WILDLIFE-ORIENTED RECREATIONAL OPPORTUNITIES ON PUBLIC SCHOOL LAND IN PAYNE COUNTY, OKLAHOMA

By

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OKLAHOMA

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The demand for hunting, fishing, camping, hiking, picnicking, and nature study is rapidly increasing as a result of shorter work weeks and working days, higher incomes, and increased leisure time. The 1970 National Survey of Fishing and Hunting indicated that approximately 128 million Americans, representing 64 percent of the total population, participated in one or more outdoor recreational activities during that year (Anonymous, 1972a).

There is also a growing demand for nonconsumptive uses of wildlife resources (i.e. animal watching, photography). Although 15 million persons bought hunting licenses nationally in 1970, another 100 million people went into the woods just for an esthetic experience of seeing wild animals (Anonymous, 1972a).

The increasing demand for outdoor recreation in Oklahoma is not unlike the national problem. During fiscal year 1969, 39 percent of all Oklahomans fished and 11 percent hunted (Anonymous, 1970b). In many cases, opportunities for hunting, fishing, camping, hiking, picnicking, and nature study exist in the state, but are not utilized because access to them is limited. Copelin, Price, and Lambou (1966) found that the percentage of landowners allowing hunting or fishing only by their family and friends was 71.1 and 67.4 percent respectively. The percentage of landowners who allowed hunting and fishing only with their permission

was 17.3 and 20.6 percent respectively. The potential for recreation is obviously restricted greatly on private land. This situation exists not only in Oklahoma but in New York (Waldbauer, 1966), Pennsylvania (Barclay, 1966), and other states.

A possible solution to the problem lies in the administration and management of public lands. Fairhurst and East (1971), Hibbard (1965), Olson (1958), Smith (1959), and Woodward (1953), describe the status of public lands and discuss future problems, especially conflicts between demands for recreation and existing land-use policies. Most attention, however, has focused on large tracts of public domain in western states. Not enough attention has been given to recreational opportunities in more densely populated sections of the United States. Three fourths of the human population in the United States is centered around urban areas, and recreational opportunities are most urgently needed there (ORRRC, 1962).

This study sought to analyze the feasibility of applying the multiple-use concept to public school lands in Oklahoma by adding wildlife-oriented recreation to present uses of mining, farming, and/or commercial business.

Under provisions of the Enabling Act passed by Congress in June, 1906, Oklahoma was granted 3,132,736.57 acres of land to benefit schools, institutions, and public buildings (Anonymous, 1970). Generally, sections 16 and 36 in every township, except those sections having prior legal claim, were granted to Oklahoma to benefit the common schools. Sections 13 were granted to benefit colleges and universities, while sections 31 were to be used for penal institutions and public buildings. The state was also given the option of selecting other

tracts in lieu of lands having prior legal claim. The eastern one third of Oklahoma was Indian Territory when the Enabling Act was passed and the U. S. Government gave Oklahoma 5 million dollars in lieu of school lands designated for that area.

School lands are located near many major population centers. Two thirds of the cities over 10,000 in population and 86 percent of the state's total population are located within 20 miles of school lands. School land tracts are well-distributed and easily accessible by county roads. Thus they are located where they could alleviate some of the problems of providing sportsmen a place to hunt or fish without driving a great distance.

The Oklahoma Department of Commissioners of the Land Office, headed by a commission including the Governor, Secretary of State, State Auditor, Superintendent of Public Instruction, and the President of the Board of Agriculture, administers school lands. This department has the right to sell school lands, and over two-thirds have been sold; there are currently 768,957 acres remaining. These lands are leased for agricultural, mineral, or commercial interests.

Public access to school lands for any type of outdoor recreation is not assured by present lease arrangements. Although the agricultural lease contract encourages the lessee to allow hunting or fishing by the public, there is currently no provision that prevents him from refusing permission, nor are there any other legal stipulations within the contract that concern other types of recreation. Access to school lands for any type of recreation is determined by the lessee.

The objectives of this study were: (1) to determine the acreage of vegetative cover types on school lands in Payne County; (2) to determine

indices of wildlife populations in these same cover types and from these indices determine the potential for recreation; (3) to determine attitudes of lessees toward wildlife-oriented recreation on their leases; and (4) to determine hunters' and fishermen's opinions concerning the quality of their outdoor recreation experiences on school lands. After achieving these objectives, the potential for recreational use of public school lands could be judged based on current land use, existing habitat, existing wildlife populations, and attitudes of lessees and sportsmen.

CHAPTER II

DESCRIPTION OF THE STUDY AREA

School lands within Payne County were selected as study areas to develop techniques for a statewide analysis of school lands in the future. The lands are distributed into 48 distinct tracts (Figure 1) and contain 24,767 acres, 5.6 percent of the county's area. Most tracts occupy 1-square-mile sections.

The uniform distribution of school lands throughout the county provides diversity in topography, geography, and vegetation. The terrain varies from gently sloping hills and ravines in the north and west portions of the county, where small creeks and intermittent streams predominate, to steep and often abrupt elevation changes in the south and east associated with the Cimarron River and its major tributaries (Wild Horse, Stillwater, and Council Creeks). Vegetation is extremely varied; tall-grass prairie is most abundant, postoak-blackjack and bottomland forests are of lesser importance (Eubanks, 1970).

Private individuals lease 97.3 percent of the school lands for agricultural use. Size of the leases varies from 10 to 640 acres; the average lease contains 148.3 acres.

Agricultural lease contracts are for 5-year terms and are renewable. Most of the school land in Payne County has been leased to the same individuals for long periods of time. Control by one individual over a period of 10 to 20 years is not uncommon. With few exceptions, the

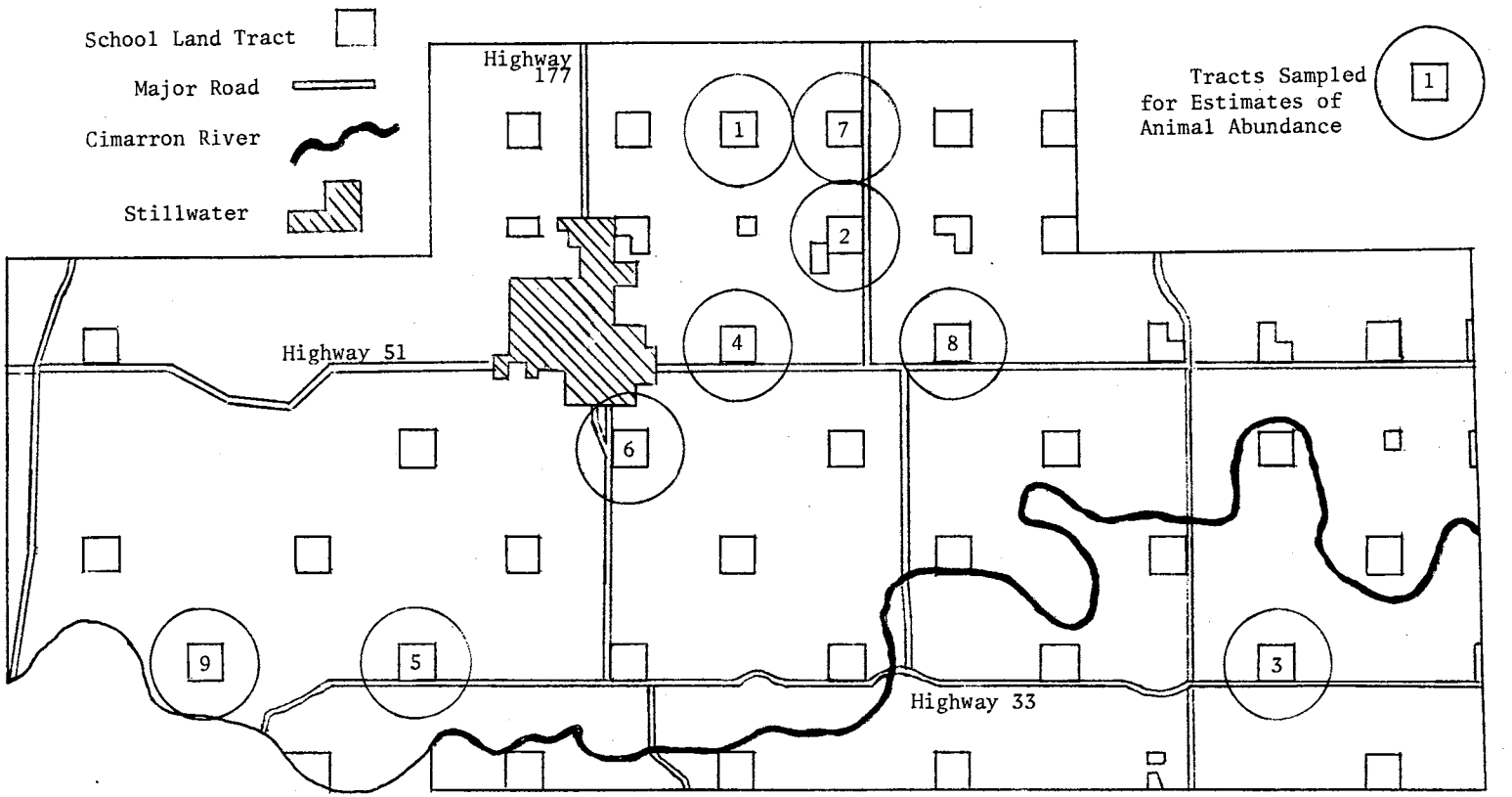

Figure 1. Locations of School Land Tracts, Payne County, Oklahoma

lessees live on, beside, or near their school land leases. Many lessees have lived on school land since childhood or acquired control by purchasing the preference right to the lease from relatives or friends. This lease arrangement has tended to promote a feeling similar to private ownership toward school land.

CHAPTER III

METHODS

Evaluation of Habitat

Determining Acreage of Cover Types

The size of any wildlife population is determined by suitability of the habitat, especially the distribution of various cover types. Therefore, it was necessary to examine the distribution of vegetation on school lands and determine current land use practices in order to evaluate potential abundance of wildlife. Cover mapping allowed both a quantitative and qualitative analysis of plant distribution and abundance (Dalke, 1937).

Aerial photographs with a scale of 1:7920 were obtained from the Agricultural Stabilization and Conservation Service. A cover map was made for each school land tract by placing tracing paper over the photograph and marking the cover type boundaries. Vegetation was classified into cover types according to major plant associations recognized by Eubanks (1970) (Table I). Farm ponds, roads, and residential areas including homes, barns, sheds, and nonvacant buildings were also mapped. Symbols representing each cover type were written on the map. Each cover map was taken into the field, to the associated school land tract, where identification of cover types was confirmed, and changes could be noted in land uses made since the photos were taken. A compensating

TABLE I

MAJOR TYPES OF VEGETATIVE COVER IN PAYNE COUNTY, OKLAHOMA,
WITH DESCRIPTIONS AND PREDOMINANT SPECIES

Classification	Description	Predominant Species*
Postoak-Blackjack Forest	vegetation characteristic of uplands	postoak, blackjack oak
Native Pasture	tall-grass, midgrass, and short-grass types	bluestem, gramma, buffalo, and indian grass
Other Pasture	grasses and legumes that are more intensively managed than native pasture	bermuda grass, love grass, vetch, clover
Cultivated Land	cultivated cropland	wheat, alfalfa, cotton
Bottomland Forest	vegetation in lowland areas; woody shrubs and hardwoods are abundant	elm, cottonwood, dogwood, redbud, buckbrush, greenbriar, pecan
Upland Shrubs	vegetation prevalent around old dwellings, pastures, fencerows	elm, sumac, persimmon, buckbrush
Riverine Vegetation	vegetation along the Cimarron River; shrubs, coarse grasses, small trees	salt cedar, cottonwood
Wetland	marsh and low areas around lakes or ponds; soils with high moisture content	cattail, bulrush, smartweed

TABLE I (Continued)

Classification	Description	Predominant Species
Orchard	small association of fruit trees	apple, pear
Dry Streambed	dried-up beds of intermittent streams	vegetation usually absent

*Scientific names are listed in Appendix A.

polar planimeter was used to measure acreage of each cover type greater than 0.1 acre.

The linear distance of cover type boundaries was measured using a cartometer. This linear distance represented the amount of edge present on each tract. Carbon paper was placed under each map to register the cartometer's movements. Periodic reference to the carbon paper prevented measuring any boundary line twice. The measured amount of edge was used in calculating the vegetative-cover-diversity indices described in the next section.

Interspersion and Vegetative-Cover-Diversity Indices

The amount of edge or ecotone occurring where major cover types meet directly influences the abundance of bobwhite quail (Baxter and Wolfe, 1973, DeArment, 1950), California quail (Sumner, 1935), ruffed grouse (Edminster, 1947), and other game animals with relatively low mobility (Leopold, 1931). Hanson and Miller (1961) found a strong linear correlation between the number of miles of ecotone occurring in aerial photographs and the number of bobwhites actually present. They concluded that a large amount of edge was favorable to bobwhite quail and was directly related to density of quail populations. Baxter and Wolfe (1973:159) stated that measurements of edge provide a more "definitive expression" of habitat quality and they devised an interspersion index that indicated the amount of edge occurring on a particular area.

A method similar to that of Baxter and Wolfe (1973) was used to compute an interspersion index for the 33 school land tracts in Payne County. A plastic overlay grid (Figure 2) was placed over the map of

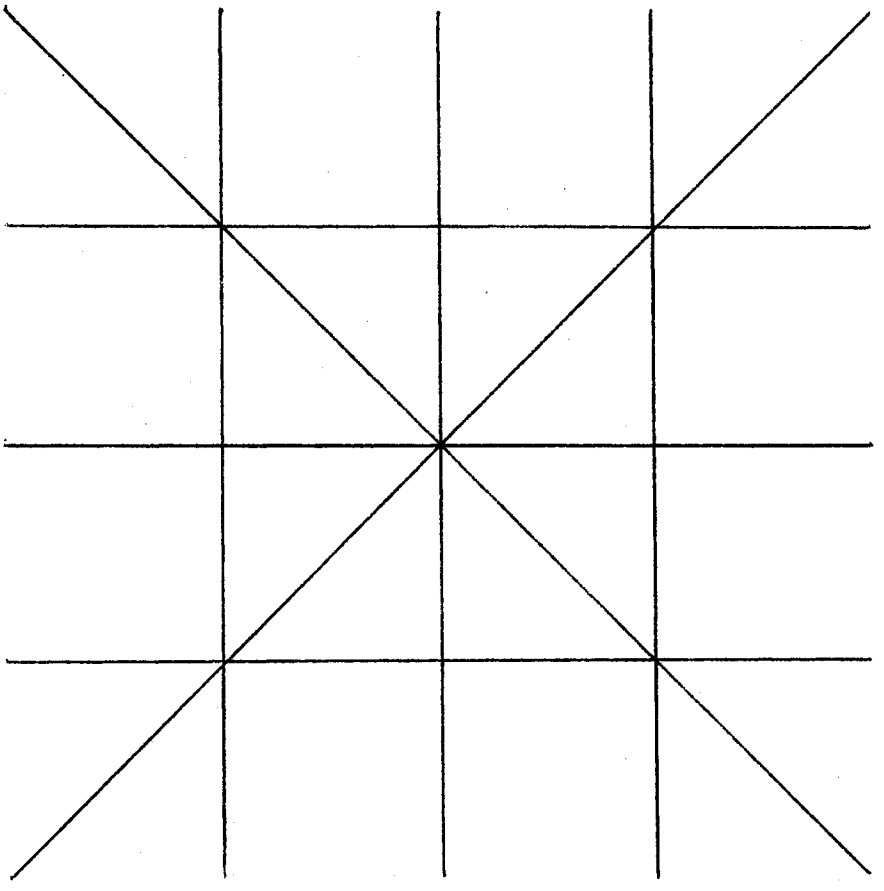

Figure 2. Grid Configuration Used to Compute Indices to Edge on 160-Acre Units of School Land

each quarter section. The number of times grid lines crossed cover type boundaries on all four of the quarter sections in each tract was determined. This number was divided by 32, the number of grid lines used on four 160-acre units, to determine the interspersion index. For example, there were 13, 12, 15, and 6 intersections between cover type boundaries and grid lines on quarter sections of a particular tract. The interspersion index was determined in the following manner:

$$I = (13+12+15+6)/32 = 46/32 = 1.4 \qquad (3.1)$$

Tracts were classified into categories of low, medium, or high interspersion based on the computed index.

