Using infrared-triggered cameras to survey white-tailed deer in Mississippi

Infra-red triggered cameras can alleviate concern about the effects of a liberalized doe harvest.

INTRODUCTION

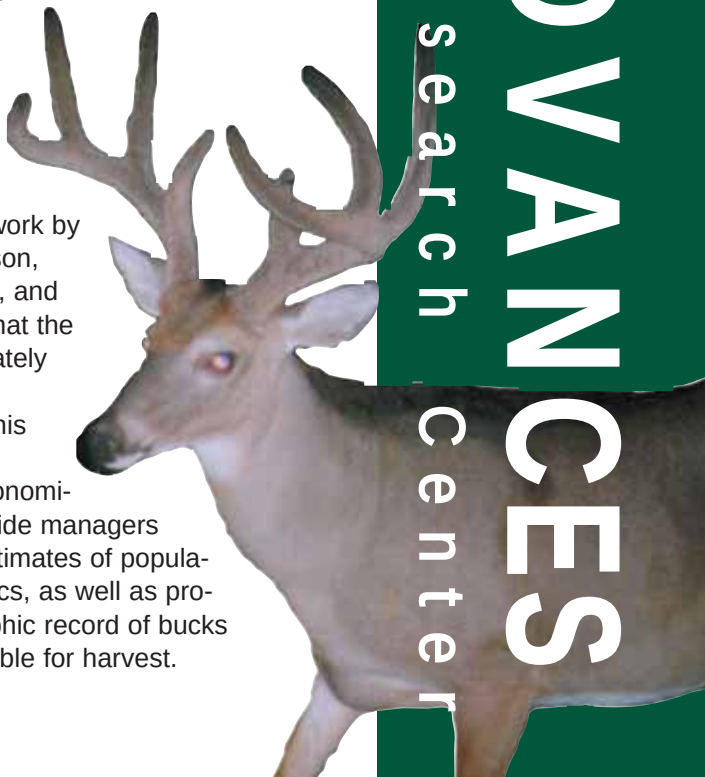
Following the successful restoration of white-tailed deer herds in the southeast, the most perplexing question that has faced deer managers has been, "How many deer are really out there?" When hunters or managers get together, their discussions often turn to the issue of deer herd numbers, sex ratio, and age structure on a particular tract of land.

Deer herds have been managed successfully for decades in Mississippi without knowing exact population numbers. However, expanded antlerless harvests since 1994 have some hunters concerned about the potential for over-harvest. Additionally, as deer management strategies intensify, there is an increased need for a reliable, cost-effective technique to estimate deer population characteristics.

Numerous techniques have been developed to estimate deer population density, sex ratio, and age structure. A partial list includes infrared cameras, spotlight counts, aerial surveys, and harvest-based estimates. Limitations exist for each method and no single, 100% accurate technique has been developed to survey deer in Mississippi, although the infrared-triggered camera system shows great potential.

Commercially available infrared-triggered camera units are relatively new on the scene and consist of two basic types - the "active" and the "passive" systems. The "active" systems use a monitor which emits a beam to a receiver. When an animal breaks the beam, the monitor activates the camera to take a picture and records the event. The "passive" systems consist of a monitor emitting a spread of beams which detect movement and body heat. Depending on the manufacturer, most units have sensitivity and time-of-day settings, event and camera-delay options, and digital display and/or printout of events. Most systems use water-resistant, automatic 35-mm cameras that record time and date on the film.

These units have been used successfully in research projects to survey populations of black bear and white-tailed deer in Mississippi. Developmental work by Dr. Harry Jacobson, Randy Browning, and others showed that the technique accurately estimated buck populations. If this method proved practical and economical, it could provide managers with accurate estimates of population characteristics, as well as provide a photographic record of bucks potentially available for harvest.



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RESEARCH ADVANCES

Forest & Wildlife Research Center

Tagging does and fawns allowed evaluation of survey accuracy.

Research Methods

Recent research on infrared-triggered cameras has focused on further quantifying the technique's accuracy for recording bucks and does and refining how landowners, biologists, and hunters can cost-effectively use it to answer that age-old question, "How many deer are really out there?" Questions to be answered about the technique included: 1) what is the potential for sex- and age-related bias in the probability of recording deer, 2) how do the number of days of sampling affect accuracy, 3) how does camera station density affect accuracy, and 4) when is the best time of the year to conduct surveys?

