

Journal of Rural Social Sciences

Volume 10

Issue 1 *Southern Rural Sociology Volume 10, Issue 1 (1994)*

Article 4

12-31-1994

The Management of Hunting Leases By Rural Landowners

John K. Thomas
Texas A&M University

Clark E. Adams
Texas A&M University

John F. Thigpen III
Texas A&M University

Follow this and additional works at: <https://egrove.olemiss.edu/jrss>



Part of the [Rural Sociology Commons](#)

Recommended Citation

Thomas, John, Clark Adams, and John Thigpen. 1994. "The Management of Hunting Leases By Rural Landowners." *Journal of Rural Social Sciences*, 10(1): Article 4. Available At: <https://egrove.olemiss.edu/jrss/vol10/iss1/4>

This Article is brought to you for free and open access by the Center for Population Studies at eGrove. It has been accepted for inclusion in *Journal of Rural Social Sciences* by an authorized editor of eGrove. For more information, please contact egrove@olemiss.edu.

THE MANAGEMENT OF HUNTING LEASES BY RURAL LANDOWNERS

**By John K. Thomas, Clark E. Adams
And John F. Thigpen III**

ABSTRACT

Most of the land in Texas is privately owned and is an important as a source for hunting recreation. Profit maximization theory (PMT) and economic behavioral theory (EBT) were used to explain differences in the net incomes of Texas landowners who sold hunting leases during the 1989-90 hunting season. In 1990, 4,621 landowners who were licensed to sell hunting leases by the Texas Parks and Wildlife Department responded to a mail survey. Findings indicated that the statewide median net lease income was \$1,100, few landowners considered their leasing operations as businesses, and few practiced intensive management of their operations. Number of acres leased had the most important effect on net lease income. Findings supported aspects of both PMT and EBT.

INTRODUCTION

Hunting has an important economic impact on many rural areas affecting land values (Pope et al. 1984), the flow of goods and services from rural communities to hunters (Steinhoff et al. 1987), and the provision of alternative sources of income for landowners, particularly those involved in agriculture (Steinbach et al. 1987). Private landowners control access to almost 95 percent of the land in the rural South (Knowles 1989; White 1987). They can sell leases or invite hunters to use their land for hunting.

John K. Thomas and Clark E. Adams are associate professors and John F. Thigpen III is an assistant professor and Extension specialist in the Department of Rural Sociology at Texas A&M University. A version of this paper was presented at the 1991 meeting of the Southwestern Sociological Association in San Antonio, Texas. Requests for reprints should be sent to the first author at: Department of Rural Sociology, Texas A&M University, College Station, Texas 77843-2125.

Fee access has been a traditional practice for approximately one of every three hunters. Although the advantages and disadvantages of fee or lease hunting (Guynn and Schmidt 1984; Morrill 1987) and the demand side of lease hunting (Bergstrom and Cordell 1991; Langner 1988; Messonier and Luzar 1990; Pope and Stoll 1985; Wright 1985) have been well discussed, studies of the supply side, specifically landowners and their activities that affect lease income, have been limited (Messonier and Luzar 1990; Steinbach et al. 1987; Wright 1985).

In this study, we examined the leasing behavior of Texas landowners and how their behaviors affected net lease income. It has been estimated that more \$100 million is spent annually on leases to access game species for hunting in Texas, producing a total annual value of wildlife that ranges from \$100 million to \$300 million when other spending by hunters is considered (Pope et al. 1984). How rural landowners manage their lease operations affects both this recreational market and the quality of habitat and game species that attract hunters.

Texas Hunting Leases

Regulation of the selling of Texas hunting leases on private lands began in 1925. Since then, the Texas Parks and Wildlife Department (TPWD) annually has sold hunting-lease licenses to private landowners, hunting clubs, corporations, and other groups. A license permits a landowner or operator to legally sell hunting leases to the public. A landowner is required by state law to purchase a license for each parcel of land designated for lease hunting. License fees vary according to the number of acres to be leased -- \$15 for less than 500 acres, \$40 for 500 to 1,000 acres, and \$60 for more than 1,000 acres. Hunting clubs, or cooperatives, pay \$60 for a license, regardless of the number of acres involved.

