HARVEST MANAGEMENT

There's More to it Than Just Shooting Deer

By Dr. James C. Kroll

It was 5 a.m. and my hunting buddy and I were driving west out of Uvalde to his ranch. He had asked me to help him manage his herd, with the goal of producing a record-book-class buck. The management plan included holding the herd at productive capacity, culling bucks with inferior antler traits and leaving the best bucks to breed—pretty much standard stuff for modern trophy deer management.

that led to the control of the screwworm parasite was one of the most significant events in the population explosion of deer in Texas.

Disease research has provided early detection and documentation of serious deer diseases, such as hemorrhagic disease, anthrax, tuberculosis and CWD. It also documented the role of deer as a carrier and reservoir host in the transmission of important diseases, such as Lyme disease, Rocky Mountain spotted fever and brucellosis.

This has proven very important in informing the public of the role of deer in the spread or maintenance of these diseases in nature. Documentation of parasite burdens has been used as a management tool relating deer condition to habitat condition and carrying capacity.

Disease researchers also have studied the effects of serious foreign diseases, such as foot and mouth disease and rhinderpest. Either of these, if established here, would be devastating to the white-tailed deer and to the North American livestock industry.

At the turn of the 20th century, foot and mouth disease was detected in North America on two occasions, once in California and once in Florida. Several thousand deer were killed in each outbreak to prevent the spread of this disease.

When the day again comes when such dread foreign diseases reach North America, research has given us some preparedness to deal with these events. Hopefully, we will see more research dollars for development of better technology for surveillance and detection of such diseases in the future.

Human Dimensions

Many of the hunting regulations state agencies adopt result from hunter, landowner and public opinion and satisfaction surveys. Ultimately, most regulations are founded in well-designed research that utilizes accepted techniques developed in the field of social science. Such studies will likely have more influence than any other research as we face new directions in deer management in the decades ahead.

In summary, research has been and will always be the foundation for sound management of the white-tailed deer. While the public sometimes looks at research as a drain on much-needed funding for management, in truth, without research there might be management, but it would be of the misguided type that usually results from the direction of "authority," or worse from "simple deductive reasoning!"



DR. HARRY JACOBSON PHOTO

We were in the third year of the program and he was full of questions. "I have two questions," he queried. "When can we stop shooting does and when can I harvest one of our best bucks?" My answer was the same for both questions: Probably never!

My friend almost ran off the road and into the Nueces River at that point. My response made for some pretty quiet driving the rest of the way to the ranch.

My friend is included in a growing number of landowners and managers who know just enough of the "talk" about trophy deer management to be dangerous. High fences and feeding are being erroneously equated to trophy management. Sure, these management activities are often associated with management, but they are only a small part of the big picture.

It probably is as much my fault as anyone's, in that those of us who have been involved in the "deer industry" for several decades have not done a good job of communicating exactly what is involved in consistently producing large numbers of trophy-class bucks. That is the litmus test to any management program. Are you a "one buck wonder," or do you produce large numbers of quality bucks for harvest?

How many times have you heard the old saying, "The three keys to trophy deer management are age, nutrition and genetics?" True, but the one key left out is proper harvest.

Which deer you harvest and how many certainly affect age structure and genetics, but also affect nutrition and habitat. I often point out the best habitat management tool is the .22-250! I can overcome a great deal of nutrition and habitat problems through harvest. It also is amazing how genetics seems to change when the herd is held to the productive capacity of the range.

So, in this article I will discuss what you should consider in developing a harvest plan for your property.

Taking Advantage of the Natural Productive Capacity

I know of only a handful of landowners who are taking advantage of the innate ability of whitetails to produce offspring. Whitetails live in dynamic habitats, which tend to change over time, like a forest is blown down by a hurricane, a tornado chewing a hole in the woods or a wild fire killing back the brush. Such disturbances set the habitat back to a more simple stage of what we call "succession."

The moment a disturbance happens, vegetation starts to re-grow within the reach of deer. Deer are uniquely adapted to take advantage of these good times through their innate high reproductive capacity.

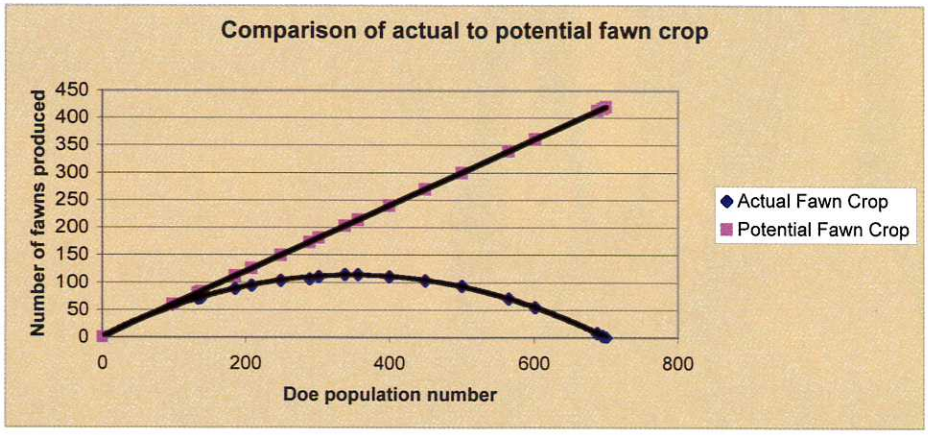


Figure 1. There is a significant difference between the potential number of fawns that can be produced versus the actual number when habitat (carrying capacity) limitations are taken into account.