A comparison of these categories revealed that computed indices adequately measured amounts of edge, but did not measure the diversity of vegetative cover. For example, a tract containing only two cover types could have a large edge index if cover types were highly intermixed, but the index would not be a good indicator of vegetative diversity. An area having a good mixture of more than 2 cover types would not only have a large amount of edge, but would be more diverse, thus having a greater chance of attracting animals. Hanson and Miller (1961) believed that even with a high amount of edge present, at least 3 types of vegetation must be represented for favorable quail habitat: grassland, cultivated fields, and brush or woodland.

An index was developed that took into consideration the amount of edge, the number of cover types, the number of occurrences of each cover type, and the acreage of each cover type.

This index to vegetative cover diversity was computed using the

equation:

$$I = (E \Sigma \frac{t_i A_i}{N})/1000 \qquad (3.2)$$

where E = total miles of cover type edge

t_i = number of separate units of the i^{th} cover type

A_i = acreage of the i^{th} cover type

N = number of units of all cover types

Acreage of each cover type was included as another measure of diversity. An area having a large acreage of only 3 cover types would be less diverse than an area having 4 cover types with smaller acreages.

While the index appeared to adequately represent vegetative cover diversity in the field, the mathematical relationship was not valid under certain hypothetical situations. These included conditions where the total amount of edge (E) would not increase substantially with an increase in the number of distinct cover types. For example, a tract equally divided into 4 quarters, and having 2 distinct cover types (each cover type comprising 2 quarters) would have a lower index value than a tract equally divided into 4 parts, but having 3 cover types (2 quarters representing 1 cover type with the other two representing 2 other cover types). The lower index value is explained by an increase in the number of distinct cover types while the amount of edge remained constant. This situation is found in symmetric patterns. Under natural field conditions, symmetric patterns of cover types are extremely uncommon, allowing the assumption that the total amount of edge (E) did increase with an increase in the number of distinct cover types.

Using this edge index, all school land tracts were stratified into categories of low, medium, and high vegetative diversity. A t-test

indicated that these categories were significantly different ($P<0.001$). The sampling design for estimating abundance of animals, described in the next section, was based on these three categories.

Estimates of Animal Abundance

Measures of abundance of wildlife and species diversity were needed to adequately assess the potentiality for hunting, fishing, birdwatching, and nature photography. A census of the entire population would require capturing or marking animals, so it was not practical because of limited time, money, and labor. Shultz and Muncy (1957) stated that indices to populations, based on the number of animals observed along transect lines, are frequently useful for studying potential hunting or the suitability of habitat. Similar counts were made for this study. These counts provided indices of abundance and were not a census of the total population.

An index to abundance of animals was determined on nine, 1-square-mile school land tracts. Three tracts were chosen randomly from each category of low, medium, and high vegetative diversity using a table of random numbers. This method of selection prevented abundance estimates from being biased in favor of any particular category of vegetative diversity. The nine sample tracts represented 23.3 percent of the acreage and 27.3 percent of the number of school land tracts in Payne County.

An index to diversity of wildlife was determined by walking eight transect lines, each one-half mile in length, on each of the nine sample tracts from August to October, 1972, and recording observations of animals or tracks. The location and direction of the transect lines were determined randomly. A plastic overlay with numbered vertical and

horizontal lines (Figure 3) was placed over each of the four 160-acre units of each sample tract. A north-south vertical line and an east-west horizontal line were chosen for each quarter section using a table of random numbers. These lines represented transects that would be walked. Reference points were marked on the cover maps so that starting points could be located in the field. Thus eight transects were selected for each of the nine school land tracts. The 72 transect lines had a total length of 36 miles.

Lines were walked with a minimum amount of noise; frequent stops were made to listen and observe; and care was taken to spend the same amount of time on each transect. Animals were recorded that were observed within 100 yards of the transect line. Cover types where each animal occurred were recorded as a measure of the importance of specific cover types. Observations of recent animal tracks were also noted. Attempts were made to avoid repeated counting of tracks from the same animal. Care was taken to reduce bias by not walking intersecting transect lines the same day. If all transect lines in a tract had been walked on one day, the observations might have been biased by counting the same animals twice or by reducing the abundance of animals along that portion of the transect line that was crossed previously. The data allowed determination of the number of individuals and species observed per unit distance, per tract, and per cover type.

An index to animal diversity (Shannon and Weaver, 1963) was calculated for each tract using the formula:

$$D = -\Sigma\left(\frac{n_i}{N}\right) \log\left(\frac{n_i}{N}\right) \qquad (3.3)$$

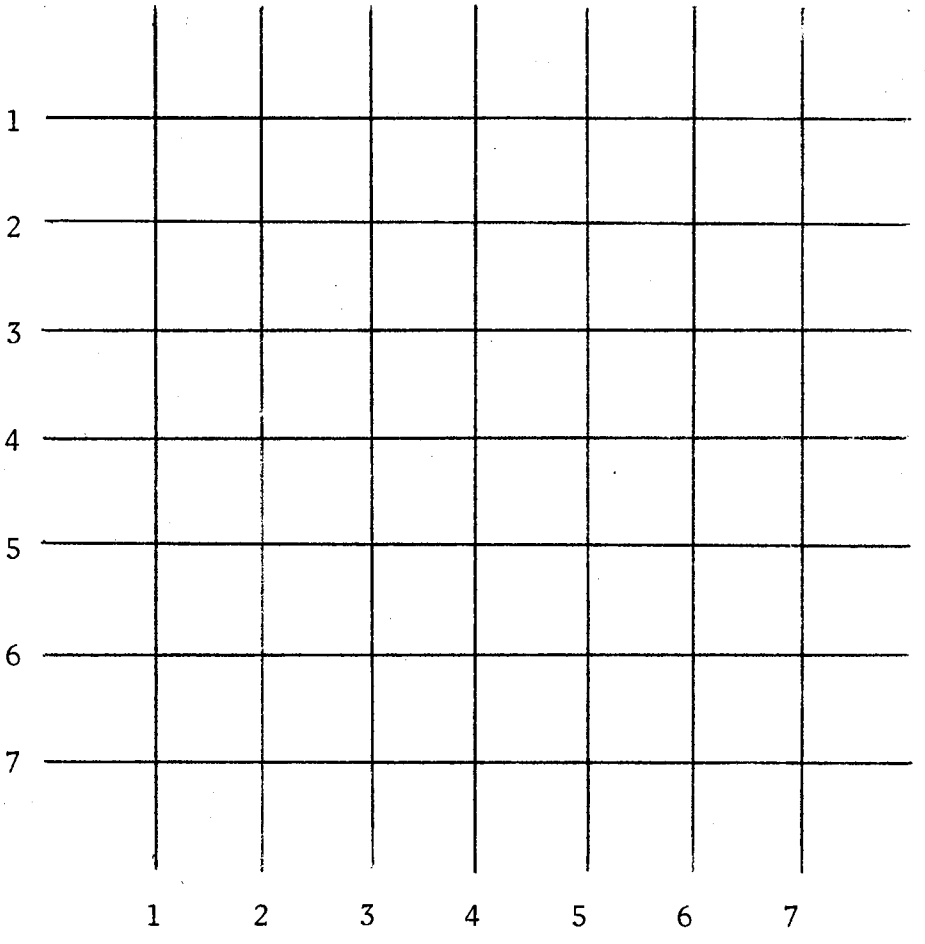

Figure 3. The Plastic Grid Overlay Employed in Denoting Transect Lines in Each 160-Acre Unit

where n_i = number of individuals of the i^{th} species

N = total number of all individuals of all species

log = natural logarithm

This index was compared with the index to diversity of vegetative cover to examine their relationship.

Counts of rabbits along roadsides were conducted early in the morning on each of the sample tracts from 16 August to 30 September, 1972. Roads adjacent to the tracts were driven from 1 hour before sunrise until 2 hours after sunrise. Observations by Lord (1959) indicated that rabbit activity in late summer peaks during this period. The wide distribution of tracts prevented traveling all roads on the same morning. Consequently, the route was divided in half, with each half driven on alternate mornings. A speed of 20 miles per hour was maintained during the counts. The travel route was changed frequently to vary the time of arrival at each tract so counts were taken at several different time periods. The total number of rabbits sighted was reduced by one-half with the assumption that one half of the rabbits came from private lands opposite the school land tracts. The resulting indices were used as an indication of abundance of rabbits on the school lands and permitted comparisons between the tracts.

A survey of populations of bobwhite quail was conducted on the nine sample tracts between 25 October, 1972, and 17 January, 1973, during the hunting season. This survey was designed to estimate quail abundance under simulated hunting conditions and was not intended to serve as a total population census. A bird dog was used to traverse quail habitat. Search effort was maintained uniformly by keeping constant rates of travel, controlling the dog's direction and pace, and

planning directions of travel in advance by studying the cover maps. The time was noted at the beginning and end of each trek. A pedometer registered the distance walked. The number of birds flushed on each tract was recorded as a function of time elapsed and distance traveled. Cover types where each covey flushed were recorded. Analysis of data included calculating the number of birds flushed per unit of distance, birds flushed per unit of time, and acres per bird. Potentiality for hunting was evaluated by comparing these data with current literature that cited densities of quail necessary for good hunting.

Counts of squirrel leaf nests (Parker, 1954, Ulig, 1956) were used as an indirect method of estimating abundance of fox squirrels on the sample tracts. The bottomland forest, postoak-blackjack, and upland shrub cover types on each tract were traversed systematically. A pedometer was used to measure the distances traveled. Freshly built leaf nests were counted and recorded as a function of distance walked. The number of squirrels was calculated for each tract by dividing the number of nests observed by the estimated number of nests built by each squirrel. Nests:squirrel estimates varied among investigators: 0.5 nests per gray squirrel (Goodrum, 1940); 1.09 nests per gray squirrel (Ulig, 1956); and 3.4 nests per fox squirrel (Parker, 1954). Parker's estimate was used because it dealt exclusively with fox squirrels, was obtained from data collected in Payne County, and provided the most conservative abundance estimate.

Survey of Lessees

Studies by Barclay (1966), Larson (1959), McIntosh (1966), and Waldbauer (1966) indicated that access to privately owned land is

influenced by attitudes and opinions of individuals controlling the land. Attitudes, opinions, and viewpoints of lessees were analyzed in this study, because these individuals controlled access to school lands.

Data were collected from personal interviews and questionnaires sent by mail. The questions used were similar in both the mail survey and the personal interview and were structured to answer the following:

1. What are current land-use practices?
2. Would wildlife-oriented recreation be allowed under existing conditions?
3. Would this type of recreation be allowed if conditions were changed?
4. What changes would be necessary?
5. Why do lessees have their current attitudes?
6. What information can lessees provide on game populations?

The format of the questionnaire contained 24 questions categorized into socio-economic data, land-use practices, lessee estimates of wildlife abundance, posting and related problems, and access incentives (Appendix B).

Lessees were asked to rate the abundance of wildlife species on their lease according to the following scale: 1 = high abundance, 2 = average or medium abundance, 3 = low abundance. Estimates were based on the lessee's own opinion of what he thought was a high, average, or low abundance of animals. No specific scale of abundance was included in the questionnaire because what was considered a high abundance of animals in one locality may have been considered medium or low in another area. The lessee estimates of animal abundance were compared with those made by the investigator.

An attitude scale, composed of statements 25-31, was also included. It measured lessee attitudes toward allowing recreation, such as hunting or fishing, on their school land lease. The scale was based on the Likert method of summated ratings (Zimbardo and Ebbesen, 1970). Statements 25-31 contained five response choices; the lessee was asked to check the response that best expressed his feelings about each statement. The respondent stated whether he strongly agreed, agreed, was undecided, disagreed, or strongly disagreed. His attitude was thereby scaled as positive, negative, or neutral toward allowing recreation on his school land lease. The response to each statement was given a numerical value. Statements 25, 26, and 27 (Appendix B) expressed a negative attitude toward allowing access for recreation. Responses to these statements were given the following values: strongly agree, 1; agree, 2; undecided, 3; disagree, 4; and strongly disagree, 5. Statements 28-31 expressed a positive attitude toward allowing access for recreation. Responses to these statements were given the following values: strongly agree, 5; agree, 4; undecided, 3; disagree, 2; and strongly disagree, 1. The seven response values were summed to give the attitude score for each lessee and analyzed by the following scales:

Attitude Score: 7 - completely negative toward allowing recreation, range 7-18;

21 - completely neutral, range 19-23;

35 - completely positive toward allowing recreation, range 24-35.

School land in Payne County was leased by 131 individuals; 11 leased land that was zoned commercially, or was not large enough for wildlife-oriented recreation. An attempt was made to personally contact the remaining 120 lessees. Data were collected from 57 personal

interviews, 52 return-mail questionnaires handed to the lessee or a member of his family at the time of the visit, and 11 questionnaires mailed to persons that could not be contacted personally. Personal interviews were conducted when possible because they provided more opportunity to motivate the respondent to supply adequate information, while still allowing greater flexibility (Gorden, 1969). If the lessee was absent or busy at the time of the visit, a questionnaire containing questions identical to those asked during the personal interview was given to a member of his family for relay to the lessee. A letter stating the purpose of the study (Appendix C) and a stamped, self-addressed enevelope were attached to the questionnaire. If the lessee or a member of his family could not be contacted after three attempts, a return-mail envelope, with the cover letter and questionnaire, was mailed to him. Follow-up letters were mailed to nonrespondents after waiting 2 weeks. Care was taken to avoid antagonizing the lessee. Correspondence and personal communication with the lessees emphasized possible benefits as shown in the letter of introduction sent to lessees (Appendix D).

Survey of Hunters and Fishermen

Questionnaires were mailed to sportsmen in Payne County to obtain their views on the quality of hunting and fishing on school lands in comparison with other public and private areas within the county. These questionnaires (Appendix E) were designed to determine how much time and effort local residents devoted to hunting and fishing, how successful they were, where they hunted or fished, and how they rated the quality of their recreational experiences.

Separate questionnaires were sent to hunters and fishermen. Although many sportsmen engaged in both hunting and fishing, only one questionnaire was sent to each individual because the time required to complete both questionnaires probably would have discouraged some recipients from responding.

Respondents were asked to rate their recreational experience(s) on school lands, other public lands, and private lands. They were given a choice of the following ratings: extremely enjoyable, satisfactory, and not enjoyable. Differences in hunter and fishermen response for each rating were tested statistically for each of the three land ownership categories using chi-square analysis.

The questionnaires were tested, prior to mailing, by 26 students enrolled in a wildlife techniques class. After minor revisions, the format was reduced to fit on the back of a stamped, self-addressed postcard.

Names and addresses of sportsmen were obtained from Oklahoma hunting and fishing license receipts held in the files of five sporting goods stores located in Stillwater, Cushing, and Yale. License receipts for 1972 were not available, so all legible names of individuals who purchased licenses from January to April, 1973, were used. Figures supplied by the Oklahoma Department of Wildlife Conservation indicated that 3,717 hunters and 5,750 fishermen purchased licenses in Payne County during 1972.

Questionnaires were sent to 372 hunters and 517 fishermen on April 16, 1973. These names represented a 10 percent sample of persons who bought hunting licenses and a 9 percent sample of persons who bought fishing licenses during 1972 in Payne County. A 10 percent sample was

desired for both hunters and fishermen. However, the number of available license receipts for fishermen was short by 1 percent due to low sales of fishing licenses during winter.

A letter (Appendix F) stating the purpose of the survey and requesting cooperation from the sportsmen, was mailed with the questionnaire and a map showing the location of the school land tracts of Payne County. Follow-up letters, containing a similar map and questionnaire, were mailed 21 days later to individuals who did not respond to the first mailing.

Three assumptions were necessary in evaluating the answers to the questionnaires: (1) hunters and fishermen who were sampled accurately represented the total population of sportsmen in Payne County; (2) hunters and fishermen were reasonably accurate in knowing where they hunted or fished; and (3) a certain amount of "brag bias" was probably present in the hunter's estimate of his success. However, the bias was similar on all lands, regardless of ownership.

Statistical tests for the analyses of animal abundance, survey of lessees, and survey of hunters and fishermen, were conducted at the 95 percent level of significance, unless otherwise stated.

CHAPTER IV

RESULTS

Evaluation of Habitat

A total of 24,673.1 acres of cover types was measured, a difference of only 94 acres from the total acreage listed by the Oklahoma State Land Office. The difference represented an error in planimetric measurement of 0.38 percent.