The types of leases sold vary by time and other conditions. There are generally three types of time-based leases. The first two and most common in Texas are annual and seasonal leases. With these leases, a landowner provides to a hunter or group of hunters the right to hunt for a full year, or for a particular hunting season. Such leases often allow hunters to hunt several game species. The seasonality of a hunt involving particular game species is regulated by the TPWD. With

Thomas et al.

annual and seasonal leases, hunters and landowners negotiate what services and facilities are to be provided by the landowner and what hunters may do to improve hunting conditions on the land. For example, a landowner may not provide cold storage facilities yet will allow hunters to place these facilities at a campsite. The other type of time-based lease is day-hunting. In this arrangement, a landowner permits a hunter access to game species on the land on a per-day basis. This short-term arrangement is usually limited only to right of ingress without provision of services or facilities (Thomas et al. 1989; Gramann 1986).

In addition to the time condition of a lease, a landowner can base a lease on the number of hunters and groups, number of acres, and types of animals to be harvested. Leases sold by the "gun" refers to the number of individual hunters allowed to hunt at a specified time (i.e., annually, seasonally, or daily). A landowner who sells leases to outfitters and to recreational or sports clubs permits these groups to assume most of the responsibility for managing hunting activity on the land. An acre-based lease is self-explanatory. Leases based on the animal to be "bagged" or harvested during a hunting season may differ according to the number, sex, size, antler development, and other characteristics of the game. A derivation of this type of lease involves the hunting of exotic game which has been imported and bred in private hunting preserves. Exotic game in Texas include several species of deer (e.g., axis, sika, and fallow), aoudad sheep, blackbuck and nilgai antelope, and elk. Landowners generally sell an exotic game lease on a single or trophy-kill basis.

Study Model

Our model was based on two economic theories. Least-cost or profit-maximization theory (PMT) explains some landowners' management and lease practices by pointing to landowners' motives of profit maximization (Obrinsky 1983; Shackle 1970). PMT states that landowners who sell hunting leases will seek to minimize their costs by providing a minimal number of inputs such as facilities and services. By keeping expenses low, landowners can charge lease fees that are mainly determined by hunter demand and competition among local lease operators. Conversely, they attempt to maximize profits by

providing short-term (e.g., game processing) and long-term (e.g., cabins and walk-in coolers) multiple inputs and intensely manage their leases to compete for and serve a socioeconomically upscale hunter clientele in some markets. PMT assumes that all landowners are rational and behave similarly and that external market factors, such as game regulations, affect each landowner equally (Heap 1989; Polkinghorn 1979).

Economic behavioral theory (EBT) originated with Gabriel Tarde's *La Psychologie Economique* (1902) in which he proposed that economic decision making is affected by personal and non-economic motives, incomplete and inaccurate use of information, and uncertainty (March and Sevon 1988). Rural landowners possess different natural resource-related values and information processing abilities, which can also influence their decision making (Warneryd 1988). Many landowners are not always driven by profit-making motives when they decide to lease or not to lease their land to hunters (Brown et al., 1984; Kaiser and Wright, 1985). Because of these factors, sorting out landowner' decisions to or not to sell and manage hunting leases is difficult and complex.

In our study, we expected to find landowners who sold hunting leases for profits and for non-economic reasons. We assessed the extent to which rural landowners treated their lease activities as businesses in two distinctive ecoregions of Texas. We expected to find the number of management practices conducted on hunting leases positively affected leasing activities and net incomes. Texas was selected because it has one of the largest private lease systems in the United States (Wiggers and Rootes 1987; Wright 1985), one of the most diverse ecosystems (U.S. Fish and Wildlife Service 1979), and one of the largest populations of private landowners (U.S. Bureau of the Census 1990).

By examining lease-related behaviors we were able to apply the two theories to explain variations in net incomes derived from the sale of hunting leases. We tested the following hypotheses.

Hypotheses 1a-c: (a) Ecological region, (b) years of operation, and (c) operational status positively affect the number of management practices of landowners, the acreages leased, the numbers of hunters who fee-access hunted, and landowners net income.

