Stem Count Index

A Habitat Appraisal Method for South Texas

TEXAS PARKS & WILDLIFE

STEM COUNT INDEX
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by Jimmy Rutledge, Ty Bartoskewitz and Alan Cain

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INTRODUCTION

Habitat is the cornerstone of wildlife management. Plant communities, an important component of habitat, are composed of forbs, grasses, woody plants and cacti. Healthy habitats sustain our native wildlife populations. Browsing of woody plants by white-tailed deer and domestic livestock may have tremendous impacts on native habitats in Texas. Excessive browsing may lead to decreased plant vigor, increased disease susceptibility, or decreased reproduction and seedling establishment. Stresses such as these could potentially cause the disappearance of some plant species important to wildlife habitat. Consequently, biologists need a quantifiable method to measure deer and livestock impacts on the vegetation to assist managers in making sound wildlife and ranch management decisions.

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This is an example of a diverse woody plant community in South Texas.

DEER AND HABITAT

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Erect Dayflower, a preferred forb

Diet studies of white-tailed deer conducted in South Texas have demonstrated that deer prefer forbs to woody plants and cacti (Drawe 1968, Chamrad and Box 1968, Arnold and Drawe 1979, Everitt and Gonzalez 1981). However, South Texas climates are characterized by frequent droughts, limiting forb availability. While all components of habitat are extremely important, the focus of the stem count index method (SCI) is on the woody plant community, the most dependable component of habitat. Cursory observations are recorded during site evaluations about the presence or abundance of prickly pear, perennial grasses (both native and introduced) and perennial forbs.

Within the woody plant community, white-tailed deer have preferences; some species are more palatable to deer than others. The most palatable plants receive the most browsing pressure. However, on ranges with low woody plant diversity, less palatable species may receive heavier use. In South Texas, rainfall decreases from east to west (Appendix 1). Shrub palatability and occurrence differs along this gradient (Appendix 2 and 3).

Moderate browsing stimulates the sprouting of lateral buds along stems and increases the number of stem tips available, which is beneficial. However, negative impacts to woody plants occur when over-browsing or severe pruning affects the plant's ability to capture sunlight and convert it to food through photosynthesis, thereby shrinking and weakening the root system.

Plants with weakened root systems are often characterized by dying branches and a relatively unhealthy appearance. During extended periods of drought these plants are most vulnerable to death. When this occurs, the most preferred species of plant communities could be lost, compromising habitat quality.

Supplemental feeding of deer to counteract drought effects is now a common practice. Although some offer opinions suggesting supplemental feeding alleviates impacts of high deer densities by relieving browsing pressure of woody plants, there is mounting evidence to the contrary. Preliminary research results in South Texas indicate that supplemental feeding has relatively little affect on how deer utilize native habitats except for some of the most unpalatable plants, third choice species. In fact, moderate and high deer densities have been shown to reduce forb canopy cover regardless of supplemental feeding, and white-tailed does with access to supplemental food consumed more forbs than those without access to feed. (DeYoung et al 2007). Deer densities appear to be correlated with utilization of native forages regardless of supplemental feeding. Although supplemental feed may be a successful tool in deer management, it does not offset the impacts of high deer densities and does not replace native habitats.

Example of cursory observations:

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Top photo illustrates Brasil plants with severe hedging.

The coma shrub in the photo to the right represents an unhealthy plant as a result of severe pruning over time.

