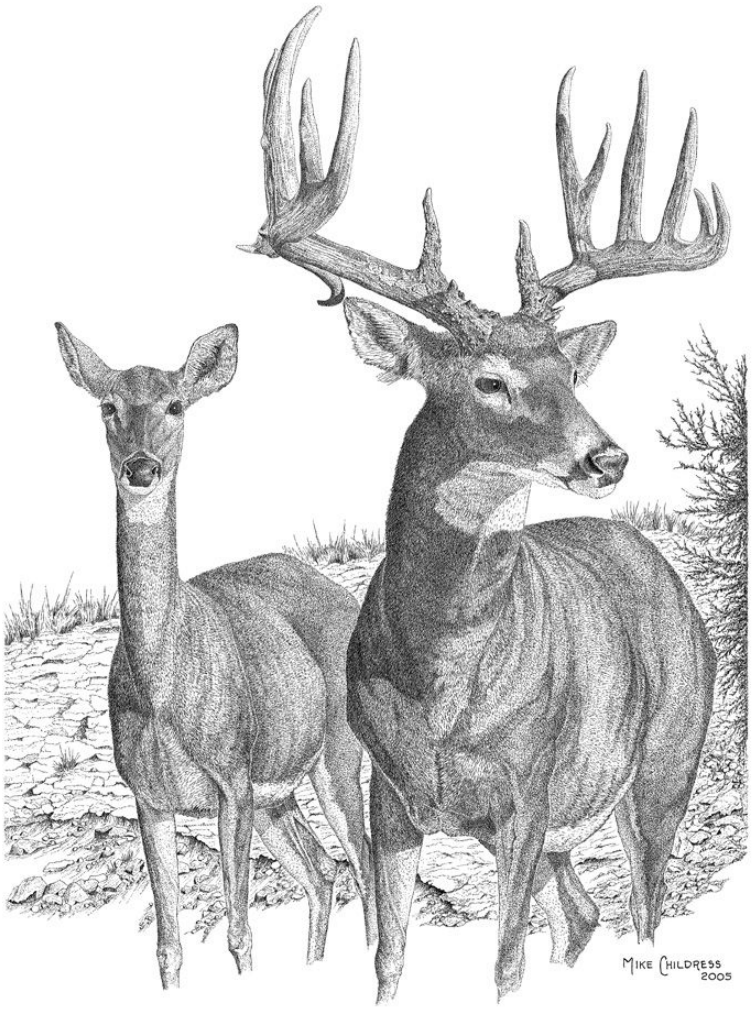
Back to the Basics
White-Tailed Deer Management



CROSSING THE CAPROCK

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West Texas Deer Study Group

Edited by:
Ricky Linex

Acknowledgments

The beneficial exchange of knowledge from a meeting such as the West Texas Deer Study Group (WTDSG) happens only after hours, weeks and months of planning, scheming and arm twisting. The foresight of Steve Nelle, Dale Rollins, Ruben Cantu and Greg Simons to organize the first WTDSG in 1998 has led to spirited debates, presentations of research findings and deliveries of on the ground experiences of many researchers, biologists, hunting guides and land managers. Each and every speaker was most gracious in giving of their time in being here to present as well as taking time to submit an abstract for the proceedings. Special thanks to the Stasney's Cook Ranch for hosting the evening activities and field session, Chris Beard and the Albany High School Ag Class for local support, Jenny Sanders, Helen Holdsworth and Tamara Trail with the Texas Wildlife Association for registration and advertising and to Jimmie Caughron with Texas Parks & Wildlife Department for his mastery of audio visuals. The cover art is provided by the Texas Big Game Awards (TBGA) and artist Mike Childress. The Bass Pro Shops TBGA Art Program annually features some of the top big game taken annually in Texas. The support of the commercial exhibitors is greatly acknowledged.

- The Planning Committee -

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THE EVOLUTION OF WHITE-TAILED DEER IN SHACKELFORD COUNTY

BOB GREEN, Owner and Manager, J.R. Green Ranch Company, 5441 CR 112, Albany, TX 76430

Overview of my knowledge of white-tailed deer in the area – from 1920's to the present day- I am nearly 84 years old and was born and have spent all my life on this ranch located in northeast Shackelford and northwest Stephens Counties with a few time outs for schools and World War II.

I can remember my father telling me that the last of the old time deer were descended from ancestors who had been here forever were killed out in the early 1920's during the Breckenridge oil boom. There were no deer here at all when I was growing up, or anywhere else in the area. The only wild hogs were up on the river above Fort Griffin. Supposedly these were remnants of pigs that had been supplied to the Indians when the Comanche Indian Reservation was in operation and were left behind when all the Indians were moved to Oklahoma reservations.

From before the turn of the century, a lot of the country side of this ranch in this area was highly settled up with many families on small farms and stock farms trying to eke out a living. Any game such as turkey and quail was coveted for the table and became scarce. These little places dwindled away until during the depression days of the 1930's, all were abandoned and sold and added on to larger ranches to raise cattle. I counted up there were 17 houses, mostly small unpainted box ones, on what my Dad had added on to his ranch. A lot of this ranch is still arable land and that was what had encouraged those early day settlers to try and make a living farming but they just couldn't make a go of it.

75 years ago, the country was not covered so thickly with mesquites. I can remember back then when I was a youngster there were many open stretches that today are thick brush.

A man named Colbert was the banker in Stamford during the 20's and 30's. Among his ranches was one he called his "River Ranch" which later on became known as the Hendricks Boy's Ranch Colbert, a wealthy man, had made a show place out of this place and had imported deer from South Texas and turned them loose along the Clear Fork of the Brazos River. Watt Matthews was a good friend of Colbert's and got some deer from him and turned them loose on his Lambshead Ranch that was several miles down river.

In 1939, I was amazed as I watched three deer bound across a road one day on our ranch. Those were the first deer I ever saw on this ranch. We surmised they had filtered down river from Watt Matthew's Lambshead Ranch. Our ranch joins several

other large ranches to the north and west and they al together, provide an uninterrupted excellent game pasture of many square miles for deer. The deer population slowly increased during the World War II years and the brush cover of all the ranches intensified greatly which afforded the deer more protective cover.

Then, in the 1950's, the screw worms were miraculously eradicated. This brought on a tremendous proliferation of all wild game, in particular deer and feral hogs. Since that time, deer herds on ranches of any size have grown sizable and stabilized, affording management and fine, improved hunting while the feral hog population has gone ballistic.

ETHICS IN DEER MANAGEMENT

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Ethics are self-restraints that reside above what is legally right or wrong. They are the unwritten rules of behavior that guide our conduct—whether anybody is looking or not. Each profession has its own ethical issues, dilemmas, and debates. Accordingly, certain professional groups (e.g., medical doctors, lawyers) have adopted a "code of ethics" for their respective professions. By developing and supporting such a code of ethics, the profession is not labeling itself as unethical. Instead, it is distancing (and protecting) itself from activities, managers, and operations that the profession itself defines as involving unethical behaviors. It is important to recognize that this is a self-imposed standard—the profession itself defines what is acceptable and what is not, and individuals make the decision to sign or not sign or abide by the code. Thus, activities and behaviors not meeting the minimum standards defined in the code of ethics are, by professional definition, professionally unethical behaviors. When ruminating on such ticklish questions, I often seek the counsel of two contemporaries who lived through the Dust Bowl, but to my knowledge they never met. The first is Will Rogers and the second is Aldo Leopold. Both died before their times, and both's writings are timeless. While Rogers needs no introduction, Leopold's name may be less familiar. Suffice to say Leopold is considered a prophet among conservationists—no one wrote more vividly about the issues of stewardship and ethics in land management than Aldo Leopold. His collection of essays A Sand County Almanac should be required reading of everybody who owns a bird dog, scoped rifle, saddle, cow, or tractor. The upshot of the anthology is that the land is a complex, and largely misunderstood, machine. A machine that during Leopold's lifetime (and still today) showed signs of sputtering. I belong to the professional societies of range and wildlife managers. Both can list victories and accomplishments over the years, and yet how much of our rangeland is below par? We give awards for those who practice what we preach, but sometimes those awards are captured based on window dressing. We can see brush and weed control demonstrations, and high fences and deer feeders, but have we captured the essence of conservation? Is the land-engine purring or coughing? Have we captured the high ground?

WHITE-TAILED DEER HABITAT MANAGEMENT
A RETURN TO THE BASICS

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In all professions and endeavors of life, the most successful people are those who concentrate on doing the basics very well. By concentrating on the basics of habitat management, deer managers are assured of achieving the greatest success possible in the most cost-effective manner. People often want to jump into advanced or new techniques thinking they are a fast track to success, but basic habitat management is the central component of all truly successful deer programs.