Ecological Region. Few studies have examined the effect of ecological diversity on hunting (Messonnier and Luzar, 1990). Although white-tailed deer hunting is popular statewide, we used two major ecological regions (West Texas = 1, East Texas = 0) to indicate variations in habitat and hunting conditions (U.S. Fish and Wildlife Service 1979). East Texas represents 79 counties located in the Pineywoods, Gulf Prairies and Post Oak Savannah ecosystems. These systems are characterized by pine and hardwood forests, rolling hills and marshes. West Texas represents 179 counties located in the South Texas Plains, Edwards Plateau, Rolling Plains, High Plains and Trans Pecos ecosystems. West Texas is semi-arid and has escarpment, savannah and prairie types of terrain. Landowners in this region operate on average larger farms and ranches than in East Texas and in some areas, for example Llano County, they have replaced cattle ranching with the more profitable sale of hunting leases. Consequently, we expected to find that West-Texas landowners were more entrepreneurial than East-Texas landowners by more actively managing lease acreages, leasing more acres to hunters, selling leases to more hunters, providing free access to fewer hunters, and producing more net income from the sale of hunting leases.

Years of Operation. Past research is unclear about the effect of years of operation on the number management practices enacted, leasing behaviors and the amount of earned lease income. Steinbach and his colleagues (1987) reported that the longer a landowner operates a lease, the more likely he will make and accumulate investments to improve game conditions and to provide services and facilities to hunters. Their findings would support PMT. However, Wright (1985) provided evidence supporting EBT when he found that landowners older than 59 years of age were more likely than younger landowners in six Texas counties to be apprehensive about the public hunting on their land, to post their land for trespass, and to allow only friends and relatives to hunt. The difference in the these studies' findings may be that the former study was conducted in West Texas and the latter was conducted in East Texas. Both studies were limited to small geographical areas. In our statewide study, landowners were asked to report the number of years their hunting leases had been in operation. We expected to find results similar Steinbach et al. and to show that older operations had a larger leasing clientele, fewer

free-access hunters, and more net income.

Operational Status. A landowners' perception of his lease operation is an important indicator of his motive for leasing to hunters. Landowners were asked to indicate if they operated their hunting leases as business enterprises (yes = 1, no = 0). Respondents who considered their operations to be businesses would be more likely than other landowners to make needed investments and provide services to enhance profits by the sale of more and higher fee leases to hunters. However, cost control is also an important factor that affects profit margins. Landowners could view the sale of hunting leases as a low input enterprise to produce supplemental income. These landowners would be less likely to manage wildlife resources and provide services and facilities, to lease large numbers of acres to hunters, and to provide free-access to hunters in order to make a profit (Steinbach et al. 1987; Pope and Stoll 1985).

Hypotheses 2a,b: *The number of (a) management practices of landowners and (b) the number of acres leased to hunters positively affect the number of fee-access hunters and landowners' net income. They negatively affect the number of free-access hunters.*

Management Practices. According to PMT, landowners who intensively manage game and habitat to improve hunting conditions have more fee-access hunters, fewer free-access hunters, and earn more net income than other landowners. Landowners who earn little or no income have no financial incentive to manage their resources and provide services, unless they do so for personal reasons, according to EBT. Landowners and hunters can also negotiate the number and types of services to be included in a hunting lease (Thomas et al., 1989). Although the provision of services and facilities may not significantly contribute to higher lease fees and incomes because of competitive market conditions and the long-term investment in and accumulation of facilities (Messonnier and Luzar 1990; Pope and Stoll 1985), it could negatively effect operational expenses and net lease income, particularly for a start-up operation. PMT would predict a positive effect by management activity on the number of fee-access hunters and net income. Unlike EBT, it would predict a negative effect on the number of free-access hunters

Thomas et al.

Landowners indicated which of 10 management techniques (yes = 1, no = 0) they used in their 1989-90 lease operation: planted food plots; fed wildlife; conducted a wildlife census; maintained check stations; conducted sex and age counts of wildlife; fallow plowed; constructed high fences; managed tanks and ponds; controlled harvests of game; and controlled brush. Landowners further reported which of a series of services and facilities they provided to hunters (yes = 1, no = 0). Seven services which could have been provided during the 1989-90 hunting season were: hunting guides; game processing; filling game feeders; food service to hunters; delivery of hunters to hunting stands; maps of hunting areas; and publishing a newsletter. Ten types of facilities included: hunting blinds; game feeders; landing strip; cabin; kitchen; bathroom/showers; utilities; trailer hook-ups; walk-in coolers; and shooting range. An index score was created from the sum of each landowner's responses to the three series of questions. Scores varied from 0 to 27.

