Appendix L
Conducting White-tailed Deer Spotlight Surveys in South Texas

This brief overview of the **deer spotlight survey** is designed to answer some of the most commonly asked questions about this method of counting white-tailed deer and its application in SouthTexas. A deer spotlight survey is only one part of a comprehensive deer management program that must also include proper habitat management, harvest management, and record keeping. Why a deer census is needed, what it will and will not tell you, the type of equipment necessary for conducting spotlight surveys, and how to interpret data collected will be discussed.

There are some significant limitations to using spotlight census for estimating densities of white-tailed deer in south Texas. Spotlight surveys have limited application on tracts of land where dense vegetation greatly reduces visibility. Spotlight surveys are not designed to observe a total deer population, rather to sample a representative portion of habitat and the number of deer found there.

What is a deer spotlight survey? A deer spotlight survey is a method of sampling a given area of land and the density of deer found there. Area is expressed as the number of **visible acres,** which is determined by taking a series of visibility readings along the designated route at 1/10- mile intervals. Data collected on a deer spotlight survey is expressed as the number of **acres per deer**. Three or more counts are normally required on the designated route for reliable information on deer density.

Why do I need to know about estimated deer density and herd composition? Estimates of deer density and habitat surveys can help determine whether your deer herd is at, above, or below carrying capacity of the habitat. Deer **carrying capacity** is the density of healthy and productive deer the land can support without causing habitat damage. Deer "carrying capacity" can vary greatly from one property to the next. Annual winter **browse utilization surveys** must be used to monitor/determine long-term carrying capacity on a given property. A knowledge of the deer density and herd composition is necessary to regulate annual deer harvest (how many bucks or does to harvest). Daylight herd composition counts are used in conjunction with spotlight census data to more accurately estimate percentages of bucks, does, and fawns in the deer herd. The spotlight census also enables landowners to monitor progress of habitat and harvest strategies in reaching specific deer management goals and objectives.

Where do I set up my deer census line? Select all-weather roads that go through a variety of habitat types. Avoid roads that frequently wash out or become impassable following heavy rain. The route should transect different habitat types in proportion to the number of acres they represent on the property. Avoid roads that go by feeders or food plots where deer may be concentrated. Corning roads will greatly bias spotlight survey data. Spotlight surveys conducted during August and September are less likely to be influenced by seasonal environmental factors, food distribution, acorn-drop, or other biological events affecting deer. On large tracts, more than one route may be required to adequately sample a ranch. Two miles of transect for every 1,000 acres of

habitat is required to minimally sample an area. Spotlight route segments may vary from a minimum of 2 miles to up to 15 miles. The spotlight survey must be conducted along the exact route segments each time. **Make a map of the route(s) for future reference.**

How do I set up my line and determine visible acres? Once a route has been selected, an estimate of the number of visible acres along the route must be determined. Preferably during the summer months and prior to the first official count, drive the route at night with two observers on the back of the vehicle. Using the same type of spotlight you will use to count deer, have the driver stop every **10th of a mile**. The observers estimate how far they can see a deer (or where the brush becomes too thick to see deer) in a straight line perpendicular to the truck **(left 150 yards and right 50 yards, etc.)** up to maximum of 250 yards from the road. A visibility estimate is also needed at the start point of the line. To many observers, objects often appear farther away than they actually are when using a spotlight at night. It is recommended that first time observers practice on a few variable known distances at night using a spotlight before estimating visibility along the route segments. Visibility estimates made on census routes 12 miles long or greater can be taken ever **2/10-mile.** Visibility readings may be recorded on a form or tape recorder for later tabulation. This process is repeated for the length of the route. On dead-end roads, record visibility estimates only to the end of the road. Only resume taking visibility estimates after backtracking to a new portion of the route. When conducting additional counts on the same census route, it is **not** necessary to retake visibility estimates. The original visibility estimates may be used for several years unless significant changes in vegetation have occurred along the route. The following formula is used to convert visibility estimates into **acres of visibility:**

Total yards of visibility / number of 1/10mile stops +1 (start) X Number of miles X 1,760 (yards in a mile) / 4,840 (square yards in a acre) = Visible Acres

For a 7.7-mile line with 4,744 total yards of visibility the formula would be:

4,744 / 78 X 7.7 X 1,760 / 4,840 = <u>170.29 ac</u>.

When do I conduct deer spotlight counts? In south Texas, spotlight surveys should be conducted during the months of September and early October. Deer are generally well distributed in their home ranges during this period of the year and are more easily identified by sex and age-class (fawns). Each route should be counted 3-4 times to improve reliability of the data. Do not conduct surveys during rain, high wind or following significant disturbance along the route during the day of the count (working cattle, construction, seismograph work, etc.) Begin all counts one hour after official sunset. Contact the local Texas Parks and Wildlife Department game warden prior to conducting spotlight surveys. Also, notify neighbors or adjoining landowners who might see the lights to alert them about your activity.

What equipment do I need to make a deer survey? Pickup trucks (4-wheel drive

may be required) are preferred over sport utility vehicles or cars. Use a 25 ft. piece of 12 gauge insulated woven wire with two "alligator" clips on one end and a two-plug outdoor type outlet box on the other. Replace the cigarette lighter plug on the spotlight cords with a standard male plug. Attach the alligator clips to the positive and negative poles of the vehicle battery and plug the light into the outlet box. Other wiring systems can also be used. Use 100,000 candlepower tractor or utility bulbs and avoid using Q-beam-type lights, which are heavy, produce excessive glare, and can quickly drain a battery. Other necessary equipment includes clipboard or tape recorder, **binoculars,** and a pencil.

