Dr. Deer's™ PRESCRIPTION

A View from the Air

By Dr. James C. Kroll

A few years ago I wrote a piece for the magazine entitled, "Irrational Numbers." My thesis then was that biologists, managers, and some landowners, often need a number to feel confident in making management decisions, even if that number is totally irrational. This particularly is true when it comes to census. My firm opinion is more money has been wasted on censusing deer than any other activity! Yet, the activity persists. Since a census is a requisite part of Texas' Managed Lands Deer Permit system and aerial counts remain commonly used for this purpose, let's return to the irrational numbers idea. But first, a little background about deer herd counts is required.

Why?

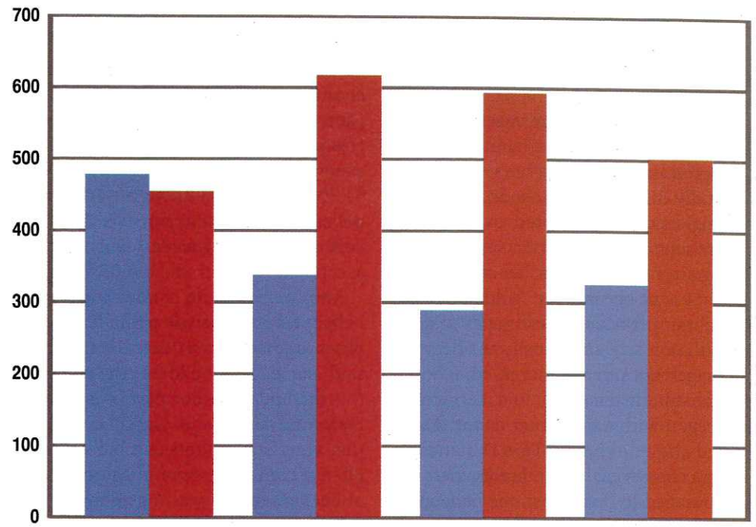
Any wildlife management student who ever has endured a class lecture and been tested on subject matter, will tell you wildlife professionals place a lot of emphasis on census. Whether it be ducks, quail, woodpeckers or deer, the belief is that it starts with an estimate of the current population. And, in *theory* it does. So, why is this often given as the first step in developing a management program?

The basic logic is we need to know how many animals are out there, so there is a baseline against which we can compare management progress. Foresters conduct a stand inventory before developing a prescription for bringing the forest into what we call "regulation;" namely, a sustained, even flow of products. Yet, trees do not move. Measure a pine tree, mark it and go back the next year; more often than not it still is there. Mark a deer, on the other hand, and a year later it may be miles away. Further, trees do not hide and they do not adapt to the observer; they just stand there and grow. So, a momentary "snapshot" of a deer herd may or may not mean a great deal.

Since the beginning of the wildlife management profession, scientists have been struggling to develop a reliable deer census. First, we conducted walking transect lines, recording the number of deer (or tails) seen out to an established or variable distance. I would hate to know how many man-hours the old Texas Parks and Wildlife biologists spent strolling through the Hill Country on this "fool's errand." About the same time, northern biologists developed a technique known as a pellet count. This method also was a transect line, along which the observer counted the number of deer pellet piles observed. It was all based on an assumption of the number of times a deer defecates per day. Later, this number was brought into serious doubt by scientists in Georgia and other states.

When I came to eastern Texas in 1973, clear-cutting just was becoming THE way to regenerate pine timber. Hundreds of thousands of acres were cut-over in a time frame almost equal to the early 1900s, when most of the region was cleared in seven years! I came at a transition time between track counts and spotlight counts. In a track count, you dragged a heavy device resembling a toothed harrow down a road or right-of-way, waited 24-hours, then walked the line counting the number of tracks crossing the line. We "assumed" most deer would travel no more than a mile during the time interval, so the number of crossings per mile was the number of deer per square mile. Well, that did not work well with the public. "Why I watched an old doe crisscross the road four times, and that fool biologist counted her later as four deer!" one old fellow exclaimed at a public meeting.

Clear-cutting the early days of plant growth offered an opportunity to improve on the track count method. You simply drove down a road at night, usually with two men and two spotlights in the back of the truck counting eyes. But, as time passed the vegetation grew above "deer height," rendering the method impractical. (Later research by my graduate students would show spotlight counts never were very accurate anyway.) I felt foolish driving down a wall of young pine saplings, trying to shine a spotlight further than three yards!



The chart above represents a simulated four-year aerial census model. The blue bars represent an estimated population for Herd 1, while the red bars represent Herd 2. You'll see a size fluctuation for the herds, but in reality, both herds are the *same* herd with an actual population of 200. It's intended to give you a perspective on interpreting and using aerial survey results.

