Special Staff Report

HUNTING DEER WITH DOGS

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ABSTRACT

The effects of hunting white-tailed deer (Odocoileus virginianus) with dogs were evaluated in 10 East Texas counties. Methods used were hunter and landowner questionnaires, mapping dog-hunted lands, investigations of deer population characteristics on 14 paired study areas, and deer movement investigations on a dog-hunted study area.

A mailout of 47,443 questionnaires to rural boxholders in the 10 dog-hunted counties revealed that 78.84 percent of landowners do not hunt deer with the aid of dogs and 73.27 percent are opposed to the practice. Seventy-three percent of landowners do not permit hunting deer with dogs on their property. A questionnaire mailed to 9 forest industries owning 2,053,822 acres (45.39 percent of the deer range) indicated that deer hunting with dogs was prohibited on 74.00 percent of corporate holdings. A mailout of 1,777 survey cards to licensed hunters revealed that 69.12 percent of respondents were opposed to hunting deer with dogs. A total of 6.09 percent of hunters reported that they exclusively hunt deer with dogs and 10.05 percent hunt both with and without dogs.

All tracts 1,000 acres or more in size were mapped to show where hunting deer with dogs was permitted by landowners. The mapping disclosed that 14.62 percent of available deer range in the 10-county area is being hunted with dogs.

Studies of deer populations on 14 paired study areas disclosed that dog-hunted areas have lower deer densities (17 deer per 1,000 acres) compared to non-dog-hunted areas (79 deer per 1,000 acres). Dog-hunted areas had doe:buck ratios of 2.27 does per buck and non-dog-hunted areas had 4.53 does per buck. Similar fawn:doe ratios were observed on dog-hunted and non-dog-hunted areas; 0.27 fawns per doe on dog-hunted areas compared to 0.23 fawns per doe on non-dog-hunted areas. Browse utilization indices were lower on dog-hunted (31-11-2) compared to non-dog-hunted areas (51-27-9) suggesting lower stocking rates on dog-hunted areas. The en utero fawn:doe ratio was 1.80 fetuses per doe on dog-hunted areas and 1.47 fetuses per doe on non-dog-hunted areas.

Serum enzyme levels in dog-chased deer compared with unchased deer showed that values for SCPK, SGOT, LDH and SGPT were significantly higher in dog-chased deer compared to unchased deer.

A total of 43 deer was captured, radio collared and monitored from October, 1984 through December, 1985. Approximately 9,780 radio locations were obtained during this period. Radio collared deer were successfully chased in 45 of 53 attempted experimental dog chases. The average chase duration on radio collared deer was 18 minutes. The average dog dispersal was 0.7 miles and the average maximum dog dispersal (per chase) was 0.9 miles. The average elapsed time between release and retrieval of dogs was 41 minutes while the average maximum elapsed time (per chase) was 68 minutes.

Experimental dog-hunts involving 40 hunters were conducted on the Polk-Hardin County study area. A total of 38 deer chases resulted in 26 deer being harvested for a hunter success rate of 65.00 percent. The incidence of crippling was 38.46 percent.

The following is a summary of significant findings:

1. Hunters using dogs make up 6 percent of the hunting public in the 10 dog-hunted counties. Another 10 percent hunt both with and without dogs. These hunters are hunting 15 percent of the deer range with landowner permission.

2. Both hunters (69 percent) and landowners (73 percent) in the 10 dog-hunted counties are opposed to hunting deer with dogs.

3. Individual tracts of land open to dog-hunting are typically "island" situations. Eighty-nine percent of these tracts 1,000 acres or more in size contain less than 10,000 acres.

4. Deer herds on dog-hunted lands are typically supressed and contain less than one-fourth the deer numbers found on non-dog-hunted lands. Browse surveys show that range conditions are not limiting deer numbers on dog-hunted lands.

5. Lower doe:buck ratios on dog-hunted (2.27 does per buck) compared to non-dog-hunted areas (4.53 does per buck) suggest a relatively higher doe deer mortality on dog-hunted areas.

6. No significant difference in deer reproductive potential or fawn survival was found on dog-hunted compared to non-dog-hunted areas.

7. Deer blood serum analysis indicates that deer are being stressed by dog chases but irreversible stress levels in deer are not known.

8. Deer movement studies have not shown any permanent detrimental biological effects on deer from dog chases in a high density deer area.

9. Experimental hunts have shown that hunting deer with dogs is a highly efficient harvest method with potential for high crippling loss. Hunter success on experimental dog-hunts was 65 percent and crippling incidence was 38 percent.

10. Dog dispersal patterns on experimental chases indicate that very large tracts of land are required to hunt deer with dogs. Seventy-four percent of identified dog-hunted lands are not large enough to insure that dog movement into surrounding ownerships will not occur 70 percent of the time. No tracts were identified that are large enough to contain dog movements 100 percent of the time.

Background

Early settlers in East Texas traditionally hunted deer with dogs. These traditions had been established in the southeastern states before the

settlers came to Texas. These pioneers found deer plentiful for their needs, but after several decades of unrestricted hunting, deer numbers began to diminish. Deer populations in many areas were severely reduced by 1900 and almost completely extirpated by 1940. Although attempts were made to close deer hunting seasons and protect the resource, these efforts were not adequate. Legislation to prohibit the use of dogs in hunting deer was enacted in 1925 but special laws were passed that permitted the continuation of the practice in some counties.

Deer restoration projects were initiated in East Texas during the 1940's and 1950's. These efforts were accompanied by increased game law enforcement. As deer populations increased, hunting seasons were established. Most counties remained closed to hunting deer with dogs, although the practice was permitted by special laws in some counties. Hunting deer with dogs was prohibited by Texas Parks and Wildlife Commission's action in most counties that were placed under the Commission's regulatory authority by legislative act.

By 1983, hunting deer with dogs was permitted by special law only in 10 counties (Fig. 1). These counties were Hardin, Harrison (part), Jasper, Newton, Orange, Panola, Polk, Sabine, San Jacinto and Tyler. The passage of the Wildlife Conservation Act of 1983 by the 68th Texas Legislature repealed all special laws permitting hunting deer with dogs in the 10 counties. The Commission consequently directed the wildlife staff to conduct a study to determine the effects of hunting deer with dogs. Regulations permitting such hunting remained unchanged pending the conclusion of this study.