Number of Acres Leased to Hunters. The purchase of a license by a landowner to sell hunting leases does not necessarily have to result in the sale of a hunting lease nor does a landowner have to lease all of the acres for which the license was purchased. According to PMT, a landowner would lease all or most of his land licensed for the 1989-90 hunting season to maximize profit. EBT would indicate a less optimal leasing behavior by licensed owners who would allow a large number of free-access hunters to access their land. Research has shown that size of operation is the primary variable positively correlated with gross lease income and that larger lease operations generally have more expenses (Messonnier and Luzar 1990; Pope and Stoll 1985; Steinbach et al. 1987).

Hypotheses 3a,b: The number of fee-access hunters positively affects landowners' net incomes, while the number of free-access hunters has an opposite effect.

Numbers of Fee- and Free-access Hunters. According to PMT, landowners who sell more leases to hunters should produce more net income than other landowners, when resource investment and acreage are controlled. In contrast to PMT, EBT proposes that landowners, in addition to selling leases, provide free hunting access to friends, business associates, and relatives. Large numbers of free-access

hunters would negatively affect a landowner's net income by making less land safely available to fee-access hunters. We determined the number of fee-access hunters by adding a landowner's responses to two questions: "How many hunters paid for leases and live in Texas?" and "How many hunters paid for leases and live outside of Texas?" The number of free-access hunters was measured by the question, "How many hunters, who used this hunting lease, hunted for free?"

Dependent Variable. The dependent variable of the model was net lease income. Operational expense was measured by the question, "What were your operating expenses on this hunting lease this season?" Space limitations of the survey questionnaire did not allow a detailed enumeration of the types and amounts of these expenses. Lease income was determined by a series of questions that asked how much income the landowner realized from the sale of leases by the gun, number of acres, groups, and animal (exotics). Incomes from these types of leases were summed to calculate a total income for each landowner. Net lease income was calculated by subtracting lease expenses from total income.

RESEARCH DESIGN

When landowners purchased a license from the TPWD, they completed an application form providing current mailing address information. The 1989-90 list of 12,363 licensees was obtained from the TPWD. A two-page questionnaire was developed for machine scanning and mailed in January 1990 to each licensee. A second questionnaire and post-card to nonrespondents followed two weeks after the first mailing. Licensees with multiple licenses (6% of all applicants) were telephoned to ensure that a questionnaire was completed for each licensed operation. Overall, 60 percent (n = 7,399) responded to the survey. Among this group, 62 percent (n = 4,621) reported being a landowner and having actually operated a lease during the 1989-90 hunting season; 20 percent were non-landowners; and 18 percent did not operate leases or derive income from lease sales. The total list of licensees accounted for 33,769,623 acres in Texas. Licensees who responded to the survey and operated leases during the 1989-90 season sold hunting leases involving 11,764,896 acres (Adams et al. 1992).¹

We tested our hypotheses by applying the multiple regression procedure and comparing standardized regression coefficients. Adjusted R-square coefficients were reported to indicate the total amounts of variation explained by the independent variables in each of five regression models. We assessed multicollinearity by examining the magnitude of bivariate correlations and by calculating variable tolerances (i.e., subtracting the squared multiple correlation for each independent variable regressed against the other independent variables from one). Correlation values were less than .600 and tolerance values were above .700. A large correlation coefficient and a tolerance value less than .001 would indicate multicollinearity. Overall, our results indicated no multicollinear problems among the data.