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HISTORY

In the past, cursory habitat evaluation surveys have provided biologists with a limited ability to quantify browsing of woody plants. An early survey method developed by the late Dan Lay, wildlife biologist with the Texas Parks and Wildlife Department (TPWD), measured impacts of deer and cattle stocking intensity by monitoring browse use on plants in East Texas (Lay 1967). Lay's method sampled multiple circular plots within major vegetation types on a property and estimated percent utilization of all woody species with greater than 20 percent occurrence within the plot. The utilization estimates were determined by ocular accounts and were categorized as specific values of 0, 5, 30 and 70 percent use. The categorized values were the midpoints of utilization ranges, 0–10 percent, 10–50 percent, and greater than 50 percent. Lay conducted surveys in the winter to ensure a complete year's growth was sampled and browse use on less palatable species could be detected. Individual species were categorized into first, second and third choice palatability classifications according to preference by deer. Palatability classification of plants were determined by 10 years of monitoring browse use in deer pens and more than 100 browse surveys on East Texas deer range. Once surveys were completed for a particular area, the data were summarized by species and palatability classification. The results provided an average utilization for each palatability class and a quantifiable number to associate with deer only or deer and cattle use on a property. By comparing browse survey results to a stocking intensity table developed by Lay, biologists had an idea of how deer and livestock densities impacted the habitat in East Texas (Table 1). Each ecological region of Texas will have its own unique stocking intensity table.

Table 1: Browse utilization indices by palatability class for East Texas range stocked at different intensities (Lay 1967).

Palatability Classification	**Stocking Intensity**		
	Light	Moderate	Heavy
Browse:	**Deer only**		
First choice	35	55	60
Second choice	10	30	40
Third choice	1	5	15
Browse:	**Deer and Cattle**		
First choice	45	55	65
Second choice	20	35	45
Third choice	5	10	25

STEM COUNT INDEX

In the mid 1980s, Jim Yantis, retired TPWD wildlife biologist, refined Lay's method by further addressing sampling issues and making the method more applicable to other ecological regions. Yantis' modification of Lay's method is the basis for current TPWD stem count surveys conducted across the state (Yantis, unpublished data). Plant communities and plant response to browsing vary widely across the state; thus, TPWD biologists continue to modify and adjust the survey method to fit the various ecological regions.

Evaluating the use of key species or key areas to determine animal impacts to rangeland habitats is an established concept of range management. This concept dictates sampling sites be selected away from areas of concentrated animal activity, insuring that representative sites of habitat condition are sampled. Examples include permanent feeders, dependable water sources, food plots and areas of recent mechanical treatments such as aeration, roller chopping, rootplowing or prescribed burning. This sampling strategy is the basis for habitat evaluations or rangeland appraisal techniques including the SCI.

Following Lay's method, Yantis selected sampling sites in major vegetation types. However, Yantis' method samples individual species within an area rather than sampling within a circular plot. A minimum of three different plants per species are sampled until 100 stem tips are counted, with no more than 34 stem tips counted on any individual plant. This minimizes the bias of counting a particular plant that has been heavily browsed. All stem tips sampled should be within a deer's reach. One hundred stem tips sampled per species constitutes an **encounter**. Multiple species should be sampled at each site/stop, but encounters for the same species must be at least 30 yards apart, preferably 100 yards if sampled at the same stop. Stem tips browsed only by cattle, deer or exotic ungulates are counted utilizing this technique. Rodent or rabbit bites are not included. Rodent and rabbit bites can be identified by the angle and shape of the cut and the absence of a tuft of plant material.

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RODENT BITE
Because of their paired incisors, rabbits and rodents have a characteristic 45-degree bite on the stem tip.

DEER OR CATTLE BITE
Notice the tuft of plant fiber at the end of the bitten stem tip.

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Tim Fulbright

Figure 1

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The first step of a SCI is to determine soil types, their accompanying ecological sites, and their abundance and distribution across the property. A published soils survey is necessary to locate the different ecological sites that occur on the ranch. If possible, it is best to sample in every significant ecological site.

Upon arrival at the pre-selected site, take note of species distribution and composition. Begin counting stem tips within reach of a deer. Care should be taken to avoid sampling plants along cattle or deer trails. A tally counter is used to count the number of browsed stem tips (Figure 1). Once the more common species have been sampled at a site, observers move to a new site and repeat the sampling process.