Habitat Requirements

All habitat management should be based on a thorough understanding of deer habitat requirements.

Food

Deer feed primarily on browse and forbs. Mast (mesquite beans, acorns, pear apples) is heavily utilized when available. Deer may also make heavy use of agricultural crops. The three important considerations for deer food are: quality, quantity and availability.

Deer require a high quality diet to grow to their potential. Deer can exist on poor quality diets, but body weights, reproduction and antler development will be poor. Crude protein of 13% to 16% and energy values of 65% to 70% TDN are considered desirable for good deer nutrition. Deer also need adequate minerals in their diet, especially phosphorus.

Deer generally consume about 3.5% of their body weight per day (on a dry weight basis), although intake varies seasonally. This means that a 120 pound deer would eat about 1500 pounds per year.

Seasonal availability - food may be abundant during certain times of the year, however, the availability of food during stress periods is the critical consideration. Physical availability - many habitats produce large amounts of food, but it is above the browsing height of deer. Management aimed at making the existing food supply more accessible is often recommended.

Cover

Deer are reclusive animals and instinctively seek to be hidden or in close proximity to concealing cover. A lack of suitable cover will limit deer use especially during hunting season. Deer need shade in the summer and protection from cold, wind, rain

or snow in winter. They also need places to escape from perceived danger and disturbance. Cover is usually provided by areas of moderate to dense brush. Tall grass or rough topography can partially compensate for a lack of woody cover.

Deer are adaptable, but they generally seek out the thicker areas of cover. This is especially true for mature bucks during the hunting season. Hunters seem to know better than anyone that deer prefer thick cover. In general, deer thrive best where 60 to 70% of the landscape supports moderate or thick brush. Some areas of very dense brush are desirable as "buck sanctuaries." Scattered among the brushy cover, should be numerous small to medium sized openings which are used for feeding. Some habitats, although they may appear "brushy", already have the right amount of cover, and any additional clearing would diminish the habitat.

Water

Water content in the rumen must stay at 60 – 70%. Deer generally drink water on a daily basis, although green forage or pricklypear may meet their water needs during certain times. One permanent water source for every 500 to 1000 acres is adequate. Deer have been known to vacate large areas when water sources dry up.

Habitat Management Principles

Several underlying principles are used by all successful managers to guide their habitat management.

Carrying capacity is the ability of habitat to support a deer herd without causing damage to the vegetation. Carrying capacity is more of a concept than a number. The general concept is that land has biological limits to the amount of food it can produce, and the deer population must be balanced with the amount of available food. Social and behavioral carrying capacity can also be limited by a lack of cover.

Carrying capacity balance is evaluated by examining deer performance (fawn crops, deer weights and antler development by age class), and by examination of key plants to determine if they are being properly browsed. Good harvest records and a good knowledge of food plants are essential in evaluating carrying capacity. When deer numbers are balanced with carrying capacity, the habitat is a self perpetuating and renewable resource with long-term sustainability.

Stewardship involves the recognition that natural resources are valuable and entrusted to the care of human managers. The steward considers it his responsibility to provide that care and husbandry with a sense of appreciation and respect for the land. Without a stewardship ethic, it is unlikely that land will be properly managed or conserved.

Weakest link is the principle that helps identify priorities of management. It is best illustrated by a chain in which the weakest link determines the strength of the entire chain. The only way to increase the strength of the chain, is to identify the weakest link and then to concentrate efforts at fortifying that particular link.

Competition. Animal competition occurs when there is excess demand for a resource which is in limited supply. As competition increases, the allocation of that resource is reduced for each individual. In deer management, the most competitive animal is another deer. Competition among over-abundant deer severely limits the food supply. Competition between animals with similar food habits such as goats, sheep and exotics is a problem in certain regions. When competition is reduced, the allocation of the resource to each individual increases.

Plant competition occurs when plants compete with each other for limited resources such as moisture, nutrients and sunlight. Suppressing those plants which have little benefit to deer can allow other desirable plants to increase. This is the basis for much habitat management.

Diversity. The greater the diversity of plants, the more likely it is that deer will be able to select a high quality diet. A habitat full of 30 - 50 different species of forbs, shrubs, vines, trees and grasses is much better than a habitat with only a few plant species.

P**reference.** Deer are very picky eaters and instinctively choose the best plants. They will repeatedly browse the same desirable plants while leaving less desirable plants barely touched. Over time, this selectivity can diminish the better plants. When the kinds of plants in a habitat begin to change due to overgrazing of the preferred plants, habitat damage is occurring.

Habitat Management Tools

In 1932, Aldo Leopold stated that "game can be restored by the creative use of the same tools which have heretofore destroyed it - axe, plow, cow, fire and gun." These are essentially the same tools we still use.

Axe represents the various methods of brush manipulation. The actual implements include the excavator, dozer, hydraulic shear, chain saw, or the application of herbicides. Brush management can have a very powerful effect on cover and food.

Plow represents the tilling of soil and planting of seed. This tool is used in food plots, habitat restoration projects, and agricultural crops.

Cow represents the different aspects of grazing management. This includes stocking rate, rotational grazing, and kind of livestock. The use of this tool is extremely important in managing the deer food supply.

Fire represents the use of prescribed burning, which is recognized as an important habitat tool and can have a strong effect on the deer food supply.

Gun represents the regulated and selective hunting. Adequate annual harvest is the primary way that populations are balanced to the carrying capacity of habitat.

Habitat Management Techniques

Techniques to improve deer habitat are many and varied. Habitat management plans should be site specific and suited to particular conditions. Cookbook approaches are seldom adequate. If assistance is needed, utilize experienced professionals and do not hesitate to seek a second opinion before major decisions are made. Deer habitat management often boils down to some variation or combination of the following five practices:

Remove competing animals to the extent feasible. This includes goats, sheep and exotics since they are highly competitive with deer for preferred foods.

Reduce animal numbers. A reduction in deer numbers is often necessary. A reduction in cattle numbers is also needed in some cases.

Rest from grazing. Deer habitat usually responds positively to periodic rest from grazing. Rotational grazing schemes will help insure that these rest periods occur on a planned basis.

Restrict brush control. Brush management can be a positive habitat management technique, but the extent and method need to be carefully planned to maintain a desirable distribution of food and cover.

Renovate habitat. This usually involves an integrated program of rotational grazing, conservative stocking rates, selective mechanical brush manipulation in patterns, re-seeding with native grasses and forbs, prescribed burning, and careful management of deer numbers. Food plots may be used to supplement native habitat.

Conclusion

1. Successful deer management involves doing the basics extremely well.
2. A land stewardship ethic is the foundation of good habitat management.
3. The most cost-effective way to increase the deer food supply is to reduce the number of animals on the range. (Al Brothers)
4. Deer need brush - they eat it and they live in it. Be careful when planning brush control.
5. Habitat management tools are neither good nor bad – it is the skillful application of tools that determines success.

DEER NUTRITION- WHAT DO WE REALLY KNOW?

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Understanding white-tailed deer nutrition is fundamental to our ability to properly manage deer populations and their habitat. General food habits, digestive anatomy, and nutritional requirements of deer are well documented. Foraging strategies and landscape level behavioral processes employed by deer to meet nutritional needs in semiarid habitats are less well understood, particularly in parts of north Texas where few scientific studies have been conducted. We do know that deer are flexible in their diet selection and change forage preferences based on availability. The ability to fluidly switch forage preferences in response to variation in rainfall and other environmental variables underscores the axiom that white-tailed deer habitat should be managed to ensure deer have a wide range of forage plants available to them.

White-tailed deer are ruminants as are goats, sheep, and cattle, but they have a smaller rumen to body mass ratio than these domestic livestock species. Deer, consequently, are concentrate feeders and depend on rapid turnover of forages in their rumen. They are highly selective, foraging on highly nutritious plants and plant parts. For example, they selectively eat the flowers and leaves of forbs in preference to the stems. Deer select the twig tips of shrubs and eat the leaves when the twig tips are depleted. Easily digestible nutrients are extracted from ingested plant tissue, and undigested material is passed quickly through the digestive tract to make room for more food.

Nutrient needs of deer vary depending on sex, age, and season of the year. Nutrient demands of does are highest during gestation and lactation; whereas, greatest forage consumption by bucks occurs during September through November. Young, growing deer have greater nutrient demands than mature deer. Variation in nutrient demands among different times of the year may influence seasonal diet preferences and amount of time deer spend foraging.