More than one half of the school land was native pasture (Table II). Cultivated land was the next predominant cover type, followed by postoak-blackjack forest, bottomland forest, and other pasture. These cover types accounted for more than 98 percent of the total acreage. Farm ponds comprised 139.5 acres. Residential areas covered 220.7 acres or approximately 1 percent of the area (Table II).

The numbers of separate units of each of the four major cover types were more similar than were the total acreage size of each. Bottomland forest occupied only 8 percent of the total area, but comprised almost 20 percent of the distinct units. Farm ponds comprised only 0.6 percent in acreage, but represented 18 percent of the units. Although native pasture was the most prevalent cover type in terms of acreage (51.5 percent), a large amount of vegetative diversity existed because of the large number of small units of less common cover types.

Habitat characteristics necessary for an abundance of quail have been described by several researchers. DeArment (1950) said the most

TABLE II

ACREAGE OF COVER TYPES AND NUMBER OF UNITS GREATER THAN 0.1 ACRE ON SCHOOL LANDS IN PAYNE COUNTY, OKLAHOMA, 1972

Classification	Acreage	Percent of Total Area	Number of Distinct Units	Percent of All Units	Mean Size of Units (Acres)
Native Pasture	12,715.3	51.54	306	19.6	41.6
Cultivated Fields	4,236.1	17.17	163	10.5	26.0
Postoak-Blackjack Forest	3,886.9	15.75	289	18.5	13.5
Bottomland Forest	1,929.1	7.82	304	19.4	6.4
Other Pasture	1,440.5	5.84	54	3.5	26.7
Residential	220.7	0.89	99	6.4	2.2
Ponds	139.5	0.57	285	18.2	0.5
Orchards	32.5	0.13	2	0.1	16.3
Roads	26.9	0.11	15	1.0	1.8
Upland Shrub	16.2	0.06	31	2.0	0.5
Riverine Vegetation	14.6	0.06	2	0.1	7.3

TABLE II (Continued)

Classification	Acreage	Percent of Total Area	Number of Distinct Units	Percent of All Units	Mean Size of Units (Acres)
Dry Streambed	10.0	0.04	3	0.2	3.3
Wetland	4.8	0.02	7	0.5	0.7
TOTAL	24,673.1	100.00	1560	100.0	15.8

important types of vegetation for quail in Payne County were timbered ravine (bottomland forest), hedges and thickets (upland shrub), forbs, and ungrazed tall-grass prairie (native pasture). School land tracts contained all of this vegetation; both grazed and ungrazed bottomland forest and upland shrub together totalled 1,945.3 acres.

With few exceptions, grazing pressure was medium to heavy over all native pasture. Indicators of overgrazing such as broomweed and ragweed were prevalent on a majority of the tracts. Rosene (1969) stated that woodlands for bobwhite quail can cover from 10 to 90 percent of the acreage with the remaining acreage in grassland or crops. Woodlands comprised 23.6 percent of the school lands. Rosene believed that if the open land was pasture, it should be distributed in small fields not larger than 20 acres and should not exceed 20 percent of the total amount of cleared land. The amount of native pasture exceeded Rosene's figure by more than 30 percent. The mean size of native pasture fields was 41.6 acres. Although total acreage of pasture exceeded the optimum suggested by Rosene, uneven distribution of the vegetation permitted a wide variety of habitat conditions and bobwhite quail populations were high in several locations.

Woodland habitat is an essential requirement for fox squirrels, thus squirrels were restricted to 5,816 acres or 23.6 percent of the school land. Potential habitat included bottomland forest, and postoak-blackjack forest.

The distribution of vegetative cover provided suitable habitat in many areas for cottontail rabbits, mourning doves, wild turkeys, white-tailed deer, and predators including coyotes, bobcats, and raccoons. Waterfowl habitat was limited primarily to farm ponds and areas

immediately adjacent to the Cimarron River. The potential area for waterfowl use, which included farm ponds and portions of the Cimarron River, was 160.1 acres or only 0.7 percent of the total area.

Vegetative-cover-diversity indices were computed for each of the 33 school land tracts using equation (3.2), page 14. Tracts were ranked into low, medium, and high diversity categories (Table III) by listing the indices in ascending order. Obvious gaps within the list arbitrarily represented the dividing points. Twenty-four percent of the tracts had low diversity, 43 percent medium, and 33 percent high. Each category was statistically different from the others at the 99 percent probability level. Cover maps are included in Appendix G as examples of vegetative cover diversity for each category.

Estimates of Animal Abundance

A total of 1,176 animals, including 50 species, were identified during the measurement of animal diversity along transect lines. Birds constituted 95.5 percent of the total individuals observed; 53 species of mammals (4.5 percent) were sighted or identified by sign (Table IV).

Meadowlarks, bobwhite quail, mourning doves, and crows were the four most common birds, accounting for more than one third of the individuals sighted. The ten most abundant birds constituted almost 80 percent of the total number of individuals sighted. The average distance walked per bird seen varied from 0.2 miles for the meadowlark and bobwhite quail to 36.0 miles for the great horned owl, coot, goldfinch, loggerhead shrike, Baltimore oriole, and roadrunner.

Sightings of mammals were not nearly as common (Table IV). Excluding fox squirrels, the most common mammals were crepuscular or

TABLE III

CATEGORIES OF VEGETATIVE DIVERSITY ON SCHOOL LAND TRACTS IN PAYNE COUNTY, OKLAHOMA, 1972

Categories of Vegetative Diversity and Location	Sample Tract Numbers	Index to Vegetative Cover Diversity
Low Diversity		
16-20N-3E*	1	0.376
36-18N-2E		0.485
16-18N-2E		0.508
16-20N-2E		0.511
36-18N-4E		0.572
13-20N-2E*		0.607
36-20N-3E*	2	0.938
36-18N-5E*	3	0.941
Medium Diversity		
16-19N-3E*	4	1.13
36-19N-5E		1.26
36-19N-3E*		1.35
36-18N-1E*	5	1.46
13-20N-4E		1.50
16-17N-3E		1.55
16-18N-6E*		1.64
36-19N-2E*	6	1.67
16-17N-2E		1.76
36-18N-3E		1.80
36-20N-4E		1.81
16-18N-1W		2.01
16-20N-4W		2.06
36-19N-1E		2.30
High Diversity		
16-19N-6E		2.48
16-18N-3E		2.72
36-19N-4E*		2.81
13-20N-3E*	7	2.86
16-18N-1E		2.90
16-17N-4E*		2.97
16-19N-4E*	8	3.00
16-18N-5E*		3.05
36-18N-1W*	9	3.11
16-19N-1W		3.15
16-18N-4E		3.83

*Denotes a tract sampled for estimates of animal abundance; these are circled in Figure 1.

TABLE IV

MINIMUM NUMBER OF EACH ANIMAL SPECIES PRESENT, PERCENT IT REPRESENTS OF ALL BIRD OR MAMMAL OBSERVATIONS, AND INDIVIDUALS OBSERVED PER MILE OF TRANSECT ON SCHOOL LAND TRACTS, PAYNE COUNTY, OKLAHOMA, 1972

Species	Percent of All Birds or Mammals	Minimum Number Present	Miles Walked per Animal
BIRDS			
Meadowlark	19.4	219	0.2
Bobwhite Quail	14.5	164	0.2
Mourning Dove	9.6	109	0.3
Crow	8.3	94	0.4
Field Sparrow	6.8	77	0.5
Bluejay	5.8	66	0.6
Rusty Blackbird	4.7	53	0.7
Starling	4.0	45	0.8
Scissor-Tail Flycatcher	2.9	33	1.1
Carolina Chickadee	2.8	32	1.1
Slate-Colored Junco	2.4	27	1.3
Yellow-Shafted Flicker	2.3	26	1.4
Cardinal	2.1	24	1.5
Barn Swallow	1.8	20	1.8
Killdeer	1.8	20	1.8
Western Kingbird	1.1	12	3.0
Red-Winged Blackbird	1.1	12	3.0
Sparrow Hawk	1.0	11	3.2
Unidentified	0.8	9	4.0
Eastern Bluebird	0.7	8	4.5
Red-Headed Woodpecker	0.5	6	6.0
Ring-Billed Gull	0.5	6	6.0
Marsh Hawk	0.4	5	7.2
Red-Tailed Hawk	0.4	5	7.2
House Wren	0.4	5	7.2
Downy Woodpecker	0.4	4	9.0
Brown Thrasher	0.4	4	9.0
Turkey Vulture	0.4	4	9.0
Domestic Pigeon	0.4	4	9.0
Common Grackle	0.4	4	9.0
Yellow-Billed Cuckoo	0.3	3	12.0
Mockingbird	0.3	3	12.0
Wood Thrush	0.3	3	12.0
White-Breasted Nuthatch	0.3	3	12.0
Vesper Sparrow	0.2	2	18.0
Brown-Headed Cowbird	0.2	2	18.0
Belted Kingfisher	0.2	2	18.0

TABLE IV (Continued)

Species	Percent of All Birds or Mammals	Minimum Number Present	Miles Walked per Animal
BIRDS (continued)			
Great Horned Owl	0.1	1	36.0
Coot	0.1	1	36.0
Goldfinch	0.1	1	36.0
Loggerhead Shrike	0.1	1	36.0
Baltimore Oriole	0.1	1	36.0
Roadrunner	0.1	1	36.0
MAMMALS			
Coyote	32.0	17	2.1
Fox Squirrel	28.3	15	2.4
Cottontail Rabbit	13.2	7	5.1
Black-Tailed Jackrabbit	13.2	7	5.1
Raccoon	5.7	3	12.0
White-Tailed Deer	3.8	2	18.0
Opossum	1.9	1	36.0
Striped Skunk	1.9	1	36.0

nocturnal. Such characteristics tended to reduce sightings. Fresh, identifiable tracks were recorded, but unless the transect line crossed a muddy creek bottom or moist drainage area, observation of tracks was difficult. The coyote was the mammal occurring most frequently and its presence was determined mainly by tracks. Abundance of small mammals such as mice, shrews, and rats was not measured. They undoubtedly were present, but measurements of their diversity and abundance were not desired.

Individuals and species observed in each cover type are shown in Table V. Game animals sighted included mourning doves, bobwhite quail, crows, fox squirrels, cottontail rabbits, black-tailed jackrabbits, coyotes, white-tailed deer, and raccoons. Results of the transects should be evaluated cautiously because the probability of observing an animal varies among cover types. For example, the probability of observing animals on native pasture was greater than in bottomland forest because the view was less obstructed.

More individuals and species were observed on native pasture than on any other cover type. The largest number of game species was sighted in bottomland forest. The greatest number of individual game animals was seen in native pasture. No animals were observed on transect lines in wetlands, roads, orchards, or riverine vegetation, probably because their acreage was so small.

Although more individuals were observed on native pasture, bottomland forest contained the greatest density of animals, with 145 individuals observed per mile of transect (Table V). Those cover types having the most animals per mile of transect in decreasing order of abundance were: bottomland forest, postoak-blackjack, native pasture,

TABLE V

DIVERSITY OF ANIMALS OBSERVED ON VEGETATIVE COVER TYPES OF PUBLIC SCHOOL LAND, PAYNE COUNTY, OKLAHOMA, 1972

Classification	Miles of Transect	All Animals				Game Animals			
		Species Observed	Individuals Observed	Percent of Total Individuals	Individuals per Mile of Transect	Species Observed	Individuals Observed	Percent of Total Individuals	Individuals per Mile of Transect
Native Pasture	18.75	32	499	42.4	27	7	153	36.6	8
Bottomland Forest	1.91	31	276	23.5	145	8	115	27.5	60
Cultivated Fields	6.06	19	154	13.1	25	4	60	14.4	10
Postoak-Blackjack	5.47	20	153	13.0	28	5	66	15.8	12
Other Pasture	2.84	7	38	3.2	13	2	3	0.7	1
Farm Ponds	0.26	7	28	2.4	--	2	6	1.4	--
Dry Streambed	0.03	2	14	1.2	--	1	13	3.1	--
Upland Shrub	0.03	6	8	0.7	--	0	0	0.0	--
Residential	0.38	3	6	0.5	--	1	2	0.5	--

and cultivated fields. Chi-square analysis indicated these differences were highly significant ($P<0.005$). Farm ponds, dry streambeds, upland shrubs, and residential areas were not included in the comparison because transect lengths over these areas were less than 1 mile and the computed number of animals per mile of transect for these areas would be misleading.

The distribution of game species among cover types was determined from transect line data (Table VI). Approximately 50 percent of the bobwhite quail were found in bottomland forest; another one-third were in native pasture. A majority of the mourning doves were observed either in cultivated fields or in native pastures. Coyotes or their tracks were seen most frequently in bottomland forest. More fox squirrels were sighted in the bottomland forest type than in the postoak-blackjack areas. Bobwhite quail were significantly more abundant in bottomland forests.

The indices to diversity of vegetative cover calculated from equation (3.2), page 14, were plotted against indices of animal diversity (equation 3.3, page 16) for each of the nine sample tracts (Figure 4) to determine if diversity of animals was influenced by vegetative diversity. A line was fitted to the data using simple linear regression. Although a slight, upward trend was indicated by the fitted line, an analysis using the F-test indicated the slope was not statistically significant. A significant relationship did not exist, probably because the predominance of birds (96 percent) in the animal diversity measurements concealed the dependence of animals of low mobility upon vegetative cover interspersion. Diversity measurements using only game animals could not be computed because only 9 species were represented.

TABLE VI

PERCENT OF GAME SPECIES SEEN IN COVER TYPES AND THE NUMBER OF INDIVIDUALS OBSERVED PER MILE OF TRANSECT IN EACH COVER TYPE (in Parenthesis), PAYNE COUNTY, OKLAHOMA, 1972

Species	Cover Types							
	Postoak-Blackjack	Native Pasture	Cultivated	Bottomland Forest	Other Pasture	Residential	Ponds	Streambed
Quail	22 (7.0)	32 (3.0)		46 (39.0)				
Dove	7 (2.0)	34 (2.0)	38 (7.0)	5 (3.0)			4	12
Crow	13 (2.0)	48 (2.0)	16 (3.0)	22 (11.0)	1 (0.4)			
Coyote	12 (0.4)	59 (0.5)	17 (0.5)	12 (1.0)				
Squirrel	27 (0.7)			53 (4.0)		13	7	
Rabbit	57 (0.7)		14 (0.2)	29 (1.0)				
Jackrabbit		71 (0.3)			29 (0.7)			
Raccoon		67 (0.1)		33 (0.5)				
Deer		50 (0.1)		50 (0.5)				

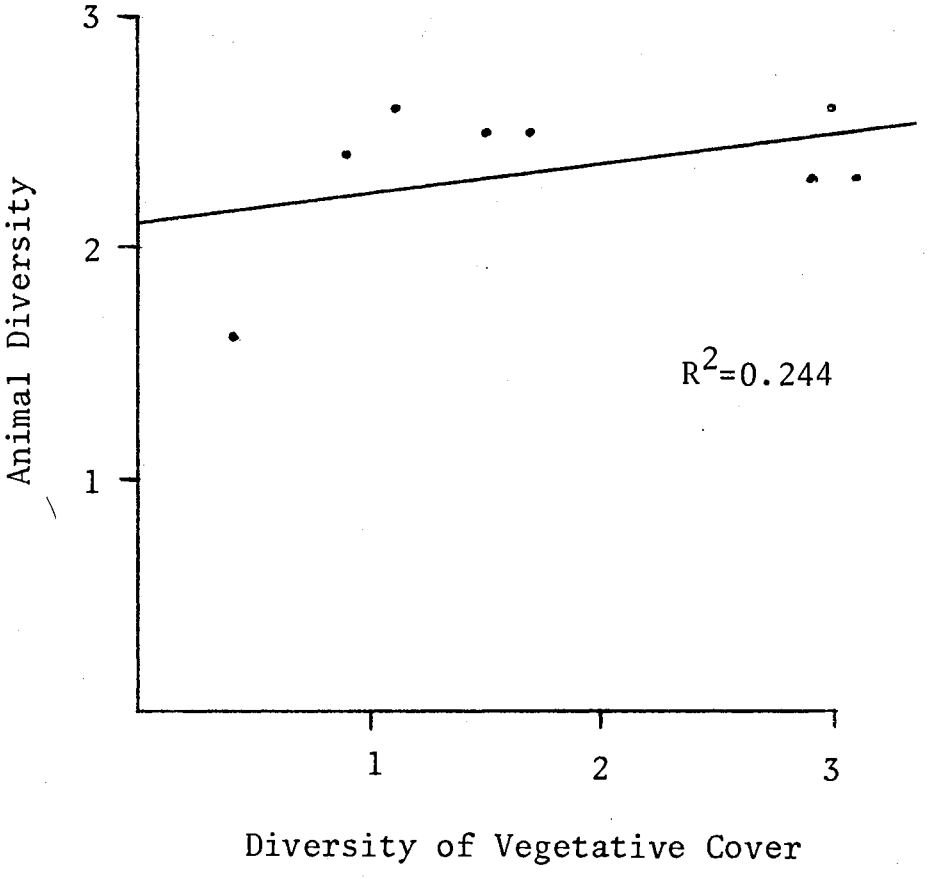

Figure 4. Diversity of Vegetative Cover in Relation to Diversity of Animals As Computed From the Shannon and Weaver Equation (Shannon and Weaver, 1963)

Accuracy of the index decreases when only a few species are present.

