SEASONAL FOOD HABITS OF THE WHITE-TAILED DEER IN THE CROSS TIMBERS AND PRAIRIES ECOLOGICAL REGION OF TEXAS

THESIS

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By

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ABSTRACT

SEASONAL FOOD HABITS OF THE
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May 2000

Dr. John T. Baccus: Committee Chair

Food habits studies for white-tailed deer (*Odocoileus virginianus*) are numerous in most ecological regions of Texas. One unstudied region is the Cross Timbers and Prairies Ecological Region. In 1996-1998, the white-tailed deer seasonal diets in relation to forage availability in this area were determined. White-tailed deer were collected (n=242) seasonally and their rumen contents were examined to determine the percent composition of the diet. Along with the overall forage consumption in the Cross Timbers and Prairies Ecological Region, forage consumption on varying range conditions, soil types, and precipitation patterns were evaluated. We found that the overall food habits consisted of 36% browse, 20% forbs, 20% mast, 12% grass, 7% food plots, and 5% commercial feed during the study period. A food profile of food resources available to white-tailed deer, a food preference index, and seasonal food habits were developed based on the data collected.

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Special thanks go out to the landowners that allowed us access to their properties and use of their facilities. Without them, this study would not have been possible.

Assistance during vegetative analysis and specimen collection was provided by fellow wildlife biology students at Southwest Texas State University. Thanks to all those that helped especially Sarah Jenkins, Paul Hendrix, Ronnie Kirchhof, Kevin Schwausch, Kevin O'Neal, and Jeannie Muñoz.

Finally, I would like to thank my wife, Sandy, and our son, David, for their understanding and support during this study. I would also like to dedicate this study to my grandfather, Maurice F. Walden, who passed away while I was working on this project. He taught me the benefits of responsibility and hard work. This study is a culmination of both those aspects of which I am very proud.

INTRODUCTION

General habitat requirements for white-tailed deer (*Odocoileus virginianus*) are well known to wildlife managers throughout the world (food, cover, water, space). But because specific habitat requirements vary, further knowledge is required to evaluate the quality of deer habitat in any given area. This quality is often expressed in terms of class (i.e., poor, fair, good, excellent). To plan proper management of white-tailed deer habitat, information is needed on food habits, food availability, and nutrient content of deer diets (Everitt and Gonzales 1979). One of the most important tools in evaluating white-tailed deer habitat is the knowledge of foods eaten. Results of scientific dietary studies of food habits of white-tailed give wildlife managers a valuable tool needed to assess the quality and suitability of their land as deer habitat. With this knowledge, they are better armed to make informative decisions to improve their white-tailed deer habitat.

Studies of food habits of white-tailed deer have been conducted in Texas by numerous researchers and several state and federal agencies. Most studies have been conducted on deer in South Texas and the Edwards Plateau. Chamrad and Box (1968), Drawe (1968), Everitt and Drawe (1974), Everitt and Gonzales (1979), Kie et al. (1980), and Strey and Brown (1989) calculated percent relative frequency and/or percent volume of forage species in diets of South Texas deer. Other studies in South Texas (Davis 1990, Davis and Winkler 1968, and Fulbright and Garza 1991) evaluated white-tailed deer diets on the basis of forage classes (browse, forbs, grasses). Armstrong et al. (1991), Bryant et al. (1981), Cross (1984), Waid et al. (1984), and Warren and Krysl (1983) evaluated deer diets on the Edwards Plateau by plant species, while Baccus et al. (1983), Bryant et al. (1979), and McMahan (1964) analysed deer diets in terms of forage classes.

Diets of white-tailed deer varied greatly between and within ecological areas. Even at the level of broad forage classes (browse, forbs, or grasses), deer diets vary widely from 56% browse, 35% forbs, 9% grasses (Waid et al. 1984) to 68.6% browse, 24% forbs, 4.9% grass (Warren and Krysl 1983) on the Edwards Plateau. In South Texas, diets varied from 61.1% cacti, 16.4% browse, 12.3% forbs, 3.0% grasses (Everitt and Gonzalez 1979) to 5% browse, 68% forbs, 22% grasses (Chamrad and Box 1968).

Few food habit studies of white-tailed deer have been completed for other ecological regions of Texas. Quinton and Horejsi (1977) estimated percent dry weight of plant species in diets of deer on rangelands with brush treatments in the Rolling Plains Ecological Region. Veteto et al. (1971) estimated forage classes based on deer diets in east Texas. Studies conducted in Louisiana and the Southeast United States by Goodrum and Reid (1962) and Blair (1967) documented important browse species in pine forests which could have direct implications for management of deer in the Pineywoods Ecological Region of Texas.

The Cross Timbers and Prairies Ecological Region of Texas is located in the north central portion of Texas and comprises about 6.88 million ha (17 million acres) (Fig. 1). Live Oak-Ashe Juniper and Post Oak- Blackjack Oak communities in this area provide a diverse habitat for white-tailed deer. Due to the economic value of white-tailed deer, there is a strong incentive to manage this species on private lands. An important aspect of management of white-tailed deer is habitat management to improve native food resources. No food habitat study of white-tailed deer has been conducted for this region of Texas. However, Gee et al. (1994) published information on deer diets in the Cross Timbers of Oklahoma, ranking plant species by preference and estimating percent

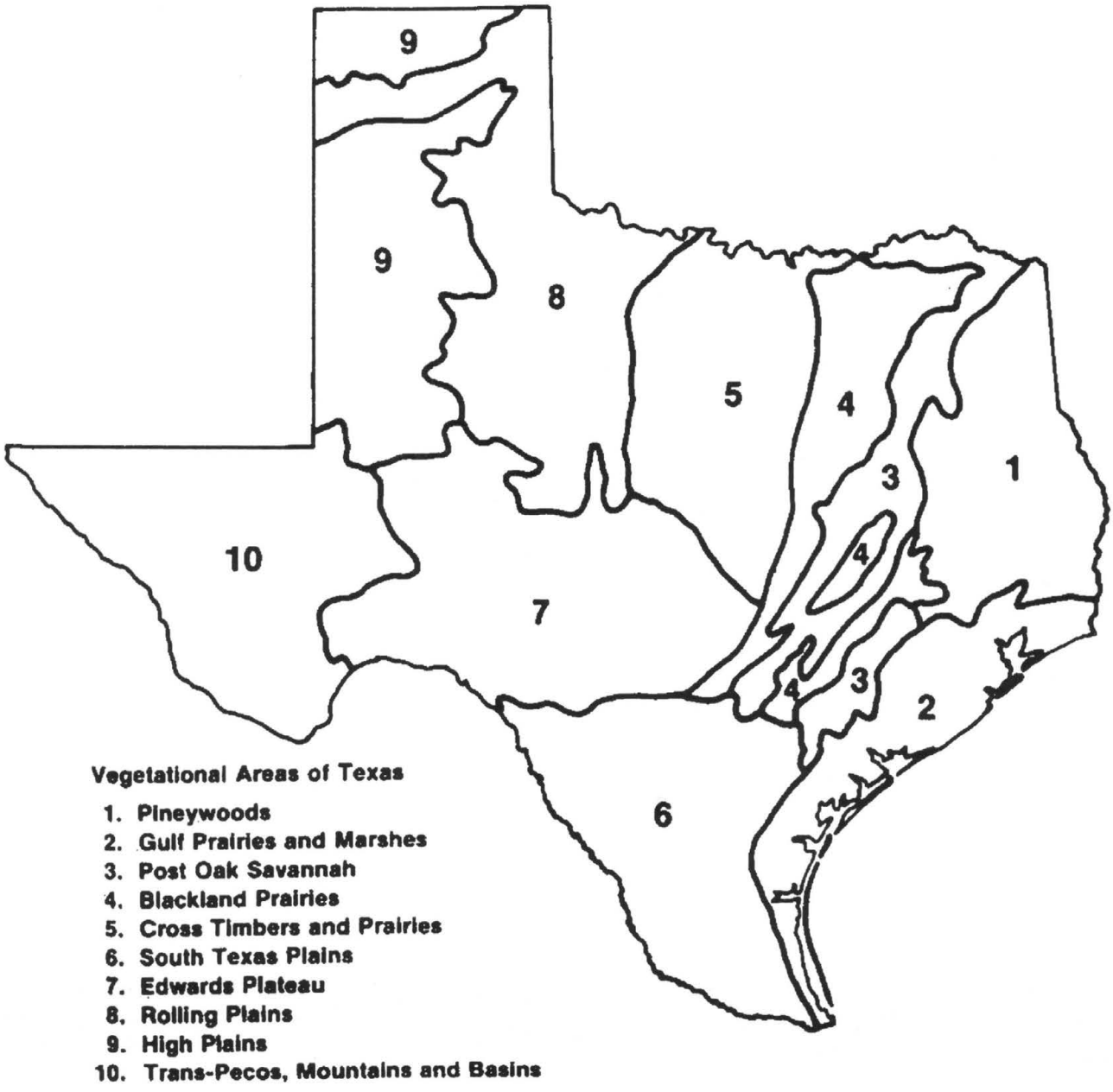

Figure 1: Cross Timbers and Prairies Ecological Region of Texas (Gould, 1962)

composition of foods in the diet by forage class. Yearly diets were composed of 41% browse, 44% forbs, and 13% grasses and grass-like plants. Seasonally, the composition of these forage classes in the diet ranged from 70% to < 20% for browse, 80% to < 20% for forbs, and the percentage of grasses and grass-like plants varied form 0-40%. Overall, legumes accounted for 15% of the annual diet. Three plant taxa were important in the diet during all seasons of the year, oaks (*Quercus sp.*), osage orange (*Maclura pomifera*), and sumacs-poison ivy complex (*Rhus spp.*).

The objectives of this study were to develop a profile of food resources available to white-tailed deer, to determine seasonal food habits, and to develop a food preference index for the white-tailed deer in the Cross Timbers and Prairies Ecological Region of Texas. Due to suspected variations in diet composition from precipitation patterns, soil types, and range conditions during the collection, these data were analyzed to document these variations in diets of white-tailed deer in the Cross Timbers and Prairies Ecological Region of Texas.

STUDY AREA

This study was conducted in six counties of the Cross Timbers and Prairies Ecological Region of Texas. Six sites were chosen to represent variation in soils, vegetation, range condition, topography, and wildlife management strategies (Fig. 2). Deer were collected on sites that had varying combinations of these components. Sites varied in habitat quality due to the intensity of management for white-tailed deer as well as livestock management. Thus, habitat enhancements for both wildlife and livestock varied from site to site.

General climatic conditions were similar for each site. The Cross Timbers and Prairies Ecological Region of Texas receives an average of 55.88 cm (22 inches) of precipitation each year. However, sites received 28.7 cm (11.3 inches) less than the mean annual precipitation the first year of the project.

Primary soils found within the Cross Timbers and Prairies Ecological Region of Texas are sandstone and limestone derived soils. Each soil group has different plant communities associated with them as well as unique geologic and hydrologic properties.

Management of livestock varied from an absence of livestock present on the site to the overstocking of an unknown number ranging throughout the site. Similarly, management of herbivore populations ranged from high intensity to no management at all. Detailed description of each collection site can be seen in Appendix 1.

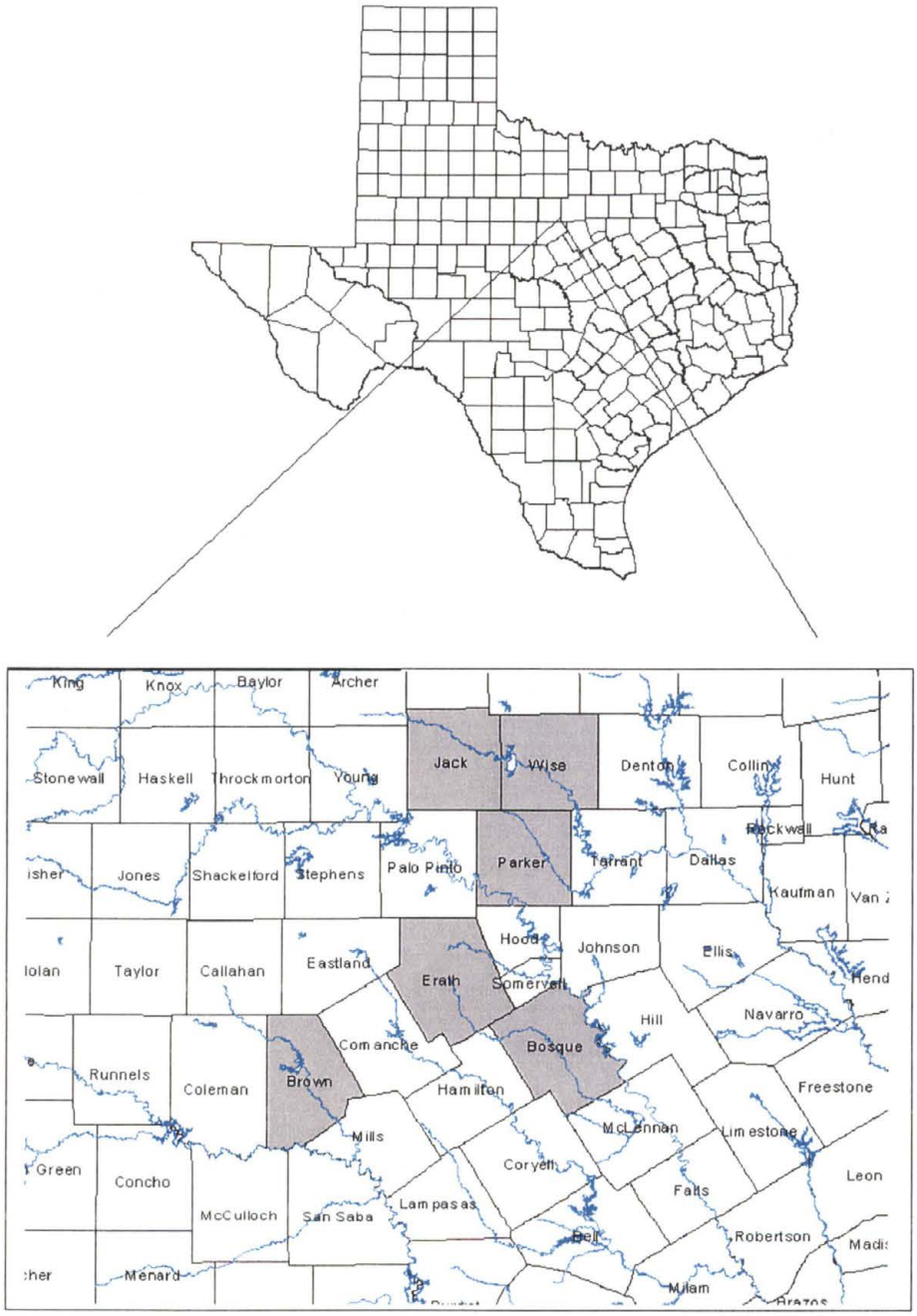

Figure 2: White-tailed deer collection sites in six counties of the Cross Timbers and Prairies Ecological Region of Texas, 1996 to 1998.

METHODS AND MATERIALS

Food habits of white-tailed deer in the Cross Timbers and Prairies Ecological Region of Texas were assessed by determining forage availability and dietary composition. Forage availability is essential to determining preferred foods in the diet. Forage availability was derived by the line intercept and quadrat methods, while rumen analysis was used to determine diet composition. Detailed descriptions of these methods follow.

Vegetative Analysis: The vegetation was sampled seasonally to determine percent composition by species. Composition of browse species was determined by the line intercept method (Simpson et al. 1996). Twenty-five, 50-meter lines were used per site to increase the accuracy in estimating plant canopy coverage. Herbaceous plant canopy coverage was estimated seasonally using the Daubenmire frame method (Simpson et al. 1996). A minimum of 50 randomly spaced quadrats were used to evaluate herbaceous vegetation at each site seasonally. All species within the quadrat were identified and percent composition for each species was estimated visually. Other plants observed outside quadrats at each site were listed.

The preference rating for any given plant species is relative to all species that occur on the range and in the diet during a given period (Chamrad and Box 1968). Therefore, plant availability data were analyzed by relative frequency and relative cover values. Frequency for each plant species was determined the percent of sampling units in which it occurs. Cover was expressed as the total percent ground coverage of a species. An Availability Factor was determined based on frequency and cover. These values were determined by the calculations:

$$\text{Relative Frequency} = \frac{\text{Frequency of species "a"}}{\text{Frequency of all species}} \times 100$$

$$\text{Relative Percent Cover} = \frac{\text{Percent cover for species "a"}}{\text{Total percent cover for all species}} \times 100$$

$$\text{Availability Factor} = \frac{\text{Relative frequency x relative cover of species "a"}}{2}$$

A numerical system similar to that used by Cross (1984) was used to account for observer bias when determining percent cover classes (1 = rare [0-0.2], 2 = occasional [0.2-1.0], 3 = frequent [1.0-5.0], 4 = moderately abundant [5.0-10.0], 5 = abundant [>10.0]).

To better assist with identification of plant matter in rumens, a collection was made of plants found on the sites. This included a pressed specimen and a microhistological slide of each plant species. Identification of plant species was done through botanical identification keys and with assistance from Texas Parks & Wildlife Department personnel and Southwest Texas State University personnel. Plant fragments were scraped in thin layers and washed in an ethyl alcohol bath prior to slide mounting to clear plant tissue (Dusi 1949). This allowed for identification of plant characteristics. Plants available as white-tailed deer forage in the Cross Timbers and Prairies Ecological Region of Texas are presented in Appendix 2. Plant nomenclature followed Correll and Johnson (1970).

Rumen Collection: A minimum of five deer were collected by firearm seasonally on each site for two years (n=242). Deer were collected at dusk using the spotlight method in an attempt to obtain rumen samples during foraging hours. By collecting during this time, highly digestible plants were still present in the rumen. This aided in plant identification as rumination and remastication were minimal.

After collection, each deer was weighed to obtain a live weight, eviscerated, and weighed again to obtain a dressed weight. Data collected from each deer included live weight, dressed weight, age, and kidney fat index. Samples of ectoparasites, blood, fecal material, and skin were preserved for later analysis. The age of each animal was estimated by the tooth wear and replacement method (Severinghaus 1949). Rumen volume was measured and contents of the rumen were mixed, placed in whirl pacs, labeled, and frozen for laboratory analysis.