Biologists refer to whitetails as "K-strategists," meaning they are controlled primarily by habitat quality, tend to be long-lived and put a lot of effort into rearing their young. The "K" comes from a mathematical representation for carrying capacity (=K).

This is opposed to species such as mourning doves, with a very high reproductive rate, but put little effort into rearing their young. These species are called "r-strategists." The "r" comes from the built in natural rate of increase for every species.

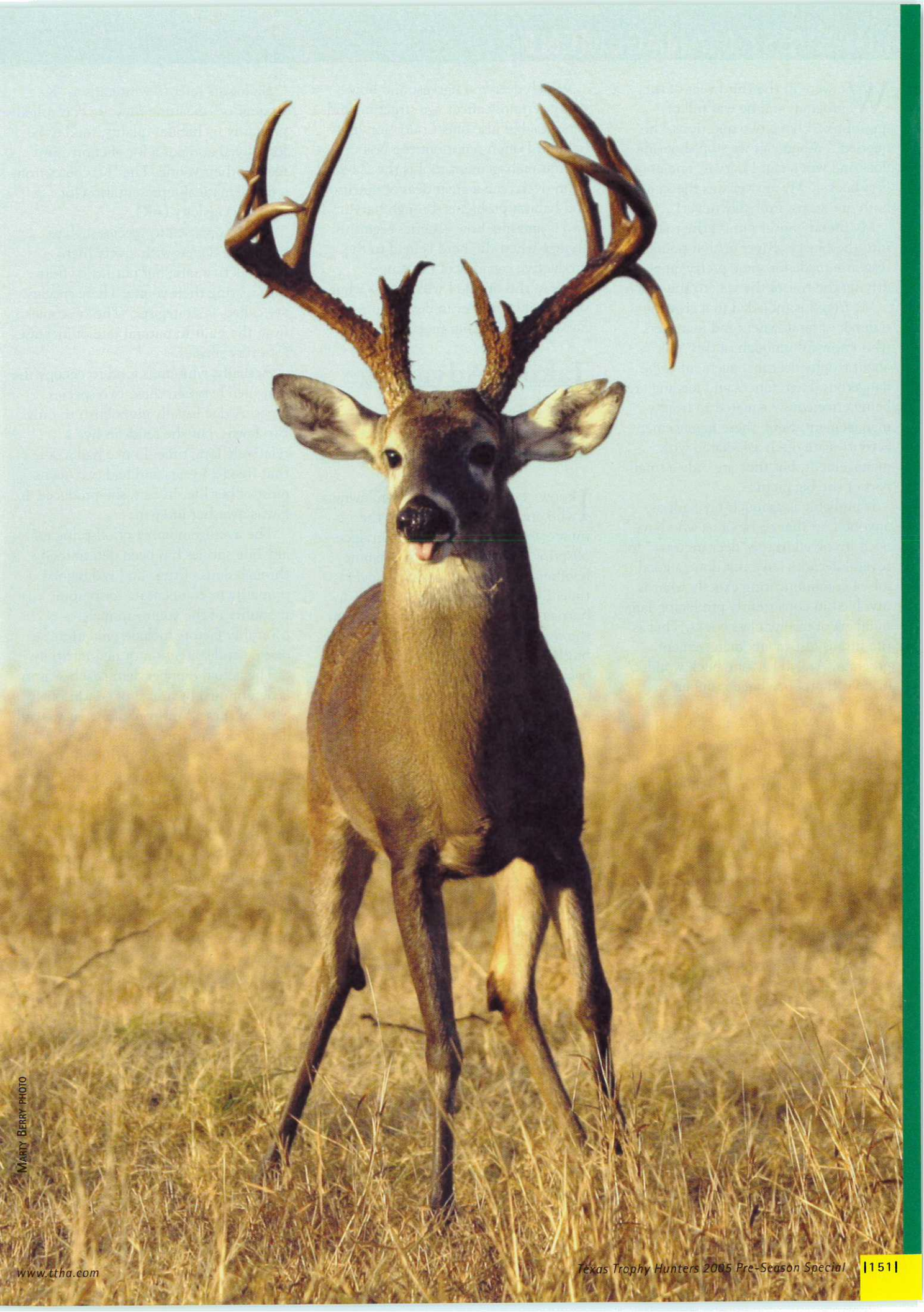
Actually, whitetails tend to occupy the gray area between these two species types. A doe usually gives birth to only two fawns, but she tends to live a relatively long time. I once had a doe that lived 23 years and had two fawns most of her life. In fact, she produced 46 fawns over her lifespan.

