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Factors Determining Per Acre Market Value Of Hunting Leases On Sixteenth Section Lands In Mississippi

Jacob Daniel Rhyne

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FACTORS DETERMINING PER ACRE MARKET VALUE OF HUNTING LEASES
ON SIXTEENTH SECTION LANDS IN MISSISSIPPI

By

Jacob D. Rhyne

A Thesis
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Forestry
in the Department of Forestry

Mississippi State, Mississippi

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ON SIXTEENTH SECTION LANDS IN MISSISSIPPI

By

Jacob D. Rhyne

Approved:

Ian A. Munn
Professor of Forestry
(Major Advisor)

Darren Hudson
Professor of Agricultural Economics
(Committee Member)

Robert K. Grala
Assistant Professor of Forestry
(Committee Member)

Anwar Hussain
Assistant Research Professor of Forestry
(Committee Member)

James P. Shepard
Professor of Forestry and Department Head
(Graduate Coordinator)

George M. Hopper
Dean and Director of the College
of Forest Resources

Name: Jacob Rhyne

Date of Degree: May 2 2008

Institution: Mississippi State University

Major Field: Forestry

Major Professor: Dr. Ian A. Munn

Title of Study: FACTORS DETERMINING PER ACRE MARKET VALUE OF
HUNTING LEASES ON SIXTEENTH SECTION LANDS IN
MISSISSIPPI

Pages in Study: 29

Candidate for Degree of Master of Science

Valuation of leases based on the contingent valuation may be biased because hypothetical data has limitations. This study used the hedonic method to evaluate factors affecting the value of hunting leases on Sixteenth Section Lands in Mississippi that are auctioned to the public. Due to the competitive nature of the issuance of these leases, this study provides a comprehensive and unbiased estimate of the impact that cover type, game quality, distance to urban areas, and location have on hunting lease prices. The implicit prices of these characteristics indicate that land managers should adopt shorter lease lengths, smaller lease sizes and improve habitat to increase lease revenue.

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CHAPTER I

INTRODUCTION

A considerable body of research on hunting leases has been conducted during the past five years. Many studies have focused on evaluating and understanding hunter lease preferences to provide knowledge and information to land managers engaged in leasing. However, there is a grey area that needs further investigation. To provide landowners with more useful information, a thorough and accurate understanding of the values that hunters place on lease characteristics is required. Previous studies have relied on non-market data obtained by using the contingent valuation method and data from hunting leases on non-industrial private lands to draw conclusions about the values that hunters place on leases and their characteristics. However, this approach has shortcomings. Hypothetical data has limitations and drawbacks that create uncertainty about the usability of its results. Information from hunting leases on non-industrial lands is not ideal for determining values that hunters place on hunting lease characteristics because these leases are typically priced in a non-competitive manner. Since most hunting leases on non-industrial private lands are not advertised nor competitively issued, these leases are inefficient and do not capture the full market value. Competitively issued hunting leases, in contrast, more likely capture full market value and thus provide more reliable

information for land owners engaged in the lease market. Hedonic analysis of competitively auctioned hunting leases will produce more reliable conclusions and reduce the error and uncertainty that are characteristic of contingent valuation studies.

There are two major obstacles that have prevented a clear understanding of the value that hunters place on hunting lease characteristics. First, acquiring hunting lease information has been difficult for researchers because most leases are issued on private lands, resulting in no public record of the market transactions available for study. To gather information for empirical studies, researchers have relied on surveys and questionnaires. The resultant hypothetical data is the basis for conclusions about the hunting lease market and the valuation of lease characteristics (Buller, Hudson, Parkhurst, and Whittington, 2006). However, there are criticisms of these methods. Hypothetical data do not necessarily represent actual market conditions and there are concerns about the reliability and accuracy of these data (Freeman, 1993; Mitchell and Carson, 1989). From studies of hunting lease markets, we have gleaned that higher quality game (Loomis and Fitzhugh, 1989; Standiford and Howitt, 1993), cover type (Stribling et al., 1992), distance to a metropolitan area (Pope and Stoll, 1985), lease duration (Shrestha and Janki, 2004), and number of acres of the lease (Messonnier and Luzar, 1990; Pope and Stoll, 1985; Shrestha and Janaki, 2004; Standiford and Howitt, 1993; Zhang, Hussain, and Armstrong, 2006) significantly influence hunting lease prices.