Hunting Methods

Deer hunting with dogs in East Texas was once practiced in remote areas with poor access except by foot or horseback. Developed road systems were nearly nonexistent and hunter movement occurred primarily through open woods and logging trails. Transportation was slow and communication among individuals in hunting parties was difficult by today's standards. The primary hunting firearm was a shotgun loaded with buckshot. The hunt was conducted by placing dogs on a deer trail and drives were made in an attempt to move the deer within shooting range of hunters or "standers."

Today, most dog-hunted lands are interlaced with developed public roads, numerous maintained private roads, and pipeline and utility rights-of-ways. Modern hunters use a variety of off-road vehicles including 4-wheel drive trucks. Movements of hunters about the hunting area are swift compared to earlier years. Hunters communicate primarily by way of CB mobile radios. Shotguns with buckshot remain the primary hunting firearm although high powered rifles are often used. As in the past, packs of hounds are released on the deer trail and hunters, ("standers") are placed in strategic locations ahead of the chase where deer are likely to cross openings such as roads or rights-of-way. Radio communication and the sound of barking dogs permits hunters to follow the chase as it progresses.

OBJECTIVES

This study was designed to:

1. Determine landowner attitude toward hunting deer with dogs.
2. Determine hunter attitude toward hunting deer with the aid of dogs, and the relative success of dog vs. non-doghunting methods.
3. Determine the magnitude and distribution of doghunting activity.
4. Compare deer populations between dog-hunted and non-dog-hunted areas.
5. Determine the range of movements for both deer and dogs during hunting activity.

PROCEDURES

Hunter-Landowner Surveys

Approximately 47,443 survey cards were mailed to rural box-holders in 10 East Texas counties where deer hunting with dogs is permitted (Fig. 2). This survey was designed to determine landowner attitudes regarding hunting deer with dogs.

A survey questionnaire was forwarded to 9 major forest industry corporate landowners with ownership in the 10 East Texas counties where hunting deer with dogs is permitted (Fig. 3). The questionnaire was designed to evaluate policies regarding hunting deer with dogs on corporate lands.

Approximately 1,777 survey cards were mailed to a random sample of licensed hunters who had previously indicated hunting in 1 or more of the 10 counties where hunting deer with dogs is legal (Fig. 4). Each survey card recipient had indicated deer hunting in the 10-county dog-hunted area at least once in the 3 years (1979, 1980, and 1981). This survey was designed to determine hunter attitude toward hunting deer with dogs and to evaluate hunting success with and without dogs.

Magnitude and Distribution of Dog Hunting Activity

Landowners who were known to own 1,000 acres or more in a continuous tract within the 10 counties where hunting deer with dogs is legal were interviewed. Tracts where deer are hunted with dogs with landowner permission were identified. Non-posted absentee landowner tracts were considered the same as tracts where permission was granted to hunt deer with dogs. The size of each tract of dog-hunted land (permission granted) was determined and then each 1,000+ acre tract was mapped. In the mapping process dog-hunted lands were coded as either private or public.

Deer harvest and hunter success data for the 10 dog-hunted counties were collected under Federal Aid Project W-109-R, Job 4, Big Game Harvest Regulations. These data were examined to determine if correlations existed between hunter success, buck harvest rates and the percentage of county deer range open to hunting with dogs.

Deer Population Characteristics

Deer populations were surveyed on paired study areas established in the 10 counties. Areas where hunting with dogs was the primary deer hunting method were paired with areas where deer were hunted without the aid of dogs.

Criteria for the selection of dog-hunted study areas were as follows:

1. Hunting with dogs has been the primary deer hunting method used for at least the past 10 years.

2. The area contains at least 10,000 acres in a contiguous tract.

3. The area is accessible by vehicle.

A total of 7 dog-hunted tracts was selected from among 17 candidate tracts identified through mapping activities. Each dog-hunted tract was paired with a non-dog-hunted tract that met similar size and accessibility criteria. Efforts were made to pair areas that had similar land use, land ownership and habitat characteristics. Non-dog-hunted areas that were geographically located nearest each dog-hunted area were given preference in selection.

One 15-mile spotlight deer survey transect was established on each study area. Each transect was established and surveyed according to standardized procedures for deer spotlight surveys in Texas. Each survey was conducted from a ½ ton pickup truck using 1 driver and 2 observers. Surveys were made along the existing road system in each study area. An attempt was made to sample as much of each area as possible. Each survey was made during the 4-hour period beginning 1 hour after sunset. Vehicle speed was maintained at 7 - 8 miles per hour. Surveys were conducted from mid-July through August.

Visibility estimates were made perpendicular to the vehicle by each observer at 1/10 mile intervals along the route. Visibility estimates were converted to total acres of visibility at the end of each survey. Each visibility reading represented the average distance a deer could be seen perpendicular to the transect at each 1/10 mile interval. All deer observed along the transect were recorded on standardized forms. Each deer was classified as either buck, doe or "unidentified." Each transect was surveyed 3 times on consecutive nights using the same observers. Paired areas were surveyed on the same nights using separate personnel crews.

Deer stocking rates were determined through browse utilization surveys (Lay, 1967) on each of 7 pairs of study areas. A total of 30 1/100-acre (11.8 ft. radius) circular plots was systematically established on each area. Sampling transects were placed at mile 2, 4, 6, 8, 10 and 12 respectively along the previously established 15-mile spotlight deer survey transect on each area. A total of 5 plots was placed at 100-yard intervals along each transect.

Percent browse utilization of identifiable species was recorded for each plot and only those species occurring on 20 percent or more of the plots were used for estimating degree of utilization and interpretation of range evaluation indices. Evidence of deer browsing on pine (Pinus spp.) was recorded but grasses and forbs were ignored.

All identifiable species were grouped in 3 categories of palatability; first, second, and third choice browse. A browse utilization mean was then determined from data collected on each of the 7 paired study areas according to palatability class. This mean was calculated by adding all the percent utilization readings (0, 5, 30 or 70 percent) for a given species, and then dividing the sum by the total number of plots in which the species occurred. The utilization mean for each palatability class was determined by averaging the utilization of individual browse species in each class. The mean indices of palatability classes were then combined to produce a ratio of 3 numbers that would indicate the stocking intensity (light, moderate, or heavy) for each study area.

