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Factors Associated with Declining Hunting License Sales in Alabama

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This article documents the magnitude of and factors associated with declining hunting license sales in Alabama. Respondents were classified as active hunters, former hunters, or nonhunters. Active hunters were relatively satisfied with their recent hunting experiences and the wildlife management programs conducted by the state. In addition, they were supportive of a modest increase of hunting fees. Reasons given by former hunters for quitting the activity were lack of time, lack of public hunting areas, aging, and loss of interest. Nonhunters either did not have an interest in hunting or considered the killing of animals as cruel. Reasons for lack of participation by nonhunters do not indicate a high probability of recruiting hunters from the ranks of nonhunters. These results suggest that agencies and organizations that depend on hunters should put resources into keeping active hunters from becoming former hunters. Based on the results and comments from active and former hunters, it would seem that the best mechanisms for hunter retention are to provide opportunities for active hunters to participate in hunting and to keep hunting woven into the social fabric of community.

Keywords *hunting license sale, hunting participation, hunter retention, hunting license fee, hunting satisfaction*

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Introduction

Sport hunting has made a significant contribution to Alabama's economy. Stribling, Wallace, and Clonts (1989) noted that hunters in Alabama spent over \$600 million on hunting and hunting-related activities. Sales of hunting licenses, however, have been declining in the state since the early 1980s. In particular, state license sales declined from almost 300,000 in the 1978–79 hunting season to about 230,000 in the 1999–2000 season. Declines in total sales appear to be associated with the cost of the license. In 1980, license fees were raised to \$10.25 (from \$5.00) and total sales dropped by over 40,000. Again in 1990, license fees were increased to \$15.00 and sales dropped by 20,000. In each of these cases, sales never returned to their preincrease level. License sales for hunting on management areas, although much smaller in total number, have declined as well. County license sales dropped from 130,000 in the late 1950s to less 17,000 in the late 1990s. Only nonresident all-game license sales actually grew from less than 1,000 in the late 1950s to about 10,000 in the late 1990s. Hunting license sales to nonresidents, however, is only a small fraction of the total hunting license sales to residents in the state (Figure 1).

These declines in license sales have a wide range of ramifications for the management of wildlife in Alabama. The wildlife management agency's operating budget is dependent on revenue generated from license sales. A decline in sales has a direct monetary impact on how effectively the agency can operate. License sales in 1978–79 generated \$1,572,348 while license revenues in 2000–01 totaled \$3,653,104 despite a decline of nearly 70,000 sales. The relationship between price and sales seems to be inelastic (Teisl, Boyle, & Record, 1999) since an increase in license costs compensated for the loss in sale volume. This apparent increase in revenue, however, does not take into account the increase in operating expenses and inflation during this 20 year period.

Although a decrease in license sales does not necessarily equate to a reduction in revenue, it does relate to a more insidious problem; the decrease in sales volume may result in an erosion of agency support from the public and the agency's ability to manage the wildlife resource. A loss of hunters means a declining constituent base and a resultant decline in public support for hunting. Hunting serves as a population management tool for many game species, and a decline in hunters means a decline in the agency's ability to manage those species.

Declining hunting license sales is not unique to Alabama; the trend has been documented in many other states. There have been studies of hunting license sales in other states (e.g., Duda, 1998) and of the loss of anglers due to demographic change (Loomis & Ditton 1988; Murdock, Backman, Colberg, Hoque, & Hamm, 1990; Murdock, Loomis, Ditton, & Hoque, 1996), but only a study of hunting intentions exists for Alabama (Rossi & Armstrong, 1999). The primary objective of our study was to determine the factors associated with declining sales of hunting licenses in Alabama. Our secondary objective was to identify