The second problem has been created by the nature of the issuance of most hunting leases. Hunting lease research has focused on leases on non-industrial private

lands (Loomis and Fitzhugh, 1989; Messonier and Luzar, 1990; Munn, Loden, Grado, Jones, and Jones, 2005; Pope and Stoll, 1985; Shrestha and Alavalapati, 2004; Standiford and Howitt, 1993; Stribling et al., 1992; Zhang, Hussain, and Armstrong, 2006). Hunting leases on non-industrial lands are often issued to friends or relatives with the lease price being negotiated. Few landowners advertise these leases to the public (Munn et al., 2007). Studies on auctioned leases have been scant but would provide valuable insight into the actual value hunters place on leases. Auctioning goods or services generally results in greater revenue than if the price is negotiated (McAfee and Mcmillan, 1987; Milgrom, 1989).

Hunting leases on Sixteenth Section Lands in Mississippi, which are advertised and auctioned to the public, present an excellent opportunity for study. Greater competition vying for the leases coupled with a competitive bidding format pushes the lease price upward. Hunters bid based upon what they think the lease is worth in order to acquire the lease. Hunting leases on non-industrial private lands in Mississippi average \$6.50 per acre (Munn et al., 2007). Comparing the average lease price on hunting leases on non-industrial lands in Mississippi to the average lease price on Sixteenth Section Lands would reveal two important points. First, it will indicate whether negotiated hunting leases on non-industrial lands, on average, are efficient. Second, evaluating competitive issued leases would determine if studies that have used hunting leases on non-industrial lands have captured the true value that hunters placed on lease characteristics.

In this study we examined hunting leases on Sixteenth Section Lands in Mississippi to determine the role that lease length, size of the lease area, habitat quality, market segmentation, game quality, and distance to the closest urban area have on hunting lease prices. Our study adds to previous research on the impact that game quality and cover type has on hunting lease prices because we used quantifiable measures of these attributes. To evaluate game quality, we used projected average county-wide Boone and Crocket Scores which are universally accepted measures of game quality and will provide insight in determining the value that hunters place on game attributes. To measure the impact of habitat quality, we used the relative amounts of various cover types where the lease is located.

Objectives

Our goal is to provide valuable information on factors affecting hunting lease prices to non-industrial private landowners, companies and corporations that lease, and the Board of Directors of Public Schools in Mississippi. Analysis of competitively issued hunting leases will provide more accurate estimates of the value hunters place on leases. We hypothesized based upon previous studies that lease length, number of acres in the lease, cover type, and game quality would influence hunting lease prices.

Factors that impact hunting lease revenue

Analyzing hunting leases is very important because it could be an additional source of income for many landowners but studying hunting leases is challenging and complex. Previous studies have improved our knowledge of hunting leases and have identified factors that significantly influence the lease price. The following are important factors in hunting lease markets.

Game quality. In a study of hunting leases on private lands in California, Loomis and Fitzhugh (1989) found that hunters were willing to pay \$106 more per hunter for a 10 percent increase in trophy quality deer in the total deer harvest. Standiford and Howitt (1993) found a positive correlation between lease price and trophy size of deer in California hardwood rangeland. Both studies classified game quality as the number or percent of trophy deer. Trophy size was not defined and was subjective.