The total number of game animals observed on each tract was plotted as a function of the corresponding vegetative diversity index (Figure 5). A slight trend again was indicated, however, simple linear regression analysis showed that the slope of the fitted line was not significant. When the number of individuals within each species was plotted separately as a function of diversity of vegetative cover, only the number of mourning doves increased significantly ($P<0.025$). Sampling limitations presumably were responsible for the absence of significant relationships for most game animals. The slope of the fitted line probably would have been greater with a larger sample size.

The roadside rabbit census indicated they were scarce on school land tracts (Table VII). The mean number of observations per tract was 0.44. Data collected along transect lines within the tracts also revealed a low population of rabbits. The potential for hunting rabbits is extremely limited at this time.

Time limitations prevented an intensive census of all quail habitat within each tract. Therefore, population numbers derived from the census using a bird dog are regarded as minimum figures (Table VIII). Population densities varied from 6 to 29 acres per bird, with the average minimum population of quail conservatively estimated at one bird per 10 acres. Such densities appeared low when compared with other areas in the state: one bird per 1.77 acres, southwestern Oklahoma (Tyler, 1962); one bird per 8 acres, southcentral Oklahoma (Herd, 1968). Density values were low largely because: (1) the total size (640 acres) of each tract was used in the calculation of population densities and consequently, areas not regarded as quail habitat were included; and

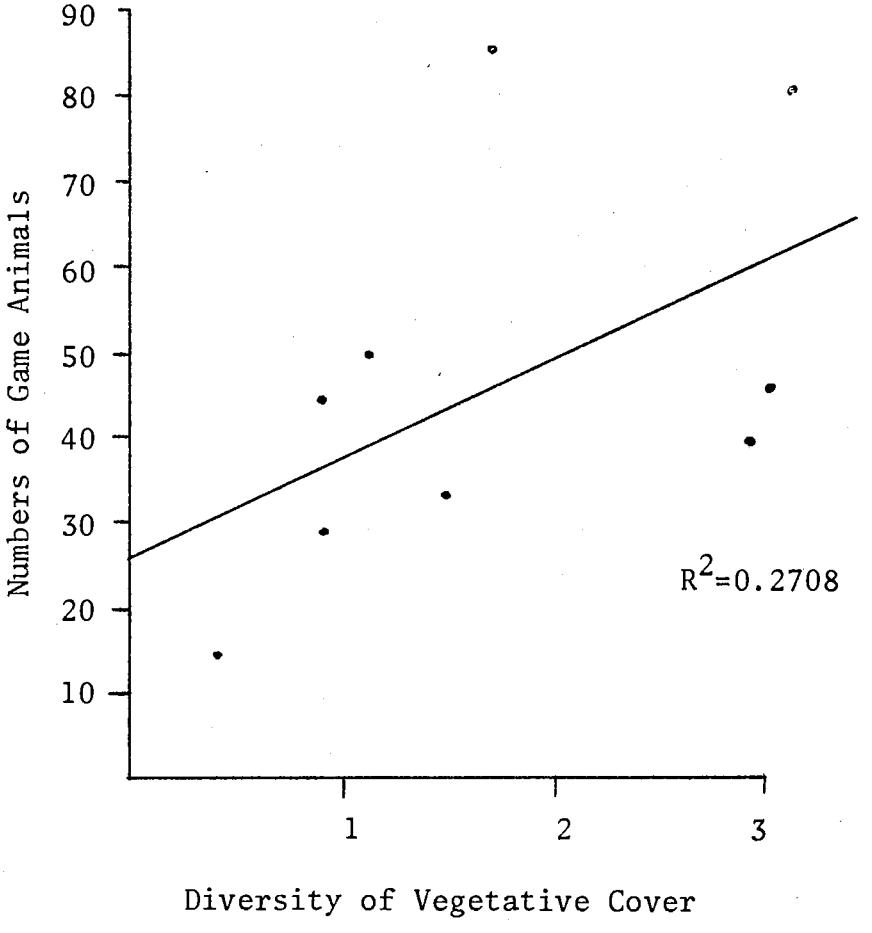

Figure 5. Diversity of Vegetative Cover in Relation to Numbers of Game Animals

TABLE VII

RABBITS OBSERVED ALONG ROADS ADJACENT TO SAMPLED SCHOOL LAND TRACTS, 16 AUGUST, TO 30 SEPTEMBER, 1972

Tract Number	Number of Times Censused	Number of Rabbits Observed	Number of Rabbits per Mile
7	13	14	0.27
2	13	10	0.24
8	13	9	0.16
3	13	7	0.14
9	13	6	0.12
6	13	4	0.07
5	13	2	0.04
1	13	1	0.02
4	12	0	--
TOTAL	116	53	0.11

TABLE VIII

MINIMUM POPULATION SIZES OF BOBWHITE QUAIL ON SAMPLED SCHOOL LAND TRACTS, PAYNE COUNTY, OKLAHOMA, 1972

Tract Number	Coveys Observed	Quail Observed	Quail Flushed per Mile Walked	Quail Flushed per Hour	Acres per Bird	Vegetative Diversity Index
6	8	100	11	22	6.4	1.67
4	6	95	14	29	6.7	1.13
9	5	82	10	18	7.8	3.11
8	5	58	5	13	11.0	3.00
3	3	40	6	13	16.0	0.94
2	2	40	7	17	16.0	0.94
1	2	22	3	7	29.1	0.38
7	0	0	0	0	--	2.86
5	0	0	0	0	--	1.46
Average per Tract	3.4	48.6	6.7	15.1	10.3	--

(2) approximately 50 percent of the birds actually present were probably missed by the dog, as Rosene (1969) found typical in census work. Quail densities have been found to be as high as 1 bird per 2.4 acres in Payne County (DeArment, 1950). Similar densities probably existed on some tracts, but were not shown because of limitations of the census technique.

Although quail populations appeared low in terms of acres per quail, five of the sample tracts or 56 percent of the total area produced more than five birds flushed per mile of walking or an average of 20 birds observed per hour. Assuming that a maximum of 50 percent of the birds observed on a hunt were shot at, and that the maximum kill was 60 percent (Betten, 1940), the estimated average kill per hour on the five tracts would have been six birds. The mean number of birds flushed per hour, on all of the tracts, was 15.1. This number would have produced an initial average kill rate for all tracts of five birds killed per hour. The potential of school lands for hunting quail was rated according to Table IX.

The estimated initial kill per hour on the sample tracts ranked above average. One third of the tracts would be rated "excellent" with their potential average kill of 7 birds per hour. These harvest rates would have decreased progressively during the hunting season, the rate of decline depending on hunting pressure.

Abundance of quail populations varied among cover types. Postoak-blackjack held 169 quail (38.6 percent of all quail); bottomland forest, 141 (32.3 percent); native pasture, 68 (15.6 percent); and upland shrub, 59 (13.5 percent). The distribution of quail, as determined by this survey, appeared more even than the distribution shown by data from

transect lines (Table VI); the latter indicated that more quail were in the bottomland forest. The difference in distribution of quail found by the two techniques may be partially explained by seasonal movements of quail. Data from transect lines were collected in early fall. The survey for quail, using a bird dog, was conducted during late fall and early winter. The birds could have moved from the open pasture and bottomland to thick, protected areas of postoak-blackjack, before the second survey. Accuracy of the two techniques was also different. Transect lines did not necessarily pass through quail habitat, thus the number of observations of quail were lower. The survey using a bird dog was more intensive and was accepted as the most accurate technique.

TABLE IX

CRITERIA FOR EXCELLENT, GOOD, AND AVERAGE QUAIL HUNTING IN TERMS OF ACRES PER BIRD AND KILL PER HOUR

	Excellent Hunting	Good Hunting	Average Hunting
Acres per Bird	1-2[a,b]	3-4[a,c]	5-6[a]
Kill per Hour	7-10[a]	4-6[a]	1-3[a,d]

[a]John Herd (Personal Communication, 1973), [b]Rosene (1969), [c]Betten (1940), [d]Bennitt (1945)

The estimates of squirrel populations, based on counts of leaf nests, were conservative because: (1) a large number of den trees were

observed, suggesting that some squirrels did not build nests, and (2) complete coverage of habitat was prevented by the large acreage of bottomland and postoak-blackjack oak cover types. The average minimum number of squirrels present, per mile, based on counts of leaf nests was 2.5 (Table X). Two of the nine sampled tracts would have a minimum of four squirrels per mile walked. Transect line data indicated an average of 0.4 squirrels observed per mile walked.

The average minimum density of squirrels estimated for the school land tracts appeared low compared to other studies. Research conducted on areas near Stillwater, Payne County, Oklahoma, by Parker (1954) indicated that the average population was 0.84 squirrels per acre in winter. Packard (1956) found that populations in winter in Kansas averaged 0.46 squirrels per acre. Such densities would probably vary greatly from year to year. The average minimum population of fox squirrels on the school land tracts from November, 1972, to January, 1973, was 0.08 squirrels per acre. Both leaf-nest and transect-line methods indicated the potentiality for hunting squirrels is low.

Survey of Lessees

Attempts were made to interview 120 individuals leasing school land in Payne County and complete questionnaires about them and their school lands. Fifty-seven questionnaires (Appendix B) were completed during interviews with lessees, 52 questionnaires were left for lessees to complete and return by mail, and 11 were mailed to lessees who could not be personally contacted. Personal interviews and mail correspondence accounted for 100 usable responses.

TABLE X

MINIMUM FOX SQUIRREL POPULATIONS BASED ON LEAF-NEST COUNTS* AT NINE SCHOOL LAND TRACTS IN PAYNE COUNTY, OKLAHOMA, NOVEMBER, 1972, TO JANUARY, 1973

Tract Number	Nests Observed	Miles Walked	Estimated Squirrels per Acre of Habitat	Estimated Squirrels per Mile Walked
8	103	5.75	0.15	5.3
4	52	5.25	0.12	2.9
5	50	6.00	0.07	2.5
9	41	8.50	0.04	1.4
6	39	4.00	0.09	2.9
2	18	6.00	0.07	0.9
1	14	2.25	0.19	1.8
3	7	0.5	0.12	4.2
7	4	3.25	0.01	0.4
Mean per Tract	36.4	4.61	0.10	2.5

*Estimates are based on 3.4 nests constructed per squirrel (Parker, 1954).

Thirty-five (67 percent) of the 52 questionnaires left with the lessees to complete and return were mailed back immediately. Follow-up letters with attached questionnaires were sent to the 17 lessees who did not reply; eight (47 percent) of these were subsequently completed. Of the 11 questionnaires sent initially by mail, 3 were returned because lessees had apparently moved and left no forwarding address. Follow-up letters were required for the remainder. Four questionnaires (36 percent) were received after the follow-up mailing. Five questionnaires were returned that were not completed.

T-test and chi-square analyses indicated no significant differences existed between mailed questionnaires and personal interviews regarding attitude scores of lessees, amount of land posted against trespass, or the proportion of lessees that allowed recreation ($P>0.01$). Differences were not expected because the only criteria for determining whether the questionnaire would be completed by interview or by mail was if the lessee was busy or absent at the time of the interviewer's visit. There was also no significant difference in lessee attitude scores between initial mail-back questionnaires and those obtained from follow-up mailings.

The ages of lessees ranged from 27 to 84 with a mean of 56.5. Over one half (56 percent) of the lessees were farmers or ranchers. Thirty-seven percent engaged in other occupations in addition to farming or ranching. This group included 13 laborers; 14 professional types, including college professors, physicians, and businessmen; 4 craftsmen; and 4 semiretired workers.

Lessees that completed grade school, high school, and college were represented approximately equally. Thirty-four (38 percent) completed

only the 8th grade, for 29 (32 percent) high school diplomas were the terminal degree, and 27 (30 percent) received college degrees.

Most lessees belonged to one or more of the following organizations: Soil and Water Conservation District (62 percent); Farmers' Union (54 percent); Farm Bureau (32 percent); Payne County Cattlemen's Association (23 percent); Oklahoma Cattlemen's Association (14 percent); and Oklahoma Wheatgrowers' Association (8 percent). Memberships in any of these organizations could have influenced the lessees' attitudes toward land management, including hunting, fishing, or other types of recreation, by exposing them to a wide range of organization policies, goals, and beliefs.

Respondents leased 20,158 acres (82 percent) of school land in Payne County. Many owned or leased other land in addition to their school lease. Sixty-five of 100 responding lessees owned a total of 26,891 acres. The mean size for privately owned property was 414 acres. Twelve respondents leased other land totalling 4,115 acres with a mean size of 343 acres. The total amount of land controlled by those responding was 51,164 acres. The properties controlled by each lessee varied from 80 to 6,400 acres and had an average size of 512 acres. The acreage controlled increased with the educational level of lessees (Chi-square test, $P<0.10$). The effect of the size of landholdings on attitudes of the lessees is discussed on page 61.

Respondents rated coyotes as the most abundant species and white-tailed deer as the least abundant animal (Table XI). The accuracy of the lessee estimates of abundance was evaluated by comparing estimates of quail populations from 26 respondents leasing the nine sample tracts with estimates made by the investigator, based on surveys with a bird

TABLE XI

LESSEE ESTIMATES OF ABUNDANCE OF GAME ANIMALS ON PUBLIC SCHOOL LANDS, PAYNE COUNTY, OKLAHOMA, 1972

Game Species	Number of Respondents	Percentage of Respondents Rating Abundance As			Average Rating*
		High	Medium	Low	
Coyote	93	49.5	31.2	19.4	1.7
Bobwhite Quail	93	11.8	36.6	51.6	2.4
Fox Squirrel	92	16.3	27.2	56.5	2.4
Cottontail Rabbit	92	10.9	31.5	57.6	2.5
Waterfowl	92	2.2	12.0	85.8	2.8
Wild Turkey	92	1.1	10.9	88.0	2.8
White-Tailed Deer	92	1.1	9.8	89.1	2.9

*1 = high abundance; 2 = average or medium abundance; 3 = low abundance.

dog. Abundance ratings by lessees were averaged for each tract and tracts were ranked according to the abundance of animals. A rank of 1 denoted a tract with the highest abundance, whereas 9 denoted a tract with the lowest abundance. Rankings by lessees were compared with those by the investigator. One rank by lessees corresponded, 3 were overestimates, and 5 were underestimates. These comparisons indicated that lessee estimates were slightly conservative. Landholder estimates should be used only as an aid in measuring the precision of estimates made by an investigator because they were only opinions, and were not based on any data derived systematically.

A substantial amount of school land, containing at least an average abundance of one or more wildlife species (Table XII), was potentially open for hunting or other types of recreation.

Recreational potentiality of farm ponds was significant on the school land tracts. Ninety-one percent of the respondents controlled one or more farm ponds. Fifty-nine percent stated their ponds were stocked with one or more of the following species: largemouth bass (78 percent), channel catfish (66 percent), crappie (32 percent), sunfish (63 percent), and unknown species (3 percent). The number of species present within each pond, according to respondents, was fairly evenly distributed with 1 species (22 percent), 2 species (27 percent), 3 species (24 percent), 4 species (24 percent), and number unknown (3 percent). Two hundred and forty-five farm ponds were located on school lands leased by respondents; 155 (63 percent) were available for fishing. The data indicated that approximately 185 farm ponds were potentially open for fishing on all school lands in the county. Data collected in Missouri by Barnickol and Campbell (1952) indicated that the

annual average number of man hours of fishing per acre on small ponds open for public use was 2,268. Based on this figure, public school lands annually could provide 317,520 man hours of fishing on all ponds and approximately 210,924 man hours on those open for recreation as stated by lessees.