Laboratory Analysis: Rumen contents from each deer were washed through a graded series of sieves and stored in 10% formalin. Contents from the 9.5 mm mesh size sieve were analyzed using the 10-point frame method (Chamrad and Box 1964). Plant fragments were studied macroscopically and identified to genus or species when possible by general leaf shape and other external characteristics. Unidentified matter was also noted. Plant fragments from the 5.6 mm mesh size sieve were analyzed using microhistological slides (Dusi 1949). Identification of fragments was based on a plant reference slide collection prepared at the beginning of the project. Identification of browse and forbs was based on epidermal and morphological characteristics of leaves and stems. These included size, shape and presence of trichomes, cell shape, and size and shape of guard cells of the stomata. Monocots were identified by the size, shape, absence or presence of hairs, specialized epidermal cells such as silica and cork cells, asperites, papillae, and walls of long-cells (Fahn 1974).

Food items were identified to the lowest taxonomic category possible. Usually, fragments could be identified to a specific forage class: browse, grass, forbs, mast, food

plots, and commercial feed. Remaining fragments were categorized to a non-specific forage class and labeled as "unidentifed". Fragments that could not be identified to a forage class were labeled "unidentifed plant material".

Preference Rating : The basis for preference ratings is that the percent composition of a food in the diet is not equal to the percent composition of that food in the habitat during a specified time. Seasonal preference ratings were developed for each plant species identified in rumen. Cross (1984) noted that the first step in this process was to determine the frequency of a food item in rumens. This was the number of rumens in which a food item occurred during a specific time. This value was then converted to a relative frequency. Relative Frequency was determined by:

$$\text{Relative Frequency} = \frac{\text{Frequency of rumens in which a food item occurs}}{\text{Total frequency of all food items}} \times 100$$

Percent Composition of a food item was determined by:

$$\text{Percent Composition} = \frac{\text{Number of hits for a food item}}{\text{Total number of hits for all food items}} \times 100$$

Importance Value was determined by:

$$\text{Importance Value} = \frac{\text{Relative Frequency} + \text{Percent Composition}}{2}$$

A preference value for a species was determined by:

$$\text{Preference} = \frac{\text{Importance value from rumen analysis}}{\text{Availability Factor}}$$

Similarity in diets between soil types, range conditions, and rainfall conditions were evaluated using Horn's Simplified Morisita's Index of Similarity. This method was stated as the best overall measure of similarity for ecological use. The values for this method can range from 0 (no similarity) to 1.0 (complete similarity) (Krebs 1999).

Seasonal diets of white-tailed deer were analyzed for variation in forage class composition. Using the ANOVA statistical analysis method, variations in the percent composition of forage classes of diets of white-tailed deer seasonally were compared for each site.

RESULTS

The food habits of white-tailed deer was based on the analysis of 238 rumens collected during May, August, and November 1996; February, May, August, and November 1997; and February 1998. Of the 242 deer collected, contents of four rumens were not properly prepared prior to laboratory analysis and had to be discarded.

Dietary information by season follows. More detailed results are contained in Appendices 3-10.

Spring 1996: Browse (50%) was the primary food in the1996 spring diet (Fig. 3). Plant species with high consumption included cedar elm (*Ulmus crassifolia*), oak species (*Quercus* spp.), greenbriar (*Smilax bona-nox*), and skunkbush (*Rhus aromatica*). Other species included holly *(Ilex* sp.*)*, bumelia (*Bumelia lanuginosa*), roughleaf dogwood (*Cornus drummondii*), and mistletoe (*Phoradendron tomentosum*). Overall, 14 browse species were identified in the diet. Deer preferences for these items are in Appendix 3.

Forbs were the second major component of the spring 1996 diet (13%). Seven identified and other unidentified forbs made up 17% of the diet. Yellow woodsorrel (*Oxalis dillenii*), wild onion (*Allium canadense*), and mat euporbia (*Chamaesyce prostrata*) were the most common in the diet. All forbs identified in the diet had preference values >1.

The grass forage class made up 13% of the 1996 spring diet. Those highly utilized were dichanthelium (*Dichanthelium oligosanthes*), sandbur (*Cenchrus incertus*), Texas wintergrass (*Stipa leucotricha*), and Texas grama (*Bouteloua rigidiseta*). Of these, dichanthelium had the highest preference value.

Mast made up 12% of the diet for this season. Acorns, skunkbush berries, and bumelia berries were common food items in the diet. Of these, acorns had the highest preference rating.

Finally, supplemental feed made up the remaining 8% of the diet. Wheat and oats planted in food plots were highly preferred and were a significant portion of the diet on the sites that had these supplements available.

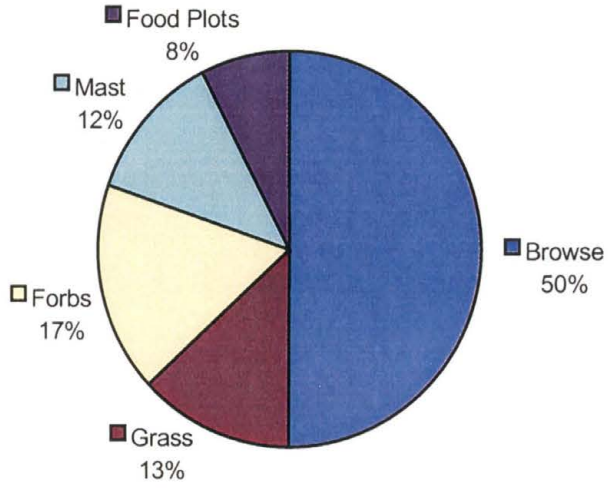

Figure 3: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Spring, 1996.

Summer 1996: Forty-six percent of the 1996 summer diet consisted of browse (Fig. 4). Woody plant species were similar to those consumed in spring 1996, including oaks, greenbriar, skunkbush and mistletoe. Of these, mistletoe had the highest preference value (Appendix 4).

Grass usage increased to 21% in the 1996 summer diet. Grasses utilized were dicanthelium, sideoats grama (*Bouteloua curtipendula*), Canada wildrye *(Elymus*

canadensis), and hairy grama (*Bouteloua hirsuta*). These species were moderately to highly preferred by deer.

The summer diet consisted of 17% mast. This included mesquite beans (*Prosopis glandulosa*), prickly pear (*Opuntia lindheimeri*) fruits, and to a lesser extent, soapberry berries (*Sapindus drummondi*) and acorns.

Forb use remained relatively the same from spring to summer. Partridge pea (*Chamaecrista fasciculata*), catnip noseburn (*Tragia ramosa*), lespedeza (*Lespedeza repens*), Coreopsis (*Coreopsis wrightii*), Venus looking-glass (*Triodanis perfoliata*), snoutbean (*Rhynchosia* sp.), and deervetch (*Lotus purshianus*) were plant species with high usage. Of these, only lespedeza and deervetch had preference values >2.

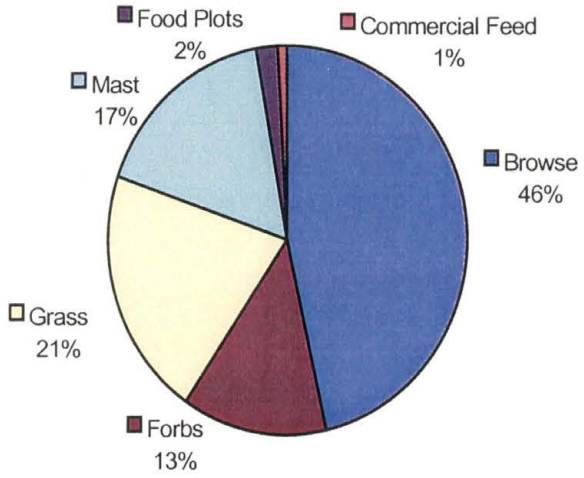

Figure 4: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Summer, 1996.

Supplemental feed made up the remaining 3% of the diet. Lab Lab (*Lablab purpureus*) planted in food plots and pelleted commercial feed were consumed on those sites where these foods were available.

Fall 1996: Browse consumption dropped to 38% of the diet during this period (Fig. 5). Browse included oaks, skunkbush, greenbriar, Ashe juniper, holly, and mistletoe. Of these, mistletoe had the highest preference value (Appendix 5).

Mast utilization increased to 26% in the fall of 1996. This was primarily due to acorn consumption. Consumption of prickly pear fruits also increased. Both were highly preferred.

Supplemental feed consumption increased to 15% during this period. Corn from automatic feeders was the most abundant supplemental feed found in rumens.

The remaining portion of the diet was comprised of grasses (11%) and forbs (10%). Rescuegrass (*Bromus unioloides*) and dichanthelim were highly utilized grasses and mat euphorbia, catnip noseburn, and yellow woodsorrel were the most utilized forbs.

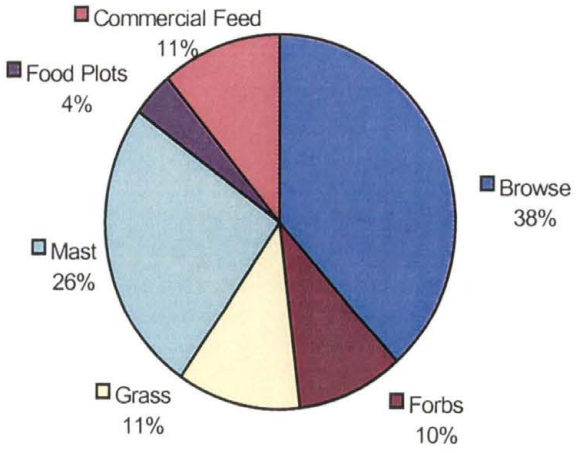

Figure 5: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Fall, 1996.

Winter 1997: Browse made up 32% of the 1997 winter diet (Fig. 6). Oaks, skunkbush, and greenbriar were the species most utilized (Appendix 6).

Similar to the 1996 fall diet, a significant portion of the diet consisted of mast (25%) and supplemental feed (18%). Acorns were the most utilized while the supplemental feeds utilized were corn, oats, wheat, and pelleted commercial feed. Also similar to the fall diet, forbs consisted of 13% of the diet and grasses 12%. Many of the species consumed during this period were the same as those utilized during the fall.

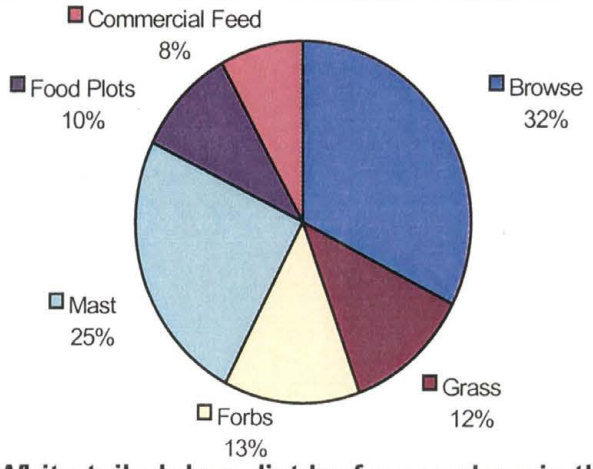

Figure 6: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Winter, 1997.

Spring 1997: Forbs (36%) were the main component of the 1997 spring diet (Fig. 7). Compared to the 1996 spring diet, this was a 30% increase in the composition of diet. Twenty-nine different forb species were identified in the diet. Some species with high preference values included dalea (*Dalea aurea*), prairie bishopsweed (*Bifora americana*),

rain lilly (*Cooperia pedunculata*), Texas vervain (*Verbena officinalis*), chickweed (*Stellaria media*), and stork's bill (*Erodium texanum*) (Appendix 7).

Browse (30%) was a significant portion of the diet as well. Of the 20 woody species identified, cedar elm, redbud (*Cercis canadensis*), and oaks had preference values > 1.

The remaining diet consisted of 14% mast, 8% grass, and 7% supplemental food. Acorns, skunkbush berries, and elbowbush berries were highly used mast, while Texas wintergrass was the most utilized grass. Similar to the 1996 spring diet, wheat and oats had high consumption as supplemental food when provided on the site.

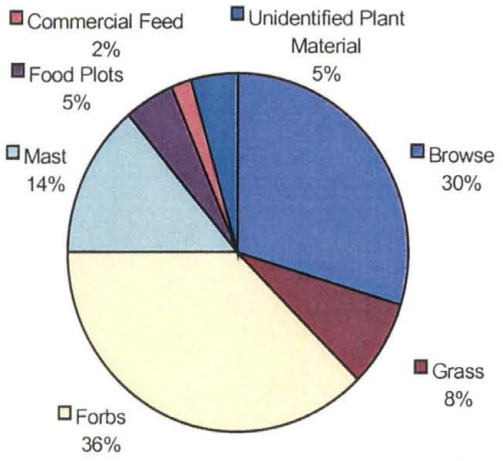

Figure 7: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Spring, 1997.

Summer 1997: Forbs made up 43% of the diet during this period (Fig. 8). Those forbs with the highest preference values were deervetch, mat euphorbia, bush clover

(*Lespedeza stuevei*), lespedeza, and wild mercury (*Argythamnia aphoroides*) (Appendix 8).

Browse (29%) and mast (14%) consumption remained at levels similar to those found during the previous season. However, mast consumption shifted to primarily mesquite beans and prickly pear fruits.

Grass (11%) and supplemental food (2%) comprised the remainder of the diet. Dichanthelium and sideoats grama were highly utilized grasses, and Lab Lab was the most common supplemental food in the diet.

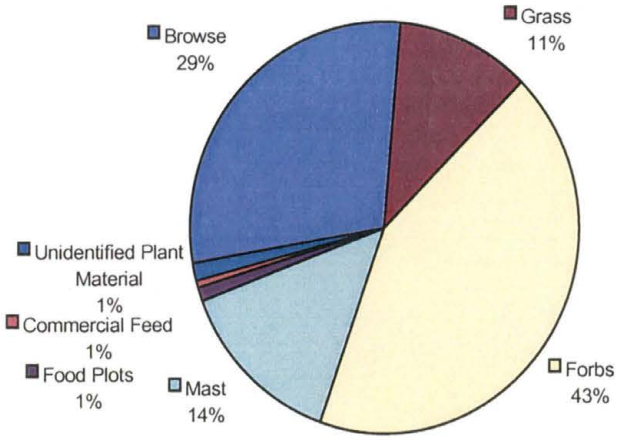

Figure 8: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Summer, 1997.

Fall 1997: Browse and mast consumption (32%) were identical during this period (Fig. 9). Species with high preference values included oaks, coralberry, flameleaf sumac (*Rhus lanceolata*) , mistletoe, and holly (Appendix 9). Mast consumption was mainly acorns.

Another significant portion of the diet was supplemental food (25%). Corn from automatic feeders, oats, and wheat were the foods most utilized.

Forbs (7%) and Grass (4%) made up the remainder of the 1997 fall diet. Few species in these categories were highly utilized.

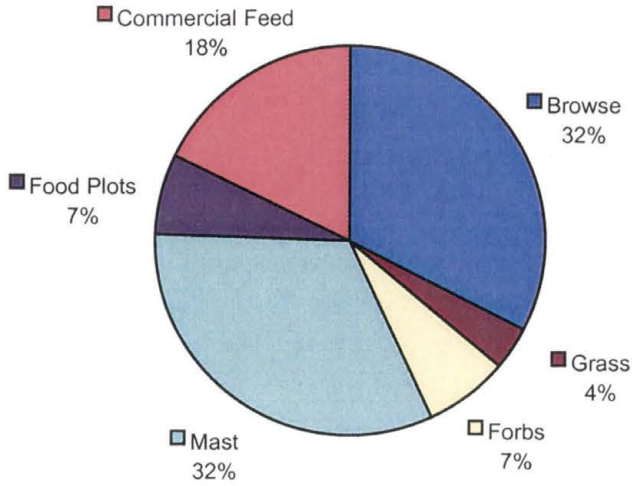

Figure 9: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Fall, 1997.

Winter 1998: Browse (27%) was the most significant component of the 1998 winter diet (Fig. 10). Oaks, greenbriar, and mistletoe had high preference values (Appendix 10). Supplemental food (23%) was also a major component of the diet. Corn, oats, and wheat were the primary foods utilized.

Mast (18%), Forbs (17%), and Grass (14%) had similar usages during this period. Mast was comprised solely of acorns, while croton, ragweed, and mat euporbia were the most utilized forbs. Green sprangletop, Texas wintergrass, and dichanthelium were the grasses most utilized.

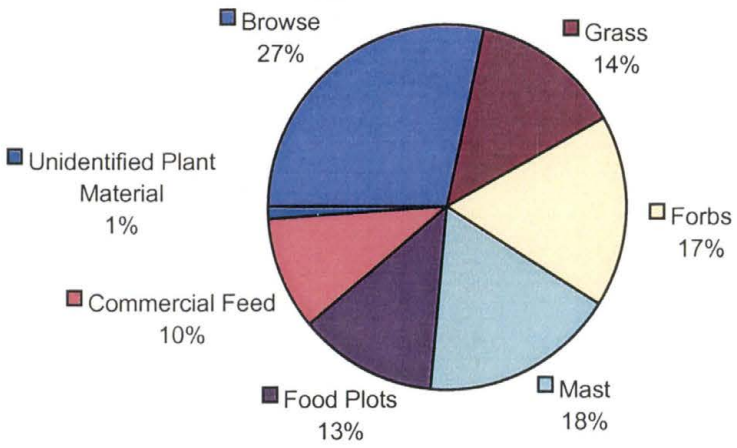

Figure 10: White-tailed deer diet by forage class in the Cross Timbers and Prairies Ecological Region of Texas, Winter, 1998.

Food Habits of the Cross Timbers: The overall food habits of white-tailed deer in the Cross Timbers and Prairies Ecological Region of Texas were determined to be 36% browse, 20% forbs, 20% mast, 12% grass, 7% food from food plots, and 5% commercial feed during the study (Fig. 11).