Cover type. Gigliotti (2000), Hussain et al. (2004), and Messmer et al. (1998) have shown that hunting success related variables influence hunter opinion of a hunting location. Cover type is a significant determinant of food availability and therefore defines the amount of game an area can sustain. The abundance of game largely determines hunter harvest success. Hardwoods, for example, provide year-round food sources and are ideal habitat for deer and other game Dickson (2004), Harris, Sullivan, and Badger, (1984), and Hazel (1995). Hardwoods also provide a diversity of food sources such as browse, fruits, mushrooms, and soft and hard mast that are relished by deer and other game (Hazel, 1995). More food sources equate to larger game populations and game

density is positively related to hunting lease revenue (Livengood, 1983). In contrast, mature pine cover types provide deer and other game with relatively little food (Thill, 1990). In a willingness to pay study, Stribling et al. (1992) found that hunters in Alabama preferred a mix of pine-hardwood age classes with less than 50% in regenerated stands of young pines.

Impact of urban areas. Distance to the closest major metropolitan centers negatively impacted hunting lease prices in Texas (Pope and Stoll, 1985). Likewise, Goodwin, Offenbach, Cable and Cook (1993) found that in Kansas residents of a town or city were 14.5 percent more likely to purchase a hunting lease than hunters that live in a rural area.

Length of lease and number of acres leased. Shrestha and Alavalapati (2004) found a positive correlation between hunting lease revenue and lease length in a study of recreational hunting on ranches in Florida. Findings concerning the impacts of lease size on lease price have been contradictory. Messonier and Luzar (1990), Pope and Stoll (1985), and Standiford and Howitt (1993) found a positive relationship between lease revenue per acre and lease size. However, Shrestha and Alavalapati (2004) and Zhang et al. (2006) reported a negative relationship.

Market segmentation. Studies that evaluate hunting leases must also account for different hunting lease markets within the study area. Separate markets are created by varying supply and demand structures within the study area coupled with barriers that prevent market integration (Freeman, 1993). If market segmentation exists and only one

hedonic price function is calculated, then the study will provide inaccurate estimates of model coefficients (Freeman, 1993). In a study of hunting leases in the coastal and Delta regions of Mississippi, Munn et al. (2005) found that lease characteristics impacted hunting lease prices differently in each region. In the coastal region lease prices were significantly impacted by the number of forested acres and wildlife management expenditures. In the Delta region, the number of agricultural acres, number of forested acres, percent increase in amount of wetlands of the total acres leased significantly influenced hunting lease prices.

CHAPTER II

METHODS

The hedonic method

The hedonic pricing method is a market evaluation technique used to estimate the economic value consumers place on non-market characteristics of a good or service. It is often used with goods that have varying attributes or characteristics that can only be sold as a collective unit (Rosen, 1974). Hunting leases can be considered composite goods with varying attributes. The use of hedonic analysis was justified as it allowed heterogeneous sites made up of a bundle of characteristics to be decomposed into a specific price for each characteristic (Brown and Mendelsohn, 1984). Other studies have used the hedonic method to evaluate hunting leases (Buller et al., 2006, Hussain et al., 2007, Munn et al., 2005, Pope and Stoll, 1985, Zhang et al., 2006).

Data and construction of variables

Lease data were obtained for hunting leases on Mississippi's Sixteen Section Lands from the Public Lands Division of the Mississippi Secretary of State's Office. These tracts were set aside to benefit public education in the Land Ordinance of 1785

(Public Land Division, 2005). The sixteenth section, an approximately 640 acre block, of every township was reserved for public school districts to use in support of education. In Mississippi, the Board of Directors of each school district decides how these lands will be utilized. Revenue is generated from these lands through the sale of timber and from various leases such as oil, gas, mineral, farming, and hunting. Hunting leases are allowed only on forested land. Hunting leases are awarded to the highest bidder in a sealed bid auction. School districts advertise lease sales in local newspapers for two consecutive weeks prior to the lease auction. In 2005, there were 875 hunting leases on Sixteenth Section Lands (Figure 2.1). Revenue generated from these leases was over 2.5 million dollars.