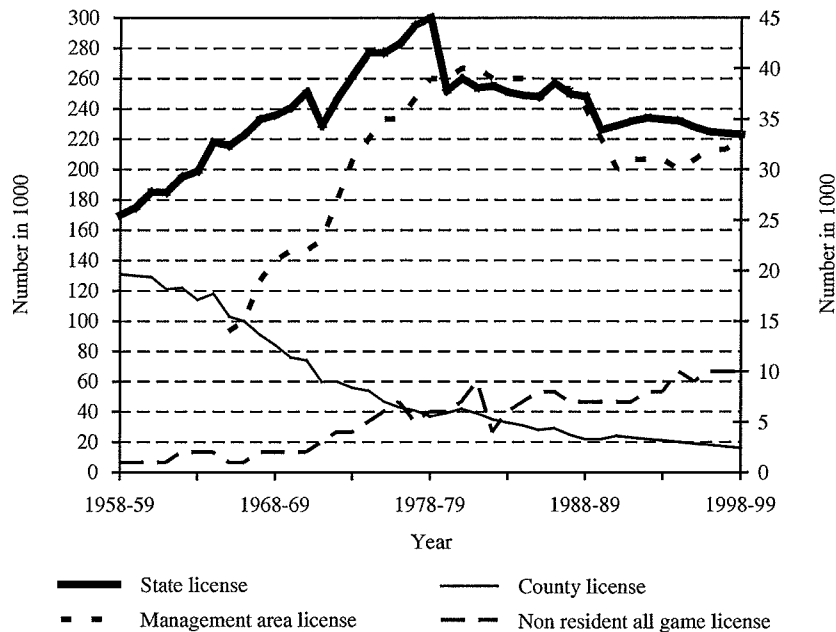


FIGURE 1 Major hunting license sales in Alabama: 1958–2000. State and county license sale numbers are shown on the primary y-axis. Management area license and nonresident all-game license sale numbers are shown on secondary y-axis. Source: Alabama Department of Natural Resource and Conservation (2001, Personal communication).

factors influencing individuals' hunting participation status in the state. Information gathered is useful to policymakers in designing appropriate policy to retain and recruit hunters in the future.

Methods

For the purposes of this study, an active hunter was defined as someone who had hunted within the three previous years. Former hunters were those who hunted three or more years ago, but who had not hunted since that time. Nonhunters were those who had never hunted.

Since a database of active, former, and nonhunters did not exist, we developed a two-phase mail survey method. The first phase developed a list or sample of active, former, and nonhunters. The second phase, the focus of this article, involved a survey of the active, former, and nonhunter samples developed in the first phase. The second phase survey elicited experiences of active and former hunters, reasons for participation or lack of participation, opinions con-

cerning the effectiveness of agency policies in enhancing hunting experiences or bringing former hunters back, and the possibility of recruiting nonhunters into the sport.

The surveys were conducted in the spring of 2001. Our sample population is Alabama residents who were 19 or older. In the first phase, we purchased a list of randomly selected Alabamians from a commercial mailing list vendor (List Bazaar. Com, Inc.). The one-page questionnaire asked respondents to identify themselves as either active, former, or nonhunters. Of the initial sample ($n=14,814$), a total of 1,981 persons responded (response rate=13%). Among those who responded, 621 were active hunters, 607 were former hunters, and 753 were nonhunters. Since first phase survey was a general population survey, we anticipated a low response rate as only those with an interest in hunting (for or against) were likely to respond. Because the nonhunter sample (phase one) was sufficient for the second phase study and because the distribution of active and former hunters were consistent with previous studies (Rossi, 1998), a nonresponse check was not conducted.

The active, former, and nonhunters were sent a separate questionnaire in the second phase. The active hunter survey (28 questions) addressed issues related to the individuals' recent hunting experiences, their attitudes toward wildlife management activities and policy variables such as hunting fees, and demographics. The former hunter survey focused on reasons for discontinuing hunting participation and things, if any, could be done to bring them back to hunting. The former hunter questionnaire (18 questions) included previous hunting experiences, reasons for not hunting anymore, possible avenues to bring them back to hunting, and demographics. The nonhunter survey (12 questions) included items related to outdoor recreation interests, reasons they chose not to hunt, and demographics. There were, however, sufficient numbers of similar questions (see Tables 2, 3, and 6) in all three surveys that provided a basis for our multinomial logit regression analysis on hunting participation status.