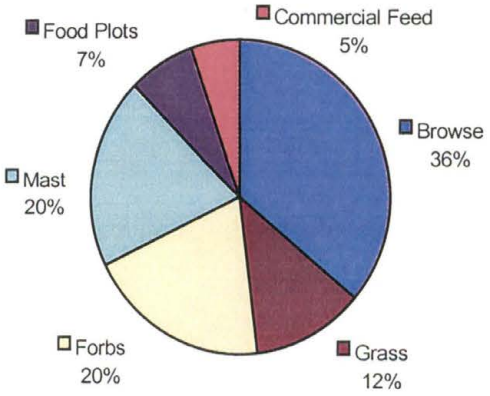

Figure 11: Overall food habits of white-tailed deer in the Cross Timbers and Prairie Ecological Region of Texas.

Data from each animal, including live weight, dressed weight, age, and kidney fat index, can be seen in Table 1. More detailed results can be seen in Appendix 11.

Table 1. Summary of age and health data collected from white-tailed deer data in the Cross Timbers and Prairies Ecological Region of Texas, 1996-1998.

	LIVE WEIGHT	DRESSED WEIGHT	AGE	KIDNEY FAT INDEX
SAMPLE SIZE	230	230	224	218
MEAN	83.5	60.2	2.8	19.3
STANDARD DEVIATION	23.8	17.5	1.8	19.1

SEASONAL VARIATION

Although collectively used as a representation of the entire Cross Timbers and Prairies Ecological Region of Texas, the six collection sites varied individually. Multiple step-wise ANOVA tests compared seasonal variation in the percent composition of forage classes in rumens between collection sites. Results of these statistical tests showed no significant variation in percent composition of diets ($p>0.05$) by forage class and year. ANOVA values can be seen in Table 2.

Table 2. Seasonal analysis of percent composition between six collection sites in the Cross Timbers and Prairies Ecological Region of Texas.

Anova: Single Factor				
	Browse	**Grass**	**Forbs**	**Mast**
Spring 1996	P = 0.86	P = 0.44	P = 0.68	P = 0.74
Summer 1996	P = 0.99	P = 0.62	P = 0.84	P = 0.56
Fall 1996	P = 0.92	P = 0.95	P = 0.99	P = 0.97
Winter 1997	P = 0.98	P = 0.89	P = 0.25	P = 1
Spring 1997	P = 0.86	P = 0.59	P = 0.81	P = 0.93
Summer 1997	P = 0.96	P = 0.88	P = 0.63	P = 0.14
Fall 1997	P = 0.96	P = 0.52	P = 0.54	P = 0.99
Winter 1998	P = 0.99	P = 0.23	P = 0.75	P = 1

DISCUSSION

Objectives of this study were to develop a profile of food resources available to white-tailed deer, to determine seasonal food habits, and to develop a food preference index of white-tailed deer in the Cross Timbers and Prairies Ecological Region of Texas.

FOOD HABITS

Major plant families represented by plants eaten included sumac (Anacardiaceae), carrot (Apiaceae), holly (Aquifoliaceae), composite (Asteraceae), pink (Caryophyllaceae), honeysuckle (Caprifoliaceae), spurge (Euphorbiaceae), pea (Fabaceae), beech (Fagaceae), geranium (Geraniaceae), lily (Lilliaceae), woodsorrell (Oxalidaceae), grass (Poaceae), elm (Ulmaceae), vervain (Verbenaceae), and mistletoe (Viscaceae).

Several different kinds of plants were consumed seasonally. However, due to widespread availability, the primary food resource utilized each season was browse. The major species consumed can be seen in Table 3.

Gee et al. (1994) reported similar results in the overall food habits of white-tailed deer in the Cross Timbers region of Oklahoma (Fig. 12). Browse and grass components in white-tailed deer diets were about the same. However, there was greater forb use by deer in Oklahoma and greater mast and supplemental food use by Texas deer.

Table 3. Preferred plant species in the Cross Timbers and Prairies Ecological Region of Texas (Preference ≥ 1).

Browse	**Grass**	**Forbs**	**Mast**
Oak (Texas,Live,Post,Blackjack)	Dicanthelium	Mat euphorbia	Acorns
Skunkbush	Texas grama	Chickweed	Skunkbush berries
Greenbriar	Green sprangletop	Dalea	Mesquite beans
Mistletoe	Texas wintergrass	Rainlilly	Prickly pear fruit
Ilex sp.	Canada wildrye	Yellow woodsorrel	Bumelia berries
Cedar elm	Sideoats grama	Lespedeza	
Flameleaf sumac	Sandbur	Deer pea vetch	
Hackberry	Little bluestem	Illinois bundleflower	
Dogwood	Rescue grass	Snoutbean	
Coralberry	Curlymesquite	Partridge pea	
		Wild mercury	
		Wild carrot	
		Spiderwort	
		Zexmenia	
		Venus looking-glass	
		Stork's bill	
		Fleabane	
		Prairie bishop's weed	
		Texas vervain	
		Two-leaf senna	

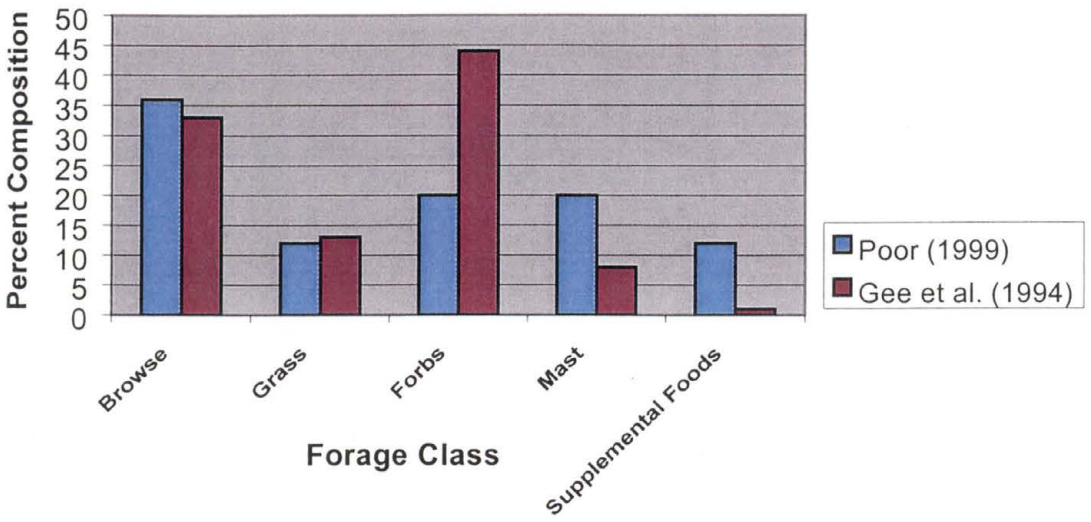

Figure 12: Comparison of deer diets in the Cross Timbers Region determined by Gee et al. (1994) and Poor (1999).

SEASONAL FOOD PREFERENCE INDEX

Seasonal food preference indices of white-tailed deer the Cross Timbers and Prairies Ecological Region of Texas can be seen in Appendices 3-10. Food habits varied from season to season, year to year, and site to site; therefore, preferences shifted as well. When available, forbs and mast food items were readily consumed by white-tailed deer. Primary variations in the diet were presumably based on availability and palatability of foods. These factors are directly related to rainfall, range conditions, and soils. These factors will be discussed as they pertain to food habits of white-tailed deer the Cross Timbers and Prairies Ecological Region of Texas.

Rainfall

Rainfall is a key factor influencing the availability of forage. Drought conditions persisted the first year of the study, while above average rainfall occurred during the second year. This caused a contrast in food resources available and consequently the diet of deer. The collection sites received a below the annual average of 27.94 cm (11 inches) of rainfall during year 1 and about the annual average precipitation (60.96 cm [24 inches]) during year 2. Therefore, it was necessary to distinguish between years and forage class consumption. Annual dietary profiles were segregated into year 1 and year 2 to analyze for variations. Forage classes varied substantially between the two periods (Fig. 13). Browse used by deer shifted from 41% in year 1 to 29% in year 2. Conversely, utilization of forbs increased from 15% in year 1 to 27% in year 2. The consumption of all other forage classes by deer remained about the same in the two years. The diets of year 1 and year 2 were dissimilar (Horn's Simplified Morisita's Similarity Index = 0.93).

Upon closer inspection of data, seasonal variations can be seen as well (Fig. 3-10). As seen in these figures, there is a dramatic shift in consumption of browse and forbs. For example, the 1996 spring diet was comprised of 50% browse and 17% forbs, while the1997 spring diet was comprised of 30% browse and 36% forbs (Fig. 3 and 7). A plausible reason for the availability of forbs in 1997 the increased rainfall received on each site. Similar trends can be seen in consumption of browse and forbs during 1996 and 1997 summers (Fig. 4 and 8).

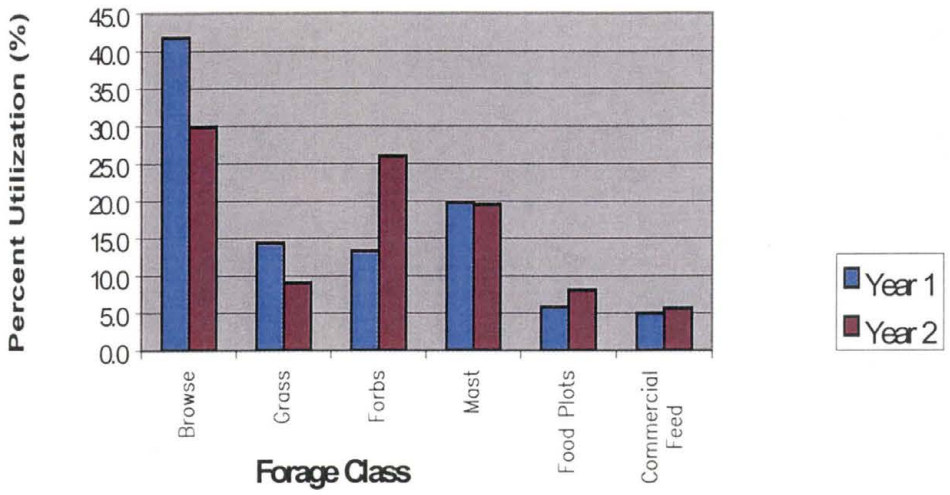

Figure 13: Comparison of the percent utilization of forage classes in the diets of white-tailed deer during Year 1 and Year 2.

Comparison of Seasonal Food Habits between Excellent and Poor Range Conditions

The range condition at collection sites was another variable that was considered during analysis. The range conditions of each site were determined by the observation of the grazing pressure by herbivores on plant communities, stocking rate (number of livestock per acre) at each site, and health conditions of deer collected at each site. Supporting data obtained from deer used for this determination included kidney fat indices and live weight (Fig. 14 and 15). Collection sites with the best range condition had more forage species available, and therefore, diets of deer from better range conditions were more diverse. This plant diversity proved to be important during periods of stress for white-tailed deer. During stressful periods, a greater variation in forage availability allows for a greater chance of meeting nutritional requirements. Conversely, having limited plant species available for consumption during stressful periods increases the probability of deer failing to meet basic nutritional requirements. Such deficits can

lead to lower body weights, lower reproductive success, and poor antler growth (Richardson 1993).

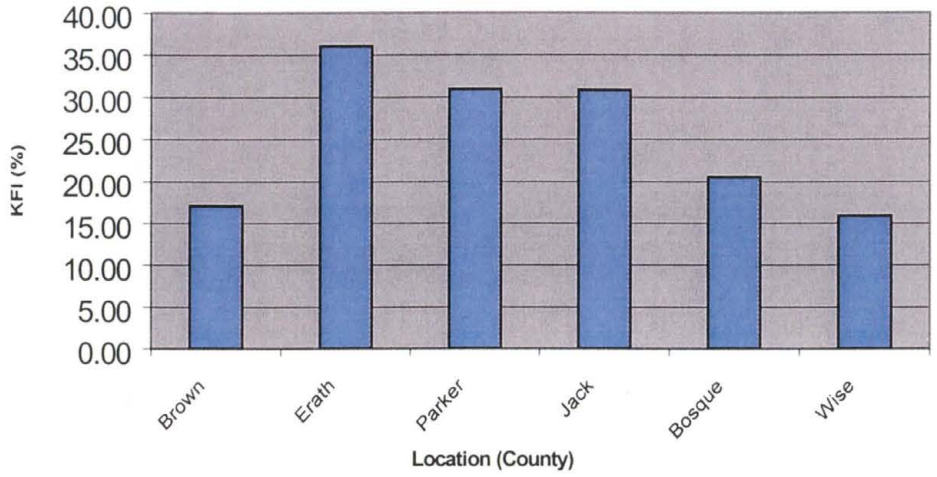

Figure 14: Average kidney fat index values of adult female white-tailed deer at collection sites

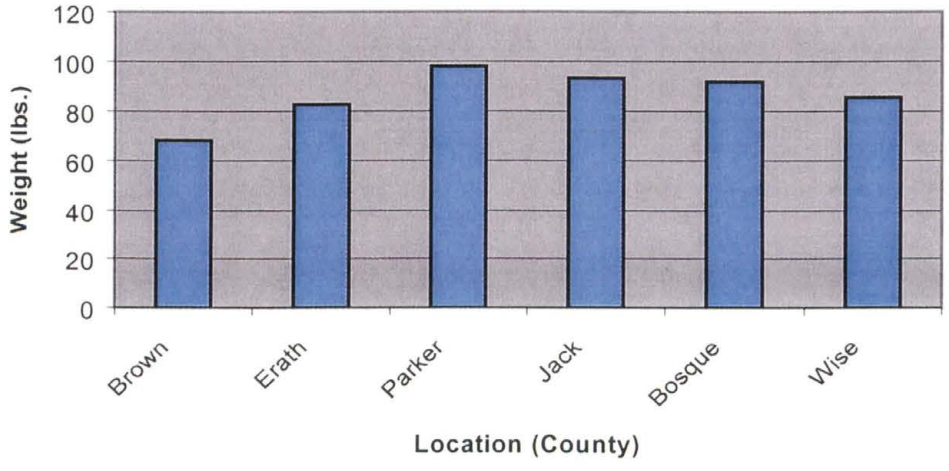

Figure 15: Average live weights of adult female white-tailed deer at collection sites

Sites with good-excellent range conditions included collection sites in Jack, Parker, Erath, and Bosque Counties. Where livestock was grazed on these sites (Jack & Bosque), their management included rotational grazing systems and less than half the removal of yearly vegetative growth. Consequently, forage availability for white-tailed deer on these sites was optimal. Sites with fair-poor range conditions included Brown and Wise County sites. Livestock management on these sites consisted of low-intensity grazing systems with large numbers of livestock per acre. The Brown County site included several types of livestock including cattle, sheep, and goats. Removal of the yearly vegetative growth on these sites exceeded 75%, and vegetative impacts such as browse lines on both sites indicated that animal numbers grazing these sites exceeded carrying capacity.

Diet composition between excellent range condition and poor range condition sites was moderately dissimilar (Horn's Simplified Morisita's Similarity Index = 0.53).

Spring: Spring diet composition varied with range conditions. Deer on sites with poor range conditions may seek alternative foods due to inter- and intraspecific competition. Composition of diets on poor range condition sites consisted of 36.3% browse, 16.6% grass, 26.3% forbs, 20.8% mast, and 0% supplemental food (Fig. 16). Conversely, diet composition of white-tailed deer on excellent range condition sites was 47.6% browse, 5.1% grass, 26.4% forbs, 9.3% mast, 10.9% food plots, and 1% commercial feed.

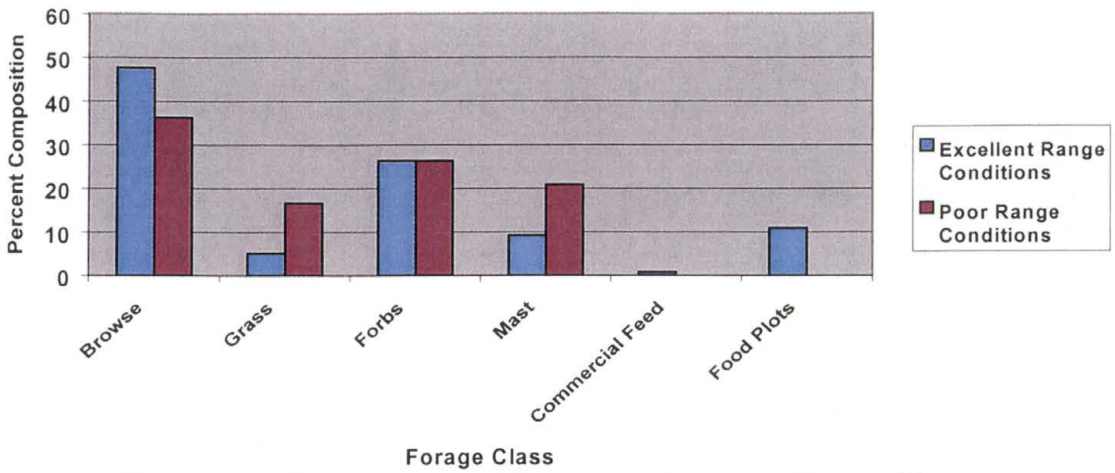

Figure 16: Comparison of the percent composition of forage classes in the spring diet of white-tailed deer on collection sites with excellent and poor range conditions.

High browse consumption on sites with excellent range condition sites can be attributed to the lack of grazing pressure on these plants. "Browse lines" were apparent on poor range condition sites while browse cover was available at all levels on excellent range condition sites. The availability of these species on sites with excellent range condition sites may explain the higher consumption of browse during all seasons.

Grass utilization was higher on poor range condition sites (Fig. 16). However, grass species utilized on these sites included less preferred (Armstrong et al. 1991) species such as three-awn, sandbur, curlymesquite, and Texas wintergrass. Species utilized on excellent range condition sites included the more preferred species, dicanthelium and sideoats grama.