The average number of offspring for any one species has been determined through eons of time and is designed primarily to compensate for natural mortality of the young animals. Mortality factors include predation, disease and starvation or malnutrition.

The actual number dying each season is determined by a host of conditions. Most of these, however, are what we call density-dependent factors. The effect of these agents is related to the density of deer. The more deer you have, the more likely some mortality factor will increase, at least under non-management situations. Management, on the other hand, can increase the ability of habitats to support more deer over a long time period.

In most of the whitetail's range, they tend to exhibit a compensatory response to harvest. This means the removal of deer from a high population will tend to result in higher fawn survival and more fawns produced. It is one of the most difficult concepts to get across to the average landowner!

You will have to trust me on this, but you actually can have more fawns living until fall with less deer on the range. More deer does not necessarily translate to more fawns. The average person would assume 200 does would produce more fawns than 100; yet, this not always is the case.



MARTY BERRY PHOTO

As the herd approaches the ability of the property to support animals, the number of fawns surviving declines, no matter how many are born. (Figure 1 shows the difference between assumed and real fawn survival.) So, you may think having, in this case, 700 does in the herd is a good thing, but more fawns are produced when the doe herd only contains 350 (1/2 of K). Now, this is not "college professor talk." It actually happens, and I have demonstrated it many times.

For example, I recently wrote about the Mustang Creek Ranch herd near Salado, Texas. Analyzing their census and fawn production data, we found the number of fawns produced declined once the herd exceeded 300-350 does (see Fig. 2). In fact, fawn crops became more erratic when the doe herd exceeded 300 females. That is a density for the ranch of one doe per eight acres, far higher than conventional "wisdom" would support.

So, if we want to maximize our harvest, we only have to keep the doe herd at one-half of carrying capacity, provided we know what that is. In this example, and in the real world example of Mustang Creek, that means the owner has to remove around 100 does per year to keep the herd at maximum production—and that is no easy task.

The above analysis was based on an average 60 percent fawn crop, yet most South Texas managers work off no more than a 25 percent average fawn crop mentality. In that region of the state, deer do not consistently show a compensatory response to harvest; herds tend to be controlled more by climate than habitat.

I have seen herds collapsed by over-shooting does. However, the ranchers who are applying intensive habitat and nutrition management are seeing such a response. For example, my friend David Morris of Los Cazidores Ranch near McAllen, Texas, clearly has shown increasing nutrition through food plots increased the productive capacity of his ranch. Whereas, neighboring ranches exhibit widely fluctuating fawn crops, his herd commonly has fawn crops of 80 percent or more.

I see no reason for South Texas ranchers to feel they are stuck with a low fawn crop, unless they are willing to live with the limits of their unmanaged range. You don't have to feed or plant food plots to increase productivity. Even less intensive habitat practices, such as roller-chopping and fertilization, increase productivity.

The rule of thumb would be to determine at what range in herd size produces maximum potential fawn production and try to hold the herd within that population range.

For site-limited areas, such as South Texas, it is not a fixed point. You want to have a broad range of doe harvest to allow for climatic fluctuations. Unfortunately, under extensive management you have to keep a buffer of non-productive does to assure an adequate fawn crop.

For years, cattlemen in that region have done something similar. They keep enough mother cows to obtain an average 50 percent calf crop, which is fine if you have a lot of land and never had to pay modern prices for it!

Of course, a larger fawn crop does not necessarily mean more bucks. There is a huge difference between fawn crop and recruitment. Even some biologists do not recognize the distinction.

Fawn crop is the number of fawns present on the range in early fall, expressed as a percentage figure. A 60 percent fawn crop means there are 60 fawns for every 100 does in, say, October. This usually is based on census, either by spotlight or by helicopter.

Yet, recruitment refers to the number of fawns produced that live to be one year of age. At that time, they are "recruited" into the population. This number or percentage may be as little as 15 percent in many herds. Poor recruitment, no matter how high the fawn crop, will result in fewer bucks for harvest, smaller body size and lower quality antlers.

At Mustang Creek Ranch, they have continued to harvest one mature buck to 50 acres (that's right) over the last seven years. In order to do so, they need a recruitment rate much higher than 15 percent. My earlier work at North Boggy Slough Hunting and Fishing Club, in cooperation with Temple-Inland biologist Bill Goodrum, showed a similar response.