Data are compiled and analyzed once sampling on a ranch has been completed. Plants are grouped by palatability classifications of first, second or third choice (Appendix 4). The total number of bites counted is divided by the total number of stem tips counted for each individual species to determine percent of stem tips bitten (Appendix 2 and 3). All species in a palatability class can be averaged to determine percent use. These values are then compared to a stocking intensity table developed for each ecological region (see Tables 1 and 2 for examples). Biologists use this information to make assessments about the health and quality of the habitat. Specifically, these data are used to adjust management recommendations including stocking rates of livestock and deer.

This technique does not measure the amount of forage consumed but serves as an index of the percentage of stem tips bitten. Cooperative long-term research is underway in South Texas to test the technique in habitats with known deer densities, with and without supplemental feed, and across differing climatic conditions. Preliminary data analysis indicates that SCI values are sensitive to differing densities of white-tailed deer (Table 2). Low diversity and preference of species within a palatability class will influence overall values (Table 3).

Table 2: Browse utilization by palatability classes for known deer densities in 2005. Deer densities: low = 14 acres per deer; moderate = 9 acres per deer; high = 4 acres per deer.

	Palatability Classes		
Stocking Intensity	**1st**	**2nd**	**3rd**
Low	36	12	6
Moderate	43	19	6
High	45	27	11

Table 3: Browse utilization by palatability classes for known deer densities in 2005. Granjeno and kidneywood values for each of the density levels are listed separately to illustrate the different results of two first choice species. Deer densities: low = 14 acres per deer; moderate = 9 acres per deer; high = 4 acres per deer. The number of encounters per palatability class is denoted by "n."

		Granjeno		Kidneywood	
	1st	% use	n	% use	n
Low	**36**	29	17	46	10
Moderate	**43**	33	14	54	11
High	**45**	45	21	–	–

Yantis selected species that had limited variation in estimation of use between different observers. We have determined through numerous staff training sessions, data analyses and staff discussions that there are several South Texas species that cannot be read consistently between observers. First-choice browse species such as guayacan and vine ephedra are examples of plants that should not be included in sampling because of inconsistent results.

SAMPLING INTENSITY

The SCI technique is evolving into a very good range appraisal method for determining stocking intensity of domestic livestock and white-tailed deer, and is designed to provide a quick and quantifiable assessment of habitat. The optimal time period to conduct the evaluation in South Texas is from January through early March. This short window of opportunity limits the number of ranch properties biologists can sample. Four years of stem counts by TPWD staff across 30 counties in South Texas have provided some insight on sampling intensity for this technique. Data presented within this publication were compiled from data collected by Wildlife Division District 8 staff from over 300 South Texas ranches.

On average, an experienced individual can count about 4,000 stem tips or 40 encounters per day. This will vary depending upon habitat diversity, distance or drive time between sampling locations, or the presence of others during the survey. An observer usually samples 500 to 700 stems at each sampling site. Ranches with a diverse assemblage of browse species increase the opportunity for sample size. Diverse ranches in South Texas often have more than 30 woody plant species present. Survey efforts concentrate primarily on browse plants within first and second choice palatability classes rather than all available browse plants. Ranches with a low diversity of browse species as a result of historic land management practices or poor soils generally will have fewer species available for sampling. In this case more second or third choice species may need to be sampled.

Normally, an observer will have one or two encounters of a individual plant species at each stop. Sites with low plant diversity (two to four species) tend to increase the likelihood of multiple encounters with the same plant species at a stop. Ultimately, the number of unique plants available at each stop will determine the number of plant species on your data sheet.

The quality and network of ranch roads and ranch maps influence sample size. A good road system enables easy access to pre-selected sampling sites. Quality maps enable individuals unfamiliar with the ranch to navigate easily and eliminate time between sampling sites. Rough and impassable ranch roads increase the amount of driving time required to reach sampling locations. GPS receivers are useful for recording the location of sampling sites and travel routes to sites for future use.