Consumption of forbs between range conditions was similar. However, species composition varied. Forbs utilized on excellent range condition sites included mat euphorbia, yellow woodsorrel, chickweed, lespedeza, deer pea vetch, snoutbean, and

Illinois bundleflower. Those utilized on sites with poor range condition included catnip noseburn, western ragweed, queen's delight, beggar's tick, and Texas vervain.

Mast consumption was greater on poor range condition sites as well. However this may be attributed to soils rather than range condition. Both sites with poor range condition were composed of limestone derived soils which facilitated the presence of live oak and Texas oak species, rather than post oak and blackjack oak that are found on sandstone soils. During both study years, live oak and Texas oak trees produced higher acorn crops than post and blackjack oaks. Consequently, consumption of acorns on sites with poor range condition was extremely high. Another mast species with high consumption on poor range condition sites was elbowbush berries. Again, this consumption may be attributed to soils rather than range condition.

No supplemental foods were made available on sites with poor range condition during spring. Supplemental foods used on sites with excellent range condition sites included wheat and oats from food plots and commercial feed.

Summer: Diet composition during summer varied on sites with different range conditions (Fig. 17). Similar to spring utilization, browse was consumed more on sites with excellent range condition (44.6%) compared to sites with poor range condition (37%). As stated earlier, this may be attributed to availability of browse which accompanies good range stewardship.

Grass utilization on sites with poor range condition (13.5%) was higher than on sites with excellent range condition (11.4%). However, species composition varied as it did in spring. Grasses with high utilization on excellent range condition sites included

Canada wildrye and dicanthelium while silverleaf bluestem, hairy grama, and Texas grama were utilized on sites with poor range condition.

Utilization of forbs was higher on sites with excellent range condition (28.6%) than on sites with poor range condition (25.4%). This can be directly linked to the overutilization of preferred forbs by competing livestock on poor range conditions. Plant species with high utilization on either range condition were similar to that of the spring diet.

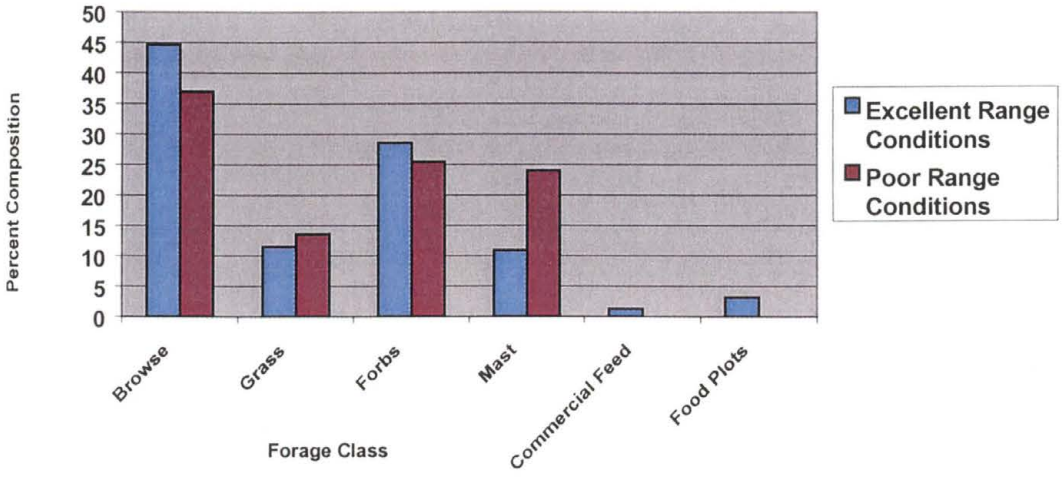

Figure 17: Comparison of the percent composition of forage classes in the summer diet of white-tailed deer on collection sites with excellent and poor range conditions.

Mast utilization in summer was higher on sites with poor range condition. Mast highly utilized on these sites included mesquite beans and some acorns. Prickly pear fruit consumption was similar on poor and excellent range conditions range conditions.

Supplemental foods were not available on sites with poor range conditions during summer. Lab Lab planted in food plots and commercial feed were utilized on sites with excellent range condition sites.

Fall: Forage classes utilized on sites with excellent range condition consisted of 39.1% browse, 4.9% grass, 10.1% forbs, 17.9% mast, 10.3% food plots and 17.8 commercial feed (Fig. 18). Utilization of foods on sites with poor range condition was 32.2% browse, 6.7% grass, 8.6% forbs, 41.6% mast, and 11% commercial feed.

Overall, grass and forb consumption declined during this time due to availability on both poor and excellent range condition sites. However, mast utilization increased. This was primarily due to high acorn consumption on all sites. Also, corn from hunters' feeders was consumed on sites with either range condition. However, oats and wheat were available in food plots at sites with excellent range condition.

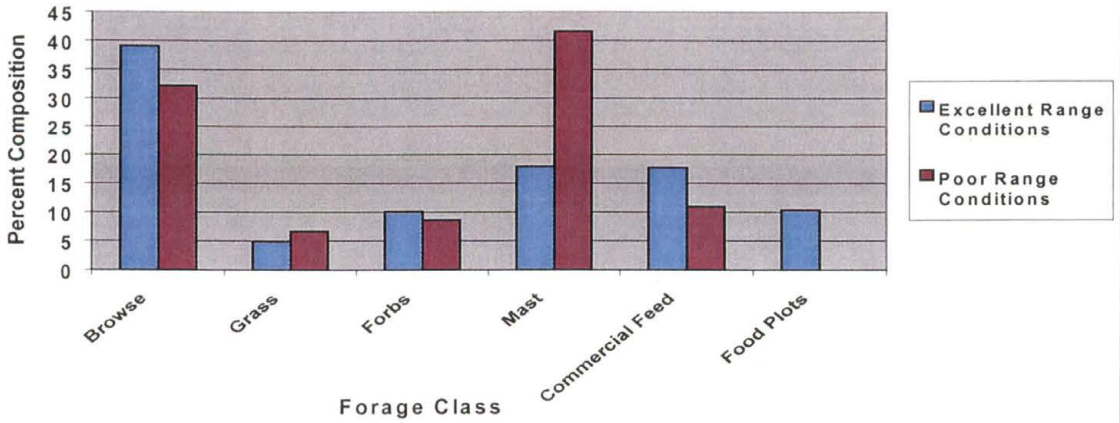

Figure 18: Comparison of the percent composition of forage classes in the fall diet of white-tailed deer on collection sites with excellent and poor range conditions.

Winter: Comparison of winter diets of deer on poor range condition sites and excellent range condition sites varied substantially in two forage classes (Fig. 19). Browse (43.1%), grass (6.3%), and forbs (10.6%) utilization on sites with excellent range condition was similar to sites with poor range condition (41.3%, 9.7%, 10.9%). However, mast consumption on sites with poor range condition (30.7%) was higher than sites with excellent range condition (12.2%). Mast used was limited to acorns during this period. Conversely, supplemental food (9.4% commercial feed and 18.4% food plots) consumption on sites with excellent range condition was significantly higher than on sites with poor range condition (7.4% commercial feed). Corn consumption was similar on sites with poor or excellent range conditions, while oats, wheat, and commercial feed were used only on sites with excellent range condition.

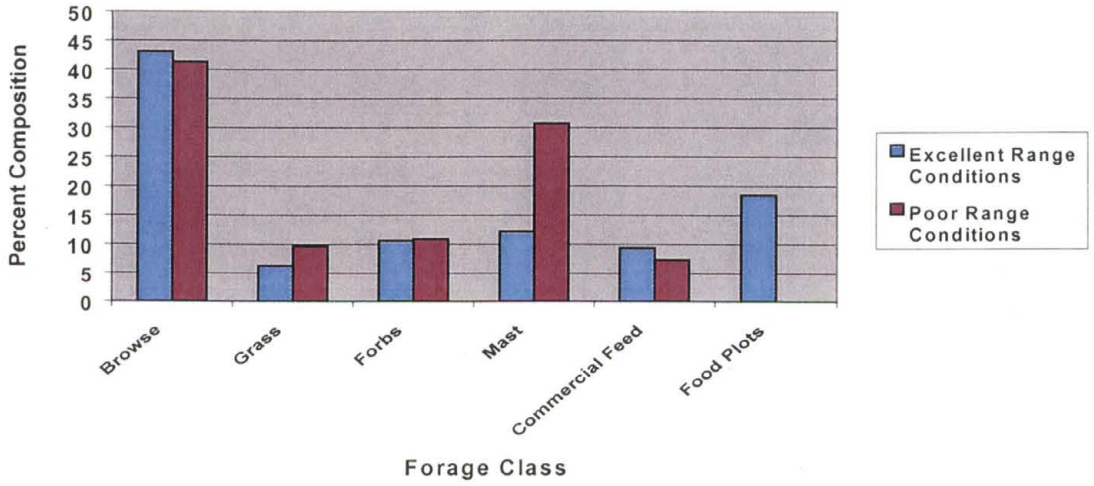

Figure 19: Comparison of the percent composition of forage classes in the winter diet of white-tailed deer on collection sites with excellent and poor range conditions.

Comparison of Seasonal Food Habits between Sandstone and Limestone Soils

Soils are a major environmental component that determines vegetative potential. Three collection sites had soils derived from limestone parent material (Brown, Bosque, and Wise). These soils were shallow to moderately deep clay or loamy. Three sites also had sandstone derived soils (Jack, Erath, and Parker) which had moderately deep to deep sandy loam soils. Plants adapted to grow on soil types differed; and therefore, food habits could be different as well. Browse species were easily distinguished between collection sites on limestone and sandstone derived soils due to availability. Browse consumed included live oak, Texas oak, and elbowbush on sites with limestone derived soils and post oak, blackjack oak, and skunkbush on sites with sandstone derived soils. However, the consumption of many plant species was constant throughout the Cross Timbers and Prairies Ecological Region of Texas. Cedar elm, greenbriar, hackberry, and mistletoe were eaten on each site. Overall the diet composition of deer collected on sandstone and limestone sites were moderately different (Horn's Simplified Morisita's Similarity Index = 0.63).

The major difference in seasonal forage class use attributed to soil type was mast (Fig. 20-23). As stated earlier, limestone derived soils produced Texas oak and live oak species, while post oaks and blackjack oaks were found on sandstone soils. Annual variations in mast production between these species accounts for the variability of seasonal mast consumption between differing collection sites.

Other mast species with high consumption on sites with limestone derived soils included prickly pear, mesquite, elbowbush, and bumelia. Skunkbush was only consumed at sites with sandstone derived soils.

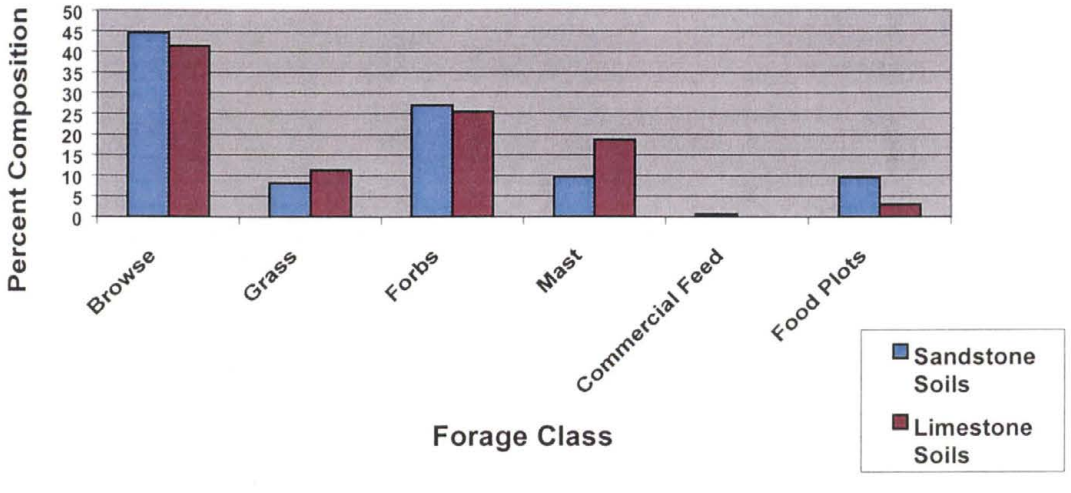

Figure 20: Comparison of the percent composition of forage classes in the spring diet of white-tailed deer on collection sites with sandstone and limestone soils.

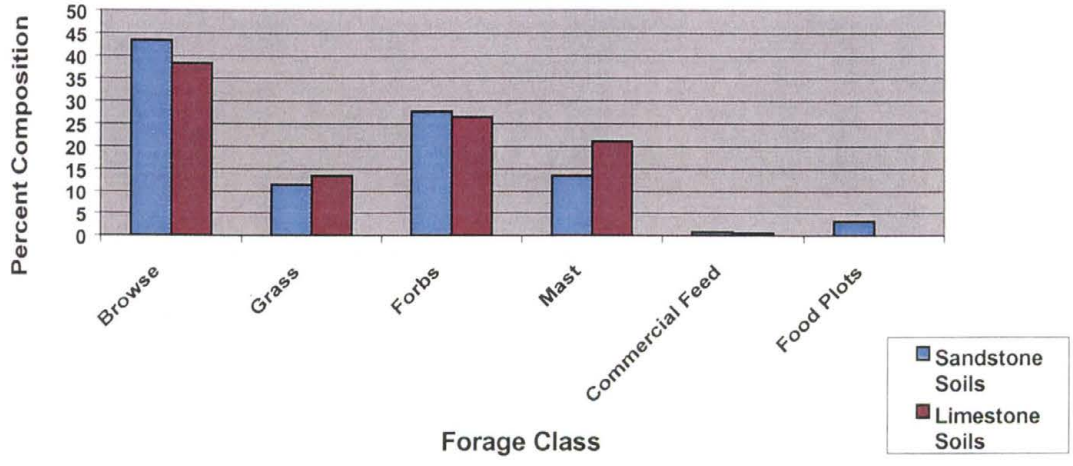

Figure 21: Comparison of the percent composition of forage classes in the summer diet of white-tailed deer on collection sites with sandstone and limestone soils.

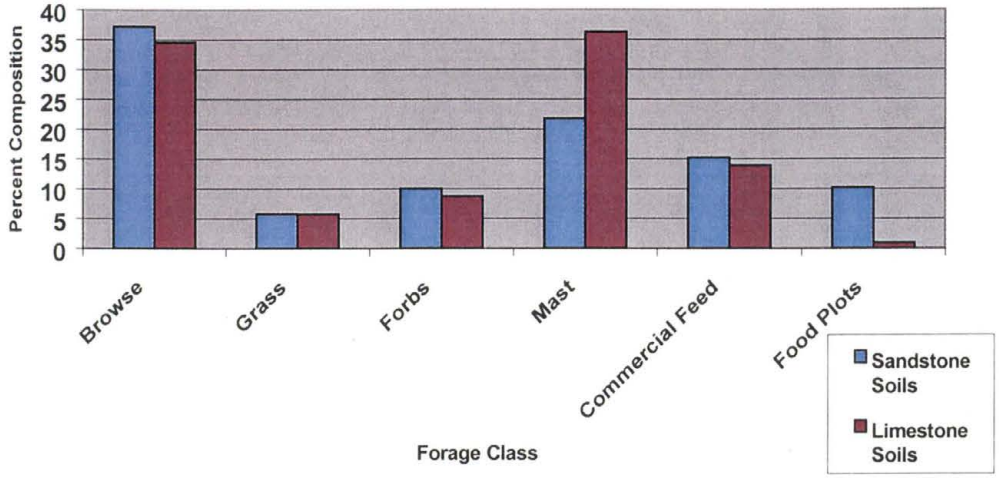

Figure 22: Comparison of the percent composition of forage classes in the fall diet of white-tailed deer on collection sites with sandstone and limestone soils.

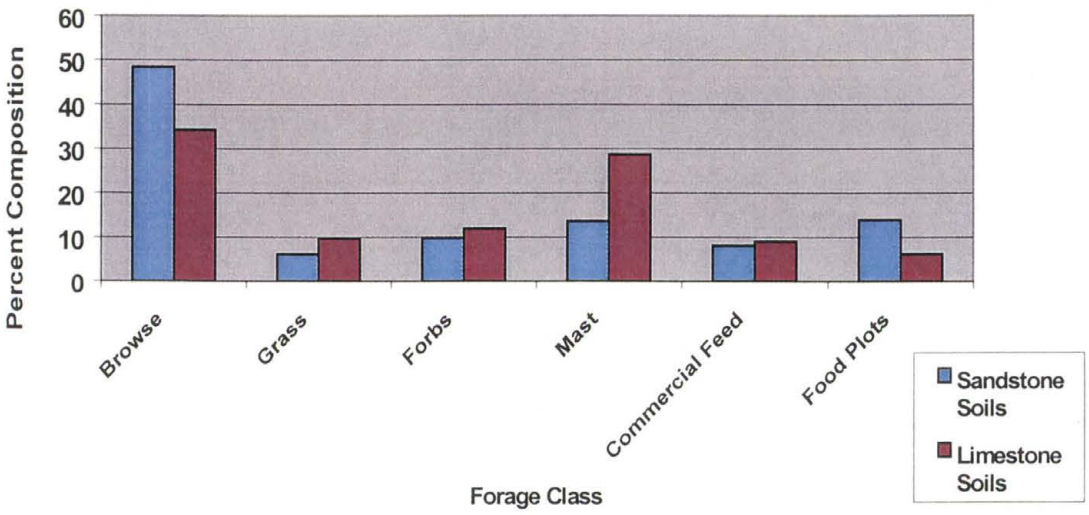

Figure 23: Comparison of the percent composition of forage classes in the winter diet of white-tailed deer on collection sites with sandstone and limestone soils.

Although this was not an objective of this study, further analysis of the sub-regions of the Cross Timbers and Prairies Ecological Region of Texas region would be an important future research project.

Habitats

As expected, each collection site had different habitats. However, general similarities could be found in each. Each site had areas of thick brush and areas that were cleared of brush. This became an important factor in the collection of deer. Due to habitat conditions on each site, there was a potential for more deer to be collected in an open habitat compared to brushy areas because of the amount of visibility for shooters. This could introduce a bias in the analysis of diets. However, I assumed that each deer had foraged in both open and brush habitats prior to collection. The rumen contents upon examination proved this assumption was correct.