White-tailed deer appear to discriminate between foods based on protein and energy content. When deer are nutritionally deficient in energy, they may select foods high in energy to meet nutritional needs; when deer need protein, they select foods high in protein. Deer are extremely plastic foragers and can adjust to changes in plant species composition by shifting to different plant species or plant parts to maintain a relatively constant level of diet nutritional quality. One consequence of this plasticity in foraging is that white-tailed deer tend to sample a variety of different plant species during foraging bouts. In a study conducted by Texas Parks and Wildlife personnel and researchers from Texas State University, for example, deer consumed 61

different plant species during spring in the Cross Timbers and Prairies Region of Texas. Understanding this aspect of deer foraging ecology is key to managing white-tailed deer nutrition and habitat. White-tailed deer habitat should be managed to support a diversity of plant species so that deer will have a wide range of options available to enable them to switch forages in response to environmental changes.

Browse is an important component of deer diets; however, white-tailed deer prefer forbs over browse and grass. Browse is the major part of the diet when forbs are lacking in the habitat. In the Cross Timbers and Prairies Region of Texas, for example, forbs and browse composed 13 and 46% of deer diets, respectively, during summer in a drought year, compared to 43 and 29% respectively, in a year when high rainfall resulted in an abundance of forbs. Mast is an important component of deer diets when it is available. Acorns are important in autumn, and mesquite beans and prickly pear fruits are important foods during summer in the Cross Timbers and Prairies region. Grass is normally a small part of the diet of deer. Fresh, green, growing grass leaves can be seasonally important in diets; an example of this is the high concentrations of deer that feed in winter wheat fields.

A common concept in deer management is that we should identify the most preferred deer food plants, rank them based on palatability, and then focus management on increasing these specific plants. The fallacy in this approach is that managing for a selected group of plant species is essentially the reverse of managing for diversity. Annual and seasonal forage preferences constantly change in time and are simply too complex for a manager to accurately identify the best species to manage for.

Research conducted by Texas Parks and Wildlife personnel and researchers from Texas State University in the Cross Timbers and Prairies Region of Texas provides a good illustration of why we should focus on managing for diversity rather than managing for specific plant species. The research was conducted over a 2 year period from spring 1996 through winter 1998. None of the forbs recorded in deer diets during spring 1996 were among the 10 most preferred forbs in diets in spring 1997. Forbs that are highly preferred during wet years may be absent in dry or normal rainfall years. Conversely, forbs that are unpalatable during high rainfall years may be staples of the diet in dry years. Acorns, mesquite beans, or mistletoe were the most highly preferred species in diets on 7 of the 8 sampling dates in the Cross Timbers and Prairie Regions study. Forbs were the most highly preferred plant species only during the wet summer of 1997. From a management perspective, clearing oaks and mesquites to favor growth of forbs simply because we know that deer prefer them over browse would be unwise. Managing for a few selected species or group of plants is likely to result in an abundance of palatable forage in wet years that exceeds nutritional needs of deer, and a deficiency in dry years when forage is badly needed. Forage preferences also vary seasonally and vary widely among individual deer, increasing the complexity of the nutritional ecology of white-tailed deer.

Feeding corn and pelleted rations is widespread in Texas, although the practice is more intensive in south Texas. Effects of feeding on deer and their habitat in north Texas have not been documented in designed experiments. Preliminary results of research from south Texas suggests that feeding results in increased body mass and may reduce pressure on native forages. There are many unanswered questions about feeding, however, such as 1) what is the optimum density of feeders?, 2) what proportion of the deer population use feeders?, 3) what is the cost: benefit ratio of deer feeding?, and 4) and how do dominance hierarchies affect feeder use?

Good habitat management is the most cost-effective way to meet nutritional needs of white-tailed deer. Rather than focuses on what are perceived to be "highly preferred species," habitat management should be focused on plant species diversity. Habitat management practices that promote plant species diversity and deer nutrition include 1) grazing livestock at densities that do not result in excessive use of palatable forbs, 2) maintaining deer densities within the carrying capacity of the habitat, 3) avoiding planting non-native plants such as Old World bluestems, 4) avoiding weed and brush management unless they are absolutely necessary, and 5) avoiding introduction of exotic ungulates.

PRESCRIBED BURNING FOR HABITAT IMPROVEMENT

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Fire is nature's method of brush management. Our landscape has been molded over time by fire, lightning, Indians and carelessness in centuries past led to large-scale fires. Today overgrazing, interspersion of cropland and quick response to outbreaks prevents the large-scale spread of wildfires.

So that we are all clear on what is prescribed burning, let's discuss three types of fire:

- Wildfire – A fire, if intentionally set, which has no identified purpose, goal or method of containment.
- Controlled burn – A burn conducted with fireguards to control the burn area but with no considerations for weather conditions, fuel load or other conditions.
- Prescribed burn – A burn conducted under specific weather prescriptions, soil moisture levels, fuel loads and season of year to achieve specific objectives.

Prescribed burning is both art and science. The rebirth in the wise use of fire in Texas can be traced to Dr. Henry Wright's appearance at Texas Tech University in the late 1960s. Through Dr. Wright's research and field burns fire prescriptions were developed for air temperature, wind speed, relative humidity and fuel load which enabled man to have reasonable control over fire speed and intensity. Fire was now a tool that could be used to manipulate the landscape for livestock forage, brush control and wildlife habitat.

Benefits of Prescribed Burning

When decadent vegetation is burned, minerals are released into the ashes and become available for use by new grasses, forbs and woody plants. Fire can open up woody overstory growth which allows sunlight to reach the soil surface, promoting fresh new growth that is within reach of browsing animals. Browse greater in height than five feet is unavailable to deer. Resprouts of woody vegetation caused by fire are now available to deer, increasing the food quantity and quality. However, some very thick brush areas should remain undisturbed to provide sanctuary areas for white-tail deer.

Shorter woody cover, resulting from browse resprouts following fire, provides very good screening cover. The top kill of certain browse species, including Texas oak, hackberry and bumelia, leads to resprouting from the basal area of the plant providing low cover, accessible browse and increased palatability. Annual forbs are reduced immediately following the burn but overall forb response is beneficial because of increased amounts of sunlight, soil moisture and nutrients.

Prescribed Burning for Deer Habitat Improvement

A prescribed burn is the most economical form of brush control on rangeland. Traditionally prescribed burns are conducted during the winter (cool season burn) when most plants are dormant and provide the greatest amount of fine fuel for burning. The largest cost in conducting a prescribed burn is the construction of fire guards normally bulldozed or bladed down to mineral soil around the entire burn area. Many large burns (greater than 500 acres) also add double fire guards on the downwind sides to enable the blacklines to be completed with a cooler prescription. Additional cost includes fuel for torches, labor and usually a donation to the local volunteer fire department for being on standby. All together, a prescribed burn can be conducted for $4 to $12 per acre. Economies of scale would suggest that burning the largest area possible nets the lowest cost per acre considering the fixed cost. However, those burning specifically for deer habitat improvement should consider burning with a mosaic pattern which leaves unburned areas connected to other unburned areas with small irregular-shaped burned areas of 15-20 acres. The only practical way of completing this type of burn is to utilize a "cool burn" with burn conditions in the range of 40-60 degrees in temperature, 40-60 percent relative humidity and winds less than 8 miles per hour. A prescribed burn conducted within this prescription will give a mosaic burn appearing patchy with some areas unburned. This gives more "edge effect" to the treated area and is beneficial to deer and other game species. Intensive deer managers should leave 30-40 percent of the area managed unburned to maintain cover.

Recently, warm season or summer burns have been promoted primarily for their increased level of damage to brush species such as juniper, mesquite and prickly pear. Since these three species of brush are fairly common in much of the deer range of Texas and provide food and cover for deer the use of hot summer fires is not recommended where deer are intensively managed. Warm season burn prescriptions for brush control suggest air temperatures of 95-105 degrees, winds above 20 miles per hour and humidity levels around 10 percent. These hot summer burns may suppress too much brush leaving a shortage of screening cover. Summer burns followed by a dryer than normal summer often harms warm season grasses and forbs.

Fire Effects on Desirable Browse Species

Prescribed burning is only one of the many tools a land manager must exercise to properly managing the habitat. The increased availability and palatability of browse following a burn will be negatively impacted if too many deer or livestock have access to the browse. Keeping deer and livestock numbers within the carrying capacity of the land is an important fact that cannot be ignored. Burning alone will not cure other problems affecting the habitat.

The “Checklist and Value of Deer Food Plants of North Central Texas” developed by Steve Nelle, NRCS wildlife biologist in San Angelo, places the value of forb and browse plants into four classes with class one being the highest preferred and class four the least preferred. Common woody plants of North Central Texas and their tolerance of “cool season” burning are listed below.

Class I Browse:
Browse that will root sprout or sprout from the stump:

- Carolina buckthorn, Hawthorne, Possumhaw, Rusty blackhaw, White honeysuckle, Texas sophora.