To evaluate the infrared-triggered camera survey method, it was necessary to determine a "best estimate" for the populations on local study areas. The first step involved intensive trapping and tagging of does and fawns prior to the surveys. We developed "best estimates" using photography of tagged deer, harvest results, and supplemental video observations. The results of the camera survey were compared to the "best estimate" for each study area.

We evaluated three important features of a passive infrared camera survey. Camera densities of 100 and 200 acres per camera were compared. We also compared surveys conducted during the fall (September - October) and winter (February - March), and compared cummulative capture rates from 1 through 14 days of operation.

Research Results

Earlier studies indicated that by setting cameras at strategic pre-baited sites for as few as 5 days, infrared-triggered cameras could photograph a high percentage of the bucks in a specific area, thus providing a reliable estimate of this important part of the deer population. Results of the current study indicate that does are equally apt to be photographed. Population estimates with the camera survey technique were as high as 90% of our “best estimates”. Unfortunately, it required 14 consecutive days and a camera per 100 acres to obtain the highest level of accuracy. Using a camera per 200 acres decreases the level of accuracy by roughly half of the value obtained with a camera per 100 acres (see Figure 1).

Time of year the survey is conducted affects the proportion of bucks and does photographed. With a camera per 100 acres, the number of consecutive days required for a stable estimate of the buck population in the fall was about 11 days, but during winter the estimate stabilized after only 6-8 days. Another significant finding was that only 3-4 days were required for the sex ratio estimate to stabilize at the 100- or 200-acre camera density during fall and winter. In other words, if the objective of the survey was primarily to estimate the sex ratio of a population, that could be accomplished in as little as 3 survey days in fall or winter.

There was significant variation in the fawn crop estimates between fall and winter surveys. Camera surveys provided much higher estimates of fawn crop during winter. During September and October many fawns may not accompany the does to bait sites, because in

Fawn production and sex ratio are important population characteristics that can be estimated easily and accurately.

Antler and body characteristics are used to identify individual bucks photographed. Older bucks may not be seen often during daylight, but an intensive camera survey can photograph over 80% of the buck population.

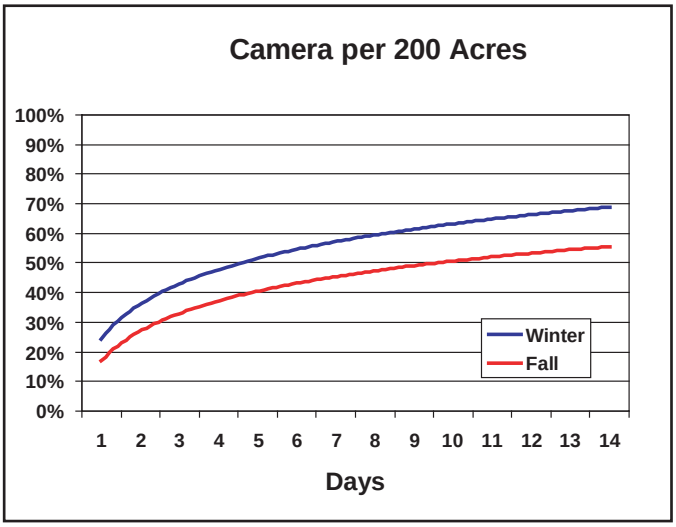
Mississippi peak fawning occurs in July and August. Therefore, if an estimate of fawn crop is required, the survey should be conducted during winter.

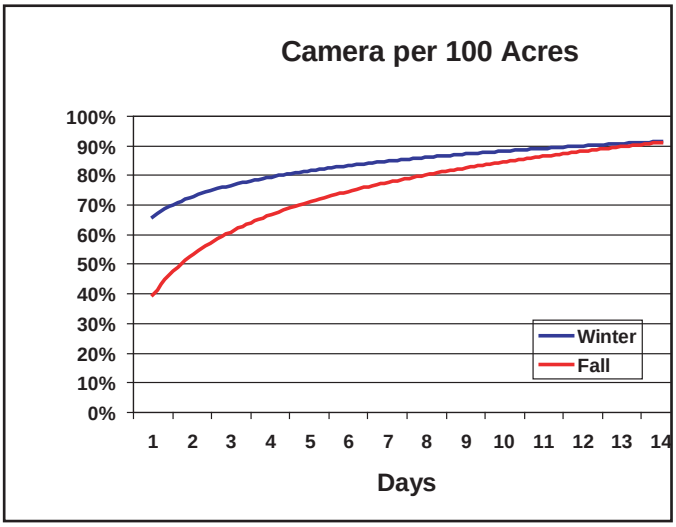
An important consideration in conducting a camera survey is to understand that the probability of photographically capturing deer is a function of the ability to attract animals to bait. Factors such as familiarity with bait, mast crop, and other food sources will influence success. If the animals can not be successfully attracted to bait, the camera survey method has significant limitations. Therefore, schedule the survey when mast is not available. Obviously, locations where deer are accustomed to feeding make ideal camera survey sites. If deer are not using pre-baited camera sites, relocate the sites.