Supplemental Food

Supplemental foods were available for deer on all collection sites during at least one season of the study. Supplemental foods found in diets included corn from automatic feeders, pelleted commercial feed provided *ad libitum,* and food plots. Food plots included Lab Lab, wheat, oats, and turnips. Pelleted commercial feed was available on three collection sites year-round. Although availability of this food source was high, it was not a major food item in the seasonal diets (Appendices 3-10). Collection sites with these supplemental foods had good to excellent range conditions, low livestock numbers,

and white-tailed deer populations were managed. Interestingly, the Erath County collection site had the highest use of pelleted feed of the three sites and also the highest deer population per acre. While collecting deer on sites with pelleted feed available, collectors observed very few deer at feeders. However, collectors did observe an abundance of raccoons (*Procyon lotor*) at each of these supplemental feeding areas.

Corn from automatic feeders, when available to white-tailed deer on collection sites, had high usage. Four sites had this type of supplemental feed available during at least one season. On the remaining collection sites, neighboring properties had this feed available. Typically, corn is used by hunters to attract deer during hunting season (November-January). Due to the fact that this feed was not available on all sites, but was found in diets from all sites, it was deducted that deer sought out this feed. However, corn is thought to be one of the poorest types of deer supplemental feeds available. Its protein level varies from 7-10% and is high in carbohydrates. These protein levels do not meet basic nutritional requirements needed for development of bone and muscle (Perkins 1991). For this reason, although highly preferred, corn is not considered an important food of white-tailed deer in the Cross Timbers and Prairies Ecological region of Texas.

Supplemental foods, primarily grains, from food plots had high consumption by deer on sites that provided them. These supplemental foods have higher nutritional value than corn supplements. However, as stated earlier, a possible bias towards these food items may be present due to visibility of deer during collection periods in these supplemental food plot areas.

CONCLUSION

Those interested in the management of white-tailed deer in the Cross Timbers and Prairies Ecological region of Texas can use the results of this study to enhance the stewardship of their land. Due to the diversity of management schemes and other variables present throughout this study, some key observations were made that should be included in management plans for healthy white-tailed deer populations in the region.

Range Condition: Deer collected from sites with poor range condition exhibited differences in utilization of forage classes as well as individual species from that of deer collected from sites with excellent range condition. Diets of these animals had been altered due to competition from livestock and other white-tailed deer. Although reproductive success was not analyzed, this shift in diet did not seem to have an adverse effect. However, lower body weights and kidney fat indicies were noted on those sites.

Drought Conditions: As stated earlier, the first year of this study was during a drought. Sites that had little or no management of livestock or white-tailed deer populations had poorer quality deer. Conversely, those sites intensely managed had large, healthy deer. We were fortunate to observe several deer that would have scored well over 150 Boone and Crocket gross points during this drought period on well managed sites.

Diversity: Although forbs consumption was higher than browse when forbs were available, browse species composed a large percentage of white-tailed deer diets in the Cross Timbers and Prairies Ecological region of Texas. Managing for a diverse habitat with both brush species and open space for forb and grass growth is optimal. Proper

management of habitat is tied directly to range management. Collection sites where rangeland was overgrazed by livestock had reduced body weights for white-tailed deer.

Population Management: As the economic value of white-tailed deer continues to grow in Texas, more and more literature will be available for managers. A key element in much of this literature focuses on maintaining white-tailed deer populations within carrying capacity. Deer collected on sites that were well managed for white-tailed deer had heavier body weights and higher kidney fat indices. Large antlered animals were observed on these sites as well.

Health Indicators: This study used basic indicators of animal health that could be used by any manager. Managers of white-tailed deer should maintain accurate records of animals harvested which might include age, sex, live weight, dressed weight, kidney fat indices, and antler measurements. If viewed as trend data over a span of several years, this data can be invaluable in determining the success of a white-tailed deer management program.

APPENDIX 1

Collection site descriptions from the Cross Timbers and Prairies Ecological Region of Texas.

Jack County Site: This 1,214-ha site comprised of sandstone derived soils had a Post Oak (*Quercus stellata*)- Blackjack Oak (*Quercus marilandica*) Savannah plant association. Understory vegetation included skunkbush (*Rhus aromatica*), poison ivy (*Rhus toxicodendron*), bumelia (*Bumelia lanuginosa*), and a variety of grasses and forbs. Topography was rolling to hilly with some canyons and low lying flats with a tributary of the Trinity River crossing the south end of the property. Stock tanks were abundant throughout the site. The range condition of the site was excellent. One hundred head of livestock were grazed in a rotational system through seven pastures. The deer population on the property was intensely managed through censusing, supplemental feed, and maintenance of desired numbers. Enhancements to the site included food plots, brush management, and a 2.4m (8ft.) high perimeter fence.

Wise County Site: This 1,052-ha site was comprised mainly of limestone derived soils. The plant community was a woodland plant association dominated by live oak (*Quercus fusiformis*), Texas oak (*Quercus buckleyi*), cedar elm (*Ulmus crassifolia*), and mesquite (*Prosopis glandulosa*). Understory vegetation was comprised of elbowbush (*Forestiera pubescens*), coralberry (*Symphoricarpos orbiculatus*), and bumelia with a mixture of grasses and forbs. The topography of the site was rolling hills with a portion of the property being adjacent to Lake Bridgeport. Other surface water features were minimal. The range condition of the site was fair to poor because of overgrazing. The rangeland

was heavily stocked with over 200 head of cattle in a continuous grazing system. The deer population was monitored but no effort was made to maintain it at a desirable level. There was no evidence of any habitat improvements for wildlife.

Parker County Site: Sandstone derived soils dominated this 1,821-ha site with a plant association composed of a Post Oak- Blackjack Oak Savannah. Other woodyspecies included Ashe juniper (*Juniperus ashei*), mesquite, cedar elm, skunkbush sumac, and elbowbush. The topography was flat to rolling hills. Surface water features included several stock ponds throughout the property. The range condition was excellent due to the absense of livestock pressure for over a decade. However, standing herbaceous biomass may have been preventing new forb growth due to sunlight competition. The deer population was monitored, but minimal efforts were taken to maintain the population at a desirable level. No habitat manipulations had been made for wildlife. However, removal of brush from other activities possibly benefited wildlife.

Erath County Site: This 405-ha site was comprised of sandstone derived soils. The plant community was dominated by a Post Oak- Blackjack Oak Savannah with skunkbush sumac, mesquite, and bumelia also prevalent. The topography of the site was rolling hills. Surface water features included small stock ponds on several small drainages. The range was in excellent condition with no livestock grazing on the site. The deer population was monitored and attempts were made to maintain an artificially produced carrying capacity by supplemental feeding. Supplemental foods, which included free choice feeders, food plots and timed feeders, were abundant on this site.

Other management techniques included prescribed burning and a 2.4m (8ft.) high perimeter fence.

Bosque County Site: This 1,619-ha site was comprised of limestone derived soils. The plant association was a Live Oak- Ashe Juniper Woodland. Although soils were considered shallow, this site had the greatest plant diversity of all study sites. Browse species included Texas oak, elbowbush, hackberry (*Celtis reticulata*), pecan (*Carya illinoiensis*), soapberry (*Sapiendus saponaria*), flameleaf sumac (*Rhus lanceolata),* yaupon (*Ilex decidua*), and redbud (*Cercis canadensis*). The topography was hilly with a small creek running through the property. Several stock tanks provided surface water features. The range condition was excellent. One hundred head of cattle were rotated in an eight-pasture grazing system. The deer population was monitored and efforts were made to maintain the population at a desirable level through recreational hunting. Management techniques on the site included prescribed burning, oak wilt suppression, and supplemental feeding through free choice feeders.

Brown County Site: This 2,023-ha site was comprised of limestone derived soils. The plant association was a Live Oak-Ashe Juniper Woodland. Available browse species included cedar elm, Texas oak, agarita (*Berberis trifoliolata*), and mesquite, but these species were limited because of severe overgrazing. The topography was flat to rolling hills. Several stock ponds provided surface water for the site. The range condition was poor. Livestock numbers on the site were unknown, but very high. Cattle, sheep, and goats were seen grazing at all times throughout the site during the study. There was no

grazing system or cross fencing to control livestock. The deer population was not monitored or controlled.

APPENDIX 2

Scientific and common names of vegetation observed in the Cross Timbers and Prairies region of Texas. Nomenclature follows Correll and Johnson (1970).

FAMILY NAME Scientific name	COMMON FAMILY NAME Common Name
ACANTHACEAE	ACANTHUS FAMILY
Dyschoriste linearis	snake-herb
Justicia americana	American water-willow
Ruellia humilis	low wild-petunia
Ruellia nudiflora	common wildpetunia
ALISMACEAE	WATER-PLANTAIN FAMILY
Echinodorus rostratus	burhead
AMARANTHACEAE	AMARATH FAMILY
Froelichia gracilis	slender snake-cotton
AMARYLLIDACEAE	AMARYLLIS FAMILY
Cooperia pedunculata	rain-lily
ANACARDIACEAE	SUMAC FAMILY
Rhus glabra	smooth sumac
Rhus lanceolata	flameleaf sumac
Rhus toxicodendron	poison ivy
Rhus aromatica	skunkbush
APIACEAE (UMBELLIFERAE)	CARROT FAMILY
Bifora americana	prairie bishopsweed
Daucus pusillus	wild carrot
Eryngium leavenworthii	eryngo
Polytaenia texana	prairie parsnip
Spermolepis inermis	smooth scaleseed
Torilis arvensis	beggar's tick
APOCYNACEAE	DOGBANE FAMILY
Amsonia ciliata	blue star
AQUIFOLIACEAE	HOLLY FAMILY
Ilex decidua	deciduous holly
Ilex vomitoria	yaupon
ASCLEPIADACEAE	MILKWEED FAMILY
Asclepias asperula	antelope horns
Asclepias viridis	green milkweed
Matelea sp.	milkvine
ASTERACEAE (COMPOSITAE)	COMPOSITE FAMILY
Achillea millefolium	yarrow
Amblyolepis setigera	huisache daisy
Ambrosia psilostachya	western ragweed

Ambrosia trifida	giant ragweed
Amphiachyris dracunculoides	broomweed
Aphanostephus skirrhobasis	lazy daisy
Aster ericoides	heath aster
Aster pratensis	aster
Baccharis neglecta	Roosevelt weed
Centaurea melitensis	yellow star-thistle
Chrysopsis canescens	gray goldenaster
Cirsium texanum	Texas thistle
Coreopsis wrightii	goldenwave coreopsis
Echinacea angustifolia	coneflower
Eclipta prostrata	yerba de tago
Engelmannia pinnatifida	Engelmann daisy
Erigeron strigosus	prairie fleabane
Evax sp.	evax, rabbit-tobacco
Gaillardia pulchella	Indian blanket
Grindelia sp.	gumweed
Gutierrezia sp.	broom snakeweed
Helenium amarum	bitterweed
Helianthus annuus	common sunflower
Helianthus maximiliani	maximilian sunflower
Hymenoxys spp.	bitterweed
Lactuca ludoviciana	wild lettuce
Liatris punctata	blazing star
Lindheimera texana	Texas daisy
Palafoxia callosa	palafoxia
Pyrrhopappus sp.	false-dandelion
Ratibida columnaris	Mexican hat
Rudbeckia amplexicaulis (Dracopis amplexicaulis)	clasping coneflower
Rudbeckia hirta	black-eyed Susan
Simsia calva	bush sunflower
Solidago radula	goldenrod
Sonchus sp.	sow thistle
Thelesperma filifolium	slender greenthread
Vernonia lindheimeri	silverleaf ironweed
Verbesina virginica	frostweed
Xanthium strumarium	cocklebur
Xanthisma texanum	sleepy daisy
Zemenan hispida	zexmenia
BERBERIDACEAE	BARBERRY FAMILY
Berberis trifoliolata	agarito
BORAGINACEAE	BORAGE FAMILY
Heliotropium tenellum	pasture heliotrope

BRASSICACEAE (CRUCIFERAE)	MUSTARD FAMILY
Draba sp.	whitlow-wort
Lepidium spp.	pepperweed
Lesquerella densiflora	bladderpod
CACTACEAE	CACTUS FAMILY
Coryphantha sp.	nipple cactus
Opuntia leptocaulis	tasajillo, pencil cactus
Opuntia lindheimeri	pricklypear
CAMPANULACEAE	BELLFLOWER FAMILY
Triodanis perfoliata	Venus' looking-glass
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY
Lonicera albiflora	white honeysuckle
Symphoricarpos orbiculatus	coralberry
Viburnum rufidulum	rusty blackhaw
CARYOPHYLLACEAE	PINK FAMILY
Stellaria media	common chickweed
COMMELINACEAE	SPIDERWORT FAMILY
Commelina erecta	common dayflower
Tradescantia occidentalis	western spiderwort
Tradescantia ohiensis	Ohio spiderwort
CONVOLVULACEAE	MORNING-GLORY FAMILY
Convolvulus equitans	common bindweed
Evolvulus nuttallianus	blue evolvulus
Evolvulus sericeus	silky evolvulus
Ipomaea trichocarpa	common morning-glory
Ipomoea lindheimeri	blue morning-glory
CORNACEAE	DOGWOOD FAMILY
Cornus drummondii	gray dogwood
CRASSULACEAE	ORPINE FAMILY
Sedum nuttallianum	yellow stonecrop
CUPRESSACEAE	CYPRESS FAMILY
Juniperus ashei	ashe juniper
Juniperus virginiana	eastern red cedar
CYPERACEAE	SEDGE FAMILY
Carex spp.	sedge
Cyperus spp.	umbrellasedge
Scirpus pendulus	bulrush
EBENACEAE	EBONY FAMILY
Diospyros texana	Texas persimmon
EQUISETACEAE	HORSETAIL FAMILY
Equisetum spp.	horsetail
EUPHORBIACEAE	SPURGE FAMILY
Acalypha monococca	oneseed copperleaf
Argythamnia aphoroides	Hill County wildmercury
Chamaesyce prostrata	mat euphorbia

Cnidoscolus texanus	Texas bull-nettle
Croton lindheimerianus	Lindheimer croton
Croton monanthogynus	oneseed croton
Euphorbia bicolor	snow-on-the-prairie
Euphorbia dentata	toothed spurge
Euphorbia spathulata	warty spurge
Phyllanthus polygonoides	knotweed leaf-flower
Stillingia texana	Texas queen's-delight
Tragia ramosa	catnip (common) noseburn
FABACEAE (LEGUMINOSAE)	PEA FAMILY
Acacia roemeriana	Roemer acacia
Acacia hirta	fern acacia
Astragalus crassicarpus	groundplum
Astragalus sp.	milkvetch
Cercis canadensis var. texensis	Texas redbud
Chamaecrista fasciculata	partridge pea
Dalea aurea	yellow dalea
Dalea enneandra	bigtop dalea
Dalea helleri	thickspike prairie-clover
Dalea tenuis	purple prairie-clover
Desmanthus illinoensis	Illinois bundleflower
Desmanthus velutinus	velvet bundleflower
Desmodium paniculatum	tall tickseed
Eysenhardtia texana	Texas kidneywood
Galactia volubilis	downy milkpea
Gleditsia triacanthos	honey locust
Indigofera miniata var. leptosepala	scarlet pea
Lespedeza repens	lespedeza
Lespedeza stuevei	tall bush clover
Lotus purshianus	deervetch
Lupinus texensis	Texas bluebonnet
Medicago spp.	burclover
Mimosa biuncifera	catclaw mimosa
Neptunia lutea	yellowpuff
Pediomelum latestipulatum	scurf pea
Prosopis glandulosa	mesquite
Rhynchosia sp.	Snoutbean
Schrankia roemeriana	sensitivebriar
Senna roemeriana	twoleaf senna
FAGACEAE	BEECH FAMILY
Quercus buckleyi (Q. texana)	Texas oak
Quercus fusiformis	plateau live oak
Quercus marilandica	blackjack oak
Quercus sinuata var. breviloba	shin oak

Quercus stellata	post oak
GERANIACEAE	GERANIUM FAMILY
Erodium texanum	stork's bill
HALORAGACEAE	WATER-MILFOIL FAMILY
Myriophyllum sp.	water-milfoil
HYDROPHYLLACEAE	WATERLEAF FAMILY
Phacelia congesta	bluecurls
JUNCACEAE	RUSH FAMILY
Juncus texanus	Texas rush
LAMIACEAE (LABIATAE)	MINT FAMILY
Marrubium vulgare	common horehound
Salvia texana	Texas sage
Scutellaria drummondii	annual skullcap
LILIACEAE	LILY FAMILY
Allium drummondii	Drummond wild garlic
Allium canadense	wild onion
Smilax bona-nox	common greenbriar
Yucca constricta	yucca
LINACEAE	FLAX FAMILY
Linum sp.	flax
MALVACEAE	MALLOW FAMILY
Abutilon fruticosum	Indian mallow
Callirhoe involucrata	wine cup
Sida abutifolia	creeping yellow sida
MENISPERMACEAE	MOONSEED FAMILY
Cocculus carolinus	Carolina snailseed
MORACEAE	MULBERRY FAMILY
Morus microphylla	Texas mulberry
NYCTAGINACEAE	FOUR O'CLOCK FAMILY
Mirabilis sp.	four o'clock
OLEACEAE	OLIVE FAMILY
Forestiera pubescens	elbowbush
Fraxinus texensis	Texas ash
ONAGRACEAE	EVENING PRIMROSE FAMILY
Oenothera speciosa	pink evening-primrose
ORCHIDACEA	ORCHID FAMILY
Spiranthes cernua	ladies'-tresses
OXALIDACEAE	WOOD-SORREL FAMILY
Oxalis dillenii	yellow woodsorrel
Oxalis drummondii	woodsorrell
PAPAVERACEAE	POPPY FAMILY
Argemone albiflora	white pricklypoppy
PASSIFLORACEAE	PASSIONFLOWER FAMILY
Passiflora lutea	yellow passionflower