How do I conduct the survey? Drive the route 5 to 8 mph. In open terrain where visibility permits, speed may be increased to 10-12 mph. Stop only to identify deer or determine the number of deer in a group. Unless all deer observed in a group can be identified by sex and age-class, record **ALL** these deer as unidentified. Recording only bucks from a group will bias data and reflect a better buck to doe ratio than may be present. Record deer as **bucks, does, fawns,** or **unidentified.** Deer are usually first spotted by their reflective eyes. Deer eye reflections are greenish-white. Birds, spiders, numerous other wildlife species, livestock, and even some fence posts give off reflections that may be mistaken for deer. It is **imperative** that binoculars be used to identify **all** deer observed. Keep the lights moving as the truck moves, checking both ahead of and behind the vehicle. The observer on each side of the vehicle shines only his/her side to prevent blinding the other observer. Deer observed over 250 yards from the vehicle should **not** be recorded. **If a large sample size (100+) of deer observations can be identified during daylight hours, it is better to forego sex and age determination of deer during spotlight counts.**

How do I interpret the spotlight census data? Divide the **total number of deer** into the **total number of visible acres** observed to determine the number of **acres per deer** on the route. For example: **1,260 acres** (one spotlight survey route counted 3 times with 420 acres of visibility) divided by **90** (total number of deer observed on one spotlight survey route counted 3 times) = **one deer per 14.00 acres.** The estimated deer population for the ranch can then be established by dividing the total acres of the ranch by the estimated acres per deer figure. For example, the deer **populations estimate** for a **5,000-**acre ranch with a deer density of one deer per **14.00** acres is **357 total deer.** An **estimate** of the number of bucks, does, and fawns in the population may then be determined by multiplying the **total number of deer** by the **percent** of all deer identified that were bucks, does, and fawns. For example:

357 Deer X 0.20 (% identified as bucks) = 71 bucks
357 Deer X 0.50 (% identified as does) = 179 does
357 Deer X 0.30 (% identified as fawns) = 107 fawns
TOTAL = 357 deer

In addition, deer identified as bucks, does, and fawns from spotlight surveys combined with daylight herd composition counts will provide important information on the buck to doe and fawn to doe ratios. These ratios are important population parameters of the

deer herd that allow measurement of the success of the management program.

For example: 179 does / 71 bucks = 2.52 does per buck

107 fawns / 179 does = 0.59 fawns per doe

The helicopter census technique is the most popular method of estimating deer population density in south Texas. This is due to the height and density of the vegetation and the relatively large areas that helicopters can easily cover. Most helicopter surveys are conducted during September through November in order to establish density estimates, herd composition (such as adult sex ratios, fawn survival, buck age structure)and harvest quotas for the upcoming hunting season.

Most surveys are complete coverage surveys, where 100% of the area to be managed is flown. This survey involves flying adjacent transects, or straight lines, beginning along one side of the property and continuing until all of the property has been flown. Most transects are flown in either a north-south or east-west direction. For complete coverage surveys, transects are spaced 200 yards apart. The helicopter is flown down the center of the transect and the pilot, plus 1-3 observers, count deer out to 100 yards on each side of the helicopter.

Since it is easier to spot a moving deer, the helicopter is flown at a low altitude (50-75 ft.) so that the sight and sound of the helicopter will cause deer to flush and run. Occasionally, stationary deer are sighted by the observers, but the vast majority of deer seen during surveys are running.

Once deer are sighted from the helicopter, they are categorized by sex and age. Bucks, does, and fawns are tallied separately. Most observers categorize bucks by antler and body size into 3 groups: small, medium, and large. These groups roughly translate into young bucks (1.5-2.5 yrs. old), middle age bucks (3.5-4.5 yrs. old), and mature bucks (5.5+ yrs. old). Some biologists and managers further categorize mature bucks into “average” and “trophy” groups according to antler size.

Recent studies in South Texas have shown the helicopter census is a relatively inaccurate technique counting 30 to 65% of a marked sample of deer. This data should only be used as a guide from which to make harvest recommendations. The greatest values of an aerial census are the herd composition data and buck antler quality estimates that can be made by observing a large sample size of deer in a short period of time. A total coverage aerial census could be used periodically, perhaps every 3-5 years, to verify and support density, herd composition, and antlered buck quality estimates derived from annual spotlight censuses and incidental observations.

How can Texas Parks and Wildlife help me? On written request, wildlife biologists and technicians provide technical assistance to landowners on wildlife and habitat management planning, including establishing deer management programs and deer spotlight surveys. Under the Private Lands Enhancement Program, personnel are

available to assist landowners with setting up and conducting an initial spotlight survey. In addition, assistance is available for interpreting census data collected by landowners and with formulating harvest recommendations based on that information. Literature and data forms are available on request. For assistance, contact Texas Parks and Wildlife, Wildlife Division, 4200 Smith School Road, Austin, Texas 78744 or your local Texas Parks and Wildlife biologist.