FINDINGS

Descriptive Results

Table 1 reports descriptive results for the study variables. The majority of respondents (82%) owned land in West Texas. Statewide, licensed landowners had averaged operating leases almost 16 years; however, only 15 percent operated their leases as businesses. They averaged using 5 management practices, although 11 percent reported using none. Lease sizes averaged 2,546 acres, compared with the median of 566 acres. Landowners generally permitted more fee than free access to hunters. They sold leases to an average of 14 hunters, compared with a mean of 3 hunters who were granted free access. Seven percent sold no leases which indicated that they had negotiated other arrangements with hunters, such as free-access or land stewardship (i.e., hunters permitted to hunt if they provided their facilities or managed the habitat and game). Sixty percent of the landowners did not allow free access. Overall, landowners averaged earning \$4,579 in net income, compared with a median of \$1,500. Fifteen percent reported net losses.

Multiple regression results are reported in Table 2. Standardized regression coefficients equal to or greater than .028 were statistically significant, although low coefficients theoretically were not important.

Table 1. Descriptive Results of a Survey of Texas Landowners Licensed to Sell Hunting Leases During the 1989-90 Hunting Season

Variables (# of respondents)		Percent	Mean	Standard Deviation
Region (4,461)	East Texas	17.9		
	West Texas	82.1		
Years of operation ^a (4,498)	less than 5	22.1		
	5 to 10	29.7		
	11 or more	48.2	15.73	14.34
Business Status (4,621)	no (0)	84.9		
	yes (1)	15.1		
Number of management practices ^a (4,621)	none	11.1		
	1 to 3	10.4		
	4 to 6	37.4		
	7 to 9	27.0		
	10 or more	14.1	4.98	4.23
Number of leased acres ^a (4,621)	1 to 249	21.0		
	250 to 499	25.5		
	500 to 999	19.6		
	1000+	33.9	2,546	8,187
Number of fee-access hunters ^a (4,621)	none	7.0		
	1 to 4	30.4		
	5 to 9	31.0		
	10 to 14	12.8		
	15 or more	18.8	14.32	58.33
Number of free-access hunters ^a (4,621)	none	60.0		
	1 to 4	23.7		
	5 to 9	9.7		
	10 to 14	3.5		
	15 or more	3.1	2.96	16.45

Table 1, continued

Variables (# of respondents)		Percent	Mean	Standard Deviation
Net lease income ^a (4,449)	none/loss	14.6		
	\$1 to 999	24.1		
	1,000-1,999	19.4		
	2,000-4,999	22.6		
	\$5,000+	19.3		
			\$4,579	\$15,860

^a Categories are for presentation only

The first model explained 15 percent of the variation in landowners' use of management practices (X4). As predicted, landowners who had operations in West Texas operated leases the longest, and considered their operations as businesses used more management practices. Operational/business status (beta = .345) had the most important effect on the number of management practices used.

The model for number of acres leased was less successful, explaining only three percent of the variation in lease acres. Business status had the only statistically significant beta (.171). Results for region and years of operation differed from expectations; neither variable was statistically significant. Size of leases were similar in both regions of the state and among starting and older operations.

The third model explained almost 27 percent of the variation in the number of fee-access hunters (X6). Contrary to our hypotheses, landowners in West Texas leased to fewer hunters (beta = -.125) and the number of management practices had no effect (beta = .011) on the number of fee-access hunters. These results may have occurred because West Texas has more landowners competing for smaller pool of hunters. The region has a lower population density (i.e., larger land area relative to population size) and higher concentration of nonhunting Hispanics than does East Texas (Murdock et al., 1990). As we expected in our other hypotheses, the number of leased acres produced the largest effect (beta = .480), while number of operating years and business status had low, positive (betas < .100) and statistically significant effects.

Table 2. Standardized coefficients produced by the regression of Texas landowners' (n = 4,621) net leasing income on the characteristics of their hunting lease operations in 1990.