Deer reproductive performance was evaluated through the analysis of doe deer reproductive tracts collected from dog-hunted and non-dog-hunted study areas. Reproductive tracts were obtained from deer collected by department personnel and from deer killed by hunters on designated study areas. The entire reproductive tract (uterus and ovaries) was removed from each doe collected and preserved in 10 percent formalin solution. Ovaries were sectioned to determine the presence of corpora lutea of pregnancy and all fetuses were removed and aged according to Armstrong, 1950. A deer was considered bred if a leutenized body of 4 mm or larger was present in the ovaries and/or by the presence of an embryo(s) or fetus(s). Each deer was aged according to tooth wear and replacement criteria described by Severinghaus, 1949.

Capture myopathy (CM) or exertional rhabomyolysis is a complex degenerative disease of skeletal muscle which has been recognized as a sequel to restraint in wild animals. Conditions which resemble capture myopathy have been reported in white-tailed deer and this condition is likely more common than is generally recognized (Wobeser, 1981).

Apparently, certain ungulates subjected to forced exercise develop CM that is most severe when animals are pursued rapidly over a short distance (Barrett et al., 1982). There is speculation that the fear, anxiety, and muscular exertion associated with the use of domestic dogs in the pursuit of white-tailed deer may lead to the subsequent death of the animal.

The incidence of clinical signs of CM in dog-chased and unchased white-tailed deer was investigated through the microscopic examination of skeletal muscle tissue and Sequential Multiple Analysis (SMA) of blood serum samples. Muscle tissue samples were collected from a sample of 23 deer killed by hunters while being chased by dogs in 1984-85. Two muscle tissue samples were collected from each deer; 1 from the "backstrap" (longissimus muscle) and 1 from the ventral portion of the upper rear leg (quadriceps muscle). These specimens were preserved in 10 percent formalin and forwarded to the Texas Veterinary Medical Diagnostic Laboratory (TVMDL) in College Station, Texas for histopath analysis. Each

specimen was examined microscopically by pathologist to evaluate the degree of muscle damage present.

A total of 29 blood serum samples was taken from deer collected by department personnel in 1985. All deer were collected from 11 previously established study areas under "resting conditions" with a rifle shot to either the neck or head area. A total of 15 blood serum samples was collected from dog-chased deer killed by hunters in 1984-85. All dog-chased deer samples came from 2 dog hunting clubs in Jasper, Polk, and Hardin Counties. All blood samples were taken from the heart or jugular vein. Whole blood samples were centrifuged to remove solids and serum samples were frozen and placed in storage. Samples were submitted to TVMDL for SMA. A variety of blood constituents were reported by TVMDL but serum enzyme levels were of primary interest. Elevated values of serum enzymes including glutamic oxalocetic transaminase (SGOT), glutamic pyruvic transaminase (SGPT), lactic dehydrogenase (LDH) and creatine phosphokinase (SCPK) have been observed in CM-affected animals (Barrett et al., 1982).

Deer Movements

The area used to study deer movements is located in the East Texas Timberlands Land Resource Area in the Southern Coastal Plain. The forest type is shortleaf (Pinus echinata) - loblolly (P. taeda) pine-hardwood (Stransky 1969). The major land use on the area is timber production. The land is owned by Kirby Forest Industries and Temple-Eastex, Incorporated. Intensive forest management has been practiced by converting the pine-hardwood forest to loblolly pine plantations.

The area is designated as flatwoods. The topography is nearly level with depressional areas. The soil association is Otanya - Kirbyville - Waller characterized by moderate to moderately slow permeable soils. The average deer density at the beginning of the study was 75 deer per 1,000 acres.

The study was conducted on 2 deer hunting clubs, leased by Kirby and Temple-Eastex, that covered 33,942 acres in Hardin and Polk counties (Fig. 17, Areas 2 & 5). The area was within the boundaries of FM 943 on the north, old Bragg-Segno county road on the east, FM 787 on the south, and FM 1298 on the west. The hunting clubs practiced both "still" hunting (without dogs), and the use of dogs in hunting deer.

Forest management activities during the study period included timber harvest, site preparation for planting pine, planting pine, prescribed burning, and road maintenance. Pine plantations less than 3 years old made up 20 percent of the area; pine plantations 3-10 years old accounted for 15 percent; pine poletimber and sawtimber occurred on 56 percent of the area. Bottomland hardwood and pine-hardwood occurred on 4 percent. Openings, including pipeline and transmission line rights-of-ways and roads totaled 5 percent of the area.

The major overstory conifer on the area was loblolly pine. Long-leaf (Pinus palustris), shortleaf, and slash pine (P. elliottii) occurred to a lesser extent. The most common oaks were willow oak (Quercus phellos), white oak (Q. alba), and water oak (Q. nigra). Other hardwoods in the overstory included sweetbay magnolia (Magnolia virginiana), southern

magnolia (M. grandiflora), sweetgum (Liquidambar styraciflua), and red maple (Acer rubrum).

The tree midstory included American holly (Ilex opaca), white sassafras (Sassafras albidum), redbay persea (Persea borbonia), and flowering dogwood (Cornus florida). Common shrubs were yaupon holly (Ilex vomitoria), large gallberry (I. coriacea), southern wax myrtle (Myrica cerifera), and American beautyberry (Callicarpa americana).

Common groundcover plants included bluestem (Andropogon spp.), panicum (Panicum spp.), greenbrier (Smilax spp.), St. Johnswort (Hypericum spp.), brambles (Rubus spp.) and yellow-eyed grass (Xyris spp.),

The helicopter drive-trapping method was used in all capture operations. A Hughes 269 helicopter was used to locate deer and drive them into a 500 ft. x 6 ft. net. The net was erected on dirt roads at 7 locations in 3-8 year old pine plantations on the study area. Personnel were spaced at intervals of 30 feet along the net and deer were caught and removed as they were driven into the net by the helicopter.

Deer movements were monitored using radio-telemetry. Forty-three deer from the existing population on the area were trapped and released at the capture site. Prior to release, the deer were marked with metal ear tags and collared with battery-powered transmitters (150-152 MHz). The distribution of the sample among sex and age classes was as follows: 4 adult males, 26 adult females, 10 juvenile males, and 3 juvenile females.