Class II Browse:
Browse that will root sprout or sprout from the stump:

- Hackberry, Greenbriar, Red oak, Cedar elm, Western soapberry, Old Man’s beard, Blackjack oak, Elbowbush, Bumelia, Cottonwood, Redbud, Wild plum, Black willow, Roemer acacia.

Class III Browse:
Browse that will root sprout or sprout from the stump:

- Live oak, Shin oak, Post oak, Indigobush amorpha, Flameleaf sumac, Skunkbush sumac, Smooth sumac, Littleleaf sumac, Coralberry, Poison ivy, Button bush, Pricklyash, Roughleaf dogwood.

Class IV Browse:
Browse that will root sprout or sprout from the stump:

- Redberry juniper, Yucca, Mesquite, Catclaw mimosa, Catclaw acacia, Mexican buckeye, Pricklypear, Willow baccharis

Browse that will be root killed by fire:

- Blueberry juniper, Algerita, Lotebush, Whitebrush, Tasajillo

Conclusions

Prescribed burning, properly planned and applied, is a tool that can be used to improve deer habitat. Other factors such as livestock numbers and grazing period, deer numbers and amount of brush control utilized on a property all influences the quality of the deer habitat. For assistance in planning a prescribed burn, contact the Natural Resources Conservation Service, Texas Parks & Wildlife Department, Texas AgriLife Extension Service or certified prescribed burn managers.

EVALUATION OF SURVEY METHODS -- WHEREIN LIES THE ACCURACY.

TY BARTOSKEWITZ, Technical Guidance Biologist, Texas Parks and Wildlife Department, Brock, TX 76087

White-tailed deer (*Odocoileus virginianus*) management can be separated into habitat management, population management, and people management. Determining white-tailed deer abundance and population characteristics on a tract of land is a very important piece of the population management puzzle. Numbers generated from a deer census are used to make important land management decisions such as the number of deer to harvest, how many animals are recruited into the population, economic and operational decisions, etc... So, which one gives us the best estimate of the deer population on our ranch? The answer, much like others in wildlife management is “it depends”.

It depends on issues like ranch size, tree canopy cover, money, visibility, time, ranch road networks, acorns, etc. There are many census methods available to wildlife managers to date. Some have been around for a long time such as the Hahn walking line while others such as remote cameras are new to the census game. Traditionally, most deer census activities in north Texas have employed the use of spotlights at night to count deer. Others, especially in the rolling plains, have used helicopters to estimate deer populations.

The most difficult question to answer is what is the true number of deer on your ranch? On 99.9% of ranches we will never know the exact number of deer living on the property at a certain time and date. Populations fluctuate seasonally and daily with ingress and egress of animals and the census techniques available to us will not identify every deer on your property. The exact number of deer is really not as important as being precise with our surveys each year and being able to detect trends in your population numbers and herd composition. In this presentation, I will provide descriptions of each technique, its strong and weak points, and examples of multiple survey methods on the same properties throughout Texas over several years with unknown densities.

One ongoing study that I will discuss on census techniques with a known deer population is being conducted at Mason Mountain Wildlife Management Area in Mason, County Texas. The research is being conducted within a 500 acre high fenced enclosure over a 3 year period. TPWD personnel obtain white-tailed deer trapped from private properties in central Texas each January to March and stock the study site with a herd of known population size and composition. After population surveys are conducted during August and September of each year, all deer in the enclosure are harvested to determine the known number of deer. Population estimates derived from various census methods are compared to the actual known

population. Preliminary results from 2006 and 2007 are shown below. The third year of the research is ongoing and will be completed this fall.

2006 Survey Results

Acres/deer	**9.0**
Does/Buck	**1.5**
Fawns/doe	**.1**

Acres/deer	**8.2**	**11.0**	**11.4**	**8.7**	**-**	**21.9**
Does/Buck	**2.4**	**2.4**	**2.3**	**2.6**	**-**	**1.8**
Fawns/doe	**.05**	**.05**	**.02**	**0**	**-**	**.04**

Bait	**Spotlight**	**Distance Sampling**	**Mobile**	**Hahn**	**IR-Camera**	**Stand Count**
Acres/deer	**7.0**	**9.3**	**7.6**	**9.9**	**17.0**	**10.3**
Does/Buck	**2.7**	**2.7**	**1.3**	**1.1**	**.6**	**1.4**
Fawns/doe	**0**	**0**	**0**	**0.1**	**0**	**0**

2007 Survey Results

Acres/deer	**8.1**
Does/Buck	**1.6**
Fawns/doe	**.1**

Acres/deer	**11.5**	**13.5**	**14.3**	**5.9**	**-**	**38.0**
Does/Buck	**2.3**	**2.3**	**3.2**	**2.6**	**-**	**1.9**
Fawns/doe	**.05**	**.05**	**.05**	**.03**	**-**	**.03**

Bait	**Spotlight**	**Distance Sampling**	**Mobile**	**Hahn**	**IR-Camera**	**Stand Count**
Acres/deer	**10.0**	**13.2**	**7.4**	**8.7**	**N/A**	**13.7**
Does/Buck	**1.8**	**1.8**	**2.3**	**4.1**	**N/A**	**1.5**
Fawns/doe	**.03**	**.03**	**.07**	**0.0**	**N/A**	**.08**

INTERACTIONS AND DISTRIBUTION OF WHITE-TAILED DEER AND CATTLE ON RANGELAND

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Optimal economic use of rangeland vegetation requires using a mixture of grazing and browsing animals. In Texas white-tailed deer are an increasingly valuable commodity and fit well with cattle in a mixed ranching operation. Competition for food between deer and cattle is less than between either species mixed with sheep or goats. Deer obtain about 50% of their diet from woody browse and cattle eat about 80% grass. However, these species do compete for the nutrient rich forbs that are an essential part of the deer's diet. Studies of diet quality of white-tailed deer in grazed systems suggests that low intensity grazing by cattle leaves enough forbs for the deer and other wildlife and may even aid forb production by removal of tall grass and some soil disturbance. Heavy grazing by cattle, even for short durations, results in lowered dietary quality for deer. Calculating stocking rates for mixed species ranching is difficult. The animals do not use pastures uniformly. We mapped the distribution of deer and cattle over one year by fitting 6 white tailed deer and 9 cows with GPS collars. These collars recorded the exact position of the animal every 5 minutes for 12 days each season. Deer tended to avoided close contact with cattle, although individuals only moved away when cattle came within 50 m. Deer and cattle shared use of the favored more productive ecological sites such as clay loam soils and riparian areas. These areas should be managed for mixed species productivity. Cattle avoided rocky terrain, so deer had almost exclusive use of rocky areas including the productive deep soil drainage areas within them. Does particularly favored these densely vegetated drainage areas as well as riparian areas, while bucks made greater use of more open clay loam sites. Distribution of deer and cattle on the land were also affected by ranch infrastructure. Both species were located closer to ranch roads than expected in a random distribution, cattle especially used roads as paths of least resistance in brushy areas. Cattle were closely associated with water sources, especially in dry periods, where as deer did not stay long near water or at supplemental feeding sites. Knowing which areas are used by both species and which are favored by one or neither species provides information on the distribution of resources used by the animals and assists in estimating suitable stocking rates for each species to maximize use of the rangeland.

DEER MANAGEMENT IN THE BIG COUNTRY OF TEXAS

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The Big Country of Texas is just that, a big country. Most of what is called the big country is land located in the Rolling Plains or Cross Timbers areas. Stasney's Cook Ranch is located close to where these two regions meet. The ranch has mesquite flats, bottoms with elms, canyons and hillsides with chittam, prickly ash, hackberry, and various brush species. The habitat is excellent for whitetail deer.

Deer were stocked here in 1946 and 1947 by the game department. The Lambshead Ranch in southern Throckmorton County served as a game preserve throughout the 1950's and the deer thrived there and spread in just about every direction. With the eradication of the screwworm the deer numbers skyrocketed. Most of this area now has a healthy population of deer. Almost every acre in this area is hunted now, either by the landowner and friends, commercial hunting operation, or hunting club or lease. The deer numbers in many of these areas border on the maximum number of deer the habitat can support. Controlling the number of deer is one of the key factors of land management here to prevent damage to the habitat. The harvesting of does is essential for a healthy deer herd. At Stasney's Cook Ranch we try to keep a buck to doe ratio of 1:2, one buck for each two does. A herd with a wide ratio of does per buck can put more stress on each buck. In a good range condition almost all the does will get bred so it stands to reason that the bucks can stay in better condition in an area with a good buck to doe ratio with less does for each buck to breed. This also increases the competition for the does which results in more fighting between bucks and more chance for antler breakage.