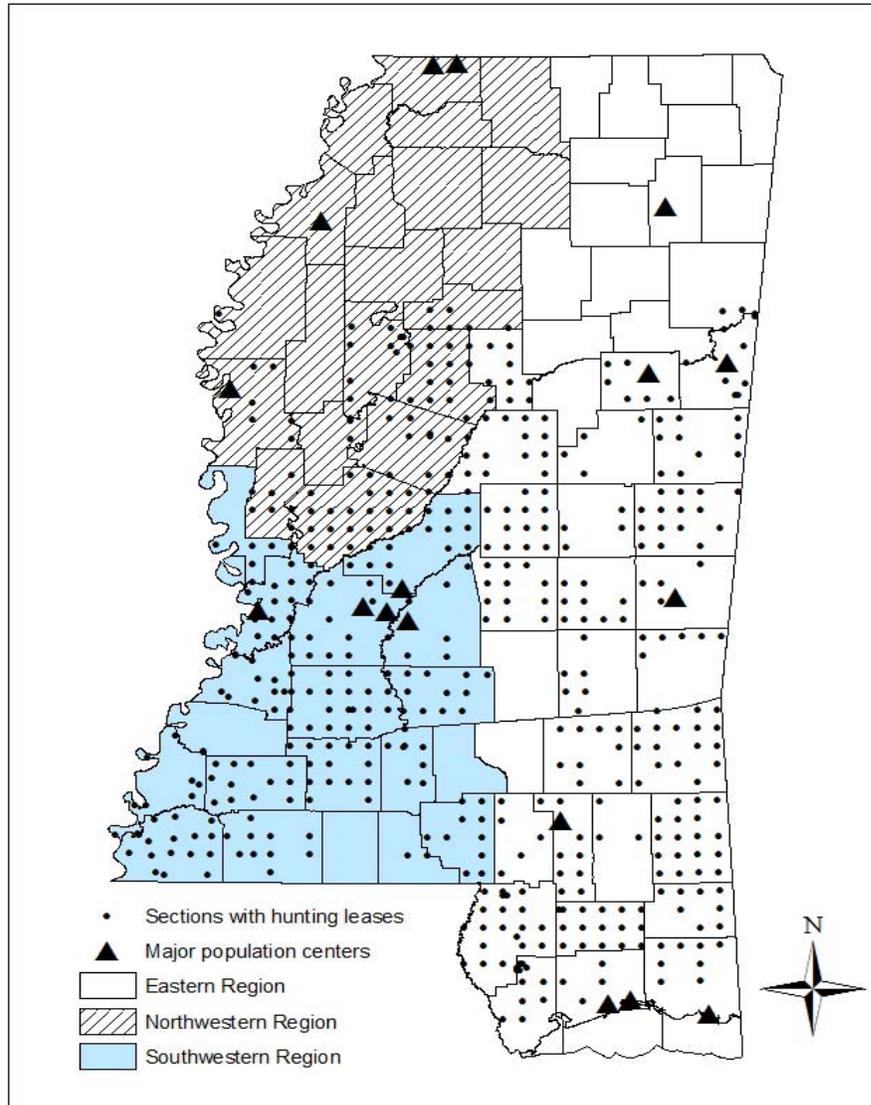


Figure 2.1. Map of Sixteenth Sections with hunting leases in Mississippi in 2005

There are fifteen counties in northern Mississippi that do not have Sixteenth Section Lands set aside for public education. When Mississippi became a state in 1817, a

large portion of northern Mississippi was still owned and inhabited by the Chickasaw and was not subject to the Land Ordinance of 1785. The U.S. government subsequently sold this land occupied by the Chickasaw and failed to set aside the Sixteenth Section Lands for public schools.

