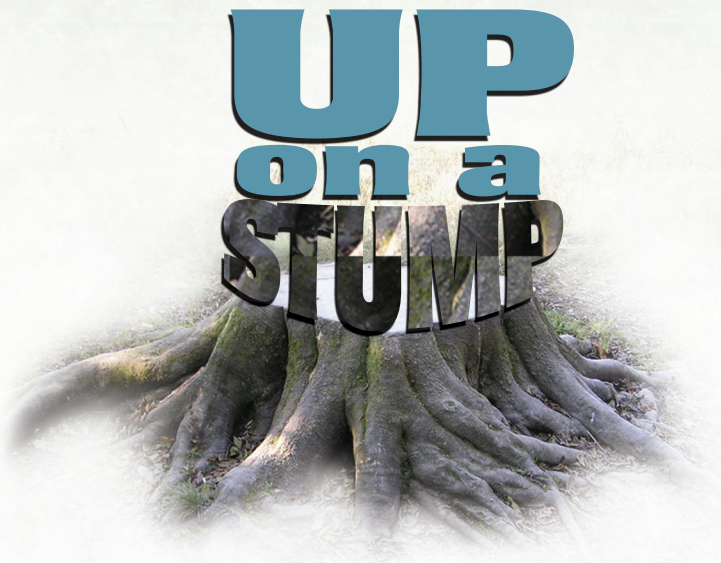


By Dr. James C. Kroll

INFRARED-TRIGGERED CAMERAS: More Than Just Buck Photographs

Editor's Note: Game trail cameras are becoming so popular with research scientists and hunters, so I asked Dr. Kroll to extol the virtues of such cameras and how they came to be. The following is his treatment of the subject. I must admit I had a selfish motive in this—I own several new cameras and I'm interested in the best way to use them on my ranch to determine deer numbers and where the best bucks hide out.

Infrared-triggered cameras, both still and video, have become an essential item for the serious deer hunter. As I travel around the country, it's fun to see folks showing photographs to each other of a big buck they "captured" on their property or hunting territory. But, do you know how these important devices came to be and how useful they really can be?

In the late 1970s I was working in the Pineywoods of East Texas on white-tailed deer movements and habitat preferences. I also was working on a project with recreation specialist, Dr. Mike Legg, on a wilderness user study in the National Forests of Texas. Mike is a master at designing and locating hiking trails and had laid out several in newly proposed wildernesses in the region. One of the important points of the study was, how many folks actually use the trails? Not having all the help in the world for the study, we were in a quandary as to how to measure use. The U.S. Forest Service had some devices consisting of a small box that sent out an infrared beam that would be reflected back by a trailer reflector to a sensor on the box. When the beam was broken, a counter would be activated. This allowed us to actually measure the amount of use of each trail.

At the same time, I was radio-tracking (putting radio collars around the animal's neck) bucks on North Boggy Slough Hunting Club in Houston and Trinity Counties. While following up on a particular buck's favorite spots, I discovered a place where a creek bank had been eroded; exposing what appeared to be a mineral deposit. There were numerous deer, hog, and other animal tracks at the site; and, you even could see teeth marks in the dirt. Being a curious scientist, I decided to count the number of visitations to the site using the devices Mike and I were using on the National Forests. Sure enough, I got lots of numbers, but I did not know how many were deer and how many were other animals.

So, I got together with some folks in California who were marketing a simple way to trigger a camera. The devices consisted of two cigarette pack-sized plastic boxes, one emitting an infrared beam, the other containing a receiving unit. When the beam was broken, a signal would be sent to a camera to take a photograph. I attached the device to a $1,200 Nikon camera, outfitted with a 400 shot magazine and motor drive. (Obviously, we did not put the camera

out in the rain!) Lo and behold, we obtained photographs of deer eating the dirt, along with everything from hogs to raccoons. This simple solution was the beginning of a new industry. Ironically, as far as I know, the company went out of business. I guess they were just ahead of their time.

Today, there are almost 200 makes and models of infrared-triggered on the market. The technology proceeded from film cameras with auto-winders to digital cameras, capable of recording both still images and video-clips. One model made by Moultrie will even send you by cell phone an image the moment it has recorded. In spite of all the capabilities of this technology, owners seldom use the cameras to their full capabilities. So, let's take a look at just a few of the applications and possibilities you may not have considered.

Patterning Whitetails

In our book, The Art & Science of Patterning Whitetails, Gordon Whittington and I defined "patterning" as establishing what your deer are or will be doing at any point in time. Patterning is not figuring out which tree any deer will walk by at what time. It includes monitoring current and future food sources such as acorns and agricultural crops; and, what your deer are doing through time. Infrared cameras are an excellent tool for the latter. Unfortunately, the average hunter places a camera to find a good buck. That certainly is important, but let's take it a step further.