Triangulation (Cochran and Lord, 1963), using a medium-gain Yagi antenna mounted through the roof of a truck and 2 fixed tracking stations was used to obtain locations of the deer. The peak signal was used to determine the direction of the transmitter. A hand-held compass was used to sight along the antenna beam for determining bearings. Deer identification number, date, time, tracking station, and bearing were recorded for each deer location. At least 2 bearings from separate tracking stations were required to obtain a location (fix) of the deer. A Hughes 269 helicopter was used to locate deer from the air when necessary.

Bearings were used to determine the position of each deer on aerial photographs (1:15,840) of the study area that were divided into a grid of X(east-west) and Y (north-south) coordinates. Bearings were collected for each deer hourly in 4, 6-hour tracking periods each week during 1984-85. Two or more telemetry observers collected simultaneous bearings for each deer. Bearings collected for each deer by a single observer were completed as soon as possible. The 4 tracking periods were 2400h-0600h, 0600h-1200h, 1200h-1800h, and 1800h-2400h. Radio tracking was conducted from October 1, 1984 February 28, 1985. Bearings were collected for each deer hourly during 4 2-hour daytime tracking periods per week in 1985-86.

Dogs that were owned and used to hunt deer by the members of the hunting clubs on the area were selected for the experimental deer chases. The dog packs were typical of those used to hunt deer in East Texas. Beagles, walkers, black and tans, and hybrids were included. Prior to each experimental chase, the dogs used were collared with radio transmitters

identical to those used on fawns. At least 2 dogs were radio-collared in each experimental chase. Dogs were radio-collared to allow monitoring of the dogs if they ceased chasing a radio-collared deer and began chasing an unmarked deer. The experimental chases were conducted to simulate a typical deer hunt using dogs. Beginning in December, 1984, an attempt was made to conduct at least 4 experimental chases each week. Beginning the first week in January, 1985 hunters were allowed to harvest any deer chased in an experimental chase. In the fall of 1985, all experimental chases were conducted during a 4-day period (December 7-10), and hunters could harvest any deer chased.

A hand-held antenna was used to approach a radio-collared deer for an experimental chase. Dog handlers with the dog pack followed the telemetry observer. The dogs were released behind the deer when either the selected deer was sighted or the behavior of the dogs indicated that they were trailing the deer. An experimental chase was successful if the dogs followed the trail of the collared deer for a measurable period of time. The beginning time and location on the study area were recorded when the dogs were released for an experimental chase.

Radio tracking, using either 2 or 3 separate tracking stations with 2 observers at each station, began when the dog pack was released on the deer trail. Radio communication was used to synchronize bearings between the tracking crews. Simultaneous bearings at 5-minute intervals were taken during the experimental chase and concluded when all dogs used in the chase were retrieved. Bearings were used to determine the position of the deer and dogs on aerial photographs of the study area. No effort was made to assist the dog owners in retrieving their dogs in an experimental chase. For each experimental chase, chase number, deer identification number, dog pack description, date, fix times, tracking stations used, and bearings were recorded. Tracking stations were relocated as necessary during an experimental deer chase. A telemetry observer in a Hughes 269 helicopter was used to obtain additional observations on the deer and dogs during an experimental chase.

Data collected from the experimental chases were used to determine chase duration, elapsed time, and dog dispersal. Chase duration (min.) was the time elapsed from the release of the dogs on the trail of a collared deer until the dogs stopped following the trail of the collared deer. Elapsed time (min.) was the time elapsed between release and retrieval of each dog released in an experimental chase. Maximum elapsed time was the maximum time elapsed between release and retrieval of a dog for each experimental chase. Dog dispersal (mi.) was the distance from the point of release to the point at which each dog was captured after each experimental chase. Maximum dog dispersal was the greatest distance from the point of release to the point of greatest distance traveled from the release point by each dog.

RESULTS AND DISCUSSION

Landowner Survey

The landowner survey resulted in 9,087 of 47,443 cards being returned for a response rate of 19.15 percent. Landowners in all counties demonstrated overwhelming opposition to the use of dogs to hunt deer. Respondents opposing hunting deer with dogs ranged from 65.94 percent in Jasper County to 85.20 percent in Harrison County (Table 1). The total for all counties was 73.27 percent opposed with 24.83 percent favoring. Only 1.24 percent were in the undecided category.

The survey indicated that most landowners (78.84 percent) do not hunt deer with the aid of dogs (Table 2). The responses ranged from 71.75 percent in Jasper County to 90.80 percent in Harrison County. Size classes of lands of residence reported by respondents are shown in Table 3. The 1-4 acre size class was most commonly reported (45.08 percent of respondents) while tracts greater than 500 acres in size comprised only 2.23 percent of lands of residence.

As expected from other responses, 73.02 percent of landowners reported that they do not permit hunting deer with dogs on their property (Table 4). This response was identical to responses on Question 6. The range of percentages was from 65.68 percent in Jasper County to 82.80 percent in Harrison County.

Forest Industry Survey

Results of the forest industry (corporate) landowner survey (Fig. 3) indicated that corporate landowners controlled 2,053,822 acres of deer range in the 10 dog-hunted counties (Table 5). This total represents approximately 45.39 percent of the combined deer range in the 10 counties. Four corporations holding 1,515,667 acres do not permit hunting deer with dogs on their land while 4 corporations controlling 538,155 acres reported that dog use was authorized. The survey revealed that 26 percent of corporate holdings was available to hunters with dogs in the 10-county area. Three of the 4 corporations that prohibit dog use have company policy statements regarding hunting deer with dogs in their hunting lease contracts.

In response to question 4, regarding policies applicable to "free" hunting lands open to the public, 3 corporations permitted no "free" hunting, 2 corporations permitted deer dogs on "free" hunting lands and 3 corporations indicated that they do not permit deer dogs on "free" lands but made no attempt to enforce the policy.

Hunter Survey

Results of the hunter survey indicated a very high response rate of 68.91 percent. Of the 1,621 deliverable cards, 1,117 were returned. The controversial nature of the subject and a $100 reward incentive obviously contributed to the high response rate (Fig. 4).

The survey revealed that 69.12 percent of respondents opposed hunting deer with dogs and 24.80 percent favored the hunting method. A total of 6.09 percent of respondents was undecided (Table 6). Responses ranged from 50 percent opposed in Orange County to 79.36 percent opposed in Harrison County (Table 7).