Empirical Model

To examine factors influencing a respondent's hunting status, we employed a multinomial logit model because the dependent variable (hunting status) has three choices (active hunter, former hunter, and nonhunter). Define Y_{ij} as respondent i 's hunting status j . Our regression model is,

$$Y_{ij} = \alpha + \beta X_i + \varepsilon_i$$

where X_i represents the determining factors of hunting status, ε_i is random error, and α and β are parameters to be estimated.

Since this study focused on the causes for declining hunting license sales, we normalized on active hunters to investigate the determinants of former and

nonhunter status. This means our dependent variable, Y_{ij} , has three possible values—0 for active hunters, 1 for former hunters, and 2 for nonhunters. If we let P_{ij} be the associated probabilities for $j = 0, 1, 2$, then

$$\sum_{j=0}^2 P_{ij} = 1$$

In this case, the probability of a respondent choosing a particular hunting status is given by

$$P_{i1} = \frac{e^{X_i\beta_1}}{1 + e^{X_i\beta_1} + e^{X_i\beta_2}}$$

$$P_{i2} = \frac{e^{X_i\beta_2}}{1 + e^{X_i\beta_1} + e^{X_i\beta_2}}$$

and

$$P_{i0} = \frac{1}{1 + e^{X_i\beta_1} + e^{X_i\beta_2}}$$

where i represents the respondents, and β_1 and β_2 represent the estimated coefficients in each of the two choices in which we are interested. In general, if there are j choices, there can be two different sets of probabilities. First, there is the probability that the dependent variable is equal to j (where $j = 1, 2$). Second, there is the probability that the dependent variable is equal to 0. This implies that the log-odds ratios can be computed as (Greene, 1993)

$$\ln \left[\frac{P_{ij}}{P_{i0}} \right] = \beta_j X_i$$

This means that the log-odds ratio for the j th choice does not depend on the other choices. Because the estimated coefficients in multinomial logit can be misleading (Greene, 1993), more emphasis is often given to marginal effects, which represent a percent change in the dependent variable due to an incremental change in the respective independent variable. If there are “ m ” explanatory variables, the marginal effects for a variable “ j ” will be

$$\text{marginal effects} = P_j \left(\beta_j - \sum_{k=1}^{m-1} P_k \beta_k \right)$$

where k represents all other explanatory variables except j . The marginal effects for a particular independent variable depend on the β coefficients of that and all

other variables. A multinomial logit coefficient and marginal effects for a particular variable may have different signs.

The dependent variable in the model represented a respondent's hunting status. The independent variables included ownership type of the land (public/private) where the respondent last hunted or recreated, distance traveled for last hunting or recreation (in case of nonhunters) trip, and a variety of respondent characteristics such as age, sex, number of adults and children in the family, education, and employment. Selection of these variables was based on previous studies and their ability of improve the model's explanatory power. Enck, Decker, and Brown (2000) suggested that age, sex, and education were important factors in hunter retention. Decker and Connelly (1989) and Hayslette, Armstrong, and Mirarchi (2001) found that age and family influences are important factors in hunters' motivation for deer and dove hunting, respectively. In addition, we use ownership type of hunting or recreational site, distance traveled for hunting or recreational trip, and employment status in order to capture impacts of economic and time management issues. We have tried to use other variables, such as hunters' race and annual income, but decided to eliminate them as they did not add much additional explanatory power to the model.

Results and Discussion

Descriptive Analyses

Two-hundred and eighty-five active hunters (48%) responded to the survey. The number of respondents in the former and nonhunter groups were 306 and 257, representing a response rate of 51% and 34%, respectively.

Demographics

Table 1 shows the demographics of responding active hunters, former hunters, and nonhunters to our survey. The Chi square test (Ott & Longnecker, 2001) indicates that the distribution of age, sex, number of adults in the family, employment status, and personal income are different among these groups, while the distribution of ethnicity, education background, and number of children in the family are not. In particular, active hunters were predominantly white males, and most (71%) of them worked full time with an annual personal income higher than that of former hunters and nonhunters. They were young, with 37% of the active hunters being under 40 years old and only 16% over 60 years old. In contrast, nearly 40% of former hunters and 31% of nonhunters were over 60 years old. Former hunters were also predominantly white males. The demographic characteristics of our active hunter sample were consistent with those reported by Floyd and Lee (2002) and Zinn, Manfredo, and Barro (2002).