PLANTAGINACEAE	PLANTAIN FAMILY
Plantago spp.	plantain
POACEAE (GRAMINEAE)	GRASS FAMILY
Andropogon gerardii	big bluestem
Andropogon glomeratus	bushy bluestem
Aristida oligantha	oldfield threeawn
Aristida wrightii	purple threeawn
Bothriochloa ischaemum	King Ranch bluestem
Bothriochloa saccharoides	silver bluestem
Bouteloua curtipendula	sideoats grama
Bouteloua hirsuta	hairy grama
Bouteloua rigidiseta	Texas grama
Bromus japonicus	Japanese brome
Bromus unioloides	rescuegrass
Buchloe dactyloides	buffalograss
Cenchrus incertus	sandburgrass
Chasmanthium latifolium	creek oats
Chloris cucullata	hooded windmillgrass
Cynodon dactylon	bermudagrass
Dichanthelium lanuginosum	panicgrass
Dichanthelium oligosanthes	dicanthelium
Elymus canadensis	Canada wildrye
Elymus virginicus	Virginia wildrye
Eragrostis curvula	weeping lovegrass
Eragrostis intermedia	plains lovegrass
Eragrostis secundiflora	red lovegrass
Erioneuron pilosum	hairy tridens
Hilaria belangeri	curlymesquite
Hordeum pusillum	little barley
Leptochloa dubia	green sprangletop
Leptoloma cognatum (Digitaria cognata)	fall witchgrass
Panicum capillare	common witchgrass
Panicum coloratum	kleingrass
Panicum hallii	hall panicum
Panicum obtusum	vine-mesquite
Panicum virgatum	switchgrass
Paspalum pubiflorum	hairyseed paspalum
Schizachyrium scoparium	little bluestem
Sorghastrum nutans	Indiangrass
Sorghum halepense	Johnsongrass
Sporobolus asper	tall dropseed
Sporobolus cryptandrus	sand dropseed
Stipa leucotricha	Texas wintergrass
Tridens albescens	white tridens

Tridens muticus	slim tridens
Tridens texanus	Texas tridens
POLEMONIACEAE	PHLOX FAMILY
Phlox drummondii	Drummond wild phlox
POLYGALACEAE	MILKWORT FAMILY
Polygala alba	white milkwort
Polygala lindheimeri	Lindheimer milkwort
POLYGONACEAE	KNOTWEED FAMILY
Polygonum spp.	Smartweed
POLYPODIACEAE	TRUE FERN FAMILY
Cheilanthes lindheimeri	Lindheimer lipfern
Woodsia obtusa	common woodsia
RANUNCULACEAE	CROWFOOT FAMILY
Anemone heterophylla	wind-flower
Clematis pitcheri	purple leather flower
RHAMNACEAE	BUCKTHORN FAMILY
Rhamnus caroliniana	Carolina buckthorn
Ziziphus obtusifolia	lotebush
ROSACEAE	ROSE FAMILY
Crataegus sp.	hawthorn
Geum canadense	white avens
Prunus mexicana	Mexican plum
Rubus trivialis	southern dewberry
RUBIACEAE	MADDER FAMILY
Cephalanthus occidentalis	buttonbush
Hedyotis crassifolia	annual bluets
RUTACEAE	CITRUS FAMILY
Zanthoxylum hirsutum	tickletongue
SALICACEAE	WILLOW FAMILY
Populus deltoides	eastern cottonwood
Salix nigra	black willow
SAPINDACEAE	SOAPBERRY FAMILY
Sapindus saponaria	western soapberry
Ungnadia speciosa	Mexican buckeye
SAPOTACEAE	SAPODILLA FAMILY
Bumelia lanuginosa	bumelia
SCROPHULARIACEAE	FIGWORT FAMILY
Agalinis heterophylla	prairie agalinis
Castilleja indivisa	Indian paintbrush
Linaria texana	Texas toadflax
Veronica peregrina	wandering veronica
SOLANACEAE	TOMATO FAMILY
Solanum dimidiatum	western horsenettle
Solanum elaeagnifolium	silverleaf nightshade
Solanum rostratum	buffalo-bur

TYPHACEAE	CAT-TAIL FAMILY
Typha domingensis	cat-tail
ULMACEAE	ELM FAMILY
Celtis laevigata	sugar hackberry
Celtis reticulata	netleaf hackberry
Ulmus americana	American elm
Ulmus crassifolia	cedar elm
VERBENACEAE	VERVAIN FAMILY
Aloysia gratissima	whitebrush, bee-brush
Lantana horrida	lantana
Phyla nodiflora	fogfruit
Verbena bipinnatifida	prairie verbena
Verbena canescens	gray vervain
Verbena officinalis	Texas vervain
VIOLACEAE	VIOLET FAMILY
Viola rafinesquii	wild pansy
VISCACEAE	MISTLETOE FAMILY
Phoradendron tomentosum	mistletoe
VITACEAE	GRAPE FAMILY
Ampelopsis cordata	heartleaf ampelopsis
Parthenocissus quinquefolia	Virginia creeper
Vitis mustangensis	Mustang grape
UMBELLIFERAE	PARSLEY FAMILY
Bifora americana	prairie bishop's weed
Hydrocotyle umbellata	water pennywort
Dancus pusillus	wild carrot
Torillis arvensis	beggar's tick
Eryngo leavenworthii	eryngo

APPENDIX 3

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Spring, 1996.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	**3.74**	**15.00**	**5.64**	**4.69**	**3.00**	**1.56**
Oak	**12.71**	**24.00**	**9.02**	**10.87**	**5.00**	**2.17**
Greenbriar	**7.72**	**22.00**	**8.27**	**8.00**	**4.00**	**2.00**
Bumelia	**1.56**	**13.00**	**4.89**	**3.22**	**4.00**	**0.81**
Skunkbush	**14.02**	**14.00**	**5.26**	**9.64**	**5.00**	**1.93**
Dogwood	**1.10**	**4.00**	**1.50**	**1.30**	**1.00**	**1.30**
Hackberry	**0.36**	**1.00**	**0.38**	**0.37**	**1.00**	**0.37**
Elbowbush	**1.32**	**5.00**	**1.88**	**1.60**	**3.00**	**0.53**
Mesquite	**0.60**	**4.00**	**1.50**	**1.05**	**2.00**	**0.53**
Ash	**1.14**	**2.00**	**0.75**	**0.95**	**1.00**	**0.95**
Soapberry	**0.72**	**2.00**	**0.75**	**0.74**	**1.00**	**0.74**
Ilex sp.	**3.78**	**4.00**	**1.50**	**2.64**	**1.00**	**2.64**
Mistletoe	**1.00**	**5.00**	**1.88**	**1.44**	**1.00**	**1.44**
Agarita	**0.12**	**1.00**	**0.38**	**0.25**	**1.00**	**0.25**
Total Browse	**49.89**					
Grass						
Texas wintergrass	**2.85**	**14.00**	**5.26**	**4.06**	**5.00**	**0.81**
Texas grama	**2.15**	**9.00**	**3.38**	**2.77**	**3.00**	**0.92**
Little bluestem	**0.65**	**4.00**	**1.50**	**1.08**	**3.00**	**0.36**
Dicanthelium	**3.15**	**12.00**	**4.51**	**3.83**	**3.00**	**1.28**
Curlymesquite	**0.75**	**3.00**	**1.13**	**0.94**	**4.00**	**0.23**
Sideoats grama	**0.25**	**2.00**	**0.75**	**0.50**	**3.00**	**0.17**
Three-awn	**0.25**	**5.00**	**1.88**	**1.06**	**3.00**	**0.35**
Sandbur	**2.00**	**4.00**	**1.50**	**1.75**	**2.00**	**0.88**
Unidentified Grasses	**1.25**					
Total Grass	**13.30**					
Forbs						
Partridge pea	**1.75**	**5.00**	**1.88**	**1.81**	**1.00**	**1.81**
Wild onion	**2.10**	**8.00**	**3.01**	**2.55**	**1.00**	**2.55**
Mat euphorbia	**4.20**	**11.00**	**4.14**	**4.17**	**1.00**	**4.17**
Two-leaf senna	**0.75**	**4.00**	**1.50**	**1.13**	**1.00**	**1.13**
Yellow woodsorrel	**3.20**	**11.00**	**4.14**	**3.67**	**2.00**	**1.83**
Western ragweed	**2.10**	**12.00**	**4.51**	**3.31**	**2.00**	**1.65**
Texas thistle	**1.20**	**5.00**	**1.88**	**1.54**	**1.00**	**1.54**
Unidentified Forbs	**1.90**					
Total Forbs	**17.20**					
Mast						
Acorns	**9.10**	**18.00**	**6.77**	**7.93**	**1.00**	**7.93**
Skunkbush berries	**2.25**	**8.00**	**3.01**	**2.63**	**1.00**	**2.63**
Bumelia berries	**0.75**	**2.00**	**0.75**	**0.75**	**1.00**	**0.75**
Total Mast	**12.10**					

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Spring, 1996. Continued						
Food Plot						
Wheat/ Oats	**7.51**	**13.00**	**4.89**	**6.20**	**1.00**	**6.20**

APPENDIX 4

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Summer, 1996.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	2.50	14.00	4.59	3.55	3.00	1.18
Oak	11.43	29.00	9.51	10.47	5.00	2.09
Greenbriar	3.72	19.00	6.23	4.97	4.00	1.24
Bumelia	1.46	4.00	1.31	1.39	4.00	0.35
Skunkbush	15.42	20.00	6.56	10.99	5.00	2.20
Hackberry	0.26	1.00	0.33	0.29	1.00	0.29
Elbowbush	1.65	6.00	1.97	1.81	3.00	0.60
Mesquite	0.31	4.00	1.31	0.81	2.00	0.41
Coralberry	0.82	4.00	1.31	1.07	1.00	1.07
Ashe juniper	1.72	7.00	2.30	2.01	4.00	0.50
Ilex sp.	0.71	3.00	0.98	0.85	1.00	0.85
Yucca	0.90	3.00	0.98	0.94	1.00	0.94
Mistletoe	4.73	8.00	2.62	3.68	1.00	3.68
Agarita	0.77	2.00	0.66	0.71	1.00	0.71
Total Browse	46.40					
Grass						
Dicanthelium	8.50	16.00	5.25	6.87	3.00	2.29
Sideoats grama	1.60	8.00	2.62	2.11	2.00	1.06
Little bluestem	1.20	6.00	1.97	1.58	3.00	0.53
Texas grama	0.80	5.00	1.64	1.22	2.00	0.61
Canada wildrye	1.40	6.00	1.97	1.68	1.00	1.68
Hairy grama	1.30	3.00	0.98	1.14	1.00	1.14
Unidentified grasses	6.02					
Total Grass	20.82					
Forbs						
Mat Euphorbia	1.10	14.00	4.59	2.85	3.00	0.95
Catnip noseburn	0.45	6.00	1.97	1.21	3.00	0.40
Yellow woodsorrel	1.30	5.00	1.64	1.47	2.00	0.73
Queen's delight	0.10	3.00	0.98	0.54	2.00	0.27
Prairie verbena	0.70	3.00	0.98	0.84	1.00	0.84
Coreopsis	0.65	4.00	1.31	0.98	1.00	0.98
Venus looking-glass	0.33	6.00	1.97	1.15	1.00	1.15
Partridge pea	1.25	8.00	2.62	1.94	1.00	1.94
Plantain	0.45	7.00	2.30	1.37	2.00	0.69
Snoutbean	0.90	7.00	2.30	1.60	1.00	1.60
Deer pea vetch	1.32	10.00	3.28	2.30	1.00	2.30
Lespedeza	1.40	12.00	3.93	2.67	1.00	2.67
Eryngo	0.40	4.00	1.31	0.86	1.00	0.86
Prairie bishop's weed	0.33	3.00	0.98	0.66	1.00	0.66
Unidentified Forbs	2.40					
Total Forbs	13.08					

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Summer, 1996. Continued						
Mast						
Mesquite beans	**8.90**	**18.00**	**5.90**	**7.40**	**2.00**	**3.70**
Prickly pear fruit	**7.60**	**12.00**	**3.93**	**5.77**	**2.00**	**2.88**
Acorn	**0.20**	**3.00**	**0.98**	**0.59**	**1.00**	**0.59**
Soapberry berries	**0.15**	**2.00**	**0.66**	**0.40**	**1.00**	**0.40**
Total Mast	**16.85**					
Food Plot						
Lab Lab	**2.10**	**4.00**	**1.31**	**1.71**	**1.00**	**1.71**
Commercial Feed						
Pelleted feed	**0.75**	**6.00**	**1.97**	**1.36**	**3.00**	**0.45**

APPENDIX 5

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Fall, 1996.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	3.05	17.00	6.07	4.56	3.00	1.52
Oak	9.05	29.00	10.36	9.70	5.00	1.94
Greenbriar	3.13	16.00	5.71	4.42	4.00	1.11
Bumelia	2.05	6.00	2.14	2.10	4.00	0.52
Skunkbush	4.56	14.00	5.00	4.78	5.00	0.96
Dogwood	1.99	2.00	0.71	1.35	1.00	1.35
Hackberry	1.00	7.00	2.50	1.75	1.00	1.75
Elbowbush	1.65	3.00	1.07	1.36	3.00	0.45
Ash	1.12	2.00	0.71	0.92	1.00	0.92
Coralberry	1.97	3.00	1.07	1.52	2.00	0.76
Ashe juniper	2.46	7.00	2.50	2.48	4.00	0.62
Ilex sp.	3.02	7.00	2.50	2.76	1.00	2.76
Mistletoe	3.06	14.00	5.00	4.03	1.00	4.03
Agarita	0.10	1.00	0.36	0.23	1.00	0.23
Total Browse	38.21					
Grass						
Dicanthelium	2.60	6.00	2.14	2.37	3.00	0.79
Sideoats grama	0.66	2.00	0.71	0.69	2.00	0.34
Little bluestem	0.33	3.00	1.07	0.70	3.00	0.23
Texas grama	0.45	2.00	0.71	0.58	1.00	0.58
Rescue grass	2.10	4.00	1.43	1.76	1.00	1.76
Curlymesquite	1.30	4.00	1.43	1.36	2.00	0.68
Panicum	0.75	3.00	1.07	0.91	1.00	0.91
Unidentified grasses	3.20					
Total Grass	11.39					
Forbs						
Catnip noseburn	1.20	6.00	2.14	1.67	3.00	0.56
Yellow woodsorrel	1.10	8.00	2.86	1.98	2.00	0.99
Queen's delight	0.10	3.00	1.07	0.59	2.00	0.29
Prairie verbena	0.20	4.00	1.43	0.81	1.00	0.81
Mat euphorbia	1.40	11.00	3.93	2.66	1.00	2.66
Venus looking-glass	0.20	3.00	1.07	0.64	1.00	0.64
Partridge pea	0.30	3.00	1.07	0.69	1.00	0.69
Plantain	0.40	4.00	1.43	0.91	2.00	0.46
Chickweed	0.75	6.00	2.14	1.45	1.00	1.45
Deer pea vetch	0.80	4.00	1.43	1.11	1.00	1.11
Lespedeza	0.40	4.00	1.43	0.91	1.00	0.91
Eryngo	0.25	3.00	1.07	0.66	1.00	0.66
Prairie bishop's weed	0.65	3.00	1.07	0.86	1.00	0.86
Unidentified Forbs	2.07					
Total Forbs	9.82					

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Fall, 1996. Continued						
Mast						
Acorns	**22.40**	**24.00**	**8.57**	**15.49**	**1.00**	**15.49**
Prickly pear fruit	**3.20**	**6.00**	**2.14**	**2.67**	**2.00**	**1.34**
Total Mast	**25.60**					
Food Plots						
Oats/Wheat	**3.10**	**12.00**	**4.29**	**3.69**	**1.00**	**3.69**
Lab Lab	**0.75**	**2.00**	**0.71**	**0.73**	**1.00**	**0.73**
Total Food Plots	**3.85**					
Commercial Feed						
Pelleted feed	**0.33**	**3.00**	**1.07**	**0.70**	**3.00**	**0.23**
Corn	**10.80**	**19.00**	**6.79**	**8.79**	**1.00**	**8.79**
Total Commercial Feed	**11.13**					

APPENDIX 6

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Winter, 1997.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	1.46	12.00	5.26	3.36	3.00	1.12
Oak	13.50	30.00	13.16	13.33	5.00	2.67
Greenbriar	4.95	21.00	9.21	7.08	4.00	1.77
Bumelia	1.88	3.00	1.32	1.60	4.00	0.40
Skunkbush	2.43	12.00	5.26	3.85	5.00	0.77
Hackberry	0.80	3.00	1.32	1.06	1.00	1.06
Elbowbush	1.68	5.00	2.19	1.94	3.00	0.65
Ashe juniper	1.50	10.00	4.39	2.94	4.00	0.74
Lotebush	0.17	1.00	0.44	0.30	1.00	0.30
Poison ivy	0.31	2.00	0.88	0.59	4.00	0.15
Ilex sp.	1.57	6.00	2.63	2.10	1.00	2.10
Yucca	0.23	1.00	0.44	0.33	1.00	0.33
Mistletoe	1.42	11.00	4.82	3.12	1.00	3.12
Agarita	0.46	1.00	0.44	0.45	1.00	0.45
Total Browse	32.36					
Grass						
Dicanthelium	2.10	4.00	1.75	1.93	2.00	0.96
Sideoats grama	0.40	2.00	0.88	0.64	1.00	0.64
Little bluestem	0.25	2.00	0.88	0.56	2.00	0.28
Texas grama	0.10	1.00	0.44	0.27	1.00	0.27
Rescue grass	0.30	5.00	2.19	1.25	2.00	0.62
Texas wintergrass	2.60	8.00	3.51	3.05	3.00	1.02
Unidentified grasses	6.20					
Total Grass	11.95					
Forbs						
Mat euphorbia	2.60	7.00	3.07	2.84	1.00	2.84
Wild carrot	1.75	6.00	2.63	2.19	2.00	1.10
Yellow woodsorrel	1.35	6.00	2.63	1.99	2.00	1.00
Stork's bill	0.50	3.00	1.32	0.91	1.00	0.91
Evax	0.25	2.00	0.88	0.56	1.00	0.56
Prairie bishop's weed	0.50	2.00	0.88	0.69	1.00	0.69
Plantain	0.50	3.00	1.32	0.91	2.00	0.45
Unidentified Forbs	5.60					
Total Forbs	13.05					
Mast						
Acorns	24.60	23.00	10.09	17.34	1.00	17.34
Food Plots						
Oats/Wheat	9.80	10.00	4.39	7.09	1.00	7.09