Independent Variables		Dependent Variable ^e				
		X4	X5	X6	X7	X8
Region - dummy	(X1)	.149 ^c	<u>.014</u>	-.125 ^c	-.046 ^b	<u>.003</u>
Years of operation	(X2)	.095 ^c	<u>.008</u>	.028 ^a	.046 ^b	-.015
Business status - dummy	(X3)	.345 ^c	.171 ^c	.089 ^c	.028 ^a	.099 ^c
Management practices	(X4)			<u>.011</u>	.103 ^c	.037 ^b
Number of leased acres	(X5)			.480 ^c	.032 ^a	.510 ^c
Number of fee-access hunters	(X6)					-.028 ^a
Number of free-access hunters	(X7)					<u>.017</u>
Net lease income	(X8)					---
Adjusted R-Square		.155	.029	.268	.018	.304
F-Value		276.464 ^d	45.638 ^d	330.768 ^d	17.872 ^d	272.230 ^d

a Prob. > |t| was .05

b Prob. > |t| was .01

c Prob. > |t| was .001

d Prob. > F was .0001, with 4,497 degrees of freedom for each equation, except for the net income equation, which had 4,352 degrees of freedom.

e Underlined coefficients were not as predicted by the research hypothesis

The fourth model explained only two percent of the differences in the numbers of free-access hunters (X7). Although all the betas were statistically significant in the direction predicted, none was greater than .100, except for the number of management practices (beta = .103). Land-owners who used a larger number of management practices had leased to more fee-access hunters. Fee-access and free-access variables had a low, but statistically significant correlation ($r = .081$).

The final model explained 30 percent of the variation in net lease income. Contrary to our hypotheses, the effects by region and numbers of operating years and free-access hunters were not statistically significant. Also, the statistically significant negative effect by the number of fee-access hunters (beta = $-.028$) on net lease income was in the opposite direction predicted. Most of the explained variation resulted from number of leased acres (beta = $.510$) and business status (beta = $.099$). Landowners who regarded their operations as businesses and who leased large numbers of acres produced the most net income.

DISCUSSION

Private landowners control access to the majority of game species and land resources in Texas (Adams et al. 1992). Economic principles of supply and demand suggest that profit is often emphasized as the incentive for landowners to develop and sell hunting leases. Well managed lease acreages produce higher quality habitats and game, particularly white-tailed deer, and stimulate more hunter demand for access to such areas. Increased hunter demand and a finite resource supply thus should produce higher lease fees. If this scenario holds, we should have observed more landowners treating their lease operations as businesses, practicing more management, and obtaining greater net incomes from the sale of hunting lease than we did.

Overall, the typical lease operation in Texas was less formalized and entrepreneurial than we had expected, given the maturity of the Texas leasing system. Most of the landowners appeared to take an informal, nonbusiness approach to operating and selling hunting leases. Other results in our study indicated that almost 29 percent of the landowners statewide did not consider the license fee paid to sell

hunting leases to be an operational expense. Further, only 13 percent viewed their operations as business enterprises, slightly more than half applied fewer than 5 of 27 possible management practices, and a large segment (40%) provided free access to hunters. Free-land access by hunters could dampen lease demand and the amount charged by other landowners for leases.

Our findings lent support to both the profit maximization explanation and the economic behavioral explanation of landowners' lease operations. Many landowners might have regarded the sale of hunting leases as a "sugar jar" source of supplementing their incomes rather than pure profit maximizing enterprise. Intensive management of lease operations would have required large investments of time and money and greater risks of failure to recoup costs (March and Sevon 1988). By limiting their inputs to the provision of a small number of management practices, primarily practices that sustain wildlife game resources, landowners had lower investment risks and more profit margins, if not the most profits, resulting from the sale of hunting leases. Some social scientists would argue that this practice is the essence of profit maximization behavior (Heap 1989; Obrinsky 1983; Shackel 1970).

A final factor is also worth noting about lease hunting in Texas. New programs by the TPWD and agencies in other states (Wigley and Melchior 1987) can affect lease demand and how landowners provide resource access to hunters. For example, the TPWD instituted in 1987 the Type II Wildlife Management Area Program. In lieu of selling hunting leases, many owners have turned to the TPWD to manage wildlife and habitat resources and to control hunting on their lands. The TPWD provides low cost hunting opportunities to the public by contracting with private landowners to manage a specified number of acres for hunting and for wildlife and habitat conservation. After the TPWD deducts administrative, law enforcement and wildlife management expenses from the sale of \$35 annual permits to hunters, it pays each landowner a prorated share according to the number of hunter days spent on a owner's land. In 1989, approximately 31,000 permits were sold to hunters providing access to 728,000 acres at 81 sites in Texas (Thomas and Adams 1990-91).