Ranch personnel often join individuals conducting the SCI evaluation. Additional time is usually spent teaching the stem count technique, identifying plant species or discussing wildlife management practices on the ranch.

Ranch size, diversity of ecological sites, and the number of observers conducting the habitat evaluation determine sample size, **efficiency**, and the number of stem tips counted on a ranch. Ranch size is the major variable affecting the total number of stem tips counted. Ranches exceeding 15,000 acres generally take more than one day to sample with multiple observers to obtain adequate coverage. Large ranches will naturally encompass a greater diversity of soils. Ranches with undisturbed habitats and a diversity of soils will yield more available stems to sample because of increased plant species diversity. Multiple observers increase stem sample size and decrease the time required to evaluate a property. Large ranches (>50,000 acres) can be counted using multiple observers with multiple vehicles sampling different areas of the ranch concurrently.

How many stems should you count? Data analyses and field experience have resulted in sample size goals based on property size. Sampling experience indicates ranches up to 3,000 acres should have a minimum sample size of 3,000 stems. Experience also indicates that as sample size increases above 3,000 stems, the results do not change significantly. Small percentile changes in the average number of stem tips browsed for each palatability class are insignificant because of the range of values used in the stocking intensity table (Table 2). Additionally, smaller ranches will have fewer ecological sites and limited opportunities for sampling. A sample size of 3,000 stems, based on an average of 600 stems per stop, requires a minimum of five sampling locations. Most small ranches will not exhibit more than five individual ecological sites.

Thereafter, the approximate number of stems sampled should equal ranch size. For example, a 31,000 acre ranch would have a sample size goal of at least 31,000 stems. Sampling at intensities greater than those mentioned is preferred. However, time constraints and limited personnel have molded the process to be as efficient as possible.

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Land managers can use observations in the field to help establish trends in habitat or individual plant health. The picture on the left illustrates a kidneywood plant with light use in Jim Hogg County. Notice the elongated length of stem tips and shoots, and the production of leafy material within reach of a deer. The picture above illustrates a kidneywood plant with signs of heavy use by deer in Dimmit County.

CONCLUSION

Healthy habitats are the foundation for sustained, long-term populations of all species. It is simply not enough to know which plants deer eat; rather, it is more important to know the effects deer and other browsing animals have on the plant community or habitat. Without a reliable monitoring method, assessment of habitat quality and condition may be noticed at a stage so far advanced that degradation to the habitat has already occurred.

The SCI method used by TPWD appears to be a reliable index of deer density and a relative measure of browsing pressure on South Texas habitats. Use of all woody browse species is generally greatest in high density areas, and the use of second-choice browse species is strongly correlated with deer density (DeYoung et al 2007).

Managers may use SCI survey results combined with harvest data and population survey data to make more reliable assessments of the health of the deer herd and habitat. These informed decisions help maintain healthy habitats to support a diversity of game and nongame species.