At Boggy, decreasing the doe population resulted in a shift of buck harvest from one per 305 acres (1981) to one per 112 acres (1988). At the same time, estimated fawn crops increased

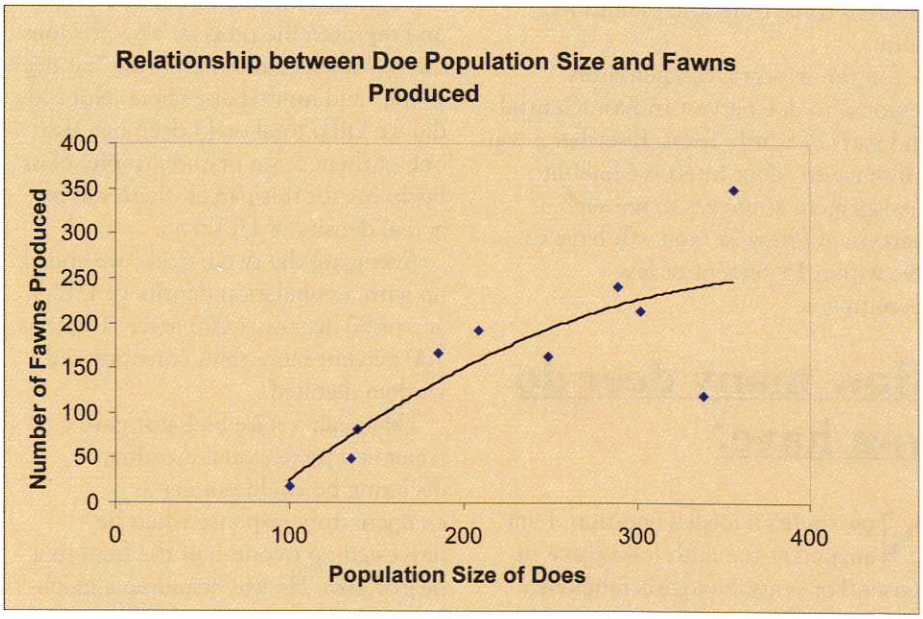


Figure 2. Real data from Mustang Creek clearly shows a leveling of the fawn crop after the herd exceeded 300 does. If the doe herd were allowed to grow larger, fawn crop would decline. Hence, the point of maximum fawn production was at about half of saturation.

from 32 percent in 1981 to 67 percent in 1988. Age structure of harvest clearly supported higher recruitment, all as a consequence of proper harvest management.

The above is staggering when you consider the average harvest density for bucks in eastern Texas is about one buck per 400 acres, and current South Texas "wisdom" is you can only harvest one buck per 500-1,000 acres (ac.), depending on your quality goal.

The sad fact is, few Texas herds are being harvested properly and the average operator is missing out on a great deal of return as a consequence. A lot of deer are being "left on the table," especially if you accept the tried and true reasoning of 15 percent recruitment.

Assuming the often-recommended population density of one deer per 25-30 acres, that means there are 30-40 deer on 1,000 acres. Fifteen percent of that figure comes potentially to about five deer that can be harvested (1/200 acres), which is about what the average ranch is doing, that is if we assume a 2:1, doe/buck harvest (one buck/606 ac.; one doe/298 ac.).

The fact is, that is probably overly optimistic. Increasing recruitment to just 25 percent would result in a potential harvest density of one buck/350 ac., as much as three times the established norm.

You can expect a compensatory response to doe harvest in East, Central and parts of South Texas. Elsewhere, you will have to adopt intensive habitat management strategies to see such a response. Otherwise, you will have to live with a 15 percent or less recruitment.

How many deer do you have?

Now there's a loaded question. I am amazed at the faith folks place in census. For years, biologists religiously have conducted spotlight and aerial censuses, believing these counts give you a correct estimation of the true population size. The amount of money spent annually on census would astound you.

The few studies on the subject suggest an error of at least plus or minus 30 percent. That means, in an inventory yielding an estimated 100 deer on a ranch, the best-case scenario is there are somewhere between 70 and 130 animals actually out there. You could never run a business with that kind of accuracy! Yet, management decisions are made every year on such a ridiculous error rate.

I am one of a handful of biologists who have had the opportunity to census a population and then conduct a total kill-out of the property. One of these properties was Ft. Perry Plantation in Georgia. The area contains 2,000 acres surrounded by a high fence. We constructed Ft. Perry by acquiring several smaller tracts. The first two were 500 acres each.

Wisdom among Georgia biologists at that time was the population density of deer in the Ft. Perry area was one per 25 acres. We started with a 500-acre parcel, which we high-fenced and then killed all the deer (which was not easy, believe me).

At the "official" density, that meant we could expect about 20 deer. In reality, we killed 37, many of which were bucks. That's an adjustment from 1/25 ac. to 13.5.

Next, we fenced another 500 acres and repeated the process. The previous owner had declared there were "no deer there," and hunted elsewhere. Not only did we kill a total of 43 deer, but also one of them was a mature, trophy-class buck. So, for this parcel, there was an actual density of 1/11.6 ac.