How rural, private landowners manage recreation-related natural resources is ecologically and economically important. Wildlife

resources belong to the commonweal and rural landowners are stewards of these resources. The results of this study imply the need to extend research on landowners' decision making regarding the management of these resources, integration of resource management with other land-use practices including farming and ranching, and their relationships with the consuming public.

Endnotes

1. Licensees who purchased a license but did not sell hunting leases accounted for 8,039,437 acres. Nonrespondents to the survey represented 13,965,290 licensed acres. Further, in April, 1990, a random sample of 110 nonrespondents was interviewed by telephone to estimate statistical bias in the survey. Sampling error was ± 9 percent, based on the population of nonrespondents. Five questions were used to estimate nonresponse bias: (1) Was this hunting lease in operation during this hunting season? (2) Will this hunting lease be in operation next year? (3) What is your relationship (i.e., landowner, operator, outfitter, or hunter) to this hunting lease? (4) Did you derive any income from leasing? and (5) In what county is the majority of this lease located? Responses of this sample were compared with those of respondents to the original survey and were tested using the chi square test. Findings indicated that nonrespondents were less likely than respondents to have operated leases during the 1989-90 hunting season, derived income from the sale of hunting leases during 1989-90, and planned to operate leases the next year. Both groups reported similar percentages of landowners. Finally, nonrespondents had licensed acres located in 51 of 254 Texas counties. No ecological clustering of these counties was observed. Overall, these results suggested that nonrespondents were different from the respondents, whom we considered to have been bona fide lease operators.

REFERENCES

- Adams, C.E., J.K. Thomas, and C. Ramsey. "A synopsis of Texas hunting
1992 leases". *Wildlife Society Bulletin* 20:188-197.
- Bergstrom, J.C. and H.K. Cordell. "An analysis of the demand for and
1991 value of outdoor recreation in the United States." *Journal of
Leisure Research* 23(1):67-86.
- Brown, T.L., D.J. Decker, and J.W. Kelley. "Assess to private lands for
1984 hunting in New York: 1963-1980." *Wildlife Society Bulletin*
12:344-349.
- Dharmaratne, G.S. "Hunting lease and characteristic demand: A conceptual
1989 and empirical hedonic-travel cost approach." Unpublished
dissertation, Texas A&M University, College Station, Texas.,
pp. 184.
- Gramann, J.H. "Market analysis for hunting in Texas." *Proceedings of the
1986 International Ranchers' Roundup*. Kerrville, Texas: Texas
A&M University, pp. 295-304.
- Gynn, D.E. and J.L. Schmidt. "Managing deer hunters on private land in
1984 Colorado." *Wildlife Society Bulletin* 12:12-19.
- Heap, S.H. *Rationality in Economics*. Oxford, United Kingdom: Basil
1989 Blackwell Ltd.
- Langenau Jr., E.E. and C.W. Ostrom Jr. "Organizational and political
1984 factors affecting state wildlife management." *Wildlife Society
Bulletin* 12:107-116.
- Langner, L.L. "Hunter participation in fee access hunting." *Transactions
1988 of the North American Wildlife and Natural Resource
Conference* 52:475-482.
- Kaiser, R.A. and B.A. Wright. "Recreational access to private land:
1985 Beyond the liability hurdle." *Journal of Soil and Water
Conservation* 40:478-481.