If you place cameras strategically around your property, beginning in early summer, you can learn a lot more. For example, what bucks make up a social group? After all, bucks tend to travel in loosely organized social groups of two to five individuals. Dominant bucks prefer to associate with a buck we call a "toady" that more often than not is his age or a year younger. The word is synonymous with sycophant, which means "flatterer." It comes from the days when kings or chieftains kept court with folks who would do their bidding just to earn favor. In the case of deer, it is to both the dominant and toady's benefit to have such a relationship. The dominant buck gets an extra set of eyes, and the subordinate enjoys social status, as well as learning how to be dominant. I might add the toady, more often than not, is the buck that gets shot!

The social relationships of bucks are not rigid. They tend to be more dynamic, with individuals spending time together, then breaking up for periods of time, only to come back together later. By knowing which bucks are associating with each other, you can get an idea of where the buck you are hunting may be. Another application of the cameras takes it a bit further.

By keeping your cameras out for several months, you can monitor antler growth and determine when bucks strip velvet and when and where they cast their antlers. Since most bucks tend to move their home ranges as the rut progresses—and do so in predictable sequences—you can determine exactly when a buck is likely to show up in your area. He may be somewhere else during the first part of the season, then re-establish his position on your land during late rut.

Lastly, you can use the cameras to learn about when the rut occurs on your land. By placing your cameras during early summer, you can determine when does show up with spotted fawns. A doe tends to keep her fawns sequestered for about two weeks, after which they begin traveling with their mother. When the does show up with fawns, back date two weeks then about 200 days (gestation of deer) to get an estimate of the peak breeding. Applications of cameras to patterning are limitless. We



Game cameras are indispensable for managing deer herds. They help determine buck-to-doe ratios, recruitment, age structure, health and condition, and population density. Cameras can also obtain a population estimate that's more reliable than any helicopter count. The key is to run a camera census 10-14 days to obtain adequate data.

even used them to determine moon effects on rut timing. Many models now include an imprint of the moon phase right on the camera.

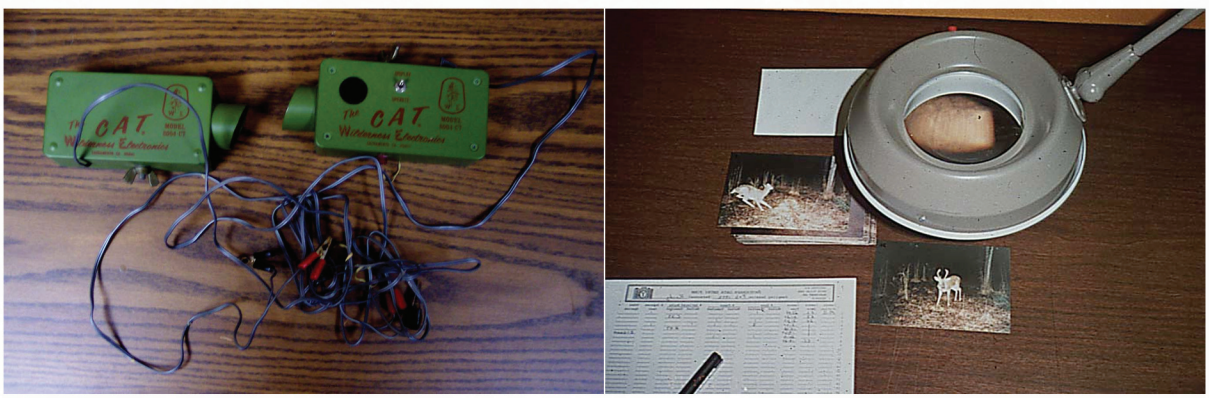
Management Applications

As a biologist, I find infrared cameras indispensable for managing deer herds. The most important applications are buck-to-doe ratios, recruitment, age structure, health and condition, and population density. Let's look at each. But first, how you use them will determine the reliability of these data.

The average manager places cameras on permanent feeding stations. Our research and that of others clearly shows bucks tend to dominate feeders, especially if the number of feeders is inadequate. We strongly recommend one feeder to 15-20 deer, or better yet, one feeder per 100 acres. This will allow more deer access to supplement. I was at the Texas Deer Association meeting in San Antonio last year. One company had a booth with a large plasma screen, playing a video of deer using their new feeder. As folks stopped by, they focused on the number and quality of bucks using the feeder; exactly what the manufacturer wanted. But, I was impressed by the does standing away from the feeder, each wanting to get to the feed, but afraid to approach. The bucks were "butterball" fat, yet the does were so skinny you could read a newspaper through them! They were starving in the presence of plenty.