TABLE 1 Demographics of Responding Hunters, Former Hunters, and Nonhunters

	Active hunters (%)	Former hunters (%)	Non-hunters (%)	Chi-square ¹	Cramer's V test ²
Age					
18-30	17	4	8		
31-40	20	9	15		
41-50	25	23	24	59.59***	0.21
51-60	23	25	22		
Over 60	16	39	31		
Sex					
Male	94	93	53	157.63***	0.48
Ethnicity					
White	92	91	91	1.93	0.05
Number of adults (18 or old) in the family					
Less than 3	75	72	88	13.44**	0.14
3 or more	25	28	13		
Number of children under age 18 in the family					
2 or less	91	80	88	2.81	0.06
3 or more	9	20	13		
Total number of years in School					
12 years or less	33	34	22	8.07	0.11
More than 12 years	67	66	78		
Employment status					
Work full time	71	56	49		
Work part time	3	4	11		
Currently unemployed	2	2	2	30.94***	0.14
Retired	19	34	29		
Other	5	5	11		
Annual personal income					
Less than \$25,000	15	22	29		
\$25,000 to \$49,999	41	34	34		
\$50,000-\$74,999	26	28	23	26.71**	0.13
\$75,000-\$99,999	8	9	7		
\$100,000 or more	10	8	9		

¹Test of homogeneity, conducted by using the *number* of respondents in each category.

²Test of dependence or association, with 1 being perfect association and 0 being no association.

*** = Significant at 99%.

** = Significant at 95%.

Active Hunters: Hunting Experiences and Hunting Fees

About 36% of active hunters went hunting 10 times or less, and another 31% went 11 to 30 times in each of the last three hunting seasons. The majority of them bought either a state hunting license (53%) or a combination state fishing and hunting license (39%). The remaining 8% held either a lifetime license, senior citizens license, or county hunting license.

Eighty-four percent of the active hunters hunted on private lands, and more than 64% of respondents indicated that they traveled less than 50 miles in their last hunting trip. Most hunting trips were 1 day in duration as more than 62% of active hunter respondents indicated that they spent less than 25 hours in their last hunting trip. About half of the respondents indicated that they spent less than \$50 in "out-of-pocket" expenses for their last hunting trip. The vast majority of them (94%) expressed satisfaction about their travel and hunting experiences and thought their money and time were well spent.

Active hunters indicated that their sources of hunting satisfaction were being close to nature, relaxing, being close to other family members, recreation, developing skills, and planning and remembering the hunt (Table 2). Sixty percent of respondents in this group indicated that hunting for meat was either "somewhat important" or "very important." They listed poor behavior of other hunters, too many hunters, and poor safety conditions as the most important sources of dissatisfaction. A majority of active hunters (63%) experienced success in hunting game such as deer (64%), turkey (15%), and dove (16%).

Active hunters did not place great emphasis on hunting facilities. They considered size of the hunting area, amount of habitat, density of wildlife, density of hunters at the site, and access and degree of human development as important factors (Table 2). Type of game, travel distance, success rate, out-of-pocket expenses, and accessibility were important factors when searching for hunting location. When asked to rate the performance of the Wildlife Section of Alabama Department of Conservation and Natural Resources (ADCNR), respondents thought the division had done a good or very good job (Table 2).

The survey contained a few questions related to hunting fees. When asked about how much more they would be willing to pay while maintaining the current level of hunting, some 50% of respondents indicated that they would be willing to pay an additional 20% or more for state hunting license (20% amounts to \$3, from the current \$15 to \$18) or combination state hunting and fishing license (20% amounts to \$4.50, from \$23.50 to \$28) (Table 3). Some 17% indicated that they would only be willing to pay the current fees, and another 32% did not respond. These responses are similar to proposed increases in other types of license fees and suggest that a modest increase in hunting license fees would not deter active hunters. However, the nonresponse rate of 32% is significantly higher than the nonresponse rate to other questions (mostly less than 10%), indicating that hunters may be concerned about the underlying intention of the question.