We could not obtain all explanatory variable information for the entire dataset. The usable dataset had 715 observations, whereby each observation is composed of one hunting lease on Sixteenth Section Lands in 2005. A Section may have multiple hunting leases. Data collected for each hunting lease included revenue generated, lease acres, lease length, cover type information, average county-level Boone and Crocket score (B&C), and the distance from each hunting lease to the nearest urban area (Table 2.1). Accordingly, the hedonic price equation was specified as:

Lease price per acre = F [lease size, lease length, habitat quality, market segment, game quality, and distance to urban area]

Table 2.1. Definitions of Explanatory Variables used to predict hunting lease prices on Sixteenth Section Lands in Mississippi in 2005

Name	Description	Expected Sign
<i>Size of Lease</i>		
log (leased, acres)	Logarithm of number of acres leased	+
<i>Length of Lease</i>		
One year to four	1 if lease is less than five years, otherwise 0;	+
Five years	1 if lease length is five years, otherwise 0;	+
Six year and over	1 if lease length is greater than five years; otherwise 0;	-
<i>Cover Type</i>		
% pine	Percentage of land in pine	-
% mixed pine-hardwoods	Percentage of land in mixed-pine hardwoods	+
% water	Percentage of land under permanent/temporary lakes, streams, ponds	+
% regenerated	Percentage of land that has been recently regenerated	-
% open	Percentage of land that is open	-
% hardwoods	Percentage of land that is in hardwoods	+
<i>Market Segmentation</i>		
Northwest	1 if land is located in northwest, MS, otherwise 0;	+
Southwest	1 if land is located in southeast, MS, otherwise 0;	+
East	1 if land is located in east, MS, otherwise 0;	-
<i>Game Quality</i>	Projected average Boone and Crocket Score by county	+
<i>Distance to urban area</i>	Miles from hunting lease to closest urban area	-

Lease Price. Hunting lease information was provided by the Public Lands Division of the Mississippi Secretary of State's Office. The lease price per acre was the dependent variable for the hedonic price function.

Lease length and acres leased. This information was provided by the Public Lands Division of the Mississippi Secretary of State's Office. To model lease length, three dummy variables were generated to represent lease lengths of one year to four years, five years, and over five years. The over five years category served as the base (omitted) category in the regression analysis.

Cover type. Cover type information was provided by the Mississippi Institute of Forest Inventory (Parker et al., 2005). The information included the number of acres in the following cover types for each sixteenth section: pine, hardwoods, mixed pine-hardwoods, water, regenerated, and open. Acreages by cover type were converted to percentages of each section. We theorized that the cover type information for each section was representative of the cover type for each hunting lease on that section. Percent pine cover type was used as the base category.

Geographic regions of the state. Three regions were delineated as distinct market segments based on the major population centers in the state (Figure 1). These segments were southwest Mississippi, northwest Mississippi, and east Mississippi. To model

market segmentation, dummy variables for each of the three regions were employed. The eastern region served as the base category.

Projected average Boone and Crocket Scores. Projected average B&C scores for four+-yr-old bucks for each county were obtained from Strickland and Demarais (2000). Their technique effectively approximates B&C scores from a subset of the antler measurements required for a direct B&C score. Strickland and Demarais (2000) calculated projected B&C scores from deer harvest data collected by the Mississippi Department of Wildlife Fisheries and Parks through the Deer Management Assistance Program (DMAP). DMAP monitors the deer population in Mississippi by taking biological samples from harvested game on wildlife management areas and from participating landowners and hunters.

Distance to urban area. The straight line distance in miles from each lease to the closest urban area was determined using ArcGIS. Five areas in Mississippi are classified as urban areas in the 2000 U.S Census. The areas are Biloxi, Pascagoula, Hattiesburg, Jackson, and Olive Branch a suburb of Memphis.

CHAPTER III

RESULTS

Descriptive statistics. The average annual lease price was \$2,959.73 or \$8.73 per acre; the average lease size was 348.73 acres. However, these were broad departures from these averages because annual lease price ranged from \$10 to \$32,000, and lease size varied from 3 to 3,059 acres. In terms of forest cover type, pine stands constituted 35 percent of the sections containing leases, hardwoods 29 percent, mixed pine-hardwoods 10 percent, regenerated forests 9 percent, and open land and water accounted for the residual (Table 3.1).