- Knowles Jr., W.R. "A national comparison of structural factors affecting participation in selected wildlife-related Activities." 1989 Unpublished Master's thesis, Texas A&M University, Department of Wildlife and Fisheries Sciences, pp. 89.
- March, James G. and Guje Sevon. "Behavioral Perspectives on Theories of the Firm." Pp. 368-402 in *Handbook of Economic Psychology*, W.F. van Raaij., G.M. van Veldhoven, and Karl-Erik Larneryd, eds. Norwell, Mass.: Kluwer Academic Publishers. 1988
- Messonier, M.L. and E.J. Luzar. "A hedonic analysis of private hunting land attributes using an alternative functional model." 1990 *Southern Journal of Agricultural Economics* 22:129-135.
- Morrill, W.I. "Fee access views of a private wildlife management consultant." 1987 *Transactions of the North American Wildlife & Natural Resources Conference* 52:531-543.
- Murdock, S.H., K. Backman, E. Colberg, N. Hogue, and R.R. Hamm. 1990 "Modeling demographic change and characteristics in the analysis of future demand for leisure services." *Leisure Sciences* 12:79-120.
- Obrinsky, M. *Profit Theory and Capitalism*. Philadelphia, PA: 1983 University of Pennsylvania Press.
- Polkinghorn, R.S. *Micro-theory and economic choices*. Homewood, Ill: 1979 Richard D. Irwin, Inc.
- Pope, C.A., C.E. Adams, and J.K. Thomas. "The recreational and aesthetic value of wildlife in Texas." 1984 *Journal of Leisure Research* (First Quarter):53-60.
- Pope, C.A. and J.R. Stoll. "The market value of ingress rights for white-tailed deer hunting in Texas." 1985 *Southern Journal of Agricultural Economics* 17:177-182.

- Schenck, E.W., W. Arnold, E.K. Brown, and D.J. Witter. "Commercial
1987 hunting and fishing in Missouri: Management implications of
fish and wildlife 'markets'." *Transactions of the North
American Wildlife and Natural Resources Conference*
52:512-524.
- Shackle, G.L.S. *Expectation, Enterprise and Profit: The Theory of the*
1970 *Firm*. Chicago, Ill: Aldine.
- Steinbach, D.W., J.R. Conner, M.K. Glover, and J.M. Inglis. "Economic
1987 and operational characteristics of recreational leasing in the
Edwards Plateau and Rio Grande Plains of Texas."
*Transactions of the North American Wildlife and Natural
Resource Conference* 52:496-515.
- Steinhoff, H.W., R.G. Walsh, T.J. Peterle, and J.M. Petulla. "Evolution of
1987 the Valuation of Wildlife." Pgs. 34-48 in D.J. Decker and G.R.
Goff (eds.), *Valuing Wildlife: Economic and Social
Perspectives*. Boulder, Colo.: Westview.
- Thomas, J.K. and C.E. Adams. "Socioeconomic factors affecting land
1985 access to hunt white-tailed deer." *Wildlife Society Bulletin*
13:147-155.
- Thomas, J.K., C.E. Adams, W.R. Knowles, and D.W. Steinbach.
1989 "Development of wildlife resources on private lands." College
Station, Texas: Texas Agricultural Experiment Station,
Department of Rural Sociology, Technical Report, pp. 16.
- Thomas, J.K. and C.E. Adams. "Type II wildlife management areas in
1990-91 Texas." *Journal of Environmental Systems* 20(2):147-155.
- Tomlinson, B.H. "Economic values of wildlife: Opportunities and pitfalls."
1985 *Transactions of the North American Wildlife and Natural
Resources Conference* 50:262-270.
- U.S. Bureau of the Census. *Statistical abstract of the United States: 1990*
1990 (110th edition). Washington, D.C.: U.S. Government Printing
Office.

- U.S. Fish and Wildlife Service. *Unique wildlife ecosystems of Texas:*
1979 *Region 2.* Albuquerque, N.M.: Dept. of the Interior, pp. 164.
- Warneryd, K. "Economic psychology as a field study." In *Handbook of*
1988 *Economic Psychology*, W.F. van Raaij, G.M. van Veldhoven,
and K. Warneryd, eds. Pp. 2-41. Norwell, Mass: Kluwer
Academic Publishers.
- White, R.J. *Big game ranching in the United States.* Wild Sheep and
1987 Goat International, Mesilla, N.M., pp. 355.
- Wiggers, E.P. and W.A. Rootes. "Lease hunting: Views of the Nation's
1987 wildlife agencies." *Transactions of the North American*
Wildlife and Natural Resources Conference 52:525-529.
- Wigley, T.B. and M.A. Melchiors. "State wildlife management programs
1987 for private lands." *Wildlife Society Bulletin* 15:580-583.
- Wright, B.A. "An empirical assesement of behavioral aspects and other
1985 determinants of rural landowners' hunter access policies."
Unpublished dissertation. Texas A&M University, College
Station, TX., pp. 223.