Active hunters' willingness to pay for hunting license fees under other scenarios showed a similar pattern. Over 52% of the responding hunters were willing to pay 20% or more if they saw half as many hunters. More than 55% of respondents would be willing to pay 20% or more if they saw twice as much game, and more than 53% would be willing to pay 20% or more if the hunting

TABLE 2 Active Hunters' Evaluation of Hunting Experiences and Attitudes Towards State Wildlife Management Agency

Survey questions and choices	Response (%)		
	Unimportant*	Neutral	Important**
<i>How do you rate each of these activities as your source of hunting satisfaction?</i>			
Relaxing	1.8	3	95
Being close to nature	1.4	4	94
Hunting for recreation	5.4	12	83
Being close to other family members	8.6	12	79
Planning and remembering the hunt	9.3	13	78
Developing skill	9.7	18	72
<i>How do you rate each of these activities as your source of hunting dissatisfaction?</i>			
Poor behavior of other hunters	6	16	78
Too many hunters	10	17	73
Poor safety conditions	16	23	62
<i>Which of these facilities do you consider important in selecting a location to hunt?</i>			
Hunting lodge	38	22	40
Cooler/meat preparation area	37	26	37
Campground facility	42	26	32
<i>How important the following factors were in your decision in choosing a hunting place?</i>			
Type of game	2	3	96
Travel distance	9	13	78
Success rate	6	18	76
Easy access	11	15	74
Out-of-pocket expenses	13	15	72

(Continued)

TABLE 2 (Continued)

<i>The Alabama Department of Conservation and Natural Resources has a wildlife division that is responsible for managing and protecting wild animals in Alabama. How do you rate their job in each of the following?</i>	Poor	Neutral	Good
Conserving Alabama wildlife	6	13	81
Setting hunting seasons	12	16	73
Enforcing wildlife laws	15	19	66
Monitoring status of wildlife population	11	25	65
Educating Alabama's population about wildlife	14	27	58
Satisfying hunters' desires in its management programs	12	32	56
Evaluating wildlife management practices	7	38	56
Providing land for public use of wildlife	19	40	41
Maintaining food plots for wildlife	20	40	40
Satisfying nonhunters' desires	6	56	38
Controlling nuisance wildlife	21	44	35

*Include "not at all important" and "somewhat unimportant."

**Include "very important" and "somewhat important."

season were extended (Table 3). Sixty percent of hunters indicated that they would take the same number of hunting trips if their out-of-pocket hunting expenses were increased by 10%.

Former Hunters: Why Did They Stop Hunting?

About 44% of former hunters stopped purchasing a hunting license between 1986 and 1996, and the rest before 1985. The majority (78%) of former hunters had only taken 1 to 5 hunting trips during the time that they purchased hunting licenses. Compared to active hunters, former hunters took fewer hunting trips before quitting hunting altogether. In addition, a larger number of former hunters (61% vs. 53% of responding active hunters) purchased state licenses and fewer (18% vs. 39%) purchased combination fishing and hunting licenses the last time

TABLE 3 Active Hunters' Willingness to Pay for a Higher Hunting Expenses and State Hunting License Fees

Survey questions and choices	Response (%)*
<i>Maintaining your current level of hunting, that is, you take the same number of trips as you did in the past season(s), how much more would you be willing to pay in each of the following hunting license?</i>	
State hunting license: 0% or at current fee (\$15)	16
20% or \$3	33
50% or \$7.5	12
100% or \$15	6
Hunting and fishing combo license: 0% or at current fee (\$23.5)	17
20% or \$4.5	33
50% or \$11.5	12
100% or \$23.5	5
<i>If everything about hunting in the area you last visited was same except you only saw half as many hunters and the fee was increased, how much more would you be willing to pay in each of the following hunting license?</i>	
State hunting license: 0% or at current fee (\$15)	12
20% or \$5	27
50% or \$7.5	13
100% or \$15	12
<i>If everything about hunting in the area you last visited was same except you saw twice as much game and the fee was increased, how much more would you be willing to pay in each of the following hunting license?</i>	

(Continued)

TABLE 3 (Continued)

Survey questions and choices	Response (%)*
State hunting license: 0% or at current fee (\$15)	11
20% or \$3	22
50% or \$7.5	16
100% or \$15	18
<i>If everything about hunting in the area you last visited was same except that the season length were extended so that there were more legal days to hunt and the fee was increased, how much more would you be willing to pay in each of the following hunting license?</i>	
State hunting license: 0% or at current fee (\$15)	12
20% or \$3	24
50% or \$7.5	16
100% or \$15	18

* This table is arranged differently from other tables in that the sum of response is not equal to 100. The residual (100% minus the sum of all responses) is the percent of nonresponse. About one-third respondent did not answer these questions.