Responses to Question 2 (Table 8) indicated that most hunters (80.51 percent) hunted without dogs. A total of 6.09 percent of sampled hunters reported that they exclusively hunt deer with dogs and 10.05 percent hunt both with and without dogs.

Of 3 categories of hunters classified in the survey, those hunters hunting both with and without dogs reported the highest hunter success (Table 9). Hunters who hunted both ways reported a 70.71 percent success (indicated killing at least one deer). Non-dog hunters reported a 51.96 success rate and 41.67 percent of dog hunters were successful.

Tables 10 and 11 list the categorized responses to Question 6 (strongest reason for favoring or opposing hunting with dogs). It appears that those opposing deer dogs are either concerned about impacts on the deer resource (45 percent), concerned about violation of the law or rights of other hunters (29 percent), prefer to hunt without dogs (6 percent), or feel that hunting with dogs is unsporting or unnatural (12 percent). Those favoring dog use do so because they feel that dogs are helpful in getting deer moving (27 percent), feel that it is a right or tradition that should not be taken away (20 percent), prefer dog use (24 percent), feel hunting with dogs is more sporting (8 percent), or feel that dogs aid in finding crippled or wounded deer (8 percent).

Magnitude and Distribution of Dog Hunting Activity

In the 10 counties where hunting deer with dogs is legal, there are 4,525,274 acres of deer range. Dog-hunted lands during 1984 represented 661,668 acres, or 14.62 percent of the available deer range (Fig. 5-15). Variations by county range from 1.88 percent of the deer range in Harrison County to 43.53 percent in Sabine County (Table 12). There were 133 individual tracts of 1,000-plus acres of dog-hunted lands identified. Of these, 95 ranged from 1,000-4,999 acres, 24 ranged from 5,000-9,999 acres and 14 were larger than 10,000 acres. The largest was a 37,000 acre tract in San Jacinto County. Acreage of 92 of the contiguous tracts are shown in Table 13.

Results of a linear regression analysis (Fig. 16) show a strong negative correlation between the percentage of county deer range hunted with dogs and buck kill per hunter ($r = -0.657$). A similar negative correlation was found between the percentage of county deer range hunted with dogs and buck kill per 1,000 acres of deer range ($r = -0.656$) (Fig. 17).

Deer Population Characteristics

A total of 14 areas (7 dog-hunted, 7 non-dog-hunted) that met established criteria was selected for investigation during 1984-85 (Fig. 18-24). Two study areas on the Sabine National Forest (SNF) were not included in 1985 because of the creation of a wilderness area and subsequent road

closures. A variety of surveys was conducted on each area to evaluate deer population characteristics. Included in the surveys were deer census, browse utilization, doe deer reproductive tract collections, deer blood and muscle tissue collections and harvest surveys. The characteristics of each study area are given in Table 14. Four pairs of areas represent predominantly forest industry ownership, 2 pairs of areas are owned by the United States Forest Service and 1 pair of areas is predominantly owned by many small private landowners. The 4 paired tracts of predominantly forest industry lands are leased to hunting clubs. All dog-hunted study areas combined contain 224,812 acres compared to 226,183 acres in the combined non-dog-hunted areas.

Deer harvest statistics for the 4 pairs of hunting club study areas are shown in Table 15. Although doghunting clubs reported less total deer harvested (923) compared to non-doghunting clubs (1,772), this total represents a much higher percentage of the total estimated deer population (26.03 percent) compared to non-doghunting clubs (14.33 percent). The total buck harvest reported by doghunting clubs appears to represent more bucks than are estimated to be present on club lands based on spotlight survey results. Conversely, non-doghunting clubs reported harvesting 60 percent of the available buck population annually. Both doghunting clubs and non-doghunting clubs reported a low antlerless deer harvest compared to antlerless deer availability (6.94 percent for doghunting clubs and 5.61 percent for non-doghunting clubs) although the reported antlerless harvest was much higher on non-doghunting clubs (583) compared to doghunting clubs (197).

Spotlight deer survey results for 1984 on 7 paired study areas are presented in Table 16 and 17. A comparison of data revealed that dog-hunted areas contain much lower deer densities (15 deer per 1,000 acres) compared to non-dog-hunted areas (85 deer per 1,000 acres). Each dog-hunted area surveyed had a lower deer density than the respectively paired non-dog-hunted area. Differences were also observed in doe:buck ratios for the 2 types of areas. Dog-hunted areas had 2.80 does per buck compared to 3.84 does per buck on non-dog-hunted areas. Similar fawn:doe ratios were observed on dog-hunted and non-dog-hunted areas; 0.43 fawns per doe on dog-hunted areas compared to 0.36 fawns per doe on non-dog-hunted areas.

The results of spotlight surveys on 6 paired study areas for 1985 are presented in Tables 18 and 19. Relative deer densities for dog-hunted and non-dog-hunted areas were somewhat similar to 1984 data. Dog-hunted areas contained 20 deer per 1,000 acres compared to 74 deer per 1,000 acres in non-dog-hunted areas. Greater differences in doe:buck ratios were observed in 1985 compared to 1984 for the paired areas. Dog-hunted areas had 1.94 does per buck compared to 5.41 does per buck on non-dog-hunted areas. Although much lower overall fawn production was observed in 1985, both dog-hunted and non-dog-hunted areas indicated similar results. The average fawn:doe ratio for dog-hunted areas was 0.13 fawns per doe compared to 0.11 fawns per doe on non-dog-hunted areas.

Statistical tests on data from both years revealed significant difference in herd densities and doe:buck ratios for dog-hunted compared to non-dog-hunted areas. No significant difference in fawn:doe ratios were observed.

Deer browse surveys conducted on 7 pairs of dog-hunted and non-dog-hunted study areas substantiated findings from spotlight surveys regarding relative deer densities on the 2 types of areas. Browse utilization indexes for dog-hunted areas (31-11-2) suggest a much lower deer stocking intensity than indicated by the utilization index for non-dog-hunted areas (51-27-9) (Tables 20 and 21).

The percent utilization of first choice browse on non-dog-hunted areas varied from a low of 24.60 on the Sam Houston National Forest area to a high of 67.00 on the N. E. Harrison area. Use of second and third choice species varied respectively according to location. However, the combined utilization means for all non-dog-hunted areas was 51.34 percent (first choice), 27.21 percent (second choice), and 9.08 percent (third choice) suggesting a moderate stocking intensity. According to Lay, 1967, a ratio of 55-30-5 for first, second and third choice browse utilization is given for moderately stocked ranges with deer only and the optimum for all species should be less than 50.00 percent utilization for first choice browse.

