Willingness to Pay for Fall and Spring Turkey Hunting Permits in Mississippi

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Abstract: As hunting participation decreases in the United States, wildlife agencies may consider increasing license fees or creating additional ones to sustain their programs. We assessed Willingness to Pay (WTP) for fall and spring eastern wild turkey (*Meleagris gallopavo silvestris*) hunting permits in Mississippi using the Contingent Valuation Method. Hunters were willing to pay more for a spring hunting permit than for a fall hunting permit and demand for spring hunting permits was also higher. Median WTP for fall and spring turkey hunting permits was US$11.00 and $36.25, respectively. Revenue can be maximized at $277,506 and $739,821 for the state by placing the permit fees at $20.62 and $39.75 for fall and spring hunting permits, respectively. These methods can be used to set fees and assess demand for a variety of recreational activities while maximizing participation.

Key words: hunting, license, *Meleagris gallopavo silvestris*, Mississippi, wild turkey

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Wildlife management agencies rely on hunters for political, economic, and harvest-related support (Enck et al. 2000). Generally, license fees have been kept low and have not increased at the same rate as cost of living (Sutton et al. 2001). With the current erosion of participation in hunting across the United States (Enck et al. 1996, Enck et al. 2000, Mehmood et al. 2003, Miller and Vaske 2003), agencies may be forced to increase license fees or create new ones to maintain the current level of wildlife management, programs, and funding. However, increasing license fees or creating new ones may have negative effects on wildlife agencies by decreasing hunter satisfaction or causing hunters to cease the activity (Sutton et al. 2001). To keep loss of constituent support to a minimum and maintain a wide dissemination of hunting opportunities, fees should be set by wildlife agencies to optimize participation and funding, rather than to maximize revenues.

Sutton et al. (2001) used the Contingent Valuation Method (CVM) to determine angler Willingness to Pay (WTP) for license fees at a fishery near Fort Hood, Texas, and to assess how prices could be set to "reduce access," "maximize profits," or "maximize access." The CVM has been defined as any approach to valuation which relies upon individual responses to contingent circumstances in an artificially structured market (Stoll 1983), and it typically uses a bidding approach (Stoll et al. 1987). Many CVM studies have focused on existence values of wildlife, preservation of public goods, or demand for recreational trips (Stevens et al. 1991, Loomis 1996, Richardson and Loomis 2005). However, fewer studies (e.g., Sutton et al. 2001) have used the CVM to demonstrate how to set various license prices for management objectives.

In this study, we estimated WTP for both spring and fall eastern wild turkey (*Meleagris gallopavo silvestris*) hunting permits among turkey hunters in Mississippi. Eastern wild turkeys are an important game species in Mississippi, with turkey hunters in 1993 having an estimated total sales impact of US$16.7 million (Grado et al. 1997). At the time of our study, residents could hunt spring turkeys if they purchased a "Sportsman's" ($32.00) or an "All Game Hunting/Freshwater Fishing" ($17.00) license (Mississippi Department of Wildlife Fisheries and Parks [MDWFP] 2005). They could also hunt fall turkeys in selected counties if they purchased a "Fall Turkey Permit" ($5.00) in addition to an "All Game Hunting/Freshwater Fishing" license or if they possessed a "Sportsman's" license. Our objectives were to determine WTP for spring and fall turkey hunting permits and identify how the optimum price for turkey hunting permits could be set using methods derived from Sutton et al. (2001). Furthermore, a turkey hunting permit separate from other licenses would allow for additional revenue to be generated for MDWFP and provide a known sampling frame of licensed turkey hunters in Mississippi for MDWFP and university researchers.

Methods

Beginning in November 2003, we sent an 11-page mail questionnaire to 2,386 turkey hunters. We acquired names and ad-

dresses from the MDWFP and National Wild Turkey Federation (NWTF). The sample consisted of: 1) 689 licensed hunters who indicated they hunted for wild turkey in an annual harvest survey during the Mississippi 2001–2002 hunting season (STATE); 2) a random sample of 1,105 Mississippi members of the NWTF; and 3) 592 participants in a 2003 MDWFP Spring Gobbler Hunting Survey (SGHS). The questionnaire was part of a larger study designed to address issues on baiting, setting season length and framework dates, tagging and reporting turkey harvest, implementing a statewide fall turkey hunting season, and determining willingness to pay for turkey hunting permits (Hunt et al. 2004*a*). Mailing procedures were modified from Dillman (2000) using procedures demonstrated to improve response rates in previous research by investigators (Hunt and Ditton 1996). We sent up to three mailings to participants which contained a cover letter, questionnaire, and business reply envelope. We sent the first two mailings three weeks apart during November 2003 and sent the third mailing in January 2004. We started the mailing process prior to the holiday season rather than waiting until after the holidays because timely information was needed for MDWFP management decisions prior to February 2004. Previous research indicated that the time period between the Thanksgiving and New Year's holidays was the worst time to implement mail surveys (Brown et al. 1989, Dillman 2000). Thus, we decided to delay the third mailing.