TABLE 4 Primary Reason for Former Hunters not Going Hunting in the Recent Years

Reason for not going hunting	Response (%)
No particular reason, just haven't had the time	51
There are very few public hunting grounds	18
I'm too old to hunt anymore	13
I've changed my mind about hunting, I think it is cruel to animals	12
Hunting has become too expensive	5
I don't hunt because of religious reasons	0

they purchased licenses. In combination, these findings suggest that former hunters may have purchased a license for a single outing and lacked the avidity seen in respondents of active hunters.

When asked for reasons why they no longer hunted, over half of respondents indicated they had no particular reason, but felt they no longer had the time to participate in the activity. Eighteen percent cited the lack of public hunting areas as the reason they quit hunting, while 13% indicated that they lost interest as they grew older. Some respondents (12%) changed their mind after participating in the sport and thought it was cruel to animals (Table 4).

Similar to active hunters, former hunters conducted their hunting activities primarily on private lands. A majority (68%) of them traveled less than 50 miles to hunt. When selecting a hunting place, they looked for easy access, short travel distance, high possibility of success, and less out-of-pocket expenses. The sources of hunting satisfaction and dissatisfaction were similar to those of active hunters. Most former hunters did not consider hunting facilities as important, but size of hunting area, amount of habitat, density of wildlife population, and density of hunters at the site were important when selecting a location to hunt. Most former hunters thought that the Wildlife Section of ADCNR had done a good job in wildlife management.

When asked what could be done to bring them back to hunting, former hunters appeared to be insensitive to various policy measures—including a reduction in hunting license fees or hunting lease fees on private lands. Similarly, increasing the population of game animals or increasing the bag limit were not viable alternatives for bringing them back into the active hunter community (Table 5). This result suggests that it may be difficult to bring former hunters back once they stop hunting.

Nonhunters: What Can Be Done to Attract Them to Hunting?

Nearly two-thirds (66%) of nonhunters indicated that their last outdoor recreational activity was in a state park or national forest. About half of them traveled

TABLE 5 Improvements that may Bring the Responding Former Hunters Back to Hunting (This Table Refers to “In Your Opinion, What Can Be Done to Bring You Back to Hunting?”)

Improvements	Response (%)		
	Unimportant	Neutral	Important
Increase population of game animals	31	33	36
Reduce private hunting lease fee	46	31	23
Decrease hunting license fee	53	29	19
Reduce hunting license fee for first-year hunters	53	33	16
Increase the bag limit	50	36	14

less than 50 miles from their home on their last recreation trip, although some (10%) indicated that they traveled more than 250 miles. Although they may be heterogeneous, nonhunters appeared relatively inactive in their recreational trips as a majority indicated that backpacking, camping, hiking, mountain biking, freshwater canoeing, and fishing were not important activities in their last trip.

About 59% of nonhunters did not have any family member or close friend who hunted. Thus, they lacked a close social connection with hunting and may not have associated with the social fabric of the hunting community. When asked to select all of the important factors in their decision not to hunt, about two-thirds (66%) of the respondents indicated that they had no interest in participating. Another two-thirds indicated that not wanting to kill animals was an important factor (Table 6). The latter indicates a personal preference or social attitude that may be difficult to change through education or other means. However, the personal choice not to hunt does not equate to opposing the right of others to participate in the activity. Responses to other factors (do not have time, do not have equipment, do not have the knowledge and skill, don't have a companion with whom to hunt, and the amount of money involved) were all below 30%.

The questionnaire included several questions designed to examine if nonhunters would be interested in hunting if ADCNR changed some of its policies. Apparently, none of the policies—decreasing hunting license fees and hunting lease fees, increasing the population of game animals and bag limits—would attract nonhunters to participate in hunting (Table 6).