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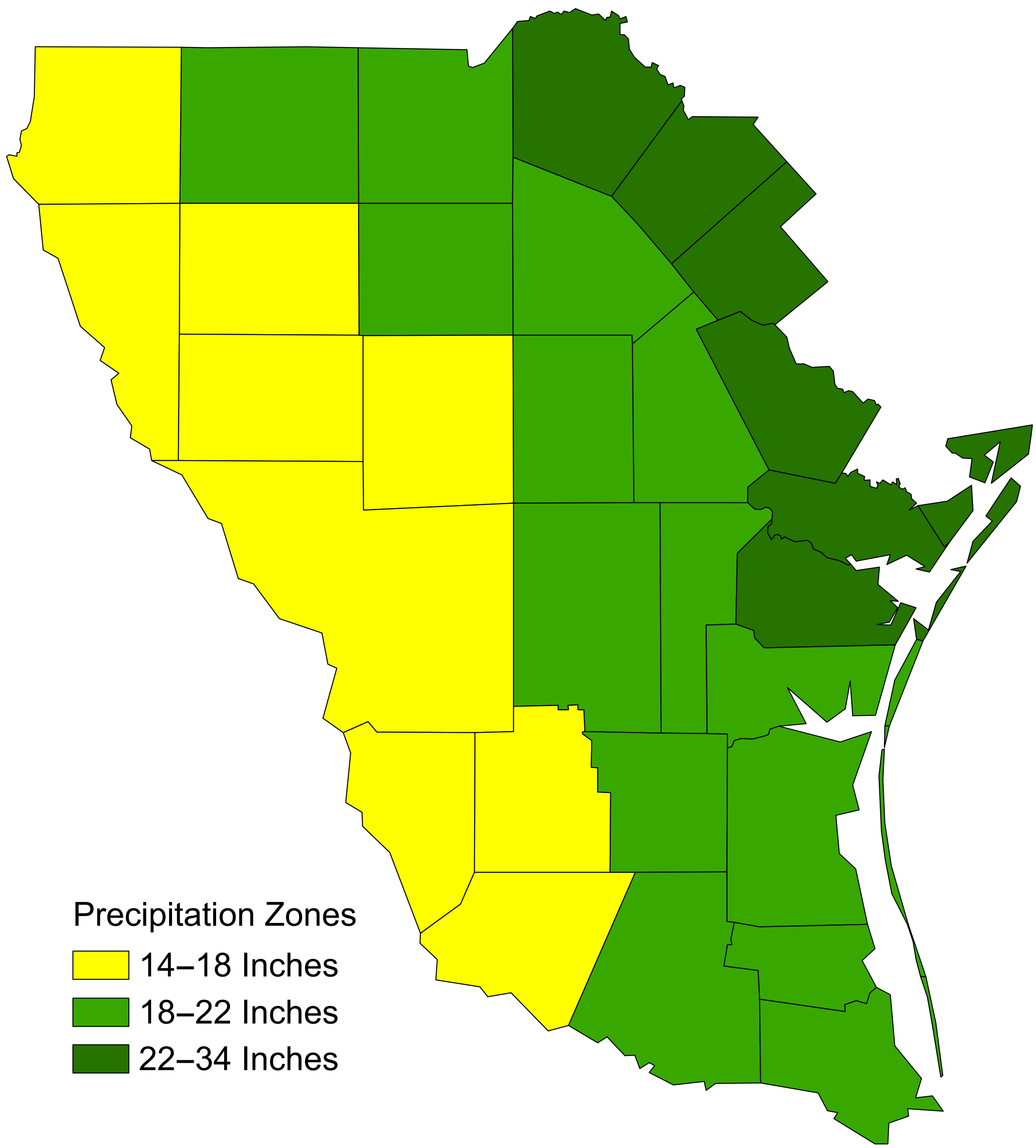
APPENDIX 1

Precipitation zones in the South Texas Rio Grande Plains Ecological Region.



APPENDIX 2

Palatability classification of woody plants in three rainfall belts on DEER and CATTLE ranges in south Texas from 2001–2004. The number of stem tips sampled is denoted by "n".

Average Annual Rainfall 22–34 inches

Common Name	Scientific Name	(n)	% Bitten
American Beautyberry	*Callicarpa americana*	1200	49
Texas Kidneywood	Eysenhardtia texana	3200	41
Evergreen Yaupon	*Ilex vomitoria*	1300	38
Hogplum	*Colubrina texensis*	2400	28
Granjeno	*Celtis pallida*	7900	19
Brasil	*Condalia hookeri*	4800	9
Desert Yaupon	*Schaefferia cuneifolia*	2300	7
Texas Persimmon	*Diospyros texana*	3100	6
Blackbrush	*Acacia rigidula*	2300	5
Twisted Acacia	*Acacia schaffneri*	1900	5
Agarito	*Mahonia trifoliata*	1000	1