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Winter, 1997. Continued						
Commercial Feed						
Corn	**6.40**	**22.00**	**9.65**	**8.02**	**1.00**	**8.02**
Pelleted feed	**1.50**	**4.00**	**1.75**	**1.63**	**3.00**	**0.54**
Total Commercial Feed	**7.90**					
Unidentified Plant Material	**0.34**					

APPENDIX 7

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Spring, 1997.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	2.72	16.00	3.63	3.17	3.00	1.06
Oak	5.85	25.00	5.67	5.76	5.00	1.15
Greenbriar	3.04	18.00	4.08	3.56	4.00	0.89
Bumelia	1.20	7.00	1.59	1.39	4.00	0.35
Skunkbush	6.94	13.00	2.95	4.94	5.00	0.99
Dogwood	1.41	2.00	0.45	0.93	1.00	0.93
Hackberry	0.36	4.00	0.91	0.63	1.00	0.63
Elbowbush	1.12	6.00	1.36	1.24	3.00	0.41
Ash	0.69	2.00	0.45	0.57	1.00	0.57
Coralberry	1.13	1.00	0.23	0.68	1.00	0.68
Ashe juniper	0.51	3.00	0.68	0.60	4.00	0.15
Lotebush	0.51	1.00	0.23	0.37	1.00	0.37
Flameleaf sumac	0.90	2.00	0.45	0.68	1.00	0.68
Ilex sp.	0.75	3.00	0.68	0.72	1.00	0.72
Redbud	1.41	3.00	0.68	1.05	1.00	1.05
Mex. Buckeye	0.47	2.00	0.45	0.46	1.00	0.46
Poison ivy	0.02	1.00	0.23	0.12	4.00	0.03
Yucca	0.09	1.00	0.23	0.16	1.00	0.16
Mistletoe	0.41	3.00	0.68	0.55	1.00	0.55
Agarita	0.17	1.00	0.23	0.20	1.00	0.20
Total Browse	29.70					
Grass						
Texas wintergrass	1.90	8.00	1.81	1.86	3.00	0.62
Texas grama	0.45	3.00	0.68	0.57	2.00	0.28
Little bluestem	0.33	3.00	0.68	0.51	2.00	0.25
Dicanthelium	0.25	3.00	0.68	0.47	2.00	0.23
Curlymesquite	0.10	2.00	0.45	0.28	1.00	0.28
Sideoats grama	1.60	12.00	2.72	2.16	2.00	1.08
Silverlaef bluestem	0.50	4.00	0.91	0.70	2.00	0.35
Green sprangletop	0.45	3.00	0.68	0.57	1.00	0.57
Unidentified Grasses	2.20					
Total Grass	7.78					
Forbs						
Partridge pea	1.10	5.00	1.13	1.12	2.00	0.56
Wild onion	1.15	7.00	1.59	1.37	2.00	0.68
Mat euphorbia	1.20	8.00	1.81	1.51	1.00	1.51
Two-leaf senna	0.45	3.00	0.68	0.57	2.00	0.28
Yellow woodsorrel	0.20	2.00	0.45	0.33	1.00	0.33
Western ragweed	1.80	18.00	4.08	2.94	4.00	0.74
Texas thistle	0.10	2.00	0.45	0.28	1.00	0.28
Catnip noseburn	0.15	5.00	1.13	0.64	2.00	0.32
Silverleaf nightshade	0.25	6.00	1.36	0.81	2.00	0.40
Spiderwort	1.25	11.00	2.49	1.87	1.00	1.87
Queen's delight	0.06	2.00	0.45	0.26	1.00	0.26
Prairie verbena	0.75	5.00	1.13	0.94	1.00	0.94

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Spring, 1997. Continued						
Coreopsis	0.33	4.00	0.91	0.62	1.00	0.62
Venus looking-glass	1.90	9.00	2.04	1.97	1.00	1.97
Dalea	1.90	14.00	3.17	2.54	1.00	2.54
Illinois bundleflower	1.85	16.00	3.63	2.74	2.00	1.37
Zexmenia	0.75	8.00	1.81	1.28	1.00	1.28
Plantain	0.10	2.00	0.45	0.28	2.00	0.14
Snoutbean	1.65	10.00	2.27	1.96	2.00	0.98
Deer pea vetch	1.75	13.00	2.95	2.35	2.00	1.17
Lespedeza	1.85	7.00	1.59	1.72	1.00	1.72
Wild carrot	0.85	2.00	0.45	0.65	2.00	0.33
Prairie bishop's weed	1.75	12.00	2.72	2.24	1.00	2.24
Rainlilly	1.65	14.00	3.17	2.41	1.00	2.41
Texas vervain	1.80	12.00	2.72	2.26	1.00	2.26
Chickweed	2.33	16.00	3.63	2.98	1.00	2.98
Stork's bill	1.95	10.00	2.27	2.11	1.00	2.11
Fleabane	1.20	9.00	2.04	1.62	1.00	1.62
Beggar's tick	1.10	11.00	2.49	1.80	2.00	0.90
Unidentified Forbs	4.25					
Total Forbs	37.42					
Mast						
Acorns	5.30	9.00	2.04	3.67	1.00	3.67
Skunkbush berries	4.80	12.00	2.72	3.76	4.00	0.94
Bumelia berries	0.75	3.00	0.68	0.72	3.00	0.24
Elbowbush berries	2.30	5.00	1.13	1.72	1.00	1.72
Mesquite beans	0.80	3.00	0.68	0.74	2.00	0.37
Total Mast	13.95		0.00			
Food Plots						
Wheat/Oats	4.80	10.00	2.27	3.53	1.00	3.53
Commercial Feed						
Pelleted feed	1.80	4.00	0.91	1.35	3.00	0.45
Unidentified Plant Matter	4.55					

APPENDIX 8

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Summer, 1997.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	1.10	14.00	3.16	2.13	3.00	0.71
Oak	7.90	22.00	4.97	6.43	5.00	1.29
Greenbriar	2.65	15.00	3.39	3.02	4.00	0.75
Bumelia	0.80	4.00	0.90	0.85	4.00	0.21
Skunkbush	9.60	11.00	2.48	6.04	5.00	1.21
Dogwood	0.33	2.00	0.45	0.39	1.00	0.39
Hackberry	0.36	2.00	0.45	0.41	1.00	0.41
Elbowbush	0.75	6.00	1.35	1.05	3.00	0.35
Ash	0.10	2.00	0.45	0.28	1.00	0.28
Coralberry	0.10	2.00	0.45	0.28	1.00	0.28
Ashe juniper	1.10	6.00	1.35	1.23	4.00	0.31
Lotebush	0.33	3.00	0.68	0.50	1.00	0.50
Flameleaf sumac	0.80	6.00	1.35	1.08	1.00	1.08
Ilex sp.	0.75	4.00	0.90	0.83	1.00	0.83
Redbud	0.66	3.00	0.68	0.67	1.00	0.67
Mex. Buckeye	0.10	3.00	0.68	0.39	1.00	0.39
Poison ivy	0.75	8.00	1.81	1.28	4.00	0.32
Yucca	0.10	1.00	0.23	0.16	1.00	0.16
Mistletoe	0.75	5.00	1.13	0.94	1.00	0.94
Agarita	0.10	1.00	0.23	0.16	1.00	0.16
Total Browse	29.13					
Grass						
Dicanthelium	3.40	6.00	1.35	2.38	3.00	0.79
Sideoats grama	2.40	7.00	1.58	1.99	2.00	1.00
Little bluestem	0.50	2.00	0.45	0.48	3.00	0.16
Texas grama	0.85	4.00	0.90	0.88	2.00	0.44
Canada wildrye	0.33	2.00	0.45	0.39	1.00	0.39
Silverlaef bluestem	0.25	3.00	0.68	0.46	3.00	0.15
Green sprangletop	0.10	1.00	0.23	0.16	1.00	0.16
Hairy grama	0.10	1.00	0.23	0.16	2.00	0.08
Unidentified grasses	3.30					
Total Grass	11.23					
Forbs						
Partridge pea	2.90	12.00	2.71	2.80	2.00	1.40
Wild mercury	3.00	16.00	3.61	3.31	1.00	3.31
Mat euphorbia	2.75	14.00	3.16	2.96	1.00	2.96
Two-leaf senna	1.30	8.00	1.81	1.55	2.00	0.78
Yellow woodsorrel	2.25	13.00	2.93	2.59	3.00	0.86
Western ragweed	1.25	19.00	4.29	2.77	4.00	0.69
Bush clover	2.10	8.00	1.81	1.95	1.00	1.95
Croton	2.80	14.00	3.16	2.98	2.00	1.49
Texas thistle	0.65	4.00	0.90	0.78	1.00	0.78
Catnip noseburn	0.85	7.00	1.58	1.22	3.00	0.41
Queen's delight	0.10	3.00	0.68	0.39	1.00	0.39
Prickly lettuce	0.33	3.00	0.68	0.50	1.00	0.50

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Summer, 1997. Continued						
Prairie verbena	0.75	4.00	0.90	0.83	1.00	0.83
Coreopsis	0.33	4.00	0.90	0.62	1.00	0.62
Venus looking-glass	0.75	4.00	0.90	0.83	1.00	0.83
Dalea	1.30	10.00	2.26	1.78	1.00	1.78
Illinois bundleflower	1.60	12.00	2.71	2.15	2.00	1.08
Zexmenia	0.85	8.00	1.81	1.33	1.00	1.33
Plantain	0.50	7.00	1.58	1.04	2.00	0.52
Snoutbean	2.40	14.00	3.16	2.78	2.00	1.39
Deer pea vetch	2.40	18.00	4.06	3.23	1.00	3.23
Lespedeza	1.33	11.00	2.48	1.91	1.00	1.91
Wild carrot	0.66	6.00	1.35	1.01	1.00	1.01
Prairie bishop's weed	0.50	3.00	0.68	0.59	1.00	0.59
Texas vervain	0.50	3.00	0.68	0.59	1.00	0.59
Chickweed	0.50	3.00	0.68	0.59	2.00	0.29
Stork's bill	1.25	9.00	2.03	1.64	1.00	1.64
Fleabane	1.15	8.00	1.81	1.48	1.00	1.48
Beggar's tick	1.33	9.00	2.03	1.68	1.00	1.68
Unidentified Forbs	4.20					
Total Forbs	42.58					
Mast						
Mesquite beans	6.20	12.00	2.71	4.45	2.00	2.23
Prickly pear fruit	6.80	14.00	3.16	4.98	3.00	1.66
Acorn	1.10	6.00	1.35	1.23	1.00	1.23
	14.10					
Food Plots						
Lab Lab	1.10	4.00	0.90	1.00	1.00	1.00
Commercial Feed						
Pelleted feed	0.50	7.00	1.58	1.04	3.00	0.35
Unidentified Plant Material	1.36					

APPENDIX 9

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Fall, 1997.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	1.80	11.00	4.10	2.95	3.00	0.98
Oak	10.10	18.00	6.72	8.41	5.00	1.68
Greenbriar	2.50	14.00	5.22	3.86	4.00	0.97
Bumelia	1.50	4.00	1.49	1.50	4.00	0.37
Skunkbush	6.30	15.00	5.60	5.95	5.00	1.19
Dogwood	0.50	2.00	0.75	0.62	1.00	0.62
Hackberry	1.10	2.00	0.75	0.92	1.00	0.92
Elbowbush	0.75	5.00	1.87	1.31	3.00	0.44
Ash	0.33	2.00	0.75	0.54	1.00	0.54
Coralberry	1.80	8.00	2.99	2.39	1.00	2.39
Ashe juniper	2.50	9.00	3.36	2.93	4.00	0.73
Flameleaf sumac	1.10	6.00	2.24	1.67	1.00	1.67
Ilex sp.	0.50	4.00	1.49	1.00	1.00	1.00
Redbud	0.25	3.00	1.12	0.68	1.00	0.68
Poison ivy	0.10	8.00	2.99	1.54	4.00	0.39
Yucca	0.10	1.00	0.37	0.24	1.00	0.24
Mistletoe	1.10	5.00	1.87	1.48	1.00	1.48
Agarita	0.10	1.00	0.37	0.24	1.00	0.24
Total Browse	32.43					
Grass						
Dicanthelium	1.10	5.00	1.87	1.48	3.00	0.49
Sideoats grama	0.50	2.00	0.75	0.62	2.00	0.31
Little bluestem	0.10	1.00	0.37	0.24	4.00	0.06
Texas grama	0.10	1.00	0.37	0.24	1.00	0.24
Rescue grass	0.33	3.00	1.12	0.72	2.00	0.36
Silver bluestem	0.10	2.00	0.75	0.42	3.00	0.14
Curlymesquite	0.33	4.00	1.49	0.91	2.00	0.46
Unidentified grasses	1.20					
Total Grass	3.76					
Forbs						
Catnip noseburn	0.66	4.00	1.49	1.08	3.00	0.36
Yellow woodsorrel	0.15	3.00	1.12	0.63	2.00	0.32
Stork's bill	0.25	3.00	1.12	0.68	1.00	0.68
Croton	0.25	3.00	1.12	0.68	2.00	0.34
Prickly lettuce	0.10	2.00	0.75	0.42	1.00	0.42
Mat euphorbia	0.50	5.00	1.87	1.18	1.00	1.18
Snoutbean	0.33	5.00	1.87	1.10	1.00	1.10
Wild mercury	0.25	5.00	1.87	1.06	1.00	1.06
Chickweed	0.33	4.00	1.49	0.91	1.00	0.91
Deer pea vetch	0.25	4.00	1.49	0.87	1.00	0.87
Beggar's tick	0.10	2.00	0.75	0.42	2.00	0.21
Lespedeza	0.75	8.00	2.99	1.87	1.00	1.87
Bush clover	0.85	9.00	3.36	2.10	1.00	2.10
Unidentified Forbs	2.15					

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Fall, 1997. Continued						
Total Forbs	6.92					
Mast						
Acorns	30.66	26.00	9.70	20.18	1.00	20.18
Prickly pear fruit	1.75	6.00	2.24	1.99	1.00	1.99
Total Mast	32.41					
Food Plots						
Oats/Wheat	6.50	12.00	4.48	5.49	1.00	5.49
Lab Lab	0.33	2.00	0.75	0.54	1.00	0.54
Total Food Plots	6.83					
Commercial Feed						
Corn	16.50	24.00	8.96	12.73	1.00	12.73
Pelleted feed	1.15	5.00	1.87	1.51	3.00	0.50
Total Commercial Feed	17.65					

APPENDIX 10

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Winter, 1998.						
SPECIES	**Percent Comp**	**Frequency**	**Relative Frequency**	**Importance Value**	**Availability Factor**	**Preference**
Browse						
Cedar elm	1.15	12.00	4.84	2.99	3.00	1.00
Oak	12.75	30.00	12.10	12.42	5.00	2.48
Greenbriar	3.75	21.00	8.47	6.11	4.00	1.53
Bumelia	1.15	3.00	1.21	1.18	4.00	0.29
Skunkbush	4.33	12.00	4.84	4.58	5.00	0.92
Hackberry	0.50	3.00	1.21	0.85	1.00	0.85
Elbowbush	1.15	5.00	2.02	1.58	3.00	0.53
Ashe juniper	1.50	10.00	4.03	2.77	4.00	0.69
Poison ivy	0.10	2.00	0.81	0.45	4.00	0.11
Ilex sp.	0.50	6.00	2.42	1.46	1.00	1.46
Yucca	0.10	1.00	0.40	0.25	1.00	0.25
Mistletoe	1.25	11.00	4.44	2.84	1.00	2.84
Agarita	0.10	1.00	0.40	0.25	1.00	0.25
Total Browse	28.33					
Grass						
Dicanthelium	2.50	4.00	1.61	2.06	2.00	1.03
Sideoats grama	0.66	2.00	0.81	0.73	1.00	0.73
Little bluestem	0.33	2.00	0.81	0.57	2.00	0.28
Texas grama	0.25	1.00	0.40	0.33	1.00	0.33
Three-awn	0.10	1.00	0.40	0.25	1.00	0.25
Green sprangletop	1.00	10.00	4.03	2.52	2.00	1.26
Plains lovegrass	0.33	5.00	2.02	1.17	1.00	1.17
Rescue grass	0.50	5.00	2.02	1.26	2.00	0.63
Texas wintergrass	2.75	16.00	6.45	4.60	3.00	1.53
Unidentified grasses	5.10					
Total Grass	13.52					
Forbs						
Mat euphorbia	2.50	7.00	2.82	2.66	1.00	2.66
Wild carrot	1.10	6.00	2.42	1.76	2.00	0.88
Yellow woodsorrel	1.50	6.00	2.42	1.96	2.00	0.98
Chickweed	0.75	3.00	1.21	0.98	1.00	0.98
Wild onion	1.50	6.00	2.42	1.96	1.00	1.96
Western ragweed	2.20	13.00	5.24	3.72	2.00	1.86
Croton	2.10	2.00	0.81	1.45	1.00	1.45
Prairie bishop's weed	0.25	2.00	0.81	0.53	1.00	0.53
Plantain	0.25	3.00	1.21	0.73	2.00	0.36
Unidentified Forbs	4.90					
Total Forbs	17.05					
Mast						
Acorns	17.55	22.00	8.87	13.21	1.00	13.21
Food Plots						
Oats/Wheat	12.50		0.00	6.25	1.00	6.25

Food habits of white-tailed deer in the Cross Timbers Ecological Region of north central Texas, Winter, 1998. Continued						
Commercial Feed						
Corn	**7.25**	**11.00**	**4.44**	**5.84**	**1.00**	**5.84**
Pelleted feed	**2.75**	**4.00**	**1.61**	**2.18**	**3.00**	**0.73**
Total Commercial Feed	**10.00**					
Unidentified Plant Material	**1.05**					

APPENDIX 11

Data collected from white-tailed deer during the food habits study in the Cross Timbers and Prairies Ecological Region of Texas study, 1996-1998.