Of the total number of 715 leases, 80 percent were of a five year length, 13 percent were of one to four year duration, and the remaining leases were of six or more year length. The regional distribution of leases indicated a skewed pattern because the east Mississippi region accounted for 48 percent of the leases. The southwest Mississippi region also accounted for a substantial proportion of leases. The average county Boone and Crocket Score was 114. The average distance to the closest urban area was 54 miles.

Table 3.1. Descriptive statistics related to hunting leases on Sixteenth Section Lands in Mississippi in 2005 (N=715).

Name	Mean	Std Dev	Min	Max
<i>Dependent Variable</i>				
Annual lease price	2,959.73	3,501.36	10.00	32,000.00
Annual lease price/acre	8.73	6.97	0.82	52.41
log price/acre	0.84	0.28	-0.09	1.72
<i>Independent Variables</i>				
<i>Size of Lease</i>				
Average lease size (acres)	348.73	261.14	3.00	3,059.00*
Log-acres leased	5.45	1.08	1.10	8.03
<i>Length of Lease</i>				
One year to four	0.13	0.34	0.00	1.00
Five years	0.80	0.40	0.00	1.00
Six year and over	0.07	0.26	0.00	1.00
<i>Cover Type</i>				
% pine	0.35	0.25	0.00	0.95
% mixed pine-hardwoods	0.11	0.07	0.00	0.40
% water	0.01	0.04	0.00	0.64
% regenerated	0.09	0.10	0.00	0.81
% open	0.15	0.16	0.00	0.90
% hardwoods	0.29	0.22	0.01	0.98
<i>Market Segmentation</i>				
Northwest	0.16	0.37	0.00	1.00
Southwest	0.36	0.48	0.00	1.00
East	0.48	0.50	0.00	1.00
<i>Game Quality</i>				
Distance to urban area	54.45	29.82	1.80	261.66

*Giles Island is 3059 acres entrusted to the Mississippi School Board.

Factors influencing hunting lease revenue. Ordinary least squares regression was used to estimate the hedonic price equation relating the dependent variable (lease revenue per acre) to the independent variables (lease acres, lease length, cover type, average county-level Boone and Crocket scores, and distance to the nearest urban area). Estimation results were calculated using the statistical software package STATA 9.2. As

hedonic price theory does not specify which functional form to use, a variety of models were estimated involving the Box-Cox procedure. The log-log functional form provided the best fit for the data. This agreed with Cropper, Leland, and McConnell (1988) who advised that if proxies were used, simpler data forms such as linear, semi-log, and log-log work best. A variety of diagnostic tests were performed as well to ensure that assumptions underlying the ordinary least square method were satisfied. In particular, diagnostics related to heteroskedasticity, multicollinearity and model specification were conducted. Based on Breusch-Pagan test, the hypothesis of nonconstant variance was rejected; thus heteroskedasticity was not a problem. Based on Ramsey specification test, the null hypothesis of model misspecification was also rejected. To determine whether multicollinearity was a problem, variance inflation factors and correlations between explanatory variables were estimated. The correlation matrix did not indicate significant correlations between any pair of explanatory variables. The VIF statistics did not indicate that multicollinearity was an issue.

Elasticities were calculated from estimated regression coefficients. The adjusted R-squared was 0.34. Of the twelve variables in the model, nine were significant at the 10% level of confidence (Table 3.2).

Table 3.2. Estimated coefficients of hedonic price model for hunting leases on Sixteenth Section Lands in Mississippi in 2005 (N=715).

Variable	Coefficient	P-Value	Elasticity
<i>Independent Variables</i>			
<i>Size of Lease</i>			
Log-acres leased	-0.027	0.003	-0.027
<i>Length of Lease</i>			
One year to four	0.225	0.000	18.252
Five years	0.182	0.000	10.649
<i>Cover Type</i>			
% pine	-0.283	0.000	-0.100
% mixed pine-hardwoods	-0.021	0.875	-0.002
% water	-0.094	0.695	-0.001
% regenerated	-0.420	0.000	-0.036
% open	-0.096	0.162	-0.014
<i>Market Segmentation</i>			
Northwest	0.226	0.000	17.241
Southwest	0.171	0.000	5.722
<i>Game Quality</i>	0.003	0.002	0.364
<i>Distance to urban area</i>	0.001	0.066	0.029
<i>Intercept</i>	0.477	0.000	