We used two separate, dichotomous choice contingent valuation questions to determine the amount hunters were willing to pay to hunt turkeys in the spring or fall in Mississippi. We randomly selected a bid value for each permit type from a set of 10 bid values ($2, $3, $4, $6, $9, $13, $19, $27, $39, or $50) and presented this to the hunter. We presented a different bid value to participants for spring and fall turkey hunting permits. An exploratory Kruskal-Wallis test on WTP for the fall turkey hunting permits indicated that none of the groups sampled (STATE, NWTF, and SGHS) varied significantly ($P = 0.655$) in their response to presented bids. The same analysis on WTP for spring turkey hunting permits indicated there was a significant ($P < 0.001$) difference between groups. However, when the sampling group was entered into the initial logistic regression model, it did not emerge as a significant independent variable for WTP for either permit type. Therefore, we pooled data for each sampling group for WTP analyses.

We modeled probability of a respondent answering "yes" to a bid value as a function of a set of independent variables for both permit types using logistic regression (Allison 1999). Independent variables for the fall permit were: 1) number of years they have been turkey hunting, 2) how satisfied they were with turkey hunting in Mississippi, 3) total number of days they turkey hunted the previous year, 4) how hunting compared in importance to other outdoor recreation activities, 5) how turkey hunting compared in importance to other species they hunted, 6) support or opposition for a fall either-sex turkey hunting season, 7) support or opposition for a gobbler-only fall turkey hunting season, 8) their total turkey harvest the previous season, 9) whether they would participate if a statewide fall turkey hunting season was implemented in Mississippi, 10) their gross household income, and 11) bid value presented to hunters. We used the variables of 1, 2, 3, 4, 5, 8, 10, and 11 outlined above, as independent variables for the spring permit model. We originally hypothesized 14 independent variables for the fall model and 11 independent variables for the spring model would affect WTP. However, because of multicollinearity among some items, we removed three variables from both the fall and spring models (Allison 1999).

We constructed demand curves to illustrate relation between permit cost and expected number of licenses purchased for each permit type using methods described by Sutton et al. (2001). We calculated demand curves by placing mean scores of each significant variable in the probability equation and only changing the bid amount to produce each point on the curve. Multiplying predicted probability of purchase for each permit type at a particular cost by number of resident turkey hunters (40,506) during the 2003 hunting season (Hunt et al. 2004*b*) yielded the expected number of permits to be purchased at each bid value. We used these values to graphically depict a demand curve to examine relation between spring and fall turkey hunting demand, total revenue (license cost x number licenses sold = total revenue), and license cost. Significant independent variables ($P \leq 0.05$) were controlled in the probability equation by setting values equal to their mean and only changing bid amount for each point on the demand curve. This project was approved by the Mississippi State University Institutional Review Board (IRB) for the protection of human subjects (IRB docket number 03–305).

Results

Effective response rates were 69%, 48%, and 76% for STATE, NWTF, and SGHS, respectively (Hunt et al. 2004*a*). Respondents were an average of 46.22 (SD = 12.67) years old with a median gross household income falling in the range of $70,000–$79,999. They had an average of 17.10 (SD = 11.91) years of turkey hunting experience. Most reported being either "very satisfied" (49.16%) or "extremely satisfied" (23.47%) with turkey hunting in Mississippi. They hunted an average of 40.21 (SD = 30.55) days for turkey and all other game the previous year. Respondents hunted an average of 17.77 (SD = 13.21) days in the spring and 0.90 (SD = 3.75) days in the fall for turkeys. They harvested an average of 0.06 (SD = 0.36) turkeys in the fall and 1.67 (SD = 1.87) turkeys in the spring. Most

(85.46%) reported that hunting was their most important outdoor activity and that turkeys were their favorite animal to hunt (57.22%). Most (84.59%) respondents indicated they have never fall turkey hunted. A plurality of respondents opposed to some extent a fall either-sex (49.45%) or a fall gobbler-only (44.21%) turkey hunting season. Yet 64.39% said they would participate in a fall turkey hunting season in Mississippi if it were offered.