Another key in managing deer in the big country is selective harvest. At Stasney's Cook Ranch we try to harvest mature bucks only. A buck uses his nutrients to build his body for the first few years of his life. In a free range situation, until he reaches the age of 4 ½ or older, his antlers probably won't be at their maximum potential. The deer with the highest Boone and Crockett score seems to fall into the 4 ½ to 5 ½ year olds in this area. Most of the bucks we see in the 6 and 7 year old range have started to decline in B&C scores. This is due partly to tooth wear. Worn teeth reduce the ability of the deer to process their food and can affect the antler growth. There are always exceptions and many of the great deer from this region are in the 6 and 7 year old category. A management buck harvest program is also important. In a quality deer program, some lesser quality bucks may need to be harvested. Like livestock, dogs, or many other animals, you want the best animals to do the breeding. It is up to the individual landowner or manager to determine the goals of the property. If your goal is to have mature bucks with ten or more points you may want to take out the big eight pointers so that they won't do any breeding. A buck with multiple points will

help pass on the gene to his offspring. You have to hope that the doe he breeds come from good stock because she is going to pass on her genes also.

Range Management. Proper cattle grazing techniques can help a deer herd. As a rule, deer don't compete with cattle when it comes to food sources. Deer normally eat forbs, leaves, and stems and twigs. Cattle are more inclined to eat grasses. If the grass in an area is overgrazed by cattle they may be forced to browse more and this can affect the deer's food source. Overgrazing can also have an effect on fawn survival. If a fawn doesn't have a good ground cover to hide in the predators are much more likely to find them.

Record Keeping. Good records are essential. Deer weights, ages, and antler measurements are useful for determining trends. This data indicates if the deer herd is getting better, staying the same, or going downhill. Body weights can be indicators of range conditions. Looking at several years of data can give a big picture of how your deer herd is doing.

Summary: Controlling numbers
Selective Harvest
Range Management
Record Keeping

MANAGEMENT PRACTICES AT HAILEY RANCH

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Hailey Ranch consists of about 2500 acres located in western Shackelford County. The terrain is typical West Texas: lots of mesquite, prickly pear, rocky soils, a little bit of bottom land and native woody plants such as skunk bush sumac, Chittam, Hackberry, prickly ash, and elbow bush. Lots of good native forbs also occur naturally on the ranch.

The deer management practices at Hailey Ranch try to maximize the utilization of the naturally occurring forbs and woody plants which are native to the area. A diligent effort to be able to identify the plants which deer like is then used to try and preserve, protect, and propagate those plants. Steps such as prescribed burns and rangeland disking to encourage the growth of these plants are done each year.

Supplemental feeding of protein is done throughout the year. This is done on a free choice basis in pellet feeders. Mineral blocks are also used. In addition to the supplemental feed program, some food plots have also been developed. These are usually 5-15 acre plots which are located throughout the ranch and are planted in wheat for winter utilization while some plots are planted in foxtail millet for summer use.

A creek bed goes through the place which flows only after heavy rains. There are a few holes in the creek bed which hold some water some of the time. About 30,000 feet of water line has been installed along with 21 small concrete water troughs. All the wildlife has easy access to water throughout the year.

Harvesting of the deer is done annually on a conservative basis – usually 3 or 4 trophy bucks (mature10 points or more) which are in the 150-155 class and then several management bucks (mature 8 points or less). Does are taken annually in trying to keep a 1:2 buck to doe ratio.

MANAGING POST-RUT BUCKS

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White-tailed deer have evolved behaviors and a social structure best suited for dense cover interspersed with openings where they can forage. This type of habitat is not conducive to development of large herds. Rather, white-tailed deer live in small, loosely knit groups. Does in small, dispersed groups cannot be gathered into harems by bucks during the rut. Instead, a buck needs to search for does. To make his task even more difficult, a buck doesn't need to find just any doe, but one that is ready to breed. Until they are ready to breed, many does run, causing bucks to chase them. All this searching for does and checking to see if they are receptive requires a tremendous amount of movement—and energy. Bucks in South Texas fitted with GPS collars nearly doubled the distance they traveled during the rut compared to months immediately prior to and after the rut. The average distance these bucks traveled during the rut was nearly six miles per day, but some days they traveled much more. Many bucks had multiple days during the rut when they traveled more than 10 miles.

An intriguing implication of this reproductive strategy is that foraging could be considered a detrimental activity for bucks during the rut. Any buck that devotes too much time to eating during the rut will not sire many offspring. This leads to the perplexing situation that, during the rut, bucks expend vast amounts of energy moving long distances, guarding receptive does, and interacting with other bucks, while spending little time eating. The stress of the rut and the resulting weight loss makes bucks more susceptible to predation, disease, and starvation after the rut. In addition, some bucks may be coping with injuries sustained during fights with other bucks. Many studies of white-tailed bucks in Texas show a peak in mortality after the rut. In fact, 80% of all the non-hunting mortality in mature bucks may occur in the four months from December through March.

This mortality could be important in managing a deer herd because it will reduce the number of bucks for harvest the following year. In addition, an increase in buck mortality will reduce the likelihood that a buck will live long enough to reach maturity. Another reason it may be important to help bucks recover from the rut is that bucks in good shape during April and May are more likely to put resources into growing antlers. For these reasons, ensuring good nutritional resources before, during, and after the rut will help bucks prepare for, cope with, and recover from the stress of breeding. Proper grazing management and diverse plant communities are the first line of defense against post-rut mortality. Plant communities and plant species that produce good deer forage from January through March should be well dispersed on the property. Many species of cool season forbs will begin to develop in

February and March and can be particularly good at enabling bucks to increase body weight. Preferred browse species, such as coma and granjeno in South Texas, and cedar elm and littleleaf leadtree further north, may also be important. The pads of prickly pear cactus are eaten this time of year and provide a ready resource for bucks to use. For those wishing to provide extra nutrients, supplemental feed could be valuable. Pelleted supplements are valuable because they contain high concentrations of digestible energy and protein. They can also be eaten quickly, allowing bucks to recover body condition quickly. Cottonseed may also have value at this time of year because of high concentrations of oils that represent readily available energy. Corn would also provide high amounts of digestible energy. One problem with supplemental feed is that it can only be offered at small feed sites. If some bucks cannot access these sites because of aggressive interactions with other bucks, then not all bucks will benefit from the provision of supplement.

There are other approaches managers may use to help bucks recover and reduce post-rut mortality. One particularly important activity would be to reduce disturbance of bucks during this period. Excessive activity in pastures should be avoided. If brush management is implemented in late winter, it may be best to focus the disturbance in as small an area as possible and not have heavy equipment spread out over large areas. If post-season deer surveys are part of the management program, bucks should not be pursued with the helicopter. Some bucks will fall prey to coyotes during this period so predator control is considered by some biologists when managing post-rut bucks. Studies of the effect of coyote control on post rut survival of bucks have found no benefit. The primary reason predator control was not beneficial maybe that bucks susceptible to coyote predation may already be in such poor shape that they were just waiting to die and some of these are found by coyotes before taking their last breath. So, time and resources may be better spent elsewhere.

MANAGING GENETICS OF FREE-RANGING WHITE-TAILED DEER

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"*The greatest obstacle to discovering the shape of the earth, the continents, and the ocean was not ignorance, but the illusion of knowledge*."
–D.J. Boorstin

A recent trend has emerged that places increasing emphasis on "genetics" in deer management. One oft-repeated phrase is that large-antlered bucks are the product of "age, nutrition, and genetics." While there is little doubt that all 3 factors are important, the exact role of genetics remains murky. From a scientific perspective, the importance of age and nutrition are well established, but some management strategies aimed at affecting "genetics" are questionable for free-ranging deer. In this brief review, I attempt to clarify 2 main issues: What do we know about deer genetics? Can one manage "genetics" in free-ranging deer? The answers to these questions involve an understanding of nutrition and habitat quality, buck breeding success, and deer behavior.

White-tailed deer range from Canada to South America and vary extensively in body size and other traits over this vast range. Some of these differences are due to genetic factors, but many environmental factors can influence body size, growth rates, and physical characters of deer. In fact, within regions, deer populations can vary quite extensively in body and antler size. A recent study in Mississippi revealed that average body and antler size of both bucks and does was associated with soil quality. Mature bucks in the best soil regions averaged 25 lbs. heavier and 20 B&C inches larger than bucks in poor soil regions. Furthermore, deer in the best soil region approached their maximum body and antler size at a younger age than deer in the poorest soil region. Molecular data indicate that there is little genetic difference between deer in these soil regions. Thus, soil and habitat quality play a large role in physical differences among populations of deer within and among regions. There has always been a mystique about the ability of south Texas to produce big deer. Really, the main factor has been the ability to control the age of bucks over large areas by controlling harvest. Many areas of the Southeast, Midwest, etc., could consistently produce big bucks if they would only allow young bucks to mature instead of harvesting them at 1.5-2.5 years old. This simple fact underscores the importance of age and nutrition!