TABLE XII

ACREAGE OF SCHOOL LANDS OPEN TO HUNTING OR OTHER TYPES OF RECREATION* WHERE LESSEES ESTIMATED "AVERAGE" OR "HIGH" POPULATIONS OF GAME ANIMALS WERE PRESENT, PAYNE COUNTY, OKLAHOMA, 1972

Game Animals	Acreage Open	Percent of Total School Land Leased by Respondents	Number of Leases
Coyote	11,201	55.6	54
Bobwhite Quail	6,962	34.5	30
Fox Squirrel	5,885	29.2	30
Cottontail Rabbit	5,344	26.5	25
Wild Turkey	1,375	6.8	7
White-Tailed Deer	1,120	5.6	6
Waterfowl	159	0.7	10

*Several lessees included stipulations: controlled number of sportsmen, asking permission, etc.

Fifty-seven respondents (58 percent) posted their school lease against trespass; 45 gave at least one reason for posting, 12 gave no reasons or had illegible responses.

Lessees who posted their land were asked to rate, in order of significance, reasons why they posted. Eighteen reasons were obtained. "Shooting livestock" was listed more frequently (29 percent) as the most important reason and ranked equally with "property damage" as a second choice (Table XIII). "Possible fires," "gates left open," and "littering" ranked equally as the third most important reason; each accounting for 18 percent of the response.

Respondents who posted had different interpretations of the sign's purpose; to prohibit only hunting (7 percent), to prohibit only fishing (2 percent), to prohibit trespassing of all kinds (57 percent), and to encourage hunters and fishermen to ask permission (31 percent). As many as 60 percent of the lessees who posted against all trespassing would still allow some types of recreation (Table XIV).

The amount of school land open in Payne County for various types of recreation was determined by summing the lease acreage of lessees who stated that they would allow such activities (Table XIV). The acreage of school land available for each type of recreation was considered a minimum amount because 12 percent of the lessees did not answer the questionnaire. The amount of land made available by nonrespondents was not determined. Personal interviews revealed that some of the land was available only as long as stipulations made by the lessee were met. Such stipulations included asking permission, restricting the numbers of sportsmen, and restricting the types of hunting and fishing allowed.

Many lessees liked to hunt or fish; 61 percent hunted and 67

TABLE XIII

LESSEES' REASONS FOR POSTING SCHOOL LANDS IN PAYNE COUNTY

Reason	Percent of Response			Percent of Total Response For All Reasons
	1st Choice	2nd Choice	3rd Choice	
Shooting Livestock	29	22	8	20.3
Property Damage	10	22	14	14.3
Possible Fires	2	11	18	11.0
Gates Left Open	5	8	18	10.1
Trespass by Large Groups	13	14	0	9.2
Desire to Have Game Available to Friends and Relatives Only	18	3	4	8.4
Littering	2	8	18	7.6
Theft of Personal Property	5	0	4	5.0
Privacy	8	0	0	3.3
Personal and Family Safety	2	0	4	2.6
Conserve and Protect Wildlife	2	3	4	2.6
Belligerent Sportsmen	0	0	4	0.8
Opposed to Hunting and Fishing	2	0	0	0.8
Shooting From Road	0	0	4	0.8
Irresponsible Sportsmen	0	3	0	0.8
Spooking Livestock	0	3	0	0.8
Liability for Accidents	2	0	0	0.8
TOTAL	100	100	100	100.0

TABLE XIV

TYPES OF RECREATION LESSEES PERMITTED ON SCHOOL LANDS, INCLUDING POSTED AREAS, ACREAGE OPEN FOR THESE TYPES OF RECREATION, AND PERCENTAGE OF TOTAL SCHOOL LAND LEASED BY RESPONDENTS ALLOWING THESE TYPES OF RECREATION, PAYNE COUNTY, OKLAHOMA, 1972

Type of Recreation	Number of Lessees That Posted but Would Allow This Use	Percent of Respondents That Posted but Would Allow This Use	Percent of All Lessees Allowing This Use	Percent of Total School Land Leased by Respondents Who Would Allow This Use	Acreage Open*
Photography	34	60	66	70.2	14,141
Birdwatching	34	60	66	70.2	14,141
Hunting	32	56	66	68.2	13,751
Fishing	32	56	65	68.4	13,797
Hiking	32	56	60	61.4	12,367
Picnicking	29	51	55	57.3	11,547
Camping	26	46	49	51.8	10,447

*With stipulations of lessee (p. 51)

percent fished. Fifty-six percent of the hunters and 39 percent of the fishermen utilized other property as well as their own or their leased land. Fifty-four percent of those who hunted posted their lease and 61 percent of those who did not hunt also posted their lease. Thirty-nine percent of those lessees who fished posted their lease, while 53 percent of those who did not fish posted their lease. The percentages indicated that the lessees who liked to hunt and fish tended to post less; however, chi-square analyses indicated this difference was not statistically significant.

An attempt was made to analyze how contacts the lessee previously had with hunters or fishermen influenced his attitude about posting school lands. Previous problems with hunters were reported by 52 (53 percent) respondents. When these individuals were asked to specify the number of problems involved, 57 percent listed 1, 25 percent listed 2, 16 percent listed 3, and 2 percent listed 4. Previous problems with fishermen were reported by 31 (32 percent) respondents. Sixty-seven percent of these respondents listed 1 problem, 27 percent listed 2, and 7 percent listed 3.

The respondents stated 17 types of problems had involved hunters and 11 types involved fishermen (Table XV). Personal interviews indicated that sportsmen were frequently blamed circumstantially for a problem when the lessee heard one or more shots or saw a car in the area and thought it belonged to hunters or fishermen. Further questioning indicated that some hunters and fishermen often receive the blame for problems actually caused by vandals.

McIntosh (1966) found that landowners who had property damaged by hunters tended to post their land more often than owners who had not

TABLE XV

TYPES OF PROBLEMS ENCOUNTERED BY LESSEES DURING CONTACTS WITH SPORTSMEN

Problem	Hunter Induced		Fisherman Induced	
	Lessees Complaining	Percent of Total Response	Lessees Complaining	Percent of Total Response
Livestock Shot	18	22	--	--
Did Not Ask Permission	14	18	5	12
Gates Left Open	11	14	8	19
Gates/Fences Damaged	11	14	6	15
Littering	7	8	11	26
Property Stolen	4	5	1	2
Fields Damaged	2	3	2	5
Cattle Spooked/Injured	2	3	4	10
Careless Shooting	2	3	--	--
Increase in People*	2	3	3	7
Signs Torn Down	1	1	--	--
Gates Blocked	1	1	--	--
Belligerent Sportsmen	1	1	--	--
Lessee Shot	1	1	--	--
Pastures Burned	1	1	--	--
Harassed by Hunting Dogs	1	1	--	--
Shooting From Road	1	1	--	--
Wasting Game	--	--	1	2
Indescriminate Cooking Fires	--	--	1	2
TOTAL	80	100	42	100

*Individuals would bring their friends on return trips.

suffered damage. Comparison of Tables XIII and XV indicates that three of the five major reasons for posting were the same as three of the five major problems previously experienced with sportsmen. The comparison is not conclusive, because lessees were not asked if they posted before or after the trouble occurred. Thirty percent of the lessees who posted stated that no trouble had occurred, but the remainder did have unfortunate experiences with hunters, fishermen, or both. Fifty-five percent of the lessees who had experienced problems listed reasons for posting that were the same as the trouble actually experienced. Apparently lessees were more inclined to post if problems had arisen earlier and the reasons for posting were closely related to the problem that had occurred.

Lessees who had experienced problems with sportsmen were asked if they knew where the individuals causing the trouble lived. Fifty-three percent did not know. However, 57 percent of those that did know stated that the individuals causing the problems lived within 10 miles. This apparently meant that a majority of the identified troublemakers were local, residing in small communities or rural areas.

Fourteen percent of the lessees said they would accept all of the incentives for allowing recreation, but 64 percent would not accept any (Table XVI). When respondents were asked why they rejected incentives, most replied that they did not want to feel obligated to allow access or they distrusted governmental agencies and officials and felt that they would not receive any economic benefits. The most acceptable incentives were elimination of liability for accidents and reimbursement for damages. Only 18 respondents (18 percent) would accept any monetary payments, and 11 of these did not specify the minimum amount desired.

TABLE XVI

RESPONSE OF LESSEES TO VARIOUS INCENTIVES DESIGNED TO PROMOTE RECREATIONAL USE OF SCHOOL LANDS, PAYNE COUNTY, OKLAHOMA, 1972

Type of Incentive	Percentage Response of Lessees to Incentives (n = 100)		
	Would Accept	Would Reject	Undecided
Reduction of Property Taxes	20	76	4
No Liability for Accidents	29	68	3
Reimbursement for Damage	29	69	2
Controlled Numbers of Sportsmen	28	69	3
Monetary Payments	18	79	3

The specified amounts varied from $1 to $5 per acre with an average of $3.29 per acre. Lessees evidently did not believe they would really receive any money or felt that obligating themselves to allow access was not worth the money they would receive. Thirteen (72 percent) of the lessees accepting the monetary incentive hunted; 11 (61 percent) fished. Although a majority were sportsmen, some individuals were willing to accept payments even though they did not hunt or fish themselves. The rating for all game animals, according to estimates made by these lessees, was slightly below the medium level of abundance.

McIntosh (1966) indicated that 70 percent of the landholders in West Virginia did not believe charges should be levied on hunters. McIntosh stated the primary reason for this attitude was the traditional belief that game belongs to everyone and it would not be ethical to charge a fee.

Approximately one half of the lessees in Payne County indicated landholders should charge fees for various types of recreation on school land (Table XVII). The average difference in "yes" and "no" answers for each type of recreation was only 7 percent. The predominance of "yes" answers for charging for hunting and fishing, in contrast to photography and birdwatching, indicated that fewer respondents desired to charge for the nonconsumptive types of wildlife-oriented recreation. This difference was highly significant as shown by t-test analysis ($P<0.01$).

Differences in age and educational levels of lessees wanting to charge fees were tested statistically with those who did not. Chi-square analyses revealed no significant difference in age classes. Slightly more individuals with higher educations wanted to charge for recreation on school lands; however, this difference was also not

statistically significant.

TABLE XVII

PERCENTAGE OF LESSEES BELIEVING LANDHOLDERS SHOULD CHARGE FEES FOR RECREATION ON SCHOOL LANDS IN PAYNE COUNTY, OKLAHOMA, 1972

Type of Recreation	Percentage of Lessees (n = 100)		
	Should Charge	Should Not Charge	Undecided
Hunting	51	40	9
Fishing	51	40	9
Camping	48	42	10
Picnicking	47	44	9
Hiking	43	48	9
Photography	42	49	9
Birdwatching	41	50	9

Lessees were asked if they desired the School Land Commission to make any specific policy changes that would allow access for hunting and fishing on the school lands they leased. Thirty-seven percent responded to this question. Responses were grouped into nine categories (Table XVIII) and indicated some lessees possessed strong opinions and attitudes concerning access control, and appeared extremely protective of their leases.

TABLE XVIII

COMMENTS MADE BY LESSEES ABOUT LEASE POLICIES OF THE SCHOOL LAND COMMISSION

Type of Response	Percentage of Lessees* (n = 37)
Lessees should control access to the land	60
Skeptical of access incentives	22
Leases are the same as private land	11
Would accept access incentives with restrictions	8
Distrustful of School Land Commission	8
Did not want to feel obligated to allow access	5
School Land Commission should give all lessees option to buy the leases	5
Should allow tenants to sublease land for recreation	3
Rent is too high	3

*Does not add to 100 percent because some respondents commented more than once

Lessees used school land primarily for agricultural purposes. Pasture was the predominant land use, accounting for 18,071 acres or 90 percent of the area. Most of this pasture was intensively used to produce cattle. Although woodland areas were frequently used as pasture, field observations revealed that some of these areas were being cleared

to increase grass production. This management practice has diminished the acreage of habitat for wildlife. "Set aside" ground designated by the Agricultural Stabilization and Conservation Service was categorized with pasture for this analysis. Croplands totalled 2087 acres or 10 percent of the area. No significant differences in land use existed between those lessees who would allow hunting and fishing and those who would not.

No respondents subleased or rented school land for recreation. No income was received from hunters or fishermen. Most lessees did practice one or more types of habitat improvement for wildlife, although not necessarily intentionally or intensively. Seventy-four percent allowed vegetation such as trees or shrubs to grow along fence rows or to exist in pasture, 35 percent provided food for wildlife by leaving some portion of crops in the field, 15 percent planted vegetation, such as multiflora rose, for cover for wildlife, and 3 percent planted food plots for wildlife.

The average attitude score of 97 responding lessees was 19.2, indicating that the attitude of the average lessee toward recreational access was neutral. Attitude scores were evaluated using chi-square and t-test analyses to determine if the lessee's attitude changed in relation to his age, amount of education, size of land holdings, and personal interest in hunting or fishing. Lessee attitudes did not differ significantly by age class, education level, or size of land holdings at the 95 percent level of significance. However, differences in land holdings were significant at the 90 percent level. The average attitude score of lessees with holdings greater than 320 acres was negative (18.2); the average attitude score of lessees with holdings less than

or equal to 320 acres was neutral (20.2). Lessee attitudes did not differ significantly between those that hunted or fished and those that did not. However, those who hunted or fished on their own lease were significantly more restrictive about access than those who hunted or fished on other land ($P<0.01$).

Poor lessee-sportsman relations appeared to affect lessee attitudes more than any other single factor. The difference in attitudes between lessees reporting prior problems with recreationists and those not having prior troubles was highly significant ($P<0.025$). The average attitude score for lessees who had prior problems with hunters or fishermen was within the negative range (18.1). The average score of lessees not having any problems remained neutral (21.2). Individuals who had not encountered problems with sportsmen possessed a more positive attitude toward access (Figure 6).

Respondents with higher attitude scores posted significantly less than those with lower scores ($P<0.025$). Among the lessees who posted their school lands, 8 had positive attitudes, 22 possessed neutral attitudes, and 25 were opposed to permitting access to recreationists.

Attitudes of lessees toward allowing access for recreation were largely determined by past experiences with sportsmen and these attitudes directly affected the availability of land by influencing the amount of posting that occurred.

Survey of Hunters and Fishermen

Questionnaires were completed by 141 hunters and 186 fishermen, representing a 36.8 percent response; 25.5 percent for the first mailing, and 21.2 percent for the second mailing. The returns represented a

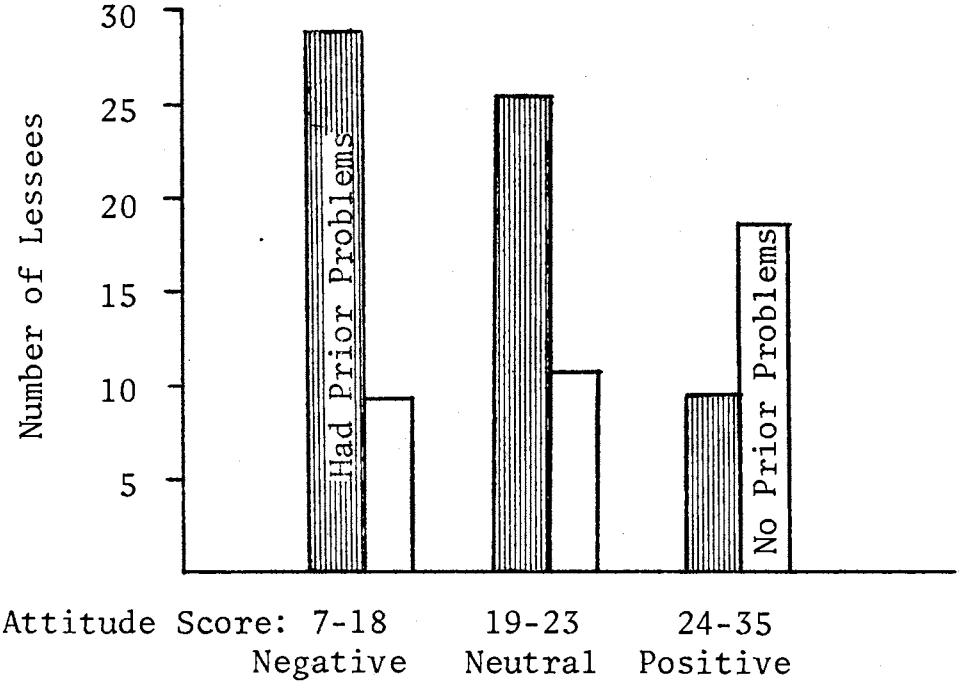

Figure 6. Attitude of School Land Lessees As Influenced by Previous Contacts With Hunters and Fishermen

sample of 3.8 percent of hunters and 3.2 percent of fishermen in Payne County.