Averaging the two parcels, we ended up with a population density of 1/12.5 ac., or 80 deer on 1,000 acres. This was 100 percent more than conventional wisdom dictated.

That year, a state biologist gave a paper at a professional meeting, declaring he could not get a compensatory response when he harvested up to one-half the herd in a nearby area. He was assuming a much lower population than actually was there. No wonder he could not demonstrate a response. He probably had harvested only 25 percent of his herd, not 50 percent.

I worked for years managing the Muy Grande Ranch in Michigan (that's right). Because of a tuberculosis (Tb) problem resulting from the free-ranging deer giving our deer the disease through the fence, we had to depopulate the entire 1,500-acre fenced area. It turns out we had about 700 deer on the property, when everyone thought we had less than 400. That calculates out to one deer to around two acres. And, the habitat was in excellent condition, mostly due to feeding and food plots.

So, if census is of no use, what can you do? The key is to let the deer "tell" you what they are doing. What this means is, if you are collecting good data from harvested animals, and are using a reasonable way to estimate both fawn crop and recruitment, you can manage the herd effectively without ever conducting a census. This would include incidental sightings and infrared-triggered camera data for fawn crop and recruitment, as well as age, weight and lactation data from your does.

I often have said, "You do not manage a deer herd, you fine-tune it." What I meant was, you make a management decision, implement it and then measure herd response. If there is a positive response, you then take another step and measure that response. Over time, you work out a harvest management plan that suits your herd.

This is a good time to address a question that no doubt has come into your head. If census does not give you an accurate estimate of herd size, how on earth can you ever determine where your herd is in regard to carrying capacity? Very good question! Again, let the herd tell you.

Monitoring recruitment over time, you eventually will see a leveling off and/or downward movement. At that time, hold the harvest constant and see what happens. If fawn crop or recruitment continues to decline, back off harvest until you get a positive response. That will be your point of maximum productivity.

At Mustang Creek Ranch, we have collected all the data discussed above for many years. In my 1991 book, "A Practical Guide to Producing and Harvesting White-tailed Deer," I

Again, DNA evidence is substantiating my earlier reports that each buck contributes only a few offspring to the herd. At higher sex ratios, a dominant buck may contribute more, but for the most part, you cannot count on a buck getting very many of his genes into the next generation. It then becomes a numbers game. Let me explain.

If you round up all the mature bucks in South Texas, count their main frame points and score them, the average buck will have eight points and score about 130 Boone and Crockett. (Figure 4 illustrates this point.) Please study it because the interpretation of this chart tells us a great deal about buck harvest strategies. The data was acquired prior to commercial hunting on the ranch from infrared-triggered camera photographs. Note, most of the bucks, as predicted, are in the eight-point class. The chart fits a more or less "normal distribution."

Our previous studies suggested an individual mature buck does not contribute more than three or four offspring in most herds. Knowing this, ask yourself what is the overall reproductive impact of the 12-point bucks in this herd? About one percent of the herd was in this class.

If there are 100 bucks present, one of the bucks was a 12-pointer, and almost 50 had eight points. The reproductive contribution of these two classes at most is four fawns for 12-pointers and 200 fawns for eight-pointers. Now, ask yourself what the impact would be of killing one 12-pointer versus one eight-pointer?

Removing just one of the better (10-plus points) bucks would result in about a 10 percent decrease in their genetic contribution, while removing one eight-point, mature buck would reduce reproduction by only two percent. Shoot all the higher scoring deer, year after year, and you have a situation in which the lower scoring deer (as a group) are having an ever-increasing impact on the herd.

In fact, Figure 3 shows just such a herd. The name of the property will be, for obvious reasons, omitted, but the removal of eight-point, or better, bucks for years resulted in a herd with almost no bucks with more than eight points!

Figure 4 illustrates the opposite situation. For years at Muy Grande Ranch, we culled all bucks 3-1/2 years or older. That was much easier to do in Michigan since high-fenced properties are privatized and the owner can cull deer anytime he pleases.

There, we removed virtually every cull buck from the property. We culled on both points and frame. There were a few bucks with eight points, but extremely large frames. We left these bucks, culling both on points and frame size. The result was a herd shifting more and more to the upper level of points (10-plus), as well as towards larger frames.

Unfortunately, the Tb episode discussed before resulted in a total kill-out, so we only had a few years to enjoy these fine animals. However, there is a rainbow after every storm.