Please note that in Mississippi it is illegal to hunt wild animals with the aid of bait, and improper use of baits could present health risks to deer and other wildlife. You should consult with your state wildlife agency for more information.

Many wildlife species are photographed, including turkey, bobcat, coyote, and raccoon.

Figure 1. The percent of the "Best Estimate" of deer





The above graphs show the effect of the number of consecutive days of camera survey on the percent of the "best estimate" of the deer population surveyed (i.e., accuracy) during fall and winter at camera densities of 100 and 200 acres. This information is valuable in planning camera surveys to achieve a desired level of accuracy and in adjusting population estimates to account for non-photographed deer.

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RECOMMENDATIONS

How best to implement a camera survey depends on the information needs. If pre-season photographs of bucks is a primary objective of the survey, then fall would obviously be the appropriate time. Accurate estimates of deer density and sex ratio can be obtained in either pre- or post-season. However, for best estimates of population characteristics, camera surveys should be conducted in winter at a density of 1 camera per 100 acres.

Camera stations should be selected carefully and pre-baited for 4-6 days. Set cameras on a 10-minute delay and operate for no less than 5 consecutive days. Operating cameras for up to 10 days can significantly improve results, especially if individual buck photographs are an important objective. Increase the estimated deer population based on the accuracy values presented in Figure 1. For example, results of a 7-day winter survey with a camera per 100 acres should be increased by a factor of 1.25 due to the 80% accuracy. If camera numbers are limited, rotate each camera to a new station after each survey period for up to 4 stations per camera. However, cameras should be dispersed over the entire area for each survey period.

The infrared-triggered camera method offers a practical option for surveying deer populations. It may not provide all the answers needed, but it is an exciting new tool that can be used in conjunction with other deer data collection techniques. It is guaranteed to add a new level of knowledge and element of excitement to the experiences associated with deer management and hunting.

"HOW TO CONDUCT A CAMERA SURVEY"

- Depending on desired accuracy, grid the property into 100- or 200-acre compartments. Locate a bait site with high deer use near the center of each compartment and clear vegetation within a 10' radius.
- Select a tree or install a post 12-15' from the center of the circle and set the camera facing either north or south to avoid sun glare. Pay special attention to the "view" of the camera and remove obstructions. A numbered sign in the view identifies the site.
- Pre-bait each site for 5 days with 30-40 pounds of corn in the center of the circle and check daily. Notify your local Conservation Officer that a deer survey is being conducted.
- Set the camera to record date and time with a 10-minute delay between pictures.
- Set the monitor so the beam is aimed 20-30 inches above the bait to eliminate unwanted photos of raccoons and other small animals.
- Operate cameras 5-10 days depending on budget and desired accuracy. Check cameras daily, if possible, replacing film as needed. Use 200 ASA print film with either 24- or 36-exposure rolls depending on animal activity and frequency of checking cameras.
- Analyze the photos to determine total number of photos each of bucks, does, and fawns and the number of individual bucks. Do not include unidentifiable deer.

SAMPLE SURVEY CALCULATIONS

Acres surveyed = 1,000
Camera sites = 10 with 1 camera per 100 acres
Consecutive survey days = 7

Total photographs of deer = 490
- Buck photos = 120
- (individual bucks identified = 35)
- Doe photos = 230
- Fawn photos = 140

Use the relationship of the number of unique bucks (35) to the total number of bucks photographed (120) to calculate a *population factor*:

35 / 120 = .29

From Figure 1, 80% of deer are photographed after 7 days, so adjust by an extrapolation factor of 1/.8 = 1.25

Estimates of population characteristics:

Bucks		=	35 x 1.25 = 44
Does =	230 x .29	=	67 x 1.25 = 84
Fawns =	140 x .29	=	41 x 1.25 = 51
Total population =			**179**

Acres per deer = 1,000/179 = 5.6
Buck to Doe ratio = 35:67 = 1:1.9
Fawn crop = fawn/doe = 41/67 = .61 or 61%