In the late 1970s, we began to play around with using infrared-triggered cameras to obtain information about East Texas deer herds. We used two cigarette pack-sized boxes, one emitting an infrared beam and the other receiving the beam, to capture the first photos of deer in the wild. When a deer broke the beam, it triggered a very expensive Nikon camera, equipped with a motor drive and 400-shot magazine. (You did *not* leave it in the rain!) Almost 20 years later, Dr. Harry Jacobson, Ben Koerth, Randy Browning and I would show you could get an accurate count using this method; however, since the method required a camera to no more than 80 acres, the cost was prohibitive in most

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cases ($7+ per acre).

In South Texas, where vegetation may look very dense looking laterally on the ground, an elevated view provides a totally different opinion. So, most biologists quickly adopted an aerial approach to census. First using fixed wing aircraft, then later helicopters, an aerial count became the "gold standard" for obtaining accurate estimates of deer population size and density. As deer management interest increased, a host of consultants emerged; and, services all began with a helicopter count. As noted above, although TPWD mandates only a census each year, landowners are encouraged to do at least one helicopter count. So, with this long introduction I would like to discuss the pros and cons of conducting such counts to better inform you, the landowner.

The pros of helicopter counts

The cost of conducting a deer census is not cheap, no matter what technique you choose. The cheapest is the spotlight count, averaging about 6¢ per acre. Track counts and pellet group counts run 28-35¢ per acre, while a camera count (as reported above) will cost you upwards of $7. My long-term average for helicopter counts is around $1.75 an acre. So, although track and pellet counts are inexpensive, the cost of conducting an aerial count is acceptable.

Another benefit to conducting a helicopter count is you actually get to observe some of your deer. Notice, I said "some." I will address the con of this method next. For now, it is nice to lay your eyes on your crop of deer for that year. Consultants and biologists often record some general categories of bucks, such as yearlings, immature and mature; along with trophies and management bucks. Some even record the number of spiked yearlings, but you probably already know how I feel about that foolishness! The technique also allows you to develop an estimate of buck-to-doe and doe-to-fawn ratios.

Lastly, helicopter counts are quickly done. Many ranchers do not live on their properties, so they have to travel to the ranch to conduct a census. It is very convenient to show up at first light, meet the helicopter contractor on site and be back on the road to home in early afternoon. So, all in all it is easy to understand why these counts are popular. But, now let's turn to the cons.

The cons of helicopter counts

Deer census is like any other management tool, useful in the hands of one who can put it into a relevant context. The utility of a helicopter count depends on what you "think" you are getting from it. The first and most important is the perception you actually are getting an accurate estimate of the true population. There have been numerous studies both on the *accuracy* and *precision* of aerial counts. You may have heard the old cliché defining the difference. If you shoot a rifle or bow at a target and see where the bullet or arrow hits, accuracy is how close it comes to the center of the bull's-eye. If, however, you now shoot a three shot grouping, the size of the grouping is the precision of the weapon. If, for example, you jerked the trigger on the first shot and the bullet hit 3 inches to the left, you might conclude your scope is 3 inches off. On the other hand, the second shot is just a half-inch to the right of the aim point. Now what do you conclude? There is a 3.5-inch distance between the two shots. The third shot nearly touches the second, so now you question the first shot.

What if you had placed the same rifle in an expensive vise, and the 3 shots hit in a grouping 6 inches across and 5 inches above the bull's-eye? The next 3 produced an even worse grouping, measuring 9.5 inches across and 10 inches to the right. I bet the average guy would either get rid of that scope, question his load or even the rifle itself. But, the bottom line would be, he could not depend on the current weapon! So, what is the accuracy and precision of an aerial count, what factors affect this and what do you really need to know about your herd?

There have been numerous studies on the accuracy of helicopter counts. Dr. Charles DeYoung not only is a good friend, but I regard him to be one of the best deer biologists in the world. He has spent a good deal of effort trying to answer these questions. He commonly reports accuracies ranging 36-65 percent. Other studies on whitetails and mule deer in several habitats produced similar results, some better and some much worse. In mixed conifer-deciduous forests, accuracy falls at about 50 percent whitetails; while, pinyon-juniper mule deer habitats produce results in the 35-86 percent range.

Factors producing these results include time of day, altitude, cover type, speed, temperature and wind speed and observability and experience of the deer themselves. I add another factor, observer bias. Often the results depend on who is doing the count and what that person may or may not want to find out! I have seen transgressors on both the landowner and biologist side of this issue; and, do not think the latter only applies to private consultants.

Even though I pointed out aerial counts are relatively inexpensive, there is an economy of scale. Very large ranches—5,000 acres—can take a long time to conduct a 100 percent census; so, often larger properties are "sampled" by some method assumed to be statistically valid. Yet, whether it be 500 acres or 50,000 acres, most landowners conduct a single count each year.