The percentage of sportsmen who hunted or fished on school land, privately owned areas, and other public land in Payne County during 1972, is presented in Table XIX. School lands were utilized by 32.4 percent of the responding hunters and 43.5 percent of the responding fishermen. Most respondents who hunted or fished on school lands engaged in the same activities on other areas.

The average hunter was 39 years old, hunted 14 days inside Payne County and 7 days in other counties, spent 5 hours per hunting trip, and drove 26 miles to his hunting area. The average fisherman was 39 years old, fished 20 days inside Payne County and 16 days in other counties, spent 4 hours per fishing trip, and drove 27 miles to his fishing area. Women comprised 12 percent of the individuals purchasing fishing licenses and 1 percent of those purchasing hunting licenses.

The amount of difficulty encountered by county sportsmen in finding a place to hunt or fish was substantial, but not critical. Thirty-six percent of the responding hunters and 34 percent of the responding fishermen experienced some type of difficulty. Younger people appeared to have greater difficulty in finding a recreational place. The average age for individuals having difficulty was 36, while the average age for those not experiencing difficulty was 40. However, t-test analysis indicated this difference was not significant.

Hunting effort and success were compared on school lands, other public lands, and privately owned areas (Table XX). Bobwhite quail were hunted more than any other species on all areas. The fox squirrel was the second most commonly hunted animal on school land. Mourning doves

TABLE XIX

LOCATIONS OF HUNTING AND FISHING IN PAYNE COUNTY PERFORMED BY SPORTSMEN BUYING THEIR LICENSES IN PAYNE COUNTY

Type of Sportsmen	Location						
	Public Land Only	Public and Private Land	Public Land and School Land	Private Land Only	Private Land and School Land	School Land Only	All Three Areas
Hunters (n = 108)*	2.8	14.8	0.9	50.0	6.5	2.8	22.2
Fishermen (n = 147)	10.2	29.3	3.4	17.0	3.4	2.0	34.7

*Sample size does not equal total return because portions of some questionnaires were not completed.

TABLE XX

HUNTING PRESSURE AND SUCCESS ON DIFFERENT LANDS IN PAYNE COUNTY, OKLAHOMA, 1972

Species Hunted	School Land					Other Public and Private Areas				
	Number of Respondents	Number of Times Hunted	Animals Bagged	Percent of All Hunts	Animals Bagged per Hunt	Number of Respondents	Number of Times Hunted	Animals Bagged	Percent of All Hunts	Animals Bagged per Hunt
Bobwhite Quail	18	46	155	28.7	3.4	86	679	2238	37.2	3.3
Fox Squirrel	8	43	106	26.7	2.5	32	187	356	10.3	1.9
Coyote	5	28	8	17.4	0.3	15	173	89	9.5	0.5
Ducks	4	15	43	9.3	2.9	21	178	310	9.8	1.7
Mourning Doves	3	11	85	6.8	7.7	33	294	1113	16.1	3.8
Cottontail Rabbit	5	10	38	6.2	3.8	35	163	277	9.0	1.7
Wild Turkey	4	5	4	3.1	0.8	8	36	6	2.0	0.2
White-Tailed Deer	1	2	0	1.2	0.0	18	86	5	4.7	0.1
Canada Goose	1	1	0	0.6	0.0	11	26	11	1.4	0.4
All Species	27	161	439	100.0	2.7	107	1822	4405	100.0	2.4

ranked second on other public land and privately owned areas. Although the number of quail, squirrels, ducks, doves, rabbits, and turkeys bagged per hunt was higher on school land areas, the difference was not statistically significant. However, the data indicated that hunting success was as good on school lands as on other categories of ownership.

More "extremely enjoyable" recreational experiences for both hunting and fishing were received on private lands than on public access areas or school lands (Table XXI). School lands produced more "extremely enjoyable" ratings than public access areas for hunting experiences, but fell below private areas and public access areas in producing "extremely enjoyable" fishing experiences. Differences in the proportion of "extremely enjoyable" and "not enjoyable" ratings for each of the three types of areas was statistically significant ($P<0.05$) for both fishing and hunting.

Many sportsmen classified their hunting or fishing experiences as "very enjoyable" even though they did not bag a large amount of game or catch fish on most of their trips. Almost 90 percent of the fishermen rated their recreational experiences as "satisfactory" or "extremely enjoyable" even though they caught fish on only 0-20 percent of their fishing trips (Table XXII). Moeller and Engelken (1972) found that the number of fish caught did not determine pleasure gained from a trip as much as did weather, size of fish caught, privacy, natural beauty, and water quality.

A similar situation existed with hunters in Payne County (Table XXII). Ninety-two percent of the hunters who rated their quail hunts as "extremely enjoyable" or "satisfactory," bagged an average of only three quail per hunt. Hunters who did not enjoy their hunting experience

TABLE XXI

HUNTERS' AND FISHERMEN'S OPINIONS OF THEIR RECREATIONAL EXPERIENCES IN PAYNE COUNTY, OKLAHOMA, 1972

Type of Recreation and Area	Rating and Percentage			
	Extremely Enjoyable	Satisfactory	Not Enjoyable	Total
HUNTING				
Private Areas (n = 101)	42.6	55.4	2.0	100.0
School Land (n = 35)	28.6	51.4	20.0	100.0
Public Access Areas (n = 44)	15.9	63.6	20.5	100.0
FISHING				
Private Areas (n = 124)	45.2	52.4	2.4	100.0
School Land (n = 64)	12.5	65.6	21.9	100.0
Public Access Areas (n = 114)	21.1	67.5	11.4	100.0

TABLE XXII

SPORTSMEN'S RATINGS OF THEIR RECREATIONAL EXPERIENCE AND HUNTING AND FISHING SUCCESS, PAYNE COUNTY, OKLAHOMA, 1972

Type of Recreation	Percentage of Response					
	Extremely Enjoyable		Satisfactory		Not Enjoyable	
	Percent of Response	Harvest per Trip	Percent of Response	Harvest per Trip	Percent of Response	Harvest per Trip
FISHING						
Percent of Fishing Trips When Fish Were Caught:						
0-20 (n = 52)	28.9	--	59.6	--	11.5	--
41-60 (n = 50)	26.0	--	56.0	--	18.0	--
81-100 (n = 72)	38.9	--	56.9	--	4.2	--
HUNTING						
Species Hunted:						
Bobwhite Quail (n = 144)	34.8	3.1	57.6	3.1	7.6	3.3
Fox Squirrels (n = 69)	44.9	1.9	52.2	1.7	2.9	1.4
Cottontail Rabbits (n = 66)	37.9	1.2	56.0	1.9	6.1	1.4

bagged almost as much game as hunters who rated their experience as "satisfactory" or "extremely enjoyable." The difference in the number of game animals bagged at each level of enjoyability was not statistically significant. Individuals either overrated the hunting areas or placed greater importance on good weather conditions, natural beauty, or other factors that contributed to a favorable experience.

Potential of School Lands for Nonconsumptive Types of Recreation

Types of recreation that do not involve harvesting wildlife are termed nonconsumptive uses. Such uses include photography, birdwatching, hiking, picnicking, and camping.

Data from the 72 transect lines (Table IV) indicates an excellent potentiality for photography and birdwatching because there is a high diversity of animals, especially birds. These types of recreation were permitted on a minimum of 14,141 acres of school land by 70 percent of the responding lessees (Table XIV), and were the recreational uses that would be permitted most frequently on school lands.

A diversity of terrain and vegetation, particularly near farm ponds, produced esthetically attractive sites for camping, hiking, and picnicking. In addition, some school lands have historical significance. For example, the first conflict of the Civil War fought in Oklahoma, the Battle of Round Mountains, occurred over an area that included the school land tract at Section 16, Township 19 North, Range 3 East, 14 miles east of Stillwater.

Hiking, picnicking, and camping were types of recreation considered least desirable by lessees, and were limited to less than 50

percent of the acreage of school lands. Picnic tables, water wells, electrical outlets, refuse cans, and other camping or picnicking facilities were not available. Lessees were more tolerant toward hunters than hikers. Many of the lessees could not realize or understand the purposes of hiking. Some thought hiking provided an excuse for snooping or prowling. Lessees considered picnickers and campers the least desirable of all recreationists and feared they would leave litter or cause wild fires.

CHAPTER V

DISCUSSION

Possible Solutions to the Problem

Methods must be found to meet effectively and efficiently the rapidly increasing demand for recreational opportunities. Public school lands are not presently utilized to provide such opportunities on a large scale. The following is a discussion concerning current lease contract provisions, implications of this study, and possible solutions to the problem of providing recreation in addition to other land uses.

School lands in Payne County were used by less than one third of the hunters and slightly more than one third of the fishermen who purchased licenses in the county. Over one half of the school lands (14,226 acres) remained closed to some types of recreation. Greater utilization of these school lands for recreational interests was restrained by provisions in the agricultural lease contract mutually signed by the Secretary of the School Land Commission and the lessee. Section 14, Form 160, "Preference Right Lease of Lands Held in Trust by the State of Oklahoma" (Anonymous, 1972b), stated that:

> This lease, or any improvements which are owned by second party (each lessee) and located on said land, shall not be assigned, transferred, conveyed, or relinquished without written consent of the first party (School Land Commission), except that second party is encouraged to permit individual hunters and fishermen on the land and may give such permission without written consent by the first party and, further that second party may accept and retain all fees for

permitting such hunting and fishing.

Although hunting and fishing of individuals was "encouraged," the commission reserved the right to limit these activities by stating in Section 13 (Anonymous, 1972b) that:

> Second party agrees to protect said land from waste, and that he will not permit any waste or trespass to be committed on or against said land, and that he will not permit the existence of a nuisance upon said premises, and will maintain the premises in a clean, orderly fashion to prevent littering and pollution, and will report any situations beyond his control to the first party . . . .

In effect, lease policy has decreased the amount of land potentially open to recreation by giving the lessee the option to either permit or refuse access to his lease, while holding him responsible for any damages sportsmen cause.

Providing school land for recreation could be economically valuable. School lands could be managed under multiple-use concepts, with hunting and fishing providing additional uses and sources of income. Economic benefits could be obtained because sportsmen are now willing to pay for the recreational enjoyment they receive. The annual expenditure in 1970, by an average small game hunter, for all activities related to hunting, was $81 (Anonymous, 1972a). During the 1972 hunting season, hunters purchased 3,717 licenses in Payne County. Based on the 1970 survey (Anonymous, 1972a), hunters presumably generated annual revenue totalling $301,077. Sample returns indicated that approximately 712 hunters utilized school lands in Payne County. These hunters provided an annual expenditure of $57,672 (712 x $81). The average expenditure per hunt was $7.62 in 1970 (Anonymous, 1972a). Approximately 4,246 hunts took place on school lands in Payne County and they may have released as much as $32,355 into the economy of the county. If

these school lands had not been available, the money would presumably have been spent for hunts on other private or public land in Payne County.

On a statewide basis, there may be some school land that would have greater economic value for hunting or fishing than for agricultural use. For example, wetland areas near large ponds and reservoirs would have little agricultural value, but would provide hunting opportunities by containing wintering populations of ducks and geese. Many heavily wooded areas would have a low value for grazing livestock, but would provide hunting opportunities for deer, squirrels, and other wildlife. Obviously, however, many areas would provide more revenue from agricultural practices than from recreation. School land tracts composed principally of cropland would not be attractive for recreation because they would not contain large animal populations. Rangeland that is intensively grazed would also be unattractive to sportsmen. An inventory of school lands that would identify those tracts having a potentially higher value for outdoor recreation than for agricultural use would permit the School Land Commission to more carefully consider alternative uses for these tracts.

There are several alternative solutions to the problem of utilizing school lands for public recreation in association with other uses. Lessees stated that as much as 70 percent of the land would be open to some types of recreation. If recreationists knew the location of these school lands, greater utilization of the lands would occur. This approach would be further enhanced by the School Land Commission reducing lessee responsibility for damages caused by sportsmen. However, stipulations made by the lessees, which included allowing only limited

numbers of sportsmen, certain types of recreation, or certain types of individuals, could partially limit the effectiveness of this option.

The lessee could sublease portions of his land to individuals or groups, but Section 15 of the lease contract (Anonymous, 1972b) regulated this practice by stating that "This lease or any improvements owned by the second party located on said land, shall not be subleased without prior written consent of first party." Limiting access to only certain individuals or groups as specified by each lessee, might lead to incomplete utilization of the recreational potential of the land.

Many sportsmen do not object to paying fees for hunting or fishing, if such fees are fair. Payments of fees are usually based on a daily or annual permit or lease contract. Under the present system, lessees are allowed to charge fees for hunting and fishing, but the survey indicated that none did. However, approximately one-half indicated that charging fees would be acceptable. If the School Land Commission encouraged this practice, by mail correspondence or visits from field representatives, school lands might be utilized more for recreation.

The School Land Commission could change its lease policy to prohibit posting or prevent the lessee from refusing permission. Lessees would be strongly opposed to this option, regarding it as an infringement of their rights. Such a change would probably be considered radical. It would also require the elimination of lessee responsibility for any damages produced by recreationists.

The School Land Commission could lease hunting or fishing rights to sportsmen's clubs or other groups and individuals. Such a contract would be based on the value of the land for these activities. Land values for hunting vary according to the abundance of game animals. The

value of woodland or rangeland was reported by Bolle and Taber (1962) to vary from 10 cents to 1 dollar per acre. Good waterfowl habitat varied from 10 to 100 dollars per acre. If 25 percent of the woodland and rangeland on school lands in Payne County were leased according to these values, the revenue would range from 463 to 4,632 dollars. This approach could provide substantial monetary returns but would limit access to only a few individuals or groups. A conflict of interest might develop between lessees and the School Land Commission over division of profits and decisions about the type of recreation to be permitted. Administering such a program would also involve added costs.

The School Land Commission could charge a daily or annual permit fee to individuals for hunting, fishing, or other types of recreation on any school land tract. Advantages of a permit system would include: (1) a guarantee, to the sportsmen, of a place to engage in recreational activities, if he complied with established regulations; (2) regulation of the number of sportsmen depending on the number of permits issued by the commission; and (3) added income to the lessee if profits were shared by the School Land Commission. Disadvantages would include: (1) additional administrative responsibilities on the part of the School Land Commission and (2) possible conflicts of interest with lessees related to fee policies.

A permit system or lease contract between the School Land Commission and sportsmen would undoubtedly create a conflict of interest with some lessees. A majority of lessees vehemently believed in their right to permit or refuse trespassing on their lease and indicated they would not accept any incentive for allowing public access. However, the School Land Commission has the right and duty to establish policies

that would bring maximum benefits to the schools of Oklahoma. Section 4 of the agricultural lease contract (Anonymous, 1972b) states that:

> The second party (the leasee) hereby agrees, binds, and obligates himself not to interfere with the possession or operation of said premises, or any part thereof, by the holder of a mineral lease, or by any other permittee or grantee of the first party, except by proper proceedings in a court of competent jurisdiction.

Some lessees indicated they would give up their leases rather than comply with any programs they disliked. However, revenue would probably not be lost as other individuals would be willing to accept provisions of the lease contract.

Greater accessibility to school lands would likely occur by selected sportsmen's clubs, groups, or individuals making a sincere effort through publicity, mail correspondence, and personal communication, to encourage the lessees to grant permission by accepting economic incentives or other agreements. A simultaneous effort on the part of the School Land Commission should be made to: (1) reduce lessee responsibility for damage created by recreationists; (2) identify those tracts having potentially higher values for outdoor recreation than for agricultural uses and lease these directly to sportsmen's groups; and (3) encourage lessees to sublease their rented land for recreation. These approaches appear to be the most practical. Although they would not guarantee automatic public access, such programs would probably reduce conflicts of interest between the School Land Commission, lessees, and sportsmen. Other solutions providing more public access would require significant policy changes in the management of school lands, that might be controversial and politically sensitive.