After the kill-out, we left the property vacant of deer for three years. During

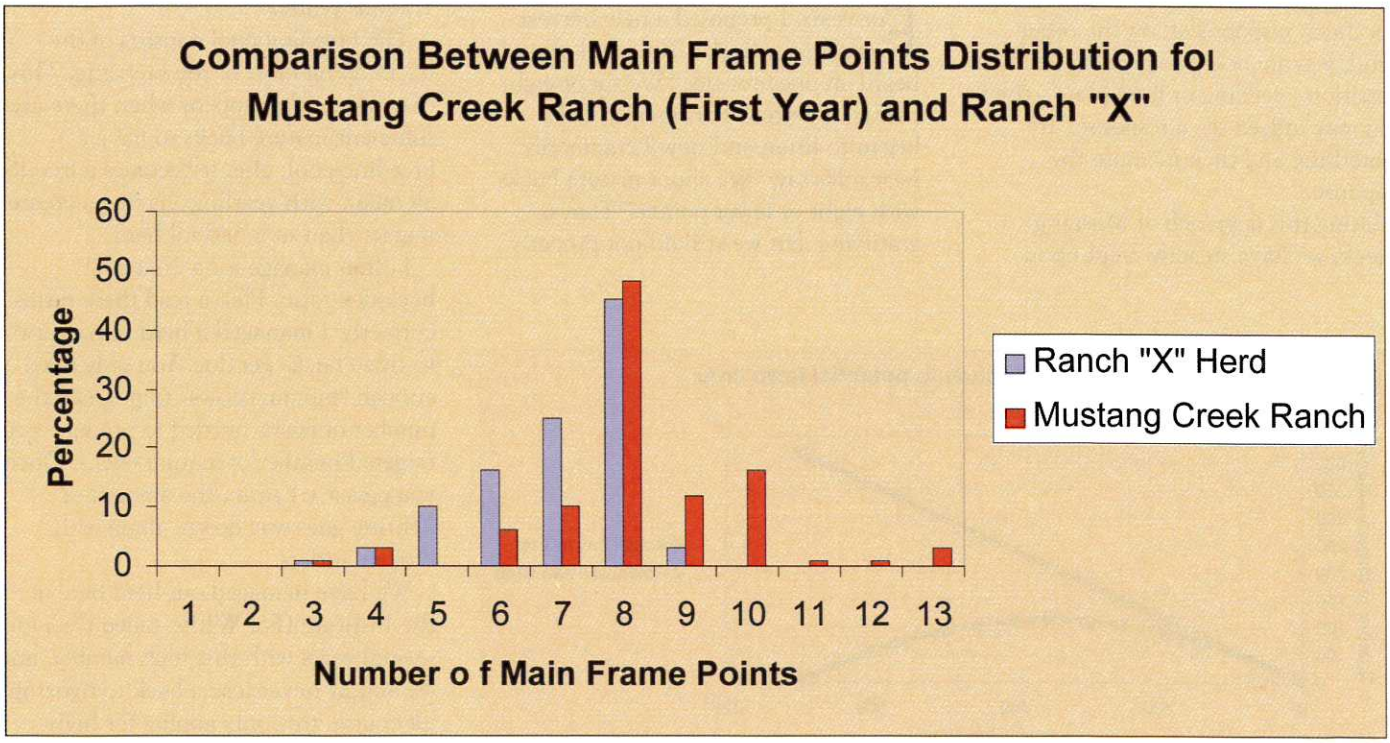


Figure 4. Data collected originally for Mustang Creek Ranch illustrates the unmanaged distribution of points in mature bucks. At the time this chart was constructed, Mustang Creek had not been hunted for some years, so this is a more or less natural condition. Note the vast majority of bucks have eight points. Further note the same data for a herd managed many years for "eight points or better" has degraded significantly.

provided standards for evaluating management progress.

One of the rules of thumb I presented regarded the proportion of harvested does that were in the 2-1/2 years or less age class. If that proportion falls between 50-60 percent of harvested does, you are harvesting the right number of does. If the proportion is larger than 60 percent, you are harvesting too many, but less than 50 percent, not enough. Yet, that is just one diagnostic to proper harvest management.

If you are also monitoring lactation (the proportion of does in milk at harvest), and the current year is 35 percent, it is obvious you have a population problem, an age structure problem or a nutrition problem. If your age structure shows you are not harvesting enough does, then increase the harvest and see what happens.

In site-limited areas, such as South Texas, this may yield no response. In such cases, there also is a nutrition problem. High variability in nutrition, caused by low rainfall, can mask any compensatory response to harvest. You can kill does right down to the last with not much response. If, on the other hand, you are doing something for nutrition—feeding or food plots—then you may indeed see a response. Try something and then measure the response.

Using this approach at Mustang Creek, we have steadily crept up in lactation rate and have achieved a sustained yield harvest of one deer to about 20 acres (one buck/50 ac.). At the same time, average buck age has remained stable at 4-1/2-5-1/2, while does average around 3-1/2 years of age (Fig. 3). We did this without relying on census, other than to meet Managed Lands Deer Permit requirements.

I am working with a 9,000-acre ranch near Laredo. The owner does not want to supplementally feed or grow food plots (probably not feasible anyway). Is he then resigned to working with a site-limited herd? Not really. What we have done there is to develop nine- to 100-acre "natural food plots," each consisting of a cattle-fenced area roller-chopped, fertilized and seeded to native plants. These areas are burned at the proper time, as well. This should increase both fawn crop and survival, in spite of low rainfall.