Multinomial Logit Model

The multinomial logit model was estimated using 694 total usable observations, of which 257 were active hunters, 242 were former hunters, and 195 were nonhunters.

TABLE 6 Factors Influencing Nonhunters Not Going Hunting and Possible Policy Change to Attracting Them to Hunting

Survey questions and choices	Response(%)		
	Unimportant*	Neutral	Important**
<i>How important is each of these factors in your decision not to hunt?</i>			
Don't have the interest	24	10	66
Don't want to kill animals	22	10	68
Don't have the time	48	25	27
Don't have the equipment	56	16	27
Don't have the knowledge about wildlife and hunting	53	23	24
Amount of money involved	59	25	15
Don't have a companion to hunt with	67	21	12
<i>Would you be interested to hunt if the Alabama Department of Conservation and Natural Resources did any of the following?</i>			
Increase population of game animals	87	9	4
Increase the bag limit	88	9	3
Reduce hunting lease fee	89	9	3
Decrease hunting license fee	89	9	2
Reduce hunting license fee for first-year hunters	90	8	2

* Includes "not at all important" and "somewhat unimportant."

** Includes "very important" and "somewhat important."

Nonresponse to some questions resulted in the exclusion of some respondents. The model did not have any significant problem with correlation, nor were there any signs of heteroskedasticity or other specification problems. The estimates are shown in Table 7, and the log likelihood test on the model is highly significant at the 99% confidence level.

The variable representing ownership type of land for the hunting or recreation trip was positive for former hunters and negative for nonhunters and significant at 99% in both cases. Since this was a binary dummy taking the value of "1" for private lands, this result signified that former hunters hunted primarily on private lands (when they did hunt) and, compared to active hunters, nonhunters were more likely to visit public lands for recreation. This indicated that a difference in selecting a destination for hunting or recreations between former hunters and nonhunters. A subtle point related to this finding is that financial issues could be

TABLE 7 Multinomial Logit Estimates of a Respondent's Hunting Status

Hunting status	Variables	Coefficient	Marginal effect	t-ratio	
Former hunter	Constant	1.402			
	Ownership type of last hunting or recreation site (1 = private)	-0.962	0.405***	5.389	
	Distance traveled for last hunting or recreation trip	-0.001	-0.000	-1.244	
	Age	0.001	0.001	1.292	
	Sex	-1.308	-0.101***	-9.531	
	No. of adults in the family	0.081	0.070***	3.722	
	No. of children between 5 and 17 years old in the family	-0.251	-0.038*	-1.579	
	No. of children under 5 in the family	-0.712	0.149**	2.253	
	Years in school	0.052	-0.012	-1.364	
	Employment status (1 = full time)	-0.348	0.076*	1.576	
	Nonhunter	Constant	2.292		
		Ownership type of last hunting or recreation site (1 = private)	-3.659	-0.534***	-11.679
		Distance traveled for last hunting or recreation trip	0.000	0.000	1.102
Age		-0.002	-0.001	-1.426	
Sex		-1.129	0.007	1.119	
No. of adults in the family		-0.304	-0.072***	-3.780	
No. of children between 5 and 17 years old in the family		-0.105	0.022	0.979	

(Continued)

TABLE 7 (Continued)

No. of children under 5 in the family	-0.062	0.109*	1.763
Years in school	0.139	0.018**	2.119
Employment status (1 = full time)	-0.909	-0.114**	-2.532
Log-likelihood		-586.831	
Restrict. log-likelihood		-757.805	
Chi-square value		341.948***	
No. of observations		694	

Note: *** significant at 99%; ** significant at 95%; * significant at 90%.

a factor in deciding a person's hunting status. It is more expensive to hunt or to do recreation on private land, and perhaps some of the former hunters who used to hunt on private land stopped because the additional cost of hunting on private land proved to be expensive for them. Nonhunters, on the other hand, prefer public lands that provide ample opportunities for inexpensive recreation.