Findings of this study indicate that the multiple-use concept of management could be more fully implemented on public school lands.

Management of the wildlife resource could provide added income to the schools of Oklahoma and simultaneously furnish significantly more recreational opportunities to sportsmen.

Limitations of This Study

Shortcomings and limitations of this study are identified to enhance evaluation of the major findings.

A shortage of time, labor, and money restricted the study to school lands within Payne County. This sample should, therefore, be used to characterize school lands only in north-central Oklahoma. Inferences about school lands in other portions of the state are not justified by this study.

Measurements of animal diversity and abundance were designed to give only minimum estimates. In many cases, populations of animals were obviously higher than the numbers indicated by the techniques.

Animal diversity measurements were conducted during migration of several bird species. Measurements during this period could have been biased by the influence of these species.

No comprehensive or detailed study was conducted to determine the actual economic impact of recreation on the school lands. Consequently, the premise that school lands are not currently managed for maximum economic returns within a multiple-use concept could not be proven. However, available evidence did indicate that more efficient utilization of the land could occur.

The magnitude of the conflicts of interest that could arise with some of the possible solutions previously stated was not determined. Therefore, it could not be shown that revenue created from the sale of

hunting and fishing rights or other fees would be large enough to offset any potential loss of revenue created by these conflicts of interest.

A state-wide study of public school lands is needed that would include not only an assessment of recreational opportunities, but also an intensive study of the economic benefits of promoting outdoor recreation on these areas. Such a study would provide conclusive evidence concerning the feasibility of utilizing state school lands for wildlife-oriented recreation.

CHAPTER VI

SUMMARY

This study was conducted to determine the extent of wildlife-oriented recreational opportunities on public school lands in Payne County, Oklahoma. Research was divided into four separate subject categories: classification and distribution of vegetation, estimation of wildlife abundance, determination of lessee's attitudes about public recreation on school lands, and assessment of local sportsmen's opinions concerning the recreational quality of these school lands.

Native pasture, cultivated land, and postoak-blackjack oak were the most prevalent cover types, comprising 52, 17, and 16 percent respectively of the total area.

Indices to diversity of vegetative cover were computed for 33, 1-square-mile tracts. Vegetative diversity was based on the amount of edge, size, and quantity of existing cover types, and was classified as "low" on 8 tracts, "medium" on 14 tracts, and "high" on 11 tracts. A direct relationship between wildlife abundance and these vegetative cover diversity classifications was indicated, but was not statistically significant. The uneven distribution of vegetation permitted a wide variety of habitat conditions and wildlife was abundant in some locations.

Pasture was the primary land use. Grazing pressure was medium to heavy on all tracts and limited the value of native and improved

pastures for providing food and cover for wildlife.

Measurements of animal diversity and abundance were made systematically on nine, randomly sampled, 1-square-mile tracts. A total of 1,176 animals or their sign were observed. Avian fauna represented 95.5 percent of the individuals observed. Game animals constituted 35 percent of the individuals, and 18 percent of the 50 species involved. Bobwhite quail, mourning doves, and crows were among the 10 most frequently observed birds. The coyote, fox squirrel, and cottontail rabbit were the most abundant mammals.

A direct relationship between animal diversity and vegetative diversity appeared to exist but was not statistically significant. The lack of a significant relationship may have been due to the presence of large numbers of highly mobile avian species.

The abundance of wildlife varied among cover types. Native pasture contained the greatest number of animals, but bottomland forest contained more game animals. Fox squirrels were more abundant in bottomland forests than in postoak-blackjack oak areas. Bobwhite quail were most abundant during late fall in postoak-blackjack oak forest, bottomland forest, and native pasture in decreasing order of abundance.

Roadside counts and transect line data indicated the population of cottontail rabbits was low. The abundance of fox squirrels was low on the nine sample tracts, with an average minimum density of 0.08 squirrels per acre and 0.8 squirrels observed per mile of walking. Whitetailed deer and wild turkeys were seen but were not abundant.

The abundance of bobwhite quail varied greatly over the nine sample tracts. The average minimum population of quail was conservatively estimated at one bird per 10 acres. The estimated range in population

size was from one bird per 2.4 acres to one bird per 29 acres. Sampled tracts had the potentiality to produce an average initial harvest of 5 birds per hour and that was considered "good" hunting. Quail hunting on 33 percent of the tracts was rated "excellent" with a potential initial harvest of 7 birds per hour. The harvest rates would have decreased progressively during the hunting season, the rate of decline depending on hunting pressure.

Lessee estimates of animal abundance were conservative when compared with findings by the investigator. According to lessees coyotes were the most frequently observed animals, followed in order of decreasing abundance by bobwhite quail, fox squirrels, cottontail rabbits, waterfowl, wild turkeys, and white-tailed deer.

Of those respondents who stated that ponds were located on their lease, 59 percent stated that these ponds were stocked with at least one or more of the following fish species: largemouth bass (78 percent), channel catfish (66 percent), crappie (32 percent), sunfish (63 percent) and unknown (3 percent).

Permission to hunt, fish, hike, camp, picnic, photograph nature, or study bird life can be granted or refused at the discretion of the lessee of school lands. The lessee's attitudes and opinions were influenced largely by whether or not he actually had trouble in the past with sportsmen, and whether he anticipated problems in the future.

Individuals with higher attitude scores (more positive attitudes) posted significantly less than those with lower scores. Access to school lands was regulated by posting and refusal of requests for permission to trespass. The average attitude of those lessees who had previously experienced at least one problem with sportsmen was negative

(18.1). The average attitude for those lessees not having previously experienced problems with sportsmen remained neutral at 21.2. This difference was statistically significant ($P<0.025$).

Fifty-eight percent of the respondents posted their school land. However, 60 percent of those posting would allow at least one type of recreation. Seventy percent or 14,141 acres of the school land leased by respondents was open to at least one type of recreation, when stipulations of the lessee were met. One hundred and fifty-five farm ponds (63 percent) were potentially available for fishing.

Fifty-three percent of the responding lessees stated they had trouble with individuals they believed were hunters or fishermen. The main problems occurring with hunters were livestock shot, trespassing without permission, and leaving gates open. The primary problems encountered with fishermen were littering, leaving gates open, and damaging fences or gates. Lessees were more apt to post land if they had previously experienced problems with sportsmen. Three of the five major reasons for posting and three of the five major problems experienced with sportsmen were identical.

Sixty-four percent of the lessees rejected any type of incentive designed to allow access to the public. The primary reason for rejecting the incentives was distrust of governmental agencies and officials. The most acceptible incentives were elimination of liability for sportsmen's accidents and reimbursement for damages. Only 18 percent would accept monetary payments.

In addition to other public or privately owned areas, school lands were utilized by 32.4 percent of the hunters and 43.5 percent of the fishermen. Thirty-six percent of the hunters and 34 percent of the

fishermen experienced some type of difficulty in finding a place to hunt or fish. Bobwhite quail and mourning doves were the most preferred game species. Hunting success was slightly higher on school lands, than privately owned or other public areas, but the difference was not statistically significant.

Almost 90 percent of the fishermen rated their recreational experiences as "satisfactory" or "extremely enjoyable" even though they caught fish on only 0-20 percent of their fishing trips. Ninety-two percent of the quail hunters who rated their recreational experiences as "extremely enjoyable" or "satisfactory" bagged an average of only three birds per hunt. Individuals either overrated the hunting areas or placed greater importance on good weather conditions, natural beauty, or other factors that contributed to a favorable experience.

The findings of this study justify a state-wide recreational analysis of public school lands. The evidence indicates that a usable resource is present, but is not currently managed to provide maximum benefits to the sportsmen of Oklahoma.

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APPENDIX A

SCIENTIFIC NAMES FOR PLANTS AND ANIMALS MENTIONED IN THE TEXT

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SCIENTIFIC NAMES FOR PLANTS AND ANIMALS

MENTIONED IN THE TEXT

Flora

Ambrosia sp.	ragweed
Andropogon sp.	bluestem
Buchloe dactyloides	buffalo grass
Carya illinoensis	pecan
Cercis canadensis	redbud
Cornus sp.	dogwood
Cynodon dactylon	bermuda grass
Diospyros virginiana	persimmon
Eragrostis sp.	lovegrass
Gossypium herbaceum	cotton
Gutierrezia dracunculoides	broomweed
Malus sp.	apple
Medicago sativa	alfalfa
Polygonum sp.	smartweed
Populus deltoides	eastern cottonwood
Pyrus communis	pear
Quercus marilandica	blackjack oak
Q. stellata	post oak
Rhus sp.	sumac
Scirpus sp.	bulrush
Smilax sp.	greenbriar
Sorghastrum nutans	indian grass
Symphoricarpus orbiculatus	buckbrush
Tamarix gallica	salt cedar
Trifolium sp.	clover
Triticum aestivum	wheat
Typha sp.	cattail
Ulmus sp.	elm
Vicia sativa	common vetch

Fauna

Birds

Agelaius phoeniceus	red-winged blackbird
Bonasa umbellus	ruffed grouse
Bubo virginianus	great horned owl
Buteo jamaicensis	red-tailed hawk
Cathartes aura	turkey vulture
Charadrius vociferus	killdeer
Circus cyaneus	marsh hawk
Coccyzus americanus	yellow-billed cuckoo
Colaptes auratus	yellow-shafted flicker
Colinus virginianus	bobwhite quail
Columba livia	domestic pigeon
Corvus brachyrhynchos	crow
Cyanocitta cristata	bluejay
Dendrocopos pubescens	downy woodpecker
Euphagus carolinus	rusty blackbird
Falco sparverius	sparrow hawk
Fulica americana	coot
Geococcyx californianus	roadrunner
Hirundo rustica	barn swallow
Hylocichla mustelina	wood thrush
Icterus galbula	Baltimore oriole
Junco hyemalis	slate-colored junco
Lanius ludovicianus	loggerhead shrike
Larus delawarensis	ring-billed gull
Lophortyx californicus	California quail
Megaceryle alcyon	belted kingfisher
Melanerpes erythrocephalus	red-headed woodpecker
Meleagris gallopavo	wild turkey
Mimus polyglottos	mockingbird
Molothrus ater	brown-headed cowbird
Muscivora forficata	scissor-tail flycatcher
Parus carolinensis	Carolina chickadee
Pooecetes gramineus	vesper sparrow
Richmondena cardinalis	cardinal
Sialia sialis	eastern bluebird
Sitta carolinensis	white-breasted nuthatch
Spinus tristis	goldfinch
Spizella pusilla	field sparrow
Sturnella sp.	meadow lark
Sturnus vulgaris	starling
Toxostoma rufum	brown thrasher
Troglodytes aedon	house wren
Tyrannus verticalis	western kingbird
Quiscalus quiscula	common grackle
Zenaidura macroura	mourning dove

Mammals

Canis latrans	coyote
Didelphis marsupialis	opossum
Lepus californicus	black-tailed jackrabbit
Mephitis mephitis	striped skunk
Odocoilius virginianus	white-tailed deer
Procyon lotor	raccoon
Sciurus carolinensis	gray squirrel
S. niger	fox squirrel
Sylvilagus floridanus	cottontail rabbit

Fish

Ictalurus punctatus	channel catfish
Lepomis sp.	sunfish
Micropterus salmoides	largemouth bass
Pomoxis sp.	crappie

APPENDIX B

LESSEE QUESTIONNAIRE

APPENDIX B

LESSEE QUESTIONNAIRE

Questionnaire No. _____

INSTRUCTIONS: Please complete the following questionnaire by filling in the blanks as directed, circling the correct response, or by placing a checkmark or an X in the spaces indicated.

Landowner Data:

1. Age: (Please fill in) _____

2. Present occupation (Please fill in) _____

3. Education: (Please check highest grade completed)

   a. Grade School _____
   b. High School _____
   c. College _____

4. Are you presently a member of:	Yes	No
a. Farm Bureau?	_____	_____
b. Farmers' Union?	_____	_____
c. Oklahoma Cattlemen's Assoc.?	_____	_____
d. Oklahoma Wheatgrower's Assoc.?	_____	_____
e. Payne County Cattlemen's Assoc.?	_____	_____
f. Soil and Water Conservation District?	_____	_____

5. How many acres of land do you own? _____

6. How many acres of land do you lease?

   a. School Land _____
   b. Other _____

Land-Use:

7. What is the MAJOR type of land-use practice on your school land lease? (Please check)

   a. Pasture _____
   b. Crops _____
   c. Other (Please specify) _____

   _____

8. Do you sublease or rent to other people any of this school land for:

	Yes	No
a. Hunting?	_____	_____
b. Fishing?	_____	_____
c. Other types of recreation?	_____	_____

If you checked yes to part "c," what other type? _____

9. Are you receiving any income on any of your property from:

	Yes	No
a. Hunters?	_____	_____
b. Fishermen?	_____	_____
c. Campers?	_____	_____

If yes, please estimate how much you are receiving on a yearly basis (Please check only one):

$ 0 - $100?	_____
101 - $200?	_____
201 - $300?	_____
More than $300?	_____

10. Please rate your school land lease for the abundance of the following animals. (Please write 1 for high abundance, 2 for average or medium abundance, 3 for low abundance.)

a. Bobwhite quail	_____
b. Wild turkey	_____
c. White-tailed deer	_____
d. Fox squirrel	_____
e. Coyotes	_____
f. Rabbits	_____
g. Ducks	_____

	Yes	No
11. Are there any ponds on your school land lease?	_____	_____
If yes, are they stocked?	_____	_____
If yes, with what species?	_____	_____
a. Largemouth bass	_____	_____
b. Channel catfish	_____	_____
c. Crappie	_____	_____
d. Sunfish	_____	_____

Posting:

12. Do you post your school land lease? _____ _____

If yes to the above question, which of the following would be your MAJOR reason(s) for posting? (Please write 1 for what you think is the most important reason, 2 for the next important, 3 for the next, etc. You may not wish to rank all the reasons.)

a. Desire to have game available to friends and relatives only _____
b. Possible fires. . . . . _____
c. Shooting livestock . . . . . _____
d. Personal property stolen . . _____
e. Damage to buildings . . . . . _____
f. Protection from large groups _____
g. Damage to fences . . . . . _____
h. Gates left open . . . . . _____
i. Roads blocked . . . . . _____
j. Sportsmen having belligerent or quarrelsome attitudes . . _____
k. Drunk sportsmen . . . . . _____
l. Opposed to hunting and fishing in general . . . . . _____
m. Littering . . . . . _____
n. Personal and family safety . _____
o. Shooting from the road . . . _____
p. Damage to fields or crops . . _____
q. Other (Please specify) _____

_____

13. If you post your school land, what are the signs meant to do? (If you do not post, leave blank.)

a. Encourage hunters or fishermen to ask permission . . . . _____
b. Prevent hunting only . . . . _____
c. Prevent fishermen only . . . _____
d. Prevent trespassing of all kinds . . . . . _____
e. Other (Please specify) _____

14. Would you allow any of the following types of recreation regardless of whether or not your school land is posted?

	Yes	No
a. Hunting	_____	_____
b. Fishing	_____	_____

14. (Continued)

	Yes	No
c. Hiking	_____	_____
d. Camping	_____	_____
e. Picnicking	_____	_____
f. Nature photography	_____	_____
g. Bird watching	_____	_____

15. Do you hunt on:

	Yes	No
a. Your own land?	_____	_____
b. Other land?	_____	_____

16. Do you fish on:

	Yes	No
a. Your own land?	_____	_____
b. Other land?	_____	_____

17. Have you had any trespass problems, suffered any damage, or had any other unfortunate experiences with hunters?

If yes, please explain the problem(s) briefly: _____

_____

_____

18. Have you had any trespass problems, suffered any damage, or had any other unfortunate experiences with fishermen? _____ _____

If yes, please explain the problem(s) briefly: _____

_____

_____

19. Did the hunters or fishermen causing the problem: (Check only one, or if this question does not apply, leave blank)

a. Live within 10 miles of you?	_____
b. Live between 10 and 60 miles of you?	_____
c. Live farther than 60 miles of you?	_____
d. Don't know	_____

20. Would you be willing to allow access for hunting or fishing if you could: (Please answer each part)

	Yes	No
a. Have your property taxes reduced?	_____	_____

20. (Continued)

	Yes	No
b. Not be held liable for accidents?	_____	_____
c. Be paid for any damages?	_____	_____
d. If the number of sportsmen entering your school lease was controlled?	_____	_____
e. Receive money from local, state, or federal organizations or agencies?	_____	_____

If you checked "yes" to part "e", what minimum amount would you be willing to accept (dollars per acre)? _____

f. Other (Please specify) _____

21. Do you engage in any of the following habitat improvement practices for wildlife on your school land?

	Yes	No
a. Providing food for wildlife by leaving some portion of the crops standing in the field.	_____	_____
b. Allow vegetation such as trees or shrubs to grow along fence rows or be interspersed with pasture.	_____	_____
c. Plant vegetation such as multi-flora rose or other plants for wildlife cover.	_____	_____

d. Other (Please specify) _____

_____

22. Do you believe that landholders should charge a fee for access upon school land property for: (Please check each)

	Yes	No
a. Fishing?	_____	_____
b. Hunting?	_____	_____
c. Birdwatching?	_____	_____
d. Picnicking?	_____	_____
e. Camping?	_____	_____
f. Hiking?	_____	_____
g. Photography?	_____	_____

23. If you actually owned these school lands, would you:

	Yes	No
a. Be more willing to allow access?	_____	_____
b. Be less willing to allow access?	_____	_____
c. Not change your opinion?	_____	_____

24. What specific policy changes would you desire the School Land Commission to make to allow access for hunting or fishing to school lands you lease? _____

_____

_____

For each of the following statements please check the space that MOST fits your feelings toward allowing recreation such as hunting or fishing on your school lease.