Proper Buck Harvest

For years, I proposed a new harvest strategy for bucks. Time and again I heard an operator say, "We shoot eight points or better." Fortunately, folks began to listen and now I commonly hear folks say, "We shoot mature bucks with eight or fewer points." That is gratifying, but we still do not properly harvest the buck segment of the herd. Once you have your herd producing the maximum number of fawns, and recruiting a large proportion of them, it is time to focus on proper buck harvest.

The "name of the game" in trophy deer management is producing as many yearling bucks as possible for your property. That is your raw material. More and more, managers are coming to the realization that shooting yearling bucks with any antler quality is a mistake!

Our long-term project on antler development in free-ranging deer supports the idea you cannot judge a buck by his first set of antlers. Besides, recent DNA studies have substantiated claims I made 20 years ago that most of the breeding is being done by the middle-age bucks, provided they are present to do so.

The general behavioral pattern of bucks in "natural" herds (those with natural sex and age ratios) is to fight their way into the breeding pool by 4-1/2 years, hang on for one to two years and then begin to lose libido in old age (6-1/2-plus years).

The breeding pool consists of the bucks doing most of the breeding. This, of course, only happens when there are sufficient mature bucks to have a breeding pool; else, it becomes a free-for-all affair, with yearlings having a greater impact than in a natural herd.

I often manage for a 2:1 or 3:1 buck/doe ratio. Please read these ratios correctly. I managed a herd to have two to three bucks per doe. You only need enough "momma cows" to produce the number of fawns needed to produce your targeted number of mature bucks. Once you pass a 1:1 ratio, the amount of fighting goes way down, along with broken antlers.

We have managed our herd here at the Institute (For White-tailed Deer) for several years with this high number, and we almost never lose a buck to fighting. Of course, this only applies for high-fenced properties. Without a fence, the best you can ever do is a 1:1 ratio. So, in high-fenced situations, you manage the buck segment for a balanced age structure, but not sex structure. What's next?

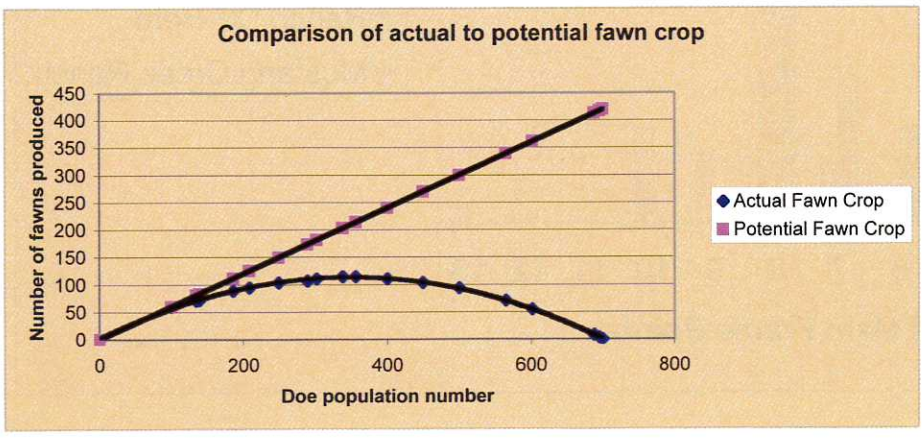


Figure 3. In spite of heavy harvests, the average ages of bucks and does at Mustang Creek Ranch have remained steady, near the targeted goal.

that time, we were able to hand select superior animals and breed them in a Tb-free facility. In the fourth year, we began releasing the best of these animals. There is nothing sadder than the deer woods devoid of deer, but now the restocking program with hand-selected animals has produced an even better herd. Two hundred-class bucks are abundant.

The Muy Grande experience tells you what you have to do in order to improve the antler quality of your bucks, but first you have to get your herd to maximum productivity and recruitment through proper doe harvest and nutrition management.

Then, you have to remove all bucks with visibly inferior traits, usually those that are 3-1/2 years and older, with eight or less points and/or small frames. That's right, I said all of them! That's where most landowners and managers fall short.

Too many operators report they are on a "culling" program when all they really are doing is removing the very worst animals they see. That may make you feel good, but will never get you to where you want to go.

"How many management bucks should I harvest," I often am asked. "Every one on the property," is my answer. Yet, the average landowner is allowing his/her lessees to remove one trophy and one management deer only per year. If you work on the false assumption you can only harvest one buck per 500-1,000 acres, you will get absolutely nowhere with this philosophy. Instead, the proper strategy would be to remove all management deer for at least five years and then reassess your situation.

Over time, you can adjust the criteria for culling based on what makes up the bottom half of mature bucks. That way, the bottom rises toward the top, making management bucks better and better each year.

