanes for deer. The land manager whose primary objective is good deer management must recognize that, for example, the oak species not only provide cover but are preferred deer forage; therefore, he should manage for the more preferred brush species.

Brush strips also provide a transition zone of vegetation that is readily used by many forms of wildlife. Because the area is changing from one vegetative form into another, it provides a wide diversity of plant forms in a relatively small area. This is not only beneficial to deer but to many other forms of wildlife.

Control of noxious brush can be accomplished by several methods, which include mechanical, chemical, biological, or fire.

Considerations of major importance when planning a brush management program are:

1. The program should not adversely impact endangered species or their habitat.
2. Extreme care should be taken to insure that too much wildlife cover is not destroyed.
3. The method used should improve wildlife food supply and habitat.
4. Removal of desirable plant species should be minimal.
5. The program should be economically feasible and comply with overall goals of the management plan.
6. Plant diversity and general health and vigor of the range should be increased.

7. Areas that support winter turkey roosts should remain totally intact.
8. Treatments that disturb soils should not be applied to highly erodible sites.

Cedar is the noxious brush most often requiring control in the Hill Country. Mechanical methods of brush control include using bulldozers to push individual trees; or, a much more non-selective method called chaining. Hand cutting is done with axes, saws, and shears.

When deer management is a primary objective, chemical control of large areas should not be considered. Herbicides that kill "undesirable" plant species also kill deer food plants. In certain cases where extremely dense stands of undesirable brush exists, some chemical treatment may be used. If chemical treatment is necessary, individual tree treatment with herbicides is preferred over broadcast application.



Regrowth Cedar

The most common biological control used in the Hill Country is the practice of overgrazing with goats to control shin oak. Goats have a preference for many of the desirable plant species such as hackberry and kidneywood and will overgraze and kill many of the desirable browse species before consuming enough shin oak for control. The use of goats to control shin oak is not recommended for proper deer management.



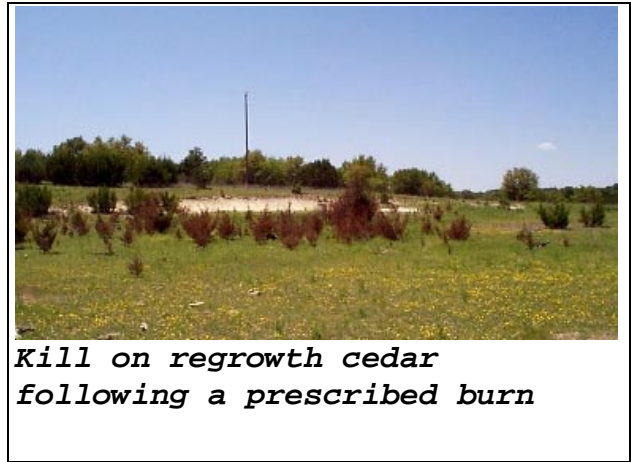
Prescribed burning

Proper use of fire can be a cost effective means of controlling small regrowth cedar. In addition to providing a means for cedar control, fire will stimulate production of a variety of browse, forb, and grass species thus creating a greater diversity of plants on the range. To properly use fire, a range manager should receive training from persons knowledgeable in its use. Personnel from the Soil Conservation Service, the Texas Agricultural Extension Service, and the Texas Parks and Wildlife Department can advise and provide assistance to

range managers about prescribed burning. There are legal constraints and liabilities in the use of fire; therefore burning should be used with caution. Qualified personnel should be contacted before a land manager initiates a burn program.

Summary

Habitat management is the key to deer management in the Texas Hill Country. In general, good deer management also benefits many species of wildlife, both game and nongame, and is good for many species of plants. Unless deer receive adequate amounts of nutritious forage, they cannot attain their genetic potential. Die-offs of deer in the Edwards Plateau are generally associated with malnutrition. To effectively manage deer habitat, a land manager must (1) control the kinds of animals (sheep, goats, cattle, exotics) utilizing the rangeland, as well as (2) the numbers of deer, exotics, and domestic livestock on the range. By use of planned grazing systems, the manager must (3) control the duration and frequency in which pastures are grazed and plan for adequate rest periods to allow for plant recovery following grazing.



When planning a brush management program, the land manger should (4) leave patterns of dense brush to act as cover for deer and (5) plan (if needed) for an organized system of noxious brush control that is cost effective and ecologically sound over a long period of time.

A sound deer management program must consider the long term needs of the white-tailed deer herd and in so doing will produce a quality deer population which exhibits good antler growth, body growth, and reproduction.



Good deer range should 'fill in' below five feet

Reference Literature

Anderegg, M. J., W. E. Armstrong, G. L. Butts, D. E. Harmel, C. W. Ramsey, S. H. Sorola. 1982. Food habits of five exotic ungulates on the Kerr Wildlife Management Area, Texas. Texas Parks and Wildlife Dept. 48 pp.

Hailey, T. L. 1979. Basics of brush management for white-tailed deer production. Texas Parks and Wildlife Dept. PWD Booklet 7000-35. 8 pp.

Harmel, D. E., G. W. Litton. 1981. Deer management in the Edwards Plateau of Texas. Texas Parks and Wildlife Dept. booklet 7000-86. 21 pp.

Perkins, J. R. 1979. Supplemental feeding. Texas Parks and Wildlife Dept. PWD Booklet 7000-33. 8 pp.