25. No one under any circumstances should be allowed on my school land lease.

a. Strongly agree _____
b. Agree _____
c. Undecided _____
d. Disagree _____
e. Strongly disagree _____

26. Only members of my family should be allowed on my school land lease.

a. Strongly agree _____
b. Agree _____
c. Undecided _____
e. Strongly disagree _____

27. Only my family and close friends should be allowed on my school land lease.

a. Strongly agree _____
b. Agree _____
c. Undecided _____
d. Disagree _____
e. Strongly disagree _____

28. I will allow people on my school land lease provided I know them and they ask permission first.

a. Strongly agree _____
b. Agree _____
c. Undecided _____
d. Disagree _____
e. Strongly disagree _____

29. I will allow most strangers on my school land lease if they ask permission first.

a. Strongly agree _____
b. Agree _____
c. Undecided _____

29. (Continued)

d. Disagree _____
e. Strongly disagree _____

30. I will allow anyone on my school land lease anytime if they ask permission first.

a. Strongly agree _____
b. Agree _____
c. Undecided _____
d. Disagree _____
e. Strongly disagree _____

31. I will allow anyone on my school land lease anytime with or without permission.

a. Strongly agree _____
b. Agree _____
c. Undecided _____
d. Disagree _____
e. Strongly disagree _____

APPENDIX C

COVER LETTER FOR LESSEE QUESTIONNAIRE

Dear Sir:

A study is being conducted by the Oklahoma State University Zoology Department, to determine if wildlife-related recreational opportunities exist on public school lands in Payne County, and to determine if these opportunities can bring benefits to both sportsmen and landholders.

A large portion of this study will deal with how landholders feel toward using school lands for recreation in addition to agricultural purposes. We would like to obtain your views on posting land, charging fees, and receiving a lump sum payment for providing wildlife for recreational enjoyment.

Please fill out the attached confidential questionnaire. Your name and address does not need to be included, as this study seeks only the views of the lessees in general over the county-wide area.

Please return the completed questionnaire in the enclosed, stamped, self-addressed envelope. It is important that every questionnaire be completed and returned to facilitate accurate analysis.

If you have any questions you may call me collect at Area Code 405, 372-2513 (after 5 PM). Your cooperation is greatly appreciated.

Sincerely,

Roy G. Frye
Graduate Research Assistant
and Project Leader

RGF.gdw
Enclosure

APPENDIX D

LETTER OF INTRODUCTION TO ALL OF THE LESSEES

Dear Landholder:

A survey will be initiated this summer by the Oklahoma Cooperative Wildlife Research Unit, Oklahoma State University, in cooperation with the Bureau of Sport Fisheries and Wildlife.

Wildlife populations and habitat will be studied on lands within Payne County. The survey will include estimating total acreage of wildlife habitat and estimating wildlife populations. Particular emphasis will be placed on the possible benefits the wildlife populations could have for the owner or lessee in the form of possible additional income.

The survey will also include obtaining your views on the posting of land, charging of fees, and obtaining possible payment for providing wildlife as a useable resource.

At some time during the next several months, I will be visiting you to discuss the project and request permission to conduct the survey on your land. Your cooperation would be greatly appreciated.

Sincerely,

Roy G. Frye

RGF.gdw

APPENDIX E

QUESTIONNAIRE FOR HUNTERS AND FISHERMEN

No. _____

Please try to answer all questions. Your help will be greatly appreciated.

1. On what percent of your fishing trips last season did you catch fish?
   _____0-20% _____21-40% _____41-60% _____61-80% _____81-100%
2. Approximately how many days did you fish in Payne County last year? _____
3. Approximately how many days did you fish outside of Payne County last year? _____
4. Approximately how many hours do you fish on an average fishing day? _____
   Please rate the commonly used fishing areas in Payne County, listed below, according to the amount of recreational enjoyment (fishing success, ease of access, scenic beauty, etc.) you obtained last season.

	Extremely Enjoyable	Satisfactory	Not Enjoyable
Ponds located on state school lands (shaded areas on map)	_____	_____	_____
Publicly owned lakes and reservoirs	_____	_____	_____
Privately owned ponds and lakes	_____	_____	_____

6. How many miles (one way) did you usually drive to fish? _____
7. Did you have difficulty in finding a place to fish last year? Yes _____; No _____
8. What is your age? _____; and sex? Male _____; Female _____

No. _____

Please try to answer all questions. Your help will be greatly appreciated.

1. Please indicate roughly the number of times you hunted the following listed species and the approximate number of those animals you bagged on state school lands (shaded areas on enclosed map), and other areas in Payne County last season.

	State School Lands		Other Public & Private Areas	
	No. of times hunted	Animals bagged	No. of times hunted	Animals bagged
Quail	_____	_____	_____	_____
Squirrel	_____	_____	_____	_____
Rabbit	_____	_____	_____	_____
Dove	_____	_____	_____	_____
Ducks	_____	_____	_____	_____
Geese	_____	_____	_____	_____
Turkey	_____	_____	_____	_____
Deer	_____	_____	_____	_____
Coyote	_____	_____	_____	_____

2. Please rate the commonly used hunting areas in Payne County listed below according to the amount of recreational enjoyment (hunting success, ease of access, pleasantness, etc.) you obtained last season.

	Extremely Enjoyable	Satisfactory	Not Enjoyable
State school lands (shaded areas on enclosed map)	_____	_____	_____
Public areas (portions of Lake Carl Blackwell)	_____	_____	_____
Privately owned land	_____	_____	_____

3. Approximately how many hours do you hunt on an average hunting day? _____
4. Approximately how many days did you hunt in Payne County last season? _____
5. Approximately how many days did you hunt outside of Payne County last season? _____
6. How many miles (one way) did you usually drive to hunt last season? _____
7. Did you have difficulty in finding a place to hunt last season? Yes _____; No _____
8. What is your age? _____; and sex? Male _____ Female _____

APPENDIX F

COVER LETTER FOR HUNTERS AND FISHERMEN QUESTIONNAIRE

Dear Sportsman:

A study is being conducted by the Oklahoma State University Zoology Department to determine the extent of hunting and fishing opportunities on state school lands and other areas in Payne County, Oklahoma. We would like to determine how much time and effort is devoted to hunting and fishing by local residents, how successful they were on their hunting or fishing trips, and whether or not they hunted or fished on state school land. The state school land tracts are represented by the shaded areas on the enclosed map. These lands are state owned and are leased to individuals for private interests. Granting or refusing permission to hunt or fish is at the discretion of the lessee.

One method of determining the quality of a hunting or fishing area is by obtaining the opinion of a hunter or fisherman. Please fill out and return the stamped, self-addressed post card. It is important that every post card be completed and returned to facilitate accurate analysis. Your cooperation would be greatly appreciated.

Sincerely,

Roy G. Frye
Graduate Research Assistant
and Project Leader

RGF.gdw
Enclosures

APPENDIX G

EXAMPLES OF EACH CATEGORY OF VEGETATIVE COVER DIVERSITY

Key to Symbols Used in Vegetative Cover Maps

Legend

Residential

Farmponds

Bottomland-Forest

Native Pasture

Postoak-Blackjack

Cultivated Land

Pasture Other than Native

Upland Shrub

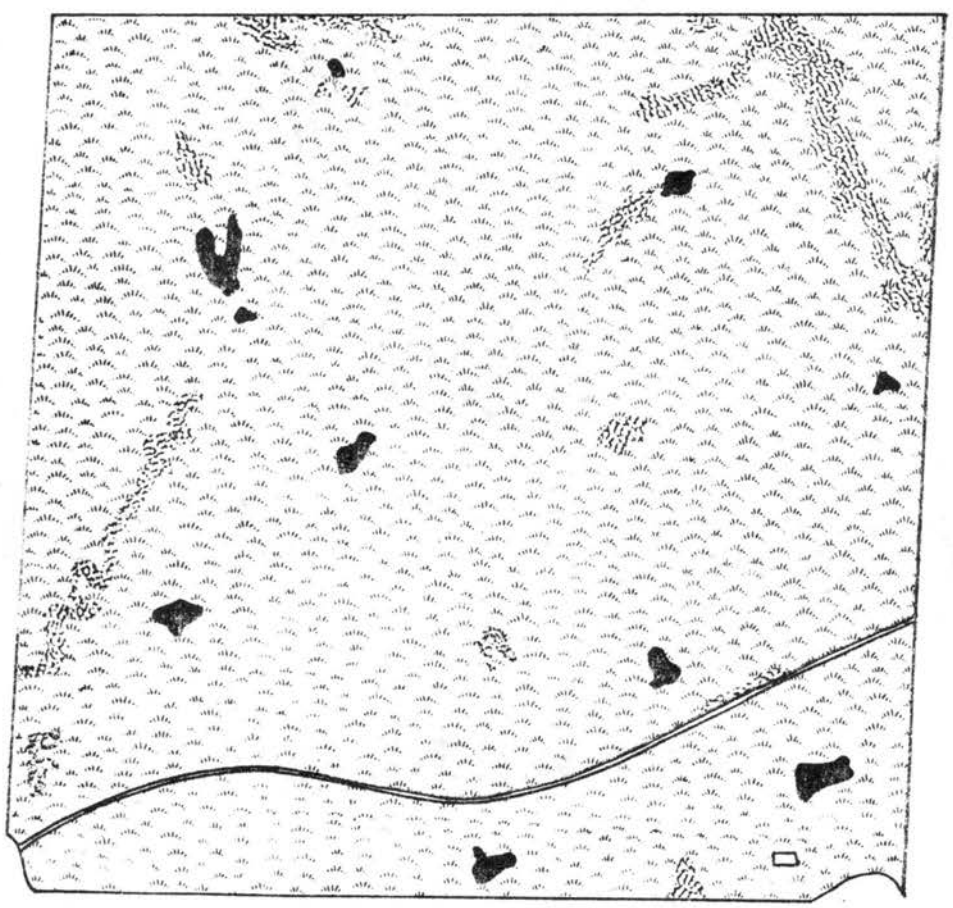
Road

Map 1 - Sec. 16-T20N-R3E (#1), Index = .376 (low diversity)

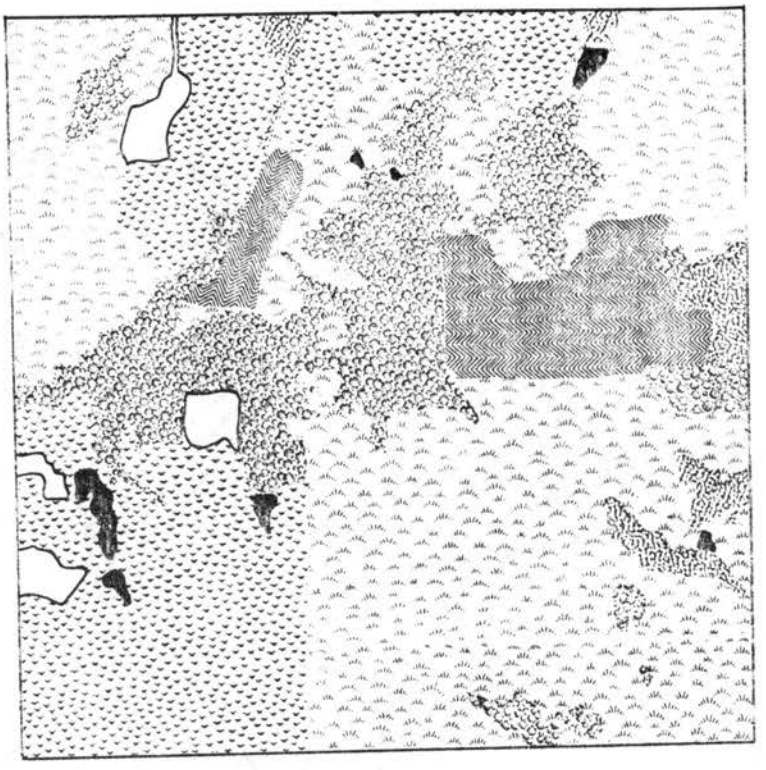
Map 2 - Sec. 36-T19N-R2E (#6), Index = 1.67 (medium diversity)

Map 3 - Sec. 16-T19N-R4E (#8), Index = 3.00 (high diversity)

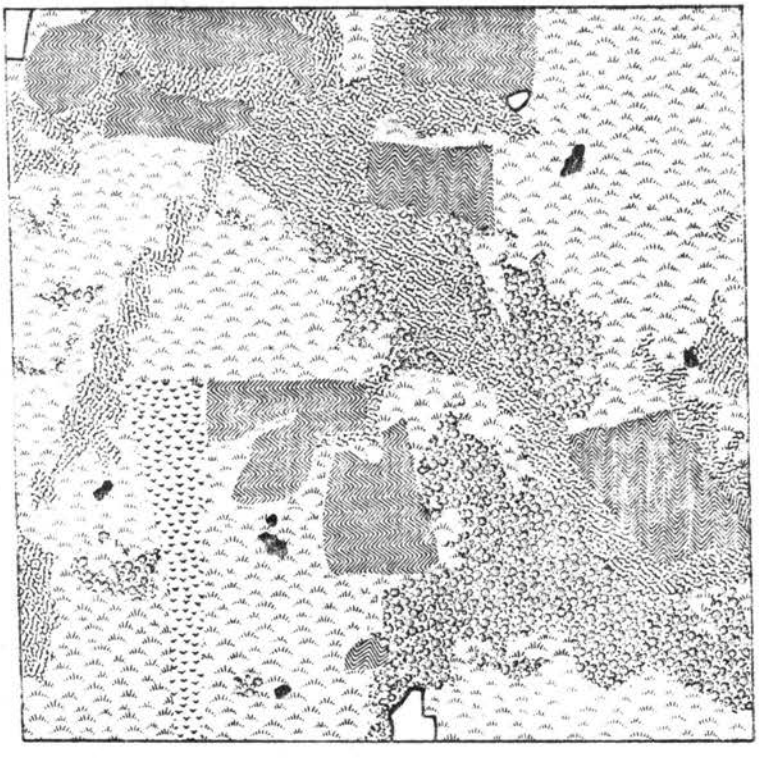
Map 1



Map 2



Map 3



VITA

Roy G. Frye

Candidate for the Degree of

Master of Science

Thesis: WILDLIFE-ORIENTED RECREATIONAL OPPORTUNITIES ON PUBLIC SCHOOL LAND IN PAYNE COUNTY, OKLAHOMA

Major Field: Wildlife Ecology

Biographical:

Personal Data: Born in Enid, Oklahoma, January 28, 1947, the son of Mr. and Mrs. Marvin J. Frye.

Education: Graduated from Enid High School, Enid, Oklahoma, in June, 1965; received Bachelor of Science degree in Wildlife Biology from Oklahoma State University in 1969; completed requirements for the Master of Science degree at Oklahoma State University in December, 1973.

Professional Experience: Summer Technician, Oklahoma Department of Wildlife Conservation, 1967; Research Assistant, Oklahoma Cooperative Wildlife Research Unit, summer, 1969; Graduate Research Fellow, Oklahoma Cooperative Wildlife Research Unit, 1971-73.