One of the best diagnostics for evaluating management progress is the eight-point/10-point ratio. I have been writing about this for some time and I am beginning to hear more folks refer to it. Using infrared-triggered cameras and/or incidental sightings of mature bucks, add up all your eight-point or less sightings and divide this total by the sum for 10-point or better bucks. When we began our program at Muy Grande, the ratio was 8:1; after some years of culling, the ratio dropped to 1:1.

I could go on for some time, but space does not allow me to continue. Needless to say, there is a whole lot more about harvest management to learn. I hope this introduction to intensive herd management has given you some ideas about managing your herd.

A friend of mine is one of the nation's top horticulturalists. He always points out, "It takes a lifetime to build a garden." Likewise, it takes many years to get a herd even close to perfection. The fun is found along the way.

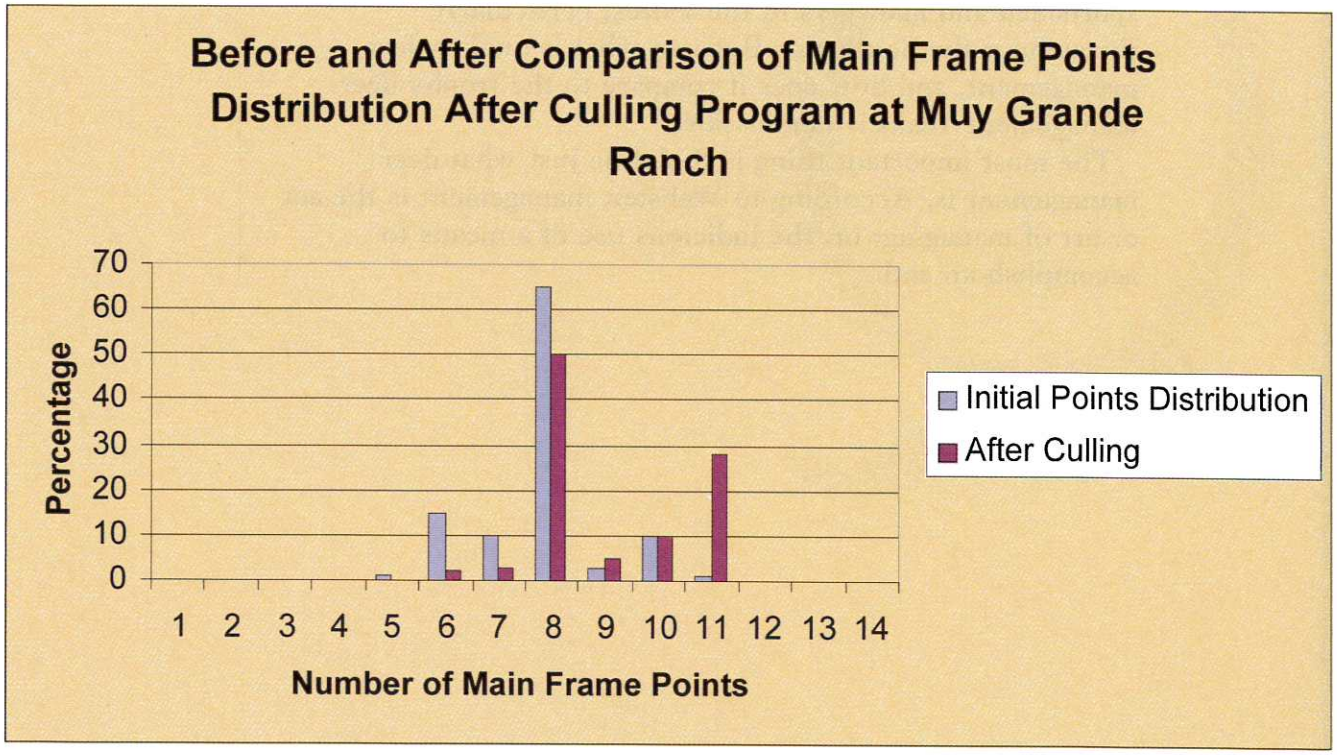


Figure 5. Adequate culling over the long haul will change the distribution of points and Boone and Crockett scores of your bucks, only if you do it correctly. At Muy Grande Ranch (Michigan), the state permits high-fenced properties to harvest deer year-round, if necessary. In this case, every buck 3-1/2 years or older with eight points or less antler points and small frames were removed for several years. The result was a buck herd moving away from the "normal" condition of eight points.

Quality vs. Trophy Deer Management

Is There a Difference?

By Bob Zaiglin

Quality management has become a popular phrase among sportsmen and managers in the 1990s, particularly throughout the Southeast. But just what is quality deer management, and how does it compare to the trophy deer management Texas is famous for?

The most important thing is to define just what deer management is. According to Webster, management is the act or art of managing; or, the judicious use of a means to accomplish an end.