This means you need to place your cameras on bait sites (where legal), each located near the center of 100-acre grid squares superimposed on the property. This will permit more deer to visit the sites. Then you will obtain a more unbiased estimate of buck-to-doe ratio. Just add up the total number of buck and doe photos (repeats are OK), then divide the number of doe photos by the number of bucks.

I have pointed out for some time too many biologists are fixated on *fawn crop*, expressed as a percent (fawns per 100 does). This metric is obtained in late summer to early fall, and represent the



***Left photo*: an example of early infrared trigger sensors. *Right photo*: census data collection obtained from photos is a meticulous process.**

Cameras can be used to obtain a population estimate more reliable than any helicopter count. If you place a camera per 100 acres, and if you place them so bucks do not dominate, we have found them to be pretty accurate. Of course, the up front cost of this census can be quite high.

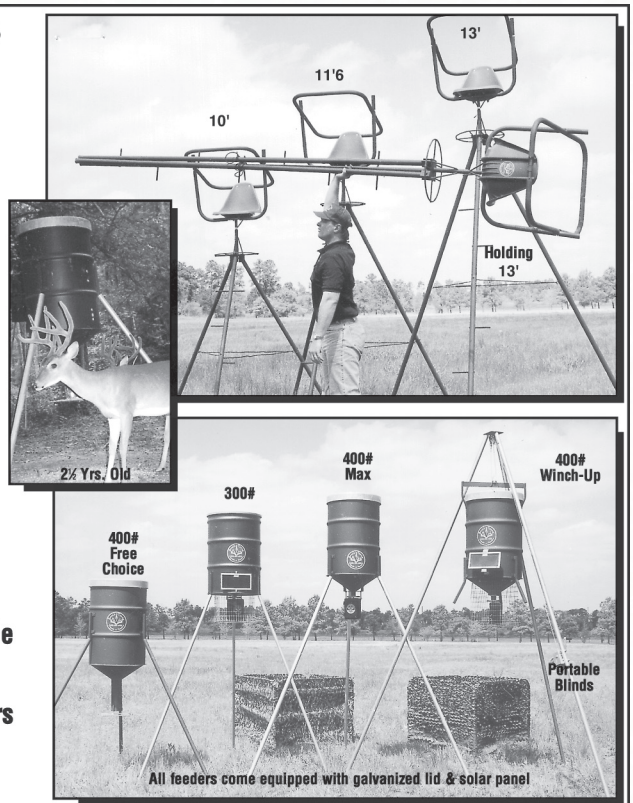
proportion of fawns born that are still alive at that time. Yet, this measurement is not all that useful. Instead, a more useful number is *recruitment*, the number alive at one year of age. To get an estimate of recruitment, you should conduct a camera survey as late in winter as practical. Our work has shown this will give you an accurate idea of recruitment. After all, about half of the fawns recruited into the population are bucks.

Our book and video, "Aging and Judging Trophy Whitetails," has been a best seller for many years. When we first came up with the idea you could age bucks (and even does) live on the hoof, many of my colleagues were quite critical. "There are two problems with that," offered one biologist, "you cannot age a buck by his appearance, and if you could, you never could teach the average guy how to do it!" Well, today there have been many books and videos on the topic, and it is common to hear average hunters talking about the 3½ year old or 5½ year old buck they saw on their lease! Our current research shows we can teach folks to be accurate most of the time, with only a short period of training. [Parenthetically, the idea a buck can be aged by its Boone and Crockett score is ludicrous at best. If that were true, there are a lot of bucks on the properties I manage in Michigan that think they are 5½, when the "experts" say they are only two! Learning to age live deer is more akin to recognizing a banana in the store. You