Many management strategies aimed at improving population antler size through manipulation of "genetics" involve selective harvest or introduction of deer with desirable antler characteristics. Several recent studies indicate that the assumptions that many selective harvest or introduction programs are based on may not be

supported. For instance, one critical assumption is that bucks with desirable antler characters will breed and sire most or all of fawns produced. However, studies of genetic parentage in deer indicate that breeding is spread among many different bucks. Although mature bucks will sire most offspring (~70%) in balanced populations (e.g., reasonable sex ratio, age structure), young bucks (1.5 and 2.5 years old) may collectively sire ~30% of fawns. There appears to be no clear relationship between antler size and breeding success; some large-antlered bucks sire fawns, some apparently do not. Thus, it is nearly impossible to predict which wild bucks are breeding or how many offspring they will sire. It is clear that managers must exercise a great deal of control over a population before one can be assured that only desirable bucks will breed, which means that every undesirable buck must be removed before the rut each year; this is obviously a difficult prospect for large properties. However, one additional factor severely limits the potential for managing genetics in free-ranging populations: bucks do not stay where they are born. Most bucks make a permanent movement (dispersal) at 1.5-2.5 years of age, traveling from 2-25 miles or more. Thus, it does little good for landowners with low-fenced land to attempt to affect genetics of a deer population, to worry about spikes, etc. Most buck fawns born on a property will disperse, while older bucks were probably born miles away. Large property size has less of an effect than you might think. On a low-fenced ranch of 25,000 acres, only 70-80% of bucks born will remain on the property.

A long-term study of red deer breeding success and heritability of antler traits in Scotland has raised some serious questions about whether one can achieve dramatic success in free-ranging deer via selective harvest. The study concluded that age, year of growth, and permanent environmental effects had a large influence on antler size. A red deer stag had to be mature and in good condition to grow big antlers; it was this combination of large, healthy body and antler size plus intangibles such as aggressiveness that allowed these stags to compete for and fight to win and keep harems and breeding rights. Any factor that affected a stag's health or body condition affected antler size. Stags born in a bad year could be stunted permanently and would never grow large antlers at maturity regardless of their genetic potential. The environment had such a large effect on antler size that antler size alone was not a reliable predictor of genetic quality for antler development. Are these results relevant to white-tailed deer? Probably yes, in most cases, though there is not enough evidence to indicate whether these permanent effects caused by early life experiences are as dramatic for white-tailed deer as they are for red deer. Studies of wild deer have indicated that yearling deer with poor antlers (e.g., spikes) will tend to have smaller antlers at maturity than yearlings with forked antlers. On average, forked-antlered deer turn out to be 10–20 B&C inches larger than spikes in a sample of south Texas bucks. Are these differences due to genetics or do they simply indicate that these particular yearlings had a poor start and could not overcome early life challenges? At this time, no one can say for sure, but, the red deer study suggests that genetic potential of wild deer is not always easy to judge.

What about captive deer? One common response when the feasibility of "genetic management" techniques is questioned is that selective breeding works in captive deer, so it should work in wild deer as well. Deer breeders are clearly successful in producing very impressive bucks. However, the critical question is whether the results achieved in a pen are easily transferable to free-ranging populations. Why does genetic manipulation work in pens? In a pen you can: 1) control exactly who breeds; 2) select both the bucks and does as parents; and 3) perform controlled inbreeding (or line-breeding) to concentrate good traits in a lineage. While breeders have produced some outstanding successes, the process is inexact, and not all offspring turn out to have large antlers. Thus, a process some have termed the "corral continuum" must be considered: the ability to achieve any "genetic" manipulation will increase as the situation approaches the level of control afforded to captive breeders and decreases as the property approaches a free-ranging condition.

If one can not easily affect "genetics" of free-ranging deer, might there still be a role for selective harvest or culling programs? It depends; removing undesirable bucks can make food and other resources more available for remaining deer. However, recruitment and fawn survival must be high to sustain the harvest. If fawn survival is variable among years, such as due to frequent droughts in arid regions, removing a large number of bucks may only result in fewer deer. One additional caveat: although spike-antlered yearlings tend to be smaller than fork-antlered bucks at maturity, many spikes will gain respectable antler size at 5.5 years (e.g., 120–140 B&C inches), and a few will be larger. Mature bucks of this size have value in that hunters will pay to harvest mature bucks, a hunt for mature bucks can be traded for services (e.g., equipment rental, maintenance), or lease hunters can be afforded more bucks to harvest.

As scientists, our role in management is not to develop new management techniques, but to develop knowledge to ensure that the principles of management rest upon a solid foundation. It appears that some of the foundations of "genetic manipulation" are not supported. Why, then is "genetic" management such a compelling topic? Many have claimed success when large-antlered bucks are produced within a few years of implementing "genetic management" in free-ranging deer via selective harvest or introduction plans. However, the same managers typically perform many other management actions simultaneously (e.g., feeding, habitat improvements, balancing sex ratio and age structure, etc.). One can measure pounds of feed consumed, acres in food plots or brush control, or sex ratio and age structure. Yet, the one factor that can not be measured, "genetics," tends to receive most of the credit. Perhaps there is an unconscious desire for a quick fix to a complex problem. Perhaps active management always feels better than sitting back and watching the deer grow. Perhaps any management strategy that involves shooting large numbers of bucks is just too compelling! Managers should critically examine the assumptions behind each management strategy and ascertain the potential benefits and liabilities of that approach in relation to their specific situation and management goals.

MLDP - AVAILABLE TOOL FOR INTENSIVE MANAGEMENT OF DEER POPULATIONS AND HABITATS

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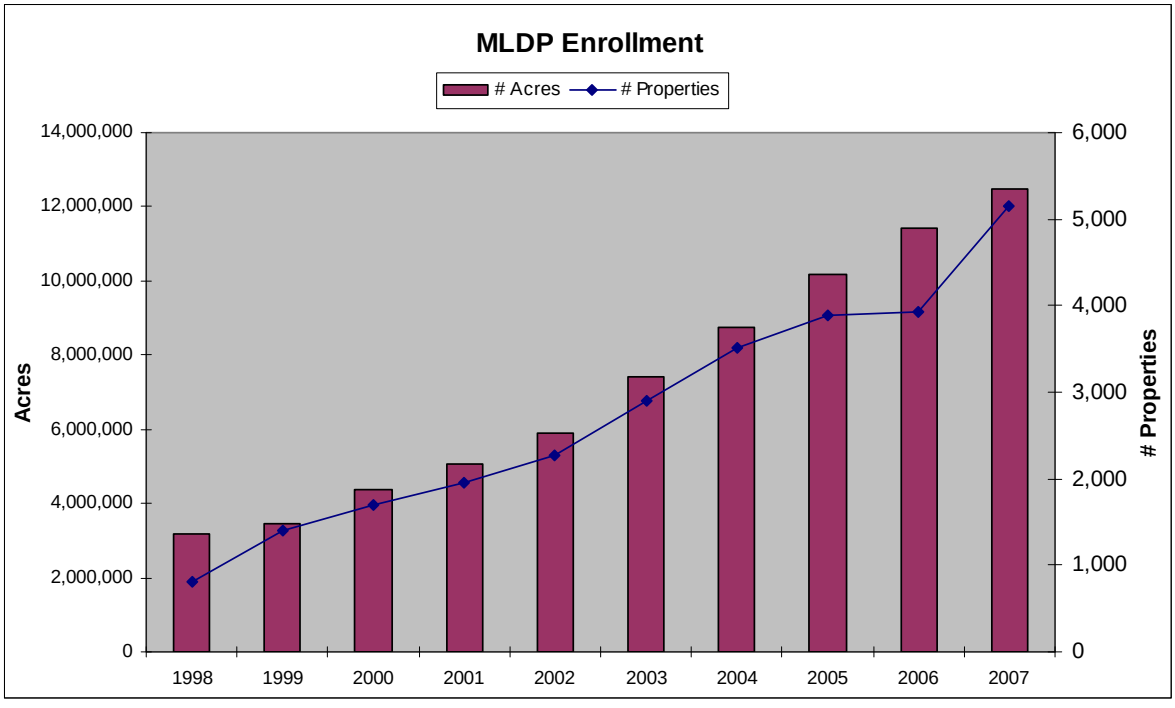
White-tailed deer management in Texas has evolved at an impressive rate over the past 15 years. Years ahead of their counterparts throughout the country, Texas hunters and landowners utilize a vast array of tools including specialized deer-permitting programs to improve deer habitat as well as the quality of deer on the landscape. I have observed an apparent transition from the *Silver Bullet* approach to a holistic approach to deer management in recent years. Of all the tools offered by Texas Parks and Wildlife Department, one in particular facilitates a holistic approach to white-tailed deer management – the Managed Lands Deer Permit (MLDP) program. The MLDP program has been extremely popular with Texas landowners, with acres enrolled increasing an average of 17% annually since the late '90s. Although this permitting program offers many benefits, some of the more attractive advantages of MLDP include early removal of does for more rapid habitat recovery, and removal of undesirable bucks prior to breeding season. The MLDP program has been effective, contributing to >30% of the statewide antlerless-deer harvest and resulting in recovery of many suffering plant communities.