First, the coefficient for lease size was negative and significant. A one percent increase in the size of the lease caused the average lease price per acre to decrease by 0.027%.¹ Second, variables representing lease length were significant and positive. Hunting leases less than five years in length generated 18.25% more per acre revenue

¹ Elasticities, evaluated at means, for explanatory variables were derived by using:

$\partial \log price / \partial x_k = \hat{B}_k \bar{X}_k$. Elasticities for log-acres leased was based on $\partial \log price / \partial \log lease acres = \hat{B}_{acres}$. For details, see Johnson et al. (1987), p. 251.

than hunting leases greater than five years in duration.² Five year hunting leases generated 10.65% more per acre revenue than hunting leases greater than five years.

Third, of the variables representing habitat quality, percent pine and regenerated lands were significant and had negative coefficients. According to our expectations that hardwoods are ideal habitat for deer and other game; results indicate the hunters value pine and regenerated stands significantly less than hardwoods. Thus, a one percent increase in the percent share of land in pines and regenerated areas with a corresponding decrease in the share in hardwoods caused lease prices to decrease by 0.10% and 0.04%, respectively. Coefficients representing mixed stands and water on hunting lease property were not significant in the model, suggesting that hunters perceive these cover types as equally as valuable as hardwoods in providing quality habitat for game.

Fourth, our expectations were that there are different hunting lease markets in Mississippi; we found that the coefficients for variables representing northwest Mississippi and southwest Mississippi were significant and positive. Accordingly, hunting leases in the northwestern and southwestern region generated approximately

² Calculated using Halvorsen and Palmquist (1980) and Kennedy (1981) elasticity effects for dummy variables : $\{\text{Exp}[\hat{\beta}_k - 1/2V(\hat{\beta}_k)] - 1\} * 100$.

17.24% and 5.72% higher revenue per acre than hunting leases in the eastern portion of the state.

Fifth, the estimated coefficient on the projected average Boone and Crocket Score by county was positive and significant. A one percent increase in the projected average Boone and Crocket score increased the average lease price by 0.36%. Finally, the coefficient for distance to an urban area was significant and positive. A one percent increase in distance to urban areas caused the lease price to increase by 0.03%.

CHAPTER IV

CONCLUSIONS

Factors that impact hunting lease prices are difficult to measure because there is little hunting lease market data available. Most hunting leases occur on private lands where the lease prices are negotiated and no public record is available. To overcome the lack of hunting lease data, researchers have relied on the contingent valuation method, which uses hypothetical questions in surveys to draw conclusions on the value hunters place on lease site characteristics. Data gathered using hypothetical questions has its limitations and there are concerns about the accuracy, reliability, and applicability of this data (Freeman, 1993, Mitchell and Carson, 1989).

Another concern with using negotiated hunting leases is that the lease price likely does not reflect the market equilibrium price. Many hunting leases on private lands are not advertised and prices are negotiated with a limited number of potential buyers. Studies that have evaluated hunting leases issued noncompetitively (Messonnier and Luzar, 1990, Zhang et al., 2006) don't capture the full market value of hunting leases.

Evaluating hunting leases that are awarded competitively in an open market provides valuable data in assessing the “going rate” of hunting lease characteristics. Hunting leases on Sixteenth Section Lands in Mississippi are different from a vast majority of issued hunting leases because they are competitively awarded. Studies have shown that goods and services that are auctioned generate more revenue than would have been generated if the price was negotiated (McAfee and Mcmillan, 1987, Milgrom, 1989). Compared to negotiated hunting leases, competitively issued leases more accurately reflect the value that hunters place on hunting lease characteristics. In theory, hunters’ bid prices approach the full market value when leases are auctioned in a competitive manner, otherwise they might lose out on the lease. Studying these leases can shed light on the value hunters place on hunting locations.