As expected, the variable representing a respondent's sex was negative and significant for former hunters but not significant for nonhunters. In our survey, active and former hunters were overwhelmingly male, while nonhunters were roughly equally male and female. This is consistent with Floyd and Lee (2002) who found a gender difference in purchasers of hunting license. Hunting is a family pastime in the South, but is dominated by males. Female members of the family may participate but it is less common. Therefore, it is conceivable that females are more likely to be former hunters than males. This represents another place where the weaving of hunting into the social fabric may be critical. If females associate with males and accept the activity of hunting then they may, in turn, be more supportive of the activity in the legislative arena.

The number of adults in the family, significant at 99 percent in both cases, was positive for former hunters and negative for nonhunters. At first glance, this may seem to be counterintuitive for former hunters; however, other factors may have contributed to this result. Recall that former hunters were generally older than active or nonhunters. An older respondent is more likely to have a higher number of adults in the family. Supporting and managing a larger family may also put a constraint on time and money for some. On the other hand, the estimate suggested that compared to active hunters, nonhunters were less likely to have a large number of adults in the family. This is expected and reinforces the notion that

hunting is often a family activity. The more adults in the family, the more likely a hunter is to have hunting companions, and hence the more likely they are to hunt.

There were two variables representing the number of children in the family. Number of children between 6 and 17 was negative and significant at 90% for former hunters, and not significant for nonhunters. This implies that former hunters are less likely to have kids between 5 and 17 years of age. Number of children under 5, on the other hand, was positive and significant in both cases. This result is consistent with the notion that for former hunters and nonhunters, lack of time is an important factor. Having small children at home requires a considerable amount of time, energy, and financial commitment, which could have been otherwise invested in hunting. However, the desire to pass on the heritage of hunting may cause hunters with older children to participate as a family on a more regular basis.

The level of education was positive significant for nonhunters and not significant in case of former hunters. This implies that compared to active hunters, nonhunters were more educated. Employment status, although significant for both former and nonhunters, was positive in case of former hunters and negative for nonhunters. This meant that former hunters, when compared to active hunters, had a higher probability of being employed full time while nonhunters were less likely to do so. This again implies that time is a factor in former hunters' decision of not hunting.

In general, results of the empirical analysis largely support the qualitative analysis of the survey. It does provide some empirical evidence in identifying the important factors in hunting license sale decline. Variables such as distance traveled and age of respondents were not significant. Dropping these two variables resulted in no improvement and a slight loss in the model's explanatory and predictive power. This is why we decided to keep them in the model.

Conclusions

The results of this study show that the demographics of hunters and nonhunters were somewhat different in Alabama. Active hunters in the survey were satisfied with the management strategies of the state agency and satisfied with their recent hunting experiences. They considered size of hunting site, abundance of game, travel distance, and accessibility as the important factors in choosing a hunting site. They would support for a modest increase (20% or \$3) in fees for state hunting licenses.

Former hunters quit hunting because (1) they did not have enough time, (2) there were not enough public hunting grounds, (3) they were aging (Murdock et al., 1990, 1996), and (4) they had lost interest in hunting. Once hunters quit hunting, it seemed that no policy means within the power of the state wildlife management agency could bring them back.

Nonhunters were not very engaging even when they did participate in outdoor recreation activities. Their principal reasons for not hunting are lack of

interest or the perception of hunting as cruel to animals. No public policy instruments seemed to be able to attract these nonhunters to start hunting.

In addition to increase in hunting license fees, declines in state hunting license sales can be attributed to (1) competing interests and aging of former hunters and (2) a general decline in society's support for hunting which may prevent nonhunters from becoming hunters. Changing these factors to improve the situation is largely beyond the control of the state wildlife management agencies. The results of our study suggest that agencies would gain the most from efforts to retain hunters, as opposed to try to recruit new hunters from the ranks of people who have no interest in it or are former hunters. Many state agencies have programs to recruit new, nontraditional groups (e.g., Becoming an Outdoors Woman) to the ranks of hunting. The results of our study suggest that any hunter recruitment would be most successful within the ranks of young professional males, although a large minority population in the state calls for attention to hunter recruitment in minorities. Finally, efforts to keep hunting woven into the social fabric of the community would ensure that hunting maintains the critical support and acceptance of the nonhunting community.

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