Average Annual Rainfall 18–22 inches

Common Name	Scientific Name	(n)	% Bitten
Texas Kidneywood	*Eysenhardtia texana*	24600	49
Coma	*Sideroxylon celastrinum*	10400	42
Southwest Bernardia	*Bernardia myricifolia*	10000	41
Cedar Elm	*Ulmus crassifolia*	2400	38
Littleleaf Sumac	*Rhus microphylla*	1200	32
Granjeno	*Celtis pallida*	45800	28
Live Oak	*Quercus virginiana*	4600	28
Colima	*Zanthoxylum fagara*	16300	23
Huisache	*Acacia minuta*	3100	21
Tasajillo	*Opuntia leptocaulis*	3100	20
Brasil	*Condalia hookeri*	27900	18
Guajillo	*Acacia berlandieri*	24100	18
Hogplum	*Colubrina texensis*	16800	18
Catclaw Acacia	*Acacia greggii*	4200	17
Cenizo	*Leucophyllum frutescens*	19400	16
Ebony	*Pithecellobium ebano*	1000	12
Lotebush	Ziziphus obtusifolia	9600	12
Blackbrush	*Acacia rigidula*	33600	9
Desert Yaupon	*Schaefferia cuneifolia*	23000	9
Twisted Acacia	*Acacia schaffneri*	18300	9

Average Annual Rainfall 18–22 inches continued

Texas Persimmon	*Diospyros texana*	30400	8
Evergreen Sumac	*Rhus virens*	1700	7
Wolfberry	*Lycium berlandieri*	5800	7
Narrowleaf Forresteria	*Forestiera augustifolia*	1100	5
Whitebrush	*Aloysia gratissima*	1600	5
Green Condalia	*Condalia viridis*	1900	3
Agarito	*Mahonia trifoliata*	1200	2
Mesquite	*Prosopis glandulosa*	5000	2

Average Annual Rainfall 14–18 inches

Common Name	**Scientific Name**	**(n)**	**% Bitten**
Coma	*Sideroxylon celastrinum*	21700	51
Live Oak	*Quercus virginiana*	2700	49
Texas Kidneywood	*Eysenhardtia texana*	24700	48
Cedar Elm	*Ulmus crassifolia*	2100	41
Huisache	*Acacia minuta*	2000	37
Southwest Bernardia	*Bernardia myricifolia*	1700	35
Granjeno	*Celtis pallida*	72200	35
Wright Acacia	*Acacia wrightii*	3800	33
Four-wing Saltbush	*Atriplex canescens*	1800	30
Colima	*Zanthoxylum fagara*	8900	30
Cenizo	*Leucophyllum frutescens*	39200	28
Littleleaf Sumac	*Rhus microphylla*	3900	26
Guajillo	*Acacia berlandieri*	44400	26
Brasil	*Condalia hookeri*	18800	21
Palo Verde	*Parkinsonia texana*	1700	21
Ebony	*Pithecellobium ebano*	1800	19
Hogplum	*Colubrina texensis*	25700	19
Catclaw Acacia	*Acacia greggii*	2900	18
Blackbrush	*Acacia rigidula*	68200	14
Twisted Acacia	*Acacia schaffneri*	49800	14
Lotebush	*Ziziphus obtusifolia*	33800	13
Texas Persimmon	*Diospyros texana*	33300	12
Desert Yaupon	*Schaefferia cuneifolia*	43900	11
Green Condalia	*Condalia viridis*	6700	8
Wolfberry	*Lycium berlandieri*	3600	8
Narrowleaf Forresteria	*Forestiera augustifolia*	1900	7
Whitebrush	*Aloysia gratissima*	3100	6
Mesquite	*Prosopis glandulosa*	1300	5
Amargosa	*Castela erecta*	4000	2

APPENDIX 3

Palatability classification of woody plants in three rainfall belts on DEER ONLY ranges from 2001–2004. The number of stem tips sampled is denoted by “n”.