For the 11 independent variables used in the original logistic regression model for fall turkey hunting permits, five were significantly related ($P < 0.05$) to WTP (Table 1). Probability of respondents agreeing to pay for a fall turkey hunting permit was positively related to support for a fall either-sex hunting season, support for a fall gobbler season, saying they would participate in a fall season if it were implemented, and gross household income. Agreeing to pay for a fall turkey hunting permit was negatively related to bid amount. Of the 8 independent variables used in the original logistic regression model for spring turkey hunting permits, three were significantly related ($P < 0.05$) to WTP (Table 2).

Table 1. Significant independent variables from a logistic regression model for willingness to pay for fall turkey hunting permits in a 2003 survey of Mississippi turkey hunters.

Variable	Estimate	S. E.	Wald Chi-square	*P*-value	Mean (SD)
Intercept	-2.39	0.32	56.43	<0.001	
"please indicate the extent to which you support or oppose implementing a Fall either-sex turkey hunting season"	0.27	0.06	18.50	<0.001	2.69 (1.47)[a]
"please indicate the extent to which you support or oppose implementing a Fall gobbler-only turkey hunting season"	0.34	0.07	24.86	<0.001	2.77 (1.37)[a]
"If there was a statewide Fall turkey hunting season in Mississippi, would you participate?"	1.25	0.21	36.58	<0.001	0.64 (0.48)[b]
"What is your approximate annual household income before taxes?"	0.09	0.03	10.35	0.001	7.55 (2.75)[c]
"If the cost of a Fall turkey hunting permit was _____, would you be willing to pay this amount to hunt wild turkeys in the fall?"	-0.07	0.01	134.67	<0.001	16.98 (15.91)[d]
Model Chi-square	385.01				
Model p-value	<0.001				
Number of observations used in model	991				

a. Recorded where 1 = "Strongly Oppose," 2 = "Oppose," 3 = "Neutral," and 4 = "Support," and 5 = "Strongly Support."
b. Coded 1 = "Yes" and 0 = "No."
c. Equates to between $60,000 and $79,999 per year.
d. Bid amounts were $2, $3, $4, $6, $9, $13, $19, $27, $39, or $50, with a "Yes" or "No" response option.

Table 2. Significant independent variables from a logistic regression model for willingness to pay for spring turkey hunting permits in a 2003 survey of Mississippi turkey hunters.

Variable	Estimate	S. E.	Wald Chi-square	*P*-value	Mean (SD)
Intercept	1.09	0.40	7.53	0.006	
"Overall, how satisfied are you with turkey hunting in Mississippi?"	0.37	0.09	17.97	<0.001	3.91 (0.82)[a]
"Compared to the other species you hunt (such as deer, squirrel, etc. . .), would you rate wild turkeys as:"	-0.55	0.09	34.57	<0.001	1.57 (0.77)[b]
"If the cost of a *Spring turkey hunting permit* was _____, would you be willing to pay this amount to hunt wild turkeys in the spring?"	-0.05	0.004	113.79	<0.001	16.98 (15.91)[c]
Model Chi-square	180.90				
Model p-value	<0.001				
Number of observations used in model	1,094				

a. Recorded where 1 = "Not at all Satisfied," 2 = "Slightly Satisfied," 3 = "Moderately Satisfied," 4 = "Very Satisfied," and 5 = "Extremely Satisfied."
b. Recorded where 1 = "Your favorite animal to hunt," 2 = "Your second favorite animal to hunt," 3 = "Your third favorite animal to hunt," and 4 = "None of the above."
c. Bid amounts were $2, $3, $4, $6, $9, $13, $19, $27, $39, or $50, with a "Yes" or "No" response option.

WTP was positively related to satisfaction with turkey hunting in Mississippi, negatively related to bid value, and as the importance of turkey hunting decreased to respondents, they were less likely to answer yes to the bid value.

Demand for spring turkey hunting permits was greater than demand for fall turkey hunting permits (Fig. 1). Spring turkey hunting permits (Fig. 2) had the potential to produce over two and one half times more revenue than fall turkey hunting permits (Fig. 3). Median bid value (probability = 0.50 of saying yes to the bid value) for a fall turkey hunting permit was $11.00 and would result in revenues of $222,826. Median bid value for a spring turkey hunting permit was $36.25 and would result in revenues of $734,292. Revenues could be maximized at $277,506 for fall turkey hunting by pricing a permit at $20.62. This price left probability of purchase from respondents at 0.33, while controlling for significantly related independent variables. Revenue could be maximized at $739,821 for spring turkey hunting if permits were priced at $39.75. Permits sold at this price yielded a probability of purchase by respondents at 0.46, while controlling for significantly related variables.