Vines, Robert A. 1984. Trees of central Texas. University of Texas Press. 403 pp.

White, L. O. 1980. Prescribed range burning in the Edwards Plateau of Texas. Ag. Ext. Serv. 900-9-80. 74pp.

Appendix A

Deer Browse Plants

Forage Preference by White-tailed Deer

Kerr Wildlife Management Area

Preferred Deer Browse

These browse plants usually show signs of being grazed even with moderate to low deer numbers. Presence of young plants of these species indicate low deer density and deer are probably on a good nutritional level.

<i>Lonicera albiflora</i> var. <i>albiflora</i>	White honeysuckle
<i>Viburnum rufidulum</i>	Downy viburnum
<i>Arbutus texana</i>	Texas madrone
<i>Quercus shumardii</i>	Texas oak var. <i>texana</i>
<i>Eysenhardtia texana</i>	Texas kidneywood
<i>Leucaena retusa</i>	Littleleaf leadtree
<i>Sophora affinis</i>	Texas sophora
<i>Pavonia lasiopetala</i>	Wright pavonia
<i>Melia azedarach</i>	Chinaberry
<i>Morus microphylla</i>	Texas mulberry
<i>Rhamnus caroliniana</i>	Carolina buckthorn var. <i>caroliniana</i>
<i>Cercocarpus montanus</i>	True mountainmahogany
<i>Crataegus crusgalli</i>	Cockspur hawthorne
<i>Celtis reticulata</i>	Neatleaf hackberry
<i>Ulmus crassifolia</i>	Cedar elm
<i>Ulmus rubra</i>	Slippery elm

Good Deer Browse

Moderate to heavy grazing on these plants indicates moderate deer numbers. Numbers of these plants should increase with proper deer numbers.

<i>Rhus aromatica</i> var. <i>flabelliformis</i>	Skunkbush sumac
<i>Rhus copallina</i>	Flameleaf sumac
<i>Rhus virens</i>	Evergreen sumac
<i>Rhus toxicodendron</i> var. <i>vulgaris</i>	Poisonivy
<i>Ilex decidua</i>	Possumhaw
<i>Atriplex canescens</i>	Fourwing saltbush
<i>Quercus durandii</i> var. <i>breviloba</i>	White shin oak
<i>Quercus laceyi</i>	Lacey oak
<i>Quercus marilandica</i>	Blackjack oak
<i>Quercus muehlenbergii</i>	Chinkapin oak
<i>Quercus stellata</i> var. <i>stellata</i>	Post oak
<i>Acacia roemeriana</i>	Roemer acacia
<i>Cercis canadensis</i> var. <i>texensis</i>	Texas redbud
<i>Smilax bona-nox</i>	Saw greenbriar
<i>Smilax rotundifolia</i>	Common greenbriar
<i>Cocculus carolinus</i>	Carolina snailseed
<i>Colubrina texensis</i>	Texas colubrina
<i>Prunus serotina</i> var. <i>eximia</i>	Escarment blackcherry

<i>Bumelia lanuginosa</i> var. <i>oblongifolia</i>	Woollybucket Bumelia
<i>Celtis reticulata</i>	Netleaf hackberry
<i>Ampelopsis cordata</i>	Heartleaf ampelopsis
<i>Cissus incisa</i>	Ivy treebine
<i>Parthenocissus heptaphylla</i>	Sevenleaf creeper
<i>Parthenocissus quinquefolia</i>	Virginia creeper
<i>Vitis</i> sp.	Mountain grape

Low Quality Deer Browse

No moderate to heavy grazing of these plants should be observed. Moderate to heavy grazing indicates an overpopulated deer herd. General condition of the deer herd will be poor.

<i>Berberis trifoliolata</i>	Agarito
<i>Diospyros texana</i>	Texas persimmon
<i>Quercus virginiana</i> var. <i>virginiana</i>	Live oak
<i>Juglans microcarpa</i>	Texas black walnut
<i>Mimosa borealis</i>	Fragrant mimosa
<i>Forestiera neomexicana</i>	New Mexico forestiera
<i>Forestiera pubescens</i> var. <i>pubescens</i>	Elbowbush
<i>Forestiera reticulata</i>	Netleaf forestiera
<i>Zanthoxylum clava-herculis</i>	Herculesclub pricklyash
var. <i>fruticosum</i>	
<i>Sapindus drummondii</i>	Western soapberry

Little Utilized Browse

Grazing on these species indicates extremely poor range conditions. Deer will be in poor condition with poor fawn crops, body condition, and antler development.

<i>Baccharis salicina</i>	Willow baccharis
<i>Garrya lindheimer's</i>	Lindheimer's silktassel
<i>Yucca rupicola</i>	Texas yucca
<i>Yucca</i> sp.	Yucca
<i>Juniperus ashei</i>	Ashe juniper
<i>Condalia obtusifolia</i>	Lotebush
<i>Ungnadia speciosa</i>	Mexicanbuckeye
<i>Aloysia lycioides</i>	Whitebrush

Note: Browse plants are placed in forage preference groups based on deer use of leafy material and not for mast preference. Deer readily eat acorns, persimmon fruits, mesquite beans, and cedar berries. Because of erratic rainfall patterns, mast is not always produced by the various browse species and is not considered a reliable food source for white-tailed deer. However, in many areas of the Edwards Plateau mast and fruit crops can become important food sources at critical times of the year. For instance, mesquite beans in the western plateau may be the primary food source during the winter period.