Average Annual Rainfall 22–34 inches

Common Name	Scientific Name	(n)	% Bitten
Texas Kidneywood	*Eysenhardtia texana*	2100	40
Granjeno	*Celtis pallida*	6500	21
Hogplum	*Colubrina texensis*	1800	17
Brasil	*Condalia hookeri*	3500	16
Lotebush	*Ziziphus obtusifolia*	1200	15
Texas Persimmon	*Diospyros texana*	3200	9

Average Annual Rainfall 18–22 inches

Common Name	Scientific Name	(n)	% Bitten
Coma	*Sideroxylon celastrinum*	3900	49
Texas Kidneywood	*Eysenhardtia texana*	13300	48
Southwest Bernardia	*Bernardia myricifolia*	5800	46
Colima	*Zanthoxylum fagara*	5400	30
Woolly Bucket Bumelia	*Bumelia lanuginosa*	3800	26
Live Oak	*Quercus virginiana*	4100	26
Granjeno	*Celtis pallida*	21700	25
Hogplum	*Colubrina texensis*	13900	23
Four-wing Saltbush	*Atriplex canescens*	1200	22
Littleleaf Sumac	*Rhus microphylla*	1800	20
Brasil	*Condalia hookeri*	9500	17
Desert Yaupon	*Schaefferia cuneifolia*	12300	11
Catclaw Acacia	*Acacia greggii*	1900	10
Guajillo	*Acacia berlandieri*	19300	10
Cenizo	*Leucophyllum frutescens*	14700	9
Blackbrush	*Acacia rigidula*	24000	8
Lotebush	*Ziziphus obtusifolia*	3500	8
Twisted Acacia	*Acacia schaffneri*	7100	8
Texas Persimmon	*Diospyros texana*	20400	5
Green Condalia	*Condalia viridis*	1700	4
Wolfberry	*Lycium berlandieri*	3000	4
Agarito	*Mahonia trifoliata*	2300	3

Average Annual Rainfall 14–18 inches

Common Name	**Scientific Name**	**(n)**	**% Bitten**
Texas Kidneywood	*Eysenhardtia texana*	20800	49
Coma	*Sideroxylon celastrinum*	12600	47
Southwest Bernardia	*Bernardia myricifolia*	1100	44
Woolly Bucket Bumelia	*Bumelia lanuginosa*	7600	32
Granjeno	*Celtis pallida*	44900	32
Colima	*Zanthoxylum fagara*	4200	27
Hogplum	*Colubrina texensis*	12500	22
Brasil	*Condalia hookeri*	10000	21
Wright Acacia	*Acacia wrightii*	1700	20
Cenizo	*Leucophyllum frutescens*	26300	19
Catclaw Acacia	*Acacia greggii*	2300	17
Guajillo	*Acacia berlandieri*	31500	17
Twisted Acacia	*Acacia schaffneri*	31200	13
Blackbrush	*Acacia rigidula*	49700	12
Lotebush	*Ziziphus obtusifolia*	19700	11
Texas Persimmon	*Diospyros texana*	15700	11
Desert Yaupon	*Schaefferia cuneifolia*	25100	10
Green Condalia	*Condalia viridis*	3600	10
Narrowleaf Forresteria	*Forestiera augustifolia*	1100	7
Wolfberry	*Lycium berlandieri*	1700	4
Amargosa	*Castela erecta*	1400	3
Knifeleaf Condalia	*Condalia spathulata*	1500	3

APPENDIX 4

Palatability classifications of white-tailed deer browse plants in the South Texas Rio Grande Plains Ecological Region. Mast not included in palatability classification.