If you know anything about statistics, that is the same as banking on a single shot to tell if your rifle is dead on. What if it is a hot day? Or, if it is very windy day? What about the contractor who does one count in the early morning at one ranch, and works you in after lunch? In most cases, it is not practical to conduct multiple counts; either from a logistical or financial standpoint.

Deer experience with counts is one of the most significant variables in my opinion. One of the ranches I manage conducted an aerial count the next fall after we had stocked deer the previous spring. Since they were ear-tagged it was easy to determine which were native and which were not. The tagged deer just stood there looking up at us, as if to ask, "What is that?" The native deer scattered like buzzards on a "flattened fauna."

On another ranch, where Ben Koerth and I have been catching deer for many years as part of our antler growth study, the minute we fire up the helicopter

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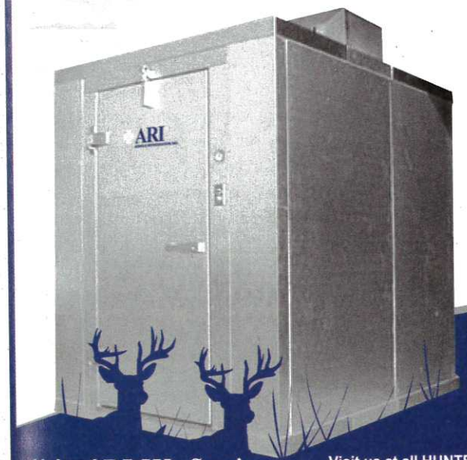


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you can watch deer dashing across the surrounding senderos. They have been to that "rodeo" and know where to go when we get in the air. My experience is the more you conduct aerial work on deer, the less likely you are to get significant results.

Sex and age ratios are perhaps the most important data you can obtain for your herd; and, aerial counts can contribute to this need. However, again it depends on all of the above. Biologists habitually conduct spotlight counts in eastern Texas in late August, when it is not possible to see a fawn in the dense vegetation. This always produces a fawn crop estimate way south of the actual value. Likewise, when you conduct an aerial count and the density of vegetation will affect ratio estimates. Here is an example. I manage a property near Alice, Texas. I have never seen so much Old Man's Beard (Clematis drummondii) on one property in my career. In about half the years we have been censusing deer, this plant completely covers the canopy of about half the ranch. Not only do we not get a reliable sex ratio estimate in these years, but we cannot even begin to see fawns.

The size of property also has a large impact both on accuracy and precision; especially if the property is high-fenced. My experience has proven the number of deer seen as the count progresses goes up as you near the fence. Some deer are pushed from one side of the property to the other, grossly inflating your results due to double and triple counting. In such cases, I have had to change my route every year to avoid increasing an already large bias in the count.

This discourse could go on and on, so let's take a look at some simple models I have developed for this article. The graph on page 27 reflects results from aerial censuses. The models I used incorporated published accuracies and variation for aerial counts. Study the graph carefully before reading on and compare the two herds. They were produced from results of two simulated aerial surveys (N=2), conducted a week apart to allow deer to settle down. What is happening with each over time?

Would it surprise you Herd 1 and Herd 2 were the same herds, and the simulated counts were done at the same time? It might also surprise you the actual deer population is 200 deer! It was not until I reached 20 sequential aerial counts, results were not statistically significant from the real deer density. Of course, some rather false assumptions were included, such as the deer did not learn from the previous counts.

So, I am saying we should not conduct aerial surveys? Absolutely not! The purpose of this article is to give you a perspective on interpreting and using results of aerial surveys. I continue to conduct such surveys, but I use them to help me determine the really important things about the herds, such as age structure and use of the property by deer.

When possible, I time aerial surveys to coincide when I can get the most reliable estimates of sex ratio and doe-to-fawn ratio, but this often is difficult. I also couple aerial data with trail camera data for a more reliable estimate of recruitment and age structure. Just as a philosophical comment, it troubles me that more and more owners of large ranches are using aerial surveys to find bucks to hunt. It is somewhat remarkable such surveys precede the opening of the season by only a few days!

As I noted in the "Irrational Numbers" article sometime back, biologists seem to need a number to cling to, nothing wrong with that per se. However, my four decades of experience managing whitetails taught me the best information to support management decision-making comes from the deer themselves. I let the deer tell me how they are doing. Solid record-keeping on age structure, recruitment rate and important diagnostics such as eight-point-to-10-point ratio, percentage of does less than 3.5 years of age, uniformity of fawning, etc., will tell you more than being in the air.

One of the ranches I manage conducted an aerial count the next fall after we had stocked deer the previous spring. Since they were ear-tagged it was easy to determine which were native and which were not. The tagged deer just stood there looking up at us, as if to ask, "What is that?" The native deer scattered like buzzards on a "flattened fauna."