DEER RESEARCH IN NORTH TEXAS….SHOW ME THE MONEY

TY BARTOSKEWITZ, Technical Guidance Biologist, Texas Parks and Wildlife Department, Brock, TX 76087

White-tailed deer (*Odocoileus virginianus*) management has grown rapidly in interest across Texas over the last 30 years. Most of the deer research information we have available to us in Texas comes from the southern half of the state. We need more research on deer in north Texas to help us do a better job of managing habitat and population parameters that will be beneficial to the unique challenges we face in this part of the state. Beyond the many varied issues and ideas of what to research lies where to do it and who is going to pay for it. Everyone wants to have research on their ranch, but many times they don't understand the costs. Let us assume that we have 3 landowners who have volunteered each of their respective ranches and temporary housing to allow us to conduct a 3 year research study in Shackelford County. The research will look at the spatial ecology of white tailed deer bucks in relation to cool season food sources (winter wheat). Other information gleaned from the study could be buck survival, habitat use, home and core range estimates and movements, etc. One student pursuing a master of science degree will be needed along with 30 GPS collars each year to collect data from deer movements. Other needed items and costs are listed in the table below. Total cost per landowner if they financed 100% of the project would be ~ $68,000 dollars each. If alternative funding sources were sought and acquired to pay ½ the project, total cost would be about $34,000 per landowner over the course of the 3 years. Knowledge is not cheap. Money invested in research can help increase returns and decrease costs in the future. Information gained from research can help us be more effective at managing costs and increasing returns from recreation. The old adage seems to be true once again…you have to spend money to make money. In this case, an investment in knowledge and conservation could help you for 10 to 20 years into the future.

Research Need	Quantity	Price	Cost
Masters level student stipend and fringe benefits	2.5 yrs	20,000 per year	50,000
Living quarters for masters student in kind	2.5 yrs	in kind	0
Living quarters for masters student (out of pocket)	50 nt/yr	65 a night	8125
GPS collars new	30	2500 ea	75000
GPS collars refurbish	30	700 ea	21000
receiver and antenna	1	1000	1000
travel	2.5	10,000	25000
deer capture	75	175 per deer	13125
air time for recon of lost collars			2500
Computer and GIS analysis			3000
Other misc. expenses		2000 per year	5000
TOTAL			**203,750**

FUTURE DEER RESEARCH NEEDS IN WEST TEXAS

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In wildlife management circles, the 3 legs of the wildlife "triangle" consist of habitat, populations, and people. In deer management circles, the triangle is characterized as age, nutrition, and genetics. We could select whichever leg and argue we need additional research applicable to west Texas. As a region, we should be (I am!) envious of the Caesar Kleberg Wildlife Research Institute and what a "Boone & Crockett" research entity it has become; we should seek to "clone" it here in West Texas. Research needs, in my opinion, that deserve attention include deer responses to changing landscapes (e.g., wind turbines, absentee landownership) and changing practices (e.g., escalation of high fences). Issues involved with deer overabundance, e.g., crop depredation, deer-vehicle-collisions) are just beginning to raise their head here in West Texas. Regarding population management we need information on annual survival rates of various cohorts, especially during the post-rut period. We have a poor understanding of various mortality agents (e.g., disease, predation). Our counting techniques (e.g., helicopter counts) need assessment. We need economic- and ecological assessments of various aspects of "deerculture", i.e., high-fence, high feed approaches to deer management. And we need a better appreciation of how various stakeholders view our practices and our profession.

NORTH TEXAS DEER MANAGEMENT CALENDAR.

TY BARTOSKEWITZ, Technical Guidance Biologist, Texas Parks and Wildlife Department, Brock, TX 76087

Deer management is an annual process. To be successful, a land manager needs to understand limiting factors, habitat needs, and issues deer face during the course of a calendar year. The timing and planned administration of habitat and land management practices (brush management, grazing, supplementation, etc...) will have both positive and negative effects on your deer population. To facilitate planning, this presentation will delineate the timing of land management practices on a monthly schedule to enhance your deer population.

January and February in north Texas are generally cold and most bucks are facing the post rut period of the year with forage availability and conditions normally sparse due to lack of moisture and extended cold temperatures. Management practices should be aimed at providing energy or carbohydrates for deer consumption. Energy could be in the form of wheat, winter forbs, or supplemental feedstuff. Winter burns and brush management treatments along with post season census are common this time of year.

March, April, and May in north Texas is generally a time for regeneration of dormant plants and annual forbs. Spring rains and mild temperatures offer good growing conditions in April and May. Most bucks have shed their antlers and are building up body reserves lost during the winter season while does are in the 2nd trimester of pregnancy. Generally, habitat conditions are at their prime during April and May provided we get timely spring rains. Now is the time to adjust your grazing system to provide for adequate fawning cover during the summer season. Water development is also a priority for the upcoming summer season. Spring and summer food plots are generally planted during this time of the year. Plants generally enjoy their highest crude protein values during this time of year and forbs will be a major part of the deer diet provided we receive timely spring rains. Monitor your land management treatments with photo points.

June, July, and August in north Texas are generally the warmest months of the year with periodic thunderstorms providing brief flooding rainfall events or no rain at all. This is the most stressful time for does because of lactation and bucks are rapidly developing antlers during these months. Ground cover and surface water are key habitat variables this time of year. Ground cover (grass and shrubs) is important for fawns to escape from predators and the summer heat. Water is important because of the heat and to ensure proper body function. Predator control is probably most effective during this time of year just prior to fawns hitting the ground. As the summer progresses, the quality of the forage generally declines in normal years. As a result, supplemental feeding of protein is common during this time of the year. Planned brush treatments, prescribed use of fire, and soil disturbance are all beneficial

this time of year just prior to a rainfall peak in September. On the population side, most managers begin collecting herd composition data and spotlight counts in mid to late August.

September to most hunters kicks off the outdoor season with dove hunting, football, and cooler temperatures. September is also a turning point for whitetails. Bucks begin to shed their velvet and conclude the antler process with the change in photoperiod while does begin to wean fawns and prepare for the upcoming breeding season. Various census techniques such as spotlight and helicopter surveys are employed to gain insight into the current years herd composition and deer density. Winter wheat fields are sewn and the first corn feeders typically start spinning feed. Deer are still on a bed to feed pattern and summer bachelor groups of bucks begin to dissipate.

October, November, and December in north Texas are all about the most important ¼ inch in deer management…the trigger pull. Each time a hunter pulls the trigger or releases an arrow, he is making a management decision that will impact his deer population both nutritionally and genetically. Surveys in August, September, and October provide information from which a harvest recommendation can be made to suit the landowner's goals and objectives. Maintaining the proper number and composition of deer on a piece of property to match the available habitat is essential. Doe and selective buck harvest are the 2 key population management practices during this time of the year. Breeding activity usually begins in mid October and lasts thru mid to late December depending on where you are in north Texas. This is the time of the year to enjoy the fruits of your labor and collect good harvest data for evaluation of your goals. It is not too early to prepare fire lines and begin some shallow discing to promote cool season forbs for the winter period.

UPDATE ON EHD/BTV RESEARCH PROJECTS

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After a brief introduction and review of hemorrhagic disease in deer, and the status of the disease in Texas, a progress report will be given about several ongoing research projects in areas in Texas investigating aspects of epizootic hemorrhagic disease (EHD) and bluetongue virus (BTV) as they effect captive and native white-tailed deer (WTD). One project on two ranches in the San Angelo area concerns studying the insect vector and determining the species involved, population numbers, spacial and temporal distribution, and the type of viral etiologic agents present in the vector combined with a similar parallel study the host WTD. Another study in South Central Texas involves investigating the genetic aspects of natural or innate disease resistance in populations of WTD in endemic areas. Future research projects on vaccine development will be discussed.