DEER	LIVE WEIGHT (lbs.)	DRESSED WEIGHT (lbs.)	SEX	AGE	DATE	RUMEN VOLUME (ML)	KIDNEY (KFI)	COUNTY
1518	75	55	M	1	08-May-96	2500	52	PARKER
1519	100	68	F	2	08-May-96	2850	83	PARKER
1520	116	73	F	8	08-May-96	3200	68	PARKER
1521	120	74	F	5	08-May-96	3750	76	PARKER
1522	118	70	F	3	08-May-96	3000	30	PARKER
1523	89	60	F	2	09-May-96	1900	15	WISE
1524	68	45	F	1	09-May-96	900	16	WISE
1525	78	55	M	1	09-May-96	2900	8	WISE
1526	79	60	M	2	09-May-96	3200	4	WISE
1527	129	78	F	6	09-May-96	3300	16	WISE
1528	112	70	F	3	09-May-96	2200	26	WISE
1529	60	45	F	1	16-May-96	2200	6	BOSQUE
1530	102	71	M	2	16-May-96	5600	11	BOSQUE
1531	104	70	F	8	16-May-96	3600	13	BOSQUE
1532	97	63	F	3	16-May-96	2200	10	BOSQUE
1533	102	63	F	3	16-May-96	3100	12	BOSQUE
1534	135	87	F	4	20-May-96	3200	26	JACK
1535	138	102	M	2	20-May-96	5000	34	JACK
1536	70	55	F	1	20-May-96	NA	3	JACK
1537	80	50	F	1	20-May-96	2800	8	JACK
1538	75	55	F	1	20-May-96	3400	8	JACK
1539	90	65	F	7	21-May-96	4000	16	ERATH
1540	107	66	F	1	21-May-96	3000	24	ERATH
1541	110	78	F	2	21-May-96	4000	28	ERATH
1542	76	55	F	1	21-May-96	2000	19	ERATH
1543	116	80	F	2	21-May-96	3500	47	ERATH
1544	62	45	F	2	22-May-96	2700	0	BROWN
1545	39	26	F	1	22-May-96	2000	4	BROWN
1546	59	40	F	1	22-May-96	2800	0	BROWN
1547	80	50	F	4	22-May-96	3400	5	BROWN
1548	45	32	M	1	22-May-96	2100	0	BROWN
1549	75	55	F	1.25	12-Aug-96	4000	6	JACK
1550	75	52	F	2.25	12-Aug-96	3600	3	JACK
1551	35	25	F	0.25	12-Aug-96	1100	5	JACK
1552	30	20	F	0.25	12-Aug-96	850	2	JACK
1553	30	21	M	0.25	12-Aug-96	1000	2	JACK
1554	75	52	F	3.25	13-Aug-96	3500	9	WISE
1555	70	50	F	2.25	13-Aug-96	2800	9	WISE
1556	82	51	F	2.25	13-Aug-96	3200	9	WISE
1557	21	18	M	0.25	13-Aug-96	550	5	WISE
1558	82	52	F	3.25	13-Aug-96	4000	5	WISE
1559	90	70	F	2.25	14-Aug-96	3300	30	PARKER
1560	65	50	F	1.25	14-Aug-96	2500	10	PARKER
1561	100	69	F	4.25	14-Aug-96	4100	7	PARKER
1562	89	62	F	3.25	14-Aug-96	4000	8	PARKER
1563	91	70	F	2.25	14-Aug-96	3600	5	PARKER
1564	80	55	F	2.25	19-Aug-96	4100	4	BROWN

1565	62	45	F	3.25	19-Aug-96	2500	5	BROWN
1566	41	30	F	1.25	19-Aug-96	2200	1	BROWN
1567	85	55	F	6	19-Aug-96	6000	4	BROWN
1568	90	58	F	5.25	19-Aug-96	6800	5	BROWN
1569	48	34	M	1.25	19-Aug-96	2200	2	BROWN
1570	80	61	F	1.25	20-Aug-96	2000	20	ERATH
1571	84	48	F	1.25	20-Aug-96	3400	9	ERATH
1572	120	86	F	4.25	20-Aug-96	5700	13	ERATH
1573	70	55	F	1.25	20-Aug-96	2000	6	ERATH
1574	80	64	F	1.25	20-Aug-96	2400	12	ERATH
1575	93	65	F	3.25	21-Aug-96	4100	10	BOSQUE
1576	98	72	F	3.25	21-Aug-96	3600	8	BOSQUE
1577	80	55	F	5.25	21-Aug-96	3700	2	BOSQUE
1578	83	60	F	2.25	21-Aug-96	2400	14	BOSQUE
1579	75	55	M	1.25	21-Aug-96	2400	3	BOSQUE
1580	95	70	F	1.5	09-Nov-96	3600	25	JACK
1581	100	70	F	3.5	09-Nov-96	5900	18	JACK
1582	115	80	F	4.5	09-Nov-96	2800	12	JACK
1583	105	80	F	4.5	09-Nov-96	3500	11	JACK
1584	85	65	F	1.5	09-Nov-96	4100	15	JACK
1585	89	70	F	2.5	13-Nov-96	2100	31	PARKER
1586	139	106	M	3.5	13-Nov-96	5200	16	PARKER
1587	105	74	F	2.5	13-Nov-96	5200	21	PARKER
1588	95	74	F	2.5	13-Nov-96	3700	35	PARKER
1589	50	35	F	0.5	13-Nov-96	2600	6	PARKER
1590	93	68	F	5.5	22-Nov-96	3200	26	BROWN
1591	38	30	F	0.5	22-Nov-96	400	13	BROWN
1592	77	58	F	4.5	22-Nov-96	2500	32	BROWN
1593	73	59	F	4.5	22-Nov-96	1500	44	BROWN
1594	81	63	F	3.5	22-Nov-96	2300	36	BROWN
1595	138	116	M	2.5	25-Nov-96	3200	12	BOSQUE
1596	57	46	F	0.5	25-Nov-96	1900	5	BOSQUE
1597	105	83	F	3.5	25-Nov-96	3200	37	BOSQUE
1598	117	94	F	6.5	25-Nov-96	3200	65	BOSQUE
1599	80	65	M	0.5	25-Nov-96	1500	14	BOSQUE
2001	90	72	F	4.5	03-Dec-96	N/A	N/A	ERATH
2002	93	75	F	4.5	22-Nov-96	N/A	N/A	ERATH
2003	87	70	F	2.5	23-Nov-96	N/A	N/A	ERATH
2004	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ERATH
2005	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ERATH
2006	99	48	F	N/A	02-Nov-96	N/A	N/A	WISE
2007	142	90	M	N/A	02-Nov-96	N/A	N/A	WISE
2008	112	70	M	N/A	02-Nov-96	N/A	N/A	WISE
2009	47	28	F	N/A	02-Nov-96	N/A	N/A	WISE
2010	59	37	F	N/A	02-Nov-96	N/A	N/A	WISE
1101	53	36	F	0.75	31-Dec-97	1600	22	ERATH
1102	92	67	F	3.75	31-Dec-97	1500	45	ERATH
1103	51	40	F	0.75	31-Dec-97	1300	16	ERATH
1104	57	44	F	0.75	31-Dec-97	2000	26	ERATH
1105	52	40	F	0.75	31-Dec-97	2900	9	ERATH
1106	120	100	F	3.75	01-Feb-97	2400	68	JACK
1107	90	70	F	2.75	01-Feb-97	1600	46	JACK
1108	110	90	F	3.75	01-Feb-97	1300	95	JACK
1109	90	70	F	1.75	01-Feb-97	1200	41	JACK
1110	100	75	F	6.75	01-Feb-97	2800	44	JACK
1111	74	54	F	2.75	02-Feb-97	2400	15	WISE

1112	83	59	F	7	02-Feb-97	4500	4	WISE
1113	85	61	F	6.75	02-Feb-97	4000	3	WISE
1114	72	53	F	1.75	02-Feb-97	4000	10	WISE
1115	81	60	F	5.75	02-Feb-97	3000	12	WISE
1116	63	47	F	2.75	14-Feb-97	2800	4	BROWN
1117	73	54	M	3.75	14-Feb-97	3100	6	BROWN
1118	75	53	F	3.75	14-Feb-97	4000	18	BROWN
1119	77	56	M	1.75	14-Feb-97	4100	6	BROWN
1120	91	65	F	4.75	14-Feb-97	3200	26	BROWN
1121	102	75	F	4.75	15-Feb-97	2000	30	BOSQUE
1122	92	70	F	2.75	15-Feb-97	2100	44	BOSQUE
1123	100	74	F	4.75	15-Feb-97	2000	17	BOSQUE
1124	85	60	F	2.75	15-Feb-97	2000	17	BOSQUE
1125	90	68	F	1.75	15-Feb-97	2400	35	BOSQUE
1126	84	62	F	3.75	16-Feb-97	2500	46	PARKER
1127	75	52	F	7	16-Feb-97	3700	11	PARKER
1128	93	65	F	3.75	16-Feb-97	3200	6	PARKER
1129	48	35	M	0.75	16-Feb-97	2100	2	PARKER
1130	96	75	M	2.75	16-Feb-97	2800	10	PARKER
1131	110	70	F	7	22-May-97	3600	14	WISE
1132	105	63	F	6	22-May-97	N/A	6	WISE
1133	95	69	M	2	22-May-97	4000	11	WISE
1134	105	68	F	4	22-May-97	3200	8	WISE
1135	115	71	F	6	22-May-97	3300	17	WISE
1136	52	38	F	1	24-May-97	2300	3	BROWN
1137	65	45	F	2	24-May-97	3800	6	BROWN
1138	88	58	F	2	24-May-97	2000	11	BROWN
1139	60	45	M	1	24-May-97	2000	0.5	BROWN
1140	82	49	F	6	24-May-97	3400	10	BROWN
1141	92	65	F	2	25-May-97	3200	34	JACK
1142	130	80	F	5	25-May-97	2400	36	JACK
1143	60	45	F	1	25-May-97	2000	1	JACK
1144	62	46	F	1	25-May-97	2100	5	JACK
1145	85	55	M	1	25-May-97	3300	9	JACK
1146	94	70	F	7	26-May-97	2200	23	BOSQUE
1147	100	70	F	5	26-May-97	3000	14	BOSQUE
1148	95	71	F	3	26-May-97	3500	15	BOSQUE
1149	97	65	F	3	26-May-97	2000	16	BOSQUE
1150	96	66	F	2	26-May-97	2300	18	BOSQUE
1151	119	76	F	2	27-May-97	2200	21	PARKER
1152	75	59	M	1	27-May-97	2000	6	PARKER
1153	73	55	M	1	27-May-97	2100	10	PARKER
1154	125	95	M	3	27-May-97	2400	25	PARKER
1155	83	61	F	2	27-May-97	4000	9	PARKER
1156	85	65	M	2	28-May-97	2000	9	ERATH
1157	75	60	F	2	28-May-97	2000	18	ERATH
1158	90	65	F	4	28-May-97	3500	9	ERATH
1159	75	55	F	1	28-May-97	2000	8	ERATH
1160	68	50	F	1	28-May-97	2000	11	ERATH
1161	94	61	F	5.25	15-Aug-97	6000	5	BOSQUE
1162	99	65	F	3.25	15-Aug-97	5200	9	BOSQUE
1163	78	56	F	1.25	15-Aug-97	4000	7	BOSQUE
1164	60	41	F	2.25	15-Aug-97	3300	3	BOSQUE
1165	88	52	F	3.25	15-Aug-97	5800	3	BOSQUE
1166	115	90	F	2.25	16-Aug-97	3600	12	JACK
1167	140	105	F	4.25	16-Aug-97	6000	12	JACK

1168	105	75	F	2.25	16-Aug-97	4400	8	JACK
1169	85	70	F	1.25	16-Aug-97	2000	9	JACK
1170	122	90	F	3.25	16-Aug-97	4500	11	JACK
1171	75	52	F	2.25	17-Aug-97	4200	4	WISE
1172	60	45	F	1.25	17-Aug-97	2200	10	WISE
1173	83	55	F	4.25	17-Aug-97	4000	8	WISE
1174	83	57	F	3.25	17-Aug-97	4000	2	WISE
1175	83	61	F	4.25	17-Aug-97	2400	16	WISE
1176	88	66	F	1.25	22-Aug-97	2800	21	ERATH
1177	34	24	F	0.25	22-Aug-97	1400	4	ERATH
1178	34	22	F	0.25	22-Aug-97	1200	5	ERATH
1179	78	58	F	1.25	22-Aug-97	2400	13	ERATH
1180	100	72	F	3.25	22-Aug-97	3200	29	ERATH
1181	96	64	F	2.25	23-Aug-97	4200	4	PARKER
1182	90	61	F	3.25	23-Aug-97	4000	6	PARKER
1183	90	68	F	2.25	23-Aug-97	2800	10	PARKER
1184	95	67	F	4.25	23-Aug-97	3600	14	PARKER
1185	100	70	F	3.25	23-Aug-97	4200	4	PARKER
1186	82	52	F	5.25	24-Aug-97	6100	6	BROWN
1187	48	32	F	1.25	24-Aug-97	2400	1	BROWN
1188	72	48	F	3.25	24-Aug-97	3600	4	BROWN
1189	70	44	F	3.25	24-Aug-97	4200	6	BROWN
1190	76	50	F	7	24-Aug-97	4300	1	BROWN
1191	89	66	F	6.5	14-Nov-97	3200	7	BROWN
1192	31	22	F	0.5	14-Nov-97	1200	2	BROWN
1193	65	47	F	4.5	14-Nov-97	3200	26	BROWN
1194	56	40	F	4.5	14-Nov-97	3200	1	BROWN
1195	83	64	M	2.5	14-Nov-97	2400	18	BROWN
3696	86	68	F	2.5	15-Nov-97	2000	43	ERATH
3697	56	42	M	0.5	15-Nov-97	2000	23	ERATH
3698	100	77	F	2.5	15-Nov-97	2100	48	ERATH
3699	99	74	F	2.5	15-Nov-97	3100	48	ERATH
3700	86	67	F	1.5	15-Nov-97	2400	21	ERATH
3671	54	41	M	0.5	16-Nov-97	N/A	12	BOSQUE
3672	90	67	F	6	16-Nov-97	3200	20	BOSQUE
3673	84	62	F	2.5	16-Nov-97	2800	23	BOSQUE
3674	98	74	F	3.5	16-Nov-97	4000	35	BOSQUE
3675	106	83	F	2.5	16-Nov-97	3600	56	BOSQUE
3701	80	52	F	N/A	28-Nov-97	N/A	N/A	WISE
3702	37	22	F	0.5	28-Nov-97	N/A	N/A	WISE
3703	87	72	F	N/A	28-Nov-97	N/A	N/A	WISE
3704	153	121	M	3.5	29-Nov-97	N/A	N/A	WISE
3705	70	54	M	N/A	30-Nov-97	N/A	N/A	WISE
3706	N/A	N/A	F	N/A	20-Dec-97	N/A	N/A	PARKER
3707	N/A	N/A	M	0.5	20-Dec-97	N/A	N/A	PARKER
3708	N/A	N/A	M	1.5	21-Dec-97	N/A	N/A	PARKER
3709	N/A	N/A	N/A	N/A	N/A	N/A	N/A	PARKER
3710	N/A	N/A	N/A	N/A	N/A	N/A	N/A	PARKER
150	N/A	N/A	N/A	N/A	Jan-98	N/A	N/A	JACK
151	N/A	N/A	N/A	N/A	Jan-98	N/A	N/A	JACK
152	N/A	N/A	N/A	N/A	Jan-98	N/A	N/A	JACK
153	N/A	N/A	N/A	N/A	Jan-98	N/A	N/A	JACK
154	N/A	N/A	N/A	N/A	Jan-98	N/A	N/A	JACK
500	31	26	F	0.75	30-Jan-98	1300	13	BROWN
501	36	27	M	0.75	30-Jan-98	800	8	BROWN
502	78	60	F	4.75	30-Jan-98	1700	76	BROWN

503	67	52	F	2.75	30-Jan-98	1300	33	BROWN
504	76	58	F	5.75	30-Jan-98	1600	48	BROWN
505	50	38	F	0.75	31-Jan-98	1600	12	JACK
506	62	49	F	0.75	31-Jan-98	1600	14	JACK
507	110	84	F	2.75	31-Jan-98	4300	36	JACK
508	60	47	F	0.75	31-Jan-98	1600	10	JACK
509	112	92	F	5.75	31-Jan-98	2400	52	JACK
510	44	33	F	0.75	01-Feb-98	400	24	WISE
511	54	42	M	0.75	01-Feb-98	1200	12	WISE
512	108	84	M	2.75	01-Feb-98	2800	32	WISE
513	102	81	F	3.75	01-Feb-98	1200	92	WISE
514	90	71	F	4.75	01-Feb-98	2000	43	WISE
516	58	48	F	0.75	13-Feb-98	2000	26	ERATH
517	68	54	F	0.75	13-Feb-98	2000	33	ERATH
518	85	68	F	2.75	13-Feb-98	1200	89	ERATH
519	69	56	M	0.75	13-Feb-98	2000	10	ERATH
520	70	54	M	0.75	13-Feb-98	1800	38	ERATH
521	90	70	M	2.75	14-Feb-98	1600	19	PARKER
522	96	72	F	6	14-Feb-98	2000	67	PARKER
523	116	82	F	2.75	14-Feb-98	1600	80	PARKER
524	98	74	F	3.75	14-Feb-98	1200	37	PARKER
525	88	68	F	2.75	14-Feb-98	1600	64	PARKER
526	88	64	F	3.75	15-Feb-98	1200	35	BOSQUE
527	76	56	M	1.75	15-Feb-98	4000	13	BOSQUE
528	88	66	M	1.75	15-Feb-98	2100	16	BOSQUE
529	70	52	F	1.75	15-Feb-98	2200	29	BOSQUE
530	40	32	F	0.75	15-Feb-98	1200	4	BOSQUE

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