Common Name	**Scientific Name**	**1st Choice**	**2nd Choice**	**3rd Choice**
Cedar Elm	*Ulmus crassifolia*	X		
Coma	*Sideroxylon celastrinum*	X		
Four-wing Saltbush	*Atriplex canescens*	X		
Granjeno	*Celtis pallida*	X		
Guayacan	*Guajacum angustifolium*	X		
Manzanita	*Malpighia glabra*	X		
Southwest Bernardia	*Bernardia myricifolia*	X		
Sugar Hackberry	*Celtis laevigata*	X		
Texas Kidneywood	*Eysenhardtia texana*	X		
Vine Ephedra	*Ephedra antisyphilitica*	X		
Anacahuita	*Cordia boissieri*		X	
Anaqua	*Ehretia anacua*		X	
Blackbrush	*Acacia rigidula*		X	
Brasil	*Condalia hookeri*		X	
Catclaw Acacia	*Acacia greggii*		X	
Cenizo	*Leucophyllum frutescens*		X	
Chomonque	*Gochnatia hypoleuca*		X	
Colima	*Zanthoxylum fagara*		X	
Guajillo	*Acacia berlandieri*		X	
Hog Plum	*Colubrina texensis*		X	
Huisache	*Acacia minuta*		X	
Little Leaf Sumac	*Rhus microphylla*		X	
Live Oak	*Quercus virginiana*		X	
Lotebush	*Ziziphus obtusifolia*		X	
Palo Verde	*Parkinsonia texana*		X	
Ratany	*Krameria ramosissima*		X	
Retama	*Parkinsonia aculeata*		X	
Snake Eyes	*Phaulothamnus spinescens*		X	
Tenaza	*Pithecellobium pallens*		X	
Texas Ebony	*Pithecellobium ebano*		X	

Common Name	**Scientific Name**	**1st Choice**	**2nd Choice**	**3rd Choice**
Twisted Acacia	*Acacia schaffneri*		X	
Woolly Bucket Bumelia	*Bumelia lanuginosa*		X	
Wright Acacia	*Acacia wrightii*		X	
Agarito	*Mahonia trifoliata*			X
Allthorn	*Koeberlinia spinosa*			X
Amargosa	*Castela erecta*			X
Coyotillo	*Karwinskia humboldtiana*			X
Creosotebush	*Larrea tridentata*			X
Desert Yaupon	*Schaefferia cuneifolia*			X
Green Condalia	*Condalia viridis*			X
Honey Mesquite	*Prosopis glandulosa*			X
Knifeleaf Condalia	*Condalia spathulata*			X
Mountain Laurel	*Sophora secundiflora*			X
Narrowleaf Forestiera	*Forestiera augustifolia*			X
Shrubby Blue Sage	*Salvia ballotiflora*			X
Texas Persimmon	*Diospyros texana*			X
Whitebrush	*Aloysia gratissima*			X
Wolfberry	*Lycium berlandieri*			X

APPENDIX 5

Stem Count Index Field Data Sheet.

South Texas Browse Survey

Ranch Name: County: Date:

Observer: GPS File Name: Lat: Long:

Note: An *ENCOUNTER* is an encounter on a transect of a plant or small group of plants with at least 100 live tips within reach of a deer. Within this sense each plant species has different encounters. Encounters for different species may be close together, but encounters for the same species must be at least 30 yards apart (preferably 100 yards).

n = total number of ENCOUNTERS.

T = total number of bites for all encounters.

Count number of bites per 100 growing tips for each species for each encounter.

Log bites/100 tips for each encounter under columns 1-25 below, *by species*.

PLANT SPECIES	BROWSE RATING (1, 2, or 3)	% Use T/n	n	T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
			0	0																									
			0	0																									
			0	0																									
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Herbaceous cover per 100 steps			0	0																									

SUMMARY BY BROWSE RATING	% Use	n	T
#1 Browse Species		0	0
#2 Browse Species		0	0
#3 Browse Species		0	0

Deer & Cattle Range_____ or Deer Only Range_____

Comments: ____________________

TEXAS PARKS & WILDLIFE

4200 Smith School Road • Austin, Texas 78744

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