WHAT TO DO WITH SPIKE BUCKS – INSIGHT FROM THE SOUTH TEXAS BUCK CAPTURE PROJECT

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The debate on how to manage yearling bucks has smoldered and sometimes raged in Texas for nearly 20 years. In 1997, over a dozen experts and several hundred interested people convened in College Station to discuss this question. Most of the information came from 2 studies of captive deer herds and those studies seemed to come to different conclusions. Although data from these captive studies were instructive, managers also wanted information more directly related to making harvest decisions for free-ranging deer. Out of the ambiguity of the College Station conference was born 2 studies of free ranging bucks. One was conducted through the Caesar Kleberg Wildlife Research Institute (CKWRI) at Texas A&M University-Kingsville, and the other through Stephen F. Austin (SFA) University. The results of those 2 studies will be presented this evening, continuing this process of greater understanding that will eventually, although not necessarily this evening, lead to better informed management.

The CKWRI study began in 1998 with captures on 4 ranches in Webb County. In 1999, a 5th ranch in Kleberg County was added. Captures were conducted on one ranch for 7 years, on one ranch for 9 years, and on the remaining 3 ranches for 10 years. During this time, we obtained over 4,000 antler and age records from nearly 3,000 individual bucks. The areas over which we captured varied from 12,000 to 25,000 acres. Two ranches were enclosed by a high fence, one was partially enclosed, and the last 2 ranches had no high fence. Mature bucks were harvested on all 5 ranches, young deer were culled on one ranch, and intense culling was implemented on half of one ranch. Our study design allowed us to provide information useful in management of yearling bucks. Specifically, we can determine the relationship between antler size at one age and antler size of that same individual at another age. In spite of the title for the evening session at this workshop, our data do not allow us to investigate the role of genetics in antler growth. We are not able

to look at antler size changes from one generation to the next, nor are we able to consider the relationship between antler size of sires and offspring.

Our data clearly show that on average, yearlings with spike antlers remain smaller than their fork-antlered counterparts as they mature. At 5 years of age and older, bucks that were spikes as yearlings had antlers that were, on average, 17 Boone and Crockett (B&C) points smaller than bucks that were fork-antlered yearlings. Basal circumference and beam length were both greater for bucks that were fork-antlered as yearlings. Bucks that had been fork-antlered yearlings had one more tine on average and about 3 inches more total tine length than bucks that had been spike yearlings, but neither of these differences was statistically significant. Inside spread was nearly identical between the two classes of bucks.

Some bucks that were spike-antlered yearlings became good quality deer at maturity. Eleven percent of spike-antlered yearlings grew antlers of at least 140 B&C points at maturity, but this was much lower than the 48% of fork-antlered yearlings that became 140 class bucks or better. None of the spike-antlered deer became trophy bucks with antlers over 160 B&C points, while 20% of fork antlered yearlings had antlers at least 160 B&C points.

In our analysis, we considered the possibility that the relationship between yearling and mature antler size may not be the same on every ranch. Spike and fork-antlered yearlings differed at nearly every age on 2 of our ranches. On two other ranches, spike and fork-antlered yearlings only differed significantly at 2 and 3 years of age. On the final ranch, spike and fork-antlered bucks did not differ at any age. The ranches on which most significant differences were found also had the largest sample sizes, which made it more likely that significant differences could be found. However, it is of interest that the ranch showing no significant differences was the ranch with the most intensive culling of young bucks, at least on a portion of the property. It is possible that removing the smallest antlered bucks influenced the results.

What does other research indicate about patterns of yearling and adult antler size? Research from captive deer at the Kerr Wildlife Management Area shows a clear relationship between yearling antler size and antler size at maturity. Analysis from the captive deer herd at Mississippi State University also suggests such a relationship through what are termed permanent environmental effects. Results from both captive and field studies of red deer suggest that animals with small antlers at young ages tend to have small antlers at older ages.

The role of research in wildlife management is to provide managers with knowledge to inform their decisions. The information our study provides is that yearling bucks with spike antlers will, on average, have smaller antlers when they mature than

yearling bucks with forked antlers. This information, however, does not represent a management prescription. What a manager does with this information depends on the situation. If you are managing deer in an area where nearly every buck is harvested as a yearling or where fawn production is low, then the information from this study will not affect your management much. In these situations, keeping bucks alive is a bigger management challenge, and harvesting spike yearlings would not make sense. If you are selling hunts and a 120-class buck is marketable, or if you have family or clients that would enjoy harvesting a mature buck, then you may not want to harvest yearling bucks. Conversely, if fawn crops on your ranch are high and consistent, buck mortality is low, and small or moderate size mature bucks have little role in your management program, then our results suggest harvesting bucks with spike antlers could be beneficial. As Dr. DeYoung made clear in an earlier presentation at this workshop, the greatest benefit of harvesting spikes is not likely to be genetic. In fact, yearling bucks are spikes because of some complex mixture of factors like birth date, nutrition, a sickly or inattentive mother, disease, and genetics. Because a white-tailed deer's most direct competitor for food is another white-tailed deer, the greatest benefit of harvesting a spike is likely to be from reducing the number of animals competing for resources.

Early stages of investigation into any subject can be frustrating because the system is often more complicated than the initial research was designed to handle. Because not all ranches in our study showed the same pattern and because the results of the SFA study differed from ours, it appears the relationship between yearling and mature buck antler size may be influenced by some factors that have not yet been investigated. This lack of understanding can be frustrating from a management perspective while at the same time be intriguing from a natural history and scientific standpoint. The goal of any successful manager is to take the best available information and use it to make decisions in the context of his management situation. The amount of information on spikes and forks continues to grow and interest in the question will promote further research to refine our understanding.

JUVENILE-TO-ADULT ANTLER DEVELOPMENT IN WHITE-TAILED DEER IN SOUTH TEXAS

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Past studies using penned deer provide conflicting results on the age when reliable predictions about antler growth potential in white-tailed deer (Odocoileus virginianus) can be made. We captured wild whitetail males via aerial net gun on 12 ranches in 5 counties in south Texas, USA; from 1999 to 2007 (continuing 2008 and beyond) to determine if a reliable juvenile-to-adult relationship in antler development existed. We individually marked and released captured animals at the trap site after we took antler and body measurements. We recaptured marked animals as possible in subsequent years or until we obtained final measurements after legal harvest. Amount of growth in the first set of antlers in whitetail males was a poor indicator of antler growth at maturity. By 4.5 years of age there were no significant differences ($P>0.05$) in antler measurements regardless of the amount of development of the first set of antlers at 1.5 years. We concluded culling of yearling males based on number of antler points would have little positive effect on overall antler quality in future years.

[J. Wildl. Manage. 72(5):1109-113; 2008].

In addition to the above published study, we also will present the following:
A comparison of this study to other published works will be presented and discussed.

WHAT DEER EAT AND WHY?

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The much faster passage rate of a deer's digestive system demands that they eat a forage diet that is more rapidly broken down in the rumen than that of a cow, which has a much slower passage rate. Since broadleaf plants with a net veination are broken down much more rapidly than grass and grass-like plants with a parallel veination, deer prefer broadleaf plants to grasses. While deer will eat immature grasses and grass-like plants that are low in fiber, they cannot receive sufficient nutrients from mature grasses that are much higher in fiber and less digestible.

The plants with the highest level of nutrition in the pasture are young forbs, also called weeds, which are herbaceous broadleaf plants. While the highest quality forbs are annual plants that germinate from seed, grow, flower, produce seeds, and die in one growing season, perennial forbs that live for several years and develop strong root systems are more stable, high in nutrient quality, and increasing their availability should be a goal of management.

Browse plants are perennial broadleaf plants that have a bark layer. Browse generally becomes the major part of a deer's diet because of its greater availability compared to forbs, and the fact that browse provides cover in addition to food. The nutritional quality of browse is variable with deer preferring those plants that are higher in quality.

In all classes of plants, deer prefer young immature leaves and stems to older, more mature plant parts. The younger plant parts are lower in fiber, and therefore more digestible, and tend to have higher protein and mineral levels than the older plant parts.

The last category of plants for deer is mast, which is the fruit of primarily browse and succulent (cacti) plants. Mast is seasonal for deer in that the fruits of a particular plant are available only once a year. Mast can vary in nutritional quality from low protein – high energy, such as with acorns and prickly pear tunas, to moderate protein – high energy, such as with mesquite beans. Regardless, mast is generally high in energy and gives the deer a needed boost in diet quality when they are available, as long as other nutrients are also available. The drawback to mast is that in west Texas, the availability is dependent on the rainfall received during the period when the mast is developing, which can lead to an abundance, or dearth, of mast, and should not be relied upon.