Each dog-hunted area reported a lower utilization index compared to the respectively paired non-dog-hunted area. The San Jacinto National Forest dog-hunted area exhibited a low of 7.20 percent utilization of first choice browse compared to a high of 43.40 percent utilization of first choice browse on the Salt Grass area. The combined utilization means for all dog-hunted areas was 30.64 percent (first choice), 10.73 percent (second choice), and 2.41 percent (third choice). This index (31-11-2) most closely fits the 35-10-1 ratio suggested for light stocking intensity established by Lay.

Department personnel collected a total of 31 deer from established dog-hunted and non-dog-hunted study areas in 1984-85. Of the 31 deer collected, 23 were adult does, 4 were female fawns and 4 were male fawns. Only reproductive tracts from adult does were analyzed. An additional 9 tracts were obtained from adult does killed by hunters on dog-hunted areas. The collection period for the 32 tracts examined was November (1), January (8), February (19), and March (4). A total of 15 tracts collected from 4 dog-hunted study areas and 17 tracts collected from 4 non-dog-hunted areas was analyzed. Department personnel attempted to collect a larger sample of reproductive tracts on dog-hunted areas but low deer densities made collections impractical. A total of 11.50 hours of hunting effort per 3-person hunting crew was expended for each deer collected on dog-hunted areas compared to 2.54 hunting hours per 3-person hunting crew for each deer collected on non-dog-hunted areas (Table 22). It appears that deer collection success was proportional to relative deer abundance as observed on spotlight survey transects.

Table 23 presents a summary of reproductive tract analysis for dog-hunted and non-dog-hunted areas. These data revealed a slightly higher <u>en utero</u> reproductive rate for dog-hunted areas (1.80 fetuses per doe) compared to non-dog-hunted areas (1.47 fetuses per doe). The fertilization rate (total fetuses ÷ total <u>corpora lutea</u> of pregnancy) was also slightly higher for dog-hunted areas (96.30 percent) compared to non-dog-hunted areas (86.21 percent). However, these differences are probably not

statistically significant because of the small sample sizes involved. Of the 32 reproductive tracts examined, only 1 was found not bred before the collection was made. This unbred doe was collected from a non-dog-hunted area. The remaining 31 tracts all contained fetuses. Although breeding dates were established for each deer in the sample, the small sample size precluded any assertions regarding breeding peaks on the two types of hunting areas.

A summary of the histopathology of muscle tissue samples is presented in the following statement from TVMDL:

> "It is apparent that there is a morphologic change in the skeletal muscle that is proportional to the degree of exertional anoxia that takes place in the animal. It appears that the Backstrap (Longissimus) muscle is a more sensitive indicator than the more massive ham (quadriceps) muscle.
>
> The changes seen morphologically in the specimens submitted are likely reversible and would not constitute a cause of mortality by themselves. However, when combined with the SMA data it is apparent that a wide range of enzyme release has occurred, and in all likelihood, those animals with drastic elevations of LDH, CPK and SGOT are more severely affected than the morphologic studies indicate. This opens a whole research project to determine at what level muscle enzymes must rise to indicate irreversible damage and unlikely survival. This has not been established in white-tailed deer.
>
> Based on the above findings, in the future it would appear that clinical chemistries are the most productive area to investigate in the dog chased animals."

The results of blood SMA is presented in Table 24. Means for SCPK, LDH, SGPT and SGOT were found to be much higher in dog chased compared to unchased deer. Statistical comparison of serum enzyme levels in dog chased with unchased deer showed significant differences in all blood values. The results of both histopath and SMA data suggest that deer muscle tissue degeneration occurred as a result of dog chases. However, the level of damage required to cause mortality is unknown.

Deer Movements

A total of 8,220 fixes was collected for 26 deer during 1984-85 (Table 25). The tracking period for each deer ranged from 55 days to 148 days and averaged 114 days. Within the tracking period, the number of days tracked for each deer ranged from 9 to 77 and averaged 53 days. The number of fixes for each deer ranged from 54 to 462 and averaged 316.

The majority of locations were obtained using 2 permanent fix stations. Eleven deer were located beginning with the first day of tracking to the end of the 1984-85 study period. At the end of that study period, 10 deer could not be located by telemetry from the ground or air. It should be noted that preliminary analysis indicated an excessive tracking regime and

that future sampling effort could be reduced with minimal loss of information.

The status of the 43 radio-collared deer involved in the study through December, 1985 is presented in Table 26. A total of 13 deer was killed and recovered by hunters during experimental hunts and 1 deer was killed by a hunter during the regular hunting season. One deer lost its radio collar during 1984 when the collar apparently was pulled away as the deer ran through heavy brush during an experimental chase. Fifteen deer are known to be alive on the study area with active radios and 13 deer have unknown status. Twelve of the unknown status deer were captured in 1984. Several of these deer with apparently non-functional radios have been sighted by hunters and department personnel. It is believed that malfunctioned radios are responsible for most of the deer in the unknown status. It is important to note that no deer movements off of the study area have been observed by department personnel during the study period. Neither has there been any incidence of deer being caught by dogs or of deer death being attributed to any cause other than gunshot wounds.

Radio tracking of experimental chases of deer was not feasible using a helicopter and fixed tracking stations. The dynamics of the chase precluded accurate telemetry locations. Chases monitored by a mobile ground crew with telemetry equipment and sightings from ground observers of the deer and dogs proved very satisfactory. A total of 53 chases was conducted between December 8, 1984 and December 10, 1985 (Table 27). The chase duration averaged 18 minutes, however, chases ranged from 1 to 75 minutes. The elapsed time averaged 41 minutes and always exceeded the chase duration. Records of field observations indicated that, in almost all of the chases, after the dogs stopped chasing the collared deer, they began chasing uncollared deer. The primary reason for the dog pack ceasing to chase the collared deer was the high deer density on the study area. Elapsed time ranged from 2 minutes to 18 hours. A beagle was retrieved in the field 18 hours after it was released on the trail of a collared deer. Excluding the 18-hour chase, the greatest elapsed time was 6 hours, 10 minutes. The average maximum elapsed time averaged 68 minutes. Chase duration and elapsed time were more equal for the chases when hunters were allowed to harvest any deer chased rather than buck-only chases. The dogs successfully chased a radio-collared deer for a measurable period of time in 45 of the experimental chases.