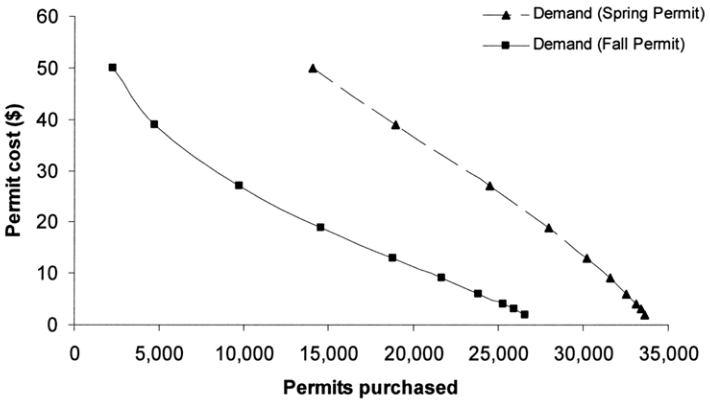

Figure 1. Demand as a function of cost for fall and spring turkey hunting permits in Mississippi from a 2003 survey of Mississippi eastern wild turkey hunters.

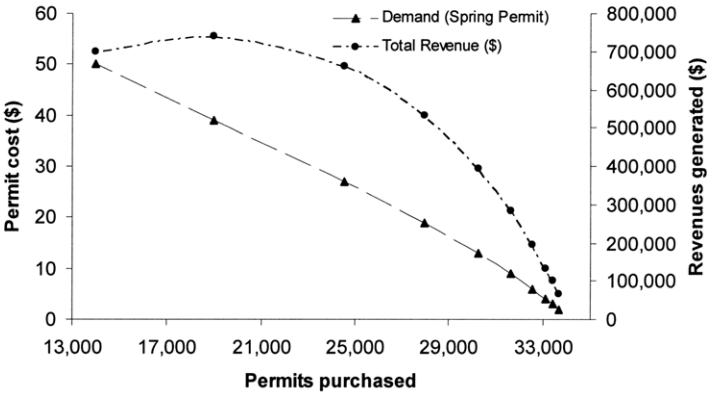

Figure 2. Potential revenues generated from spring turkey hunting permits in Mississippi as a function of number of permits purchased and permit cost for the 2003 hunting season.

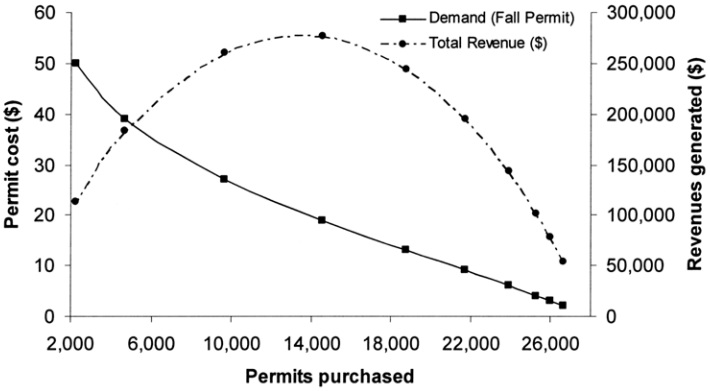

Figure 3. Potential revenues generated from fall turkey hunting permits in Mississippi as a function of number of permits purchased and permit cost for the 2003 hunting season.

Discussion

There are several explanations as to why fall turkey hunting permit demand was less than spring turkey hunting permits. A plurality of those surveyed indicated some degree of opposition to both a fall either-sex and fall gobbler-only turkey hunting season. Opposition to a fall season may be part of the reason for lower demand and smaller WTP values when compared to a spring season. However, most said they would participate in a statewide fall turkey hunting season if it were implemented. The ambiguity displayed may be a function of the relative inexperience with fall turkey hunting by respondents, as 84.59% indicated they have never fall turkey hunted. Nevertheless, demand curves (Fig. 1) indicated that the consumptive use value of a spring season was greater than a fall season.

Though revenues could be maximized at $277,506 and $739,821 for fall and spring turkey hunting, respectively, a wildlife management agency should consider negative aspects of maximizing monetary returns or simply assigning median bid value for new or increased permit fees. High permit fees could potentially cause hunters to dissociate from the activity