SOUTH TEXAS TRIPODS & FEEDERS

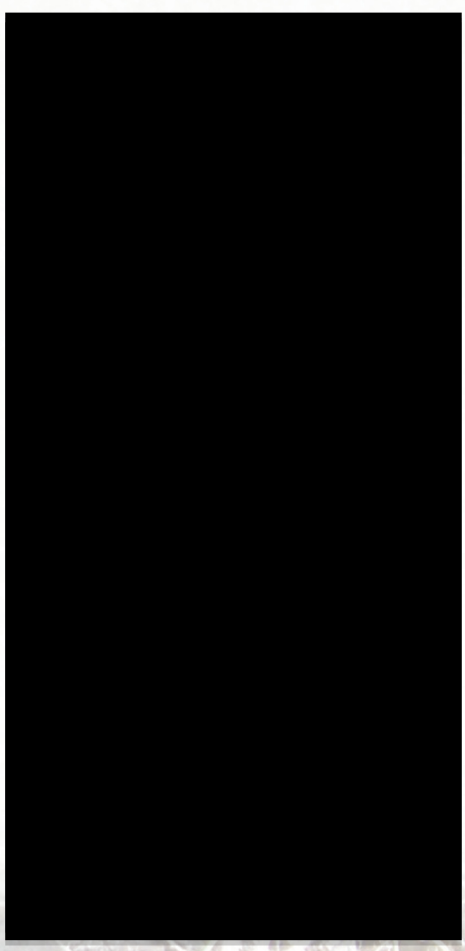
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don't run a bunch of measurements and color charts through your head at the produce counter. You just know how to recognize a banana!]

Age structure of bucks is another important metric for assessing management progress. I prefer to see at least 45 percent of my bucks in the "mature" category. A mature buck is 4½ years old or older. Again, using photographs from the camera studies, age the bucks and record the number by age class. To be honest, you do not have to know exactly how old a buck is to manage your herd. That also is true for does. I simply place bucks into these categories: fawns, yearlings, immature (2½ and 3½), mature (4½ and 5½) and over-mature (6½+). Does are placed into fawns, yearlings, mature (2½ to 5½) and over-mature (6½+). I contend if an aging technique were developed that would tell how old a buck was to the day it was born, it would not benefit deer management at all.

Health and condition of bucks are best assessed in late winter. Bucks lose

By keeping your cameras out for several months, you can monitor antler growth and determine when bucks strip velvet and when and where they cast their antlers. Since most bucks tend to move their home ranges as the rut progresses—and do so in predictable sequences—you can determine exactly when a buck is likely to show up in your area.



as much as 35 percent of body weight during the rut. The condition of a buck coming out of the rut will determine his survival, as well as the quality of his antlers the next year. I use a condition classification system rating of 1-5, with 5 being excellent condition, for doing this part of herd assessment. Does, on the other hand, are best evaluated in late summer. This is the time when they are in the poorest condition.

Cameras can be used to obtain a population estimate more reliable than any helicopter count. If you place a camera per 100 acres, and if you place them so bucks do not dominate, we have found them to be pretty accurate. Of course, the up front cost of this census can be quite high. A 5,000-acre ranch will require 50 cameras; and at an average price of good equipment of $300, that means a $15,000 investment. As with aging, however, I do not see the need to be so accurate. I let my deer tell me how they are doing, rather than trying to spend a bunch of money on trying get an accurate population estimate. If you have good age structure, recruitment and condition, and your harvest density (acres per mature buck taken), you do not care how many deer you have! (Get up off the floor and keep reading!)

If you want to estimate the population size, however, here is how you do it. Our studies suggest you must run your camera census 10-14 days to obtain adequate data. Using the above methods, obtain buck:doe and doe:fawn ratios. Then, go back through your photographs and count the number of different bucks. Antlers are like fingerprints; no two are exactly alike. Using the number of unique bucks as the basis, reconstruct the population using the ratios. Here is an example. Suppose you count 25 unique bucks, the buck doe ratio is 1:3 and the doe:fawn ratio is 1:0.6. That means for each buck there are three does, or that there are 75 does. Using this number, we multiply 75 by 0.6 to obtain an estimate of the number of fawns, 45. So, in this example, the population estimate is 145 deer (25 bucks, 75 does and 45 fawns). Is the method 100 percent accurate? Various studies show conflicting results. Our original study, published in the Journal of Wildlife Management, showed 95 percent accuracy, based on marked individuals. Other studies have not produced the same results. Yet, the results are far better than other techniques, and if nothing else, give you additional data you cannot get with a helicopter or spotlight count.

The last metric we use is the 8 point/10 point-plus ratio. Counting the number of 3½ or older bucks, I divide them into those with 8 or less mainframe points and those with 10 or more mainframe points. Management progress then can be assessed based on what happens to this ratio over time. Why? Forty percent of B&C score comes from tine length. That is why the world record Hanson buck beat out the Jordon buck; he was a 12- pointer! Many ranches have seen deterioration in this ratio due to over-harvest of multi-point bucks. The ratio should be no more than 2:1, when you include 3½-year-old bucks.

This article by no means exhausts the potential uses of infrared-triggered cameras. Hopefully, though I have given you some ideas about how you can get more out of your cameras. We continue to use them and develop new applications to sound management.