The average dog dispersal was 0.7 miles (Table 27). The distance moved by the collared deer from the point at which the dogs were released to the point at which the dogs lost the trail could not be calculated. Telemetry data during the chase proved to be inaccurate for determining the specific location of the deer when the dogs lost the trail. Dog dispersal varied from 0.1 to 4.6 miles. Excluding the 18-hour chase that ended 4.6 miles from the point of release, the greatest dog dispersal was 4.2 miles. A moderate correlation existed in the data between elapsed time and dog dispersal. This correlation indicated that some dogs chased in a straight line and some circled toward the point of release. The average maximum dog dispersal per chase was 0.9 miles. Average elapsed time and dog dispersal were greater for beagle dogs than walker-type dogs (Table 28). Excluding the 18-hour chase for a beagle that ended 4.6 miles from the point of release, the average elapsed time for beagles was 53 minutes.

Walker-type dogs were used primarily for the experimental chases when the hunters were allowed to kill any deer pursued in the chases.

Analysis of data regarding maximum dispersal of dogs during experimental chases as related to acreage hunted is presented in Table 29. Assuming that hunted tracts are square in shape and given dog dispersal data from 53 experimental chases, the number of buffer acres required to contain dog dispersal was calculated. Dog dispersal data indicated that 70 percent of dog dispersals ended no more than 1 mile from the release point and the greatest dog dispersal was 4.6 miles. These calculations demonstrate the size of tracts necessary for deer hunting with dogs if dogs are to be contained on acres controlled by dog hunters. Of the dog-hunted tracts mapped for this study, 74.00 percent were not large enough (6,211 acres) to contain dog dispersal 70.00 percent of the time if only a 1,000 acre area in the center of the tract were hunted. None of the dog-hunted tracts mapped were large enough to contain dogs 100.00 percent of the time if the entire tract were hunted.

Experimental either-sex hunts were held during January 5-6 and December 7-10, 1985 on the Polk-Hardin County study area. Local hunting clubs cooperating in the study provided the dogs and hunters for the experimental hunts. Walker-type dogs were generally used in the hunts and most hunters used shotguns loaded with buckshot as their primary hunting firearm. A total of 40 hunters expended 95 man-days of hunting effort during the 6-day period (Table 30). A total of 38 deer chases resulted in a harvest of 26 deer for a hunter success rate of 65.00 percent. Sixty-eight percent of the chases resulted in a deer being harvested. Thirteen of 26 deer harvested were radio collared. Of the 13 radio collared deer that were killed, 5 (38.46 percent) were wounded (Table 26). Two wounded deer were found dead and unrecovered by hunters and 3 deer were severely wounded and recovery would have been unlikely. The 3 wounded deer were subsequently rechased by dogs and harvested by hunters. It is doubtful that these wounded deer would have been recovered before death without the use of radio telemetry equipment.

ANALYSIS

It is apparent that most hunting and fishing regulations have both biological and sociological implications. Regardless of the sociological impacts, it is the responsibility of wildlife regulatory agencies to place constraints on hunters or fishermen when a depletion or waste of a wildlife resource results from a particular means or method.

Hunting deer with dogs is a volatile social and political issue in the 10 East Texas counties where the practice is legal. The most frequently heard complaint from hunters and landowners opposed to the practice is that deer dogs trespass on private property where they are not wanted. Conversely, doghunters proclaim that their dogs cannot read posted signs and that they are not causing harm to wildlife or private property.

The data collected in this investigation have documented the magnitude of the social problems involved in hunting deer with dogs. The very high response rate (68.91 percent) from the hunter survey suggest that most hunters are highly interested in the subject. A large majority of hunters

(69.12 percent) are opposed to hunting deer with dogs and a small minority (16.14 percent) actually practice this hunting method. Landowner responses to a similar questionnaire survey also indicated an overwhelming opposition (73.27 percent) to hunting deer with dogs.

It appears that most of the social interaction between those in favor and those opposed to hunting deer with dogs occurs along property boundaries. A typical example would be a dispute developing when deer dogs cross a property boundary into an ownership or hunting lease where they are not welcome.

The magnitude of the potential for trespass by dogs is apparent from the distribution, shape and size of dog-hunted lands mapped in this study. The average county has less than 15 percent of the deer range in tracts that are dog-hunted with landowner permission. Most of the contiguous tracts are less than 5,000 acres in size. The dog-hunted tracts are typically irregular in shape and are widely separated with frequent inholdings. Almost always dog-hunted tracts represent "islands" surrounded by lands that are not dog-hunted. Thus, interaction between doghunters, non-doghunters and associated landowners is almost unavoidable.

Radio telemetry data on dog movements during deer chases indicate a typical chase will result in a maximum dog dispersal distance of 0.9 miles radius from the place where the deer trail is found to the place where the dog(s) is retrieved. From these results, it can be determined that a very large tract of land is required to hunt deer with dogs while insuring that dog trespass on neighboring non-dog lands will not occur. For example, on a 22,130 acre tract, square in shape, a hunting party would be required to release dogs only in a core area in the center of the tract comprising 10,000 acres. The remaining 12,130 acres would be "buffer" acres where dogs could not be released without risk of trespass on neighboring lands. This strategy is impractical for most hunters and therefore, dog dispersal into surrounding lands is inevitable. According to survey results, only 17 contiguous tracts of land 10,000 acres or more in size comprising 422,595 total acres (9.33 percent of all deer range) are currently available to doghunters in the 10 "dog" counties.

In recent years trends have been toward the reduction in acreage available to deer hunters using dogs. Both small individual and corporate landowners have voluntarily restricted dog use on their properties. Within the past 15 years, approximately 74 percent of corporate holdings representing 34 percent of the total deer range in the 10 "dog" counties have been closed to dog use by company policy. Dog use on other deer habitat has been closed by sportsmen's clubs and by the Department on wildlife management areas. This trend, if continued, will force doghunters into smaller and more isolated tracts in the future, compounding the existing social dilemma.