In order to effectively analyze hunting leases on Sixteenth Section Lands in Mississippi, we used actual hunting lease data. Information we collected included: the amount of revenue generated, lease length, lease acres, cover type of the lease area, county-level Boone and Crocket Scores to proxy game quality, and distance of the hunting lease to nearest urban area. A functioning hunting lease market has not been examined in previous studies and will provide more conclusive results than studies that relied on hypothetical methods to evaluate the hunting lease market. Results of this study provide land managers with a better understanding of how to generate more financial benefit from their hunting leases.

Hunting leases on Sixteenth Section Lands in Mississippi were evaluated using hedonic theory and ordinary least squares regression to measure the value that hunters place on hunting lease characteristics. Estimation results indicated that shorter duration leases generated greater revenue than longer term leases. These results are contrary to findings by Shrestha and Janki (2004) who discovered that longer term leases generate greater per acre revenue than leases of a shorter duration. Results of this study indicated that smaller size leases brought higher per acre prices than larger size leases, which agreed with Zhang et al. (2006). This contrasted with Messonier and Luzar (1990), Pope and Stoll (1985), and Standiford and Howitt (1993) who found a positive relationship between per acre revenue generated and lease size. Our study indicated that there was a market for smaller size leases. This could be attributed to hunters who don't want to participate with a hunt club. One explanation could be that there are hunters that have a negative view of joining a hunt club because of the rules and social aspects that are inherent to belonging to this type of organization. Our findings that pine and regenerated areas did not generate as much lease revenue as hardwoods agreed with results by Stribling et al. (1992) in a study of hunters in the Alabama piedmont. The results of our study indicated that there were different hunting lease markets in Mississippi. Pope and Stoll (1985) found that there were different hunting lease markets in Texas and Munn et al. (2005) found that different hunting lease characteristics impact the lease price in different parts of Mississippi. Consequently, future studies that examine hunting leases must also take into consideration different hunting lease markets.

Results of this study indicated that hunters might be willing to pay more money to have the opportunity to hunt higher quality game. This result corroborated findings by Loomis and Fitzhugh (1989) and Standiford and Howitt (1993). Results indicated that hunting lease prices increased with distance from urban areas. In a study of hunting leases in Texas, Pope and Stoll (1985) found that hunting lease prices decreased as leases were located further from the nearest metropolitan area but these results changed at about 89 miles. Leases further than 89 miles away from an urban area, on average, experienced an increase in lease price. Our study agreed with Pope and Stoll (1985) that hunters preferred hunting locations away from urban areas.

There are several practical implications from this study that will benefit land managers and future hunting lease studies. First, land managers can increase the amount of revenue generated from leasing by offering hunting leases five years or less in duration and by offering smaller size leases. Second, dividing up large hunting leases into multiple smaller hunting leases, on average, would generate more per acre revenue. Third, providing better habitat for game by leaving hardwoods in regenerated stands is an alternative that can also lead to increased revenues. However, future studies will have to determine whether habitat improvements of this magnitude will be feasible and financially advantageous. Fourth, many hunters prefer hunting leases in remote locations away from urban areas, so advertising rural hunting leases in urban newspapers might be worthwhile in attracting prospective lessees. Fifth, advertising and auctioning hunting leases to the public is worth considering. The difference between leases on non-industrial

private lands and on Sixteenth Sections can easily be observed by calculating the average per acre lease price differential. The average per acre lease price on Sixteenth Section Lands was \$8.50 per acre, substantially higher than the \$6.50 per acre average on non-industrial private lands in Mississippi (Munn et al., 2007). Finally, because of the disparity between the average lease price on Sixteenth Section Lands and non-industrial lands in Mississippi, we can assume that studies that have examined hunting leases on non-industrial lands have not captured the actual value that hunters place on lease characteristics. Competitively issued hunting leases more accurately reflect the value that hunters place on leases. An issue for future studies would be to examine competitively issued hunting leases to determine how closely the winning bid was to the actual value hunters placed on the lease.

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