This study revealed that deer populations are very low (17 deer per 1,000 acres) on dog-hunted lands. Dog-hunted areas surveyed had lower deer densities than compared to high populations on non-dog-hunted areas (79 deer per 1,000 acres). Dog-hunted area deer densities averaged 42.50 percent of carrying capacity and only 21.51 percent as many deer found on non-dog-hunted areas. These findings are substantiated by data showing

that counties with the most deer range open to doghunters have the lowest hunting success.

Browse surveys on each study area revealed similar results (i.e. that deer stocking rates are much lower on dog-hunted compared to non-dog-hunted areas). Browse surveys also suggest that habitat factors are not limiting deer numbers on dog-hunted areas. Assuming habitat is not limiting, it must be hypothesized that some other factor(s) affecting deer natality, mortality or movements must be involved.

The first year of deer fawn production and survival data indicate that deer breeding is not being interrupted on dog-hunted areas. Both dog-hunted and non-dog-hunted areas appear to have a high reproductive potential with 1.80 fetuses per doe on dog areas compared to 1.47 fetuses per doe on non-dog-hunted areas. Fawn-at-heel counts were similar for the 2 types of areas suggesting similar survival rates.

From these preliminary results, it can be assumed that if deer survival is a limiting factor on dog-hunted areas, mortality must be occurring after fawns reach weaning age. However, studies to date have not documented excessive non-hunting, post-weaning mortality on dog-hunted areas. Neither have experimental chases shown any evidence of a deer being caught and killed by dogs nor of non-hunting mortality occurring indirectly from a chase. Blood serum analysis from dog-chased deer suggest that stress is being placed on the deer but lethal stress levels have not been determined.

Field observations suggest that radio collared deer did not permanently leave the study area despite dog harassment. However, data on deer movements during deer chases on the Polk-Hardin county study area may not be typical of deer movements on other dog-hunted areas because deer densities are higher than on other areas studied. The deer density on the Polk-Hardin county area was estimated at 101 deer per 1,000 acres while the other 6 dog-hunted areas surveyed averaged only 8 deer per 1,000 acres. Deer chases may be of shorter duration in high density deer areas since dogs tend to "switch" deer quite often during a chase. Chases of longer duration than those seen on the Polk-Hardin county area (18 minutes) may affect deer survival or cause deer to permanently relocate. The evaluation of the impacts of dog chases on deer in low density populations would require an additional study.

One possible explanation for the difference in deer densities in dog-hunted and non-dog-hunted areas is differential hunting mortality and/or crippling loss. Data collected during this study suggests that hunting deer with dogs can be a very efficient harvest technique. On 38 experimental "either sex" deer hunts with dogs, 40 hunters harvested 26 deer for a success rate of 65.00 percent. Of 13 radio-collared deer killed during these hunts, 5 had been previously wounded by gunshot. Additionally, deer harvest statistics reported by dog hunting clubs reveal a much higher legal deer harvest rate (26.03 percent) compared to non-doghunting clubs (14.33 percent). If reported buck harvest from dog-hunting clubs is valid, it appears that most of the bucks are being harvested annually, even though these deer are being taken primarily from low density deer areas.

Table 1. Landowner attitude survey[1/] on hunting deer with dogs (Question 1 and 2, opinions on the use of dogs) by county of residence.

County of Residence		Feelings About Hunting Deer With Dogs: No response	Favor strongly	Favor slightly	Oppose slightly	Oppose strongly	Undecided	TOTAL
Unknown	N	4	23	1	2	98	2	130
	%	3.08	17.69	0.77	1.54	75.38	1.54	
Hardin	N	8	338	36	56	772	16	1226
	%	0.65	27.57	2.94	4.57	62.97	1.31	
Harrison	N	0	30	5	6	207	2	250
	%	0.00	12.00	2.00	2.40	82.80	0.80	
Jasper	N	5	344	25	30	731	19	1154
	%	0.43	29.81	2.17	2.60	63.34	1.65	
Newton	N	8	228	13	10	513	9	781
	%	1.02	29.19	1.66	1.28	65.69	1.15	
Orange	N	7	310	56	74	1181	15	1643
	%	0.43	18.87	3.41	4.50	71.88	0.91	
Panola	N	6	134	12	34	609	7	802
	%	0.75	16.71	1.50	4.24	75.94	0.87	
Polk	N	11	203	22	29	664	16	945
	%	1.16	21.48	2.33	3.07	70.26	1.69	
Sabine	N	5	132	6	7	520	5	675
	%	0.74	19.56	0.89	1.04	77.04	0.74	
San Jacinto	N	1	111	9	13	440	4	578
	%	0.17	19.20	1.56	2.25	76.12	0.69	
Tyler	N	3	151	17	23	470	15	679
	%	0.44	22.24	2.50	3.39	69.22	2.21	
Other	N	2	45	5	5	164	3	224
	%	0.89	20.09	2.23	2.23	73.21	1.34	
TOTAL	N	60	2049	207	289	6369	113	9087
	%	0.66	22.55	2.28	3.18	70.09	1.24	100.00

1/ Refer to Figure 1, Rural Boxholder Survey, 1984.

A large sample of deer observations is difficult to obtain from low density populations like those typically found on dog-hunted areas. However, even if one assumes almost any set of herd composition data, it is readily obvious that recruitment must be very low in the female segment of the herd when deer densities are low (17 deer per 1,000 acres). For example, using the herd composition data obtained from dog-hunted areas (26 percent bucks, 58 percent does, 16 percent fawns) it can be determined that a deer herd of 17 deer per 1,000 acres would recruit no more than 1 or 2 female deer per 1,000 acres into the population annually. It follows that any factor(s) which leads to a loss of 2 female deer per 1,000 acres annually would result in zero population growth. To further complicate the recruitment problem, 6 of the 7 dog-hunted areas surveyed contained average deer densities of only 8 deer per 1,000 acres.

It is apparent that deer herds on most dog-hunted areas are rather fragile because of low deer densities and associated low recruitment. However, even under these conditions, deer herds on neighboring non-dog-hunted areas have gradually increased to carrying capacity. It is clear from these data that some factor or combination of factors is influencing deer populations on dog hunted areas. Based on this 2-year study, dog-hunted deer populations are subjected to higher stress, more efficient harvest, and higher crippling losses than deer herds on non-dog hunted areas; however, legal dog-hunting was not clearly identified as the primary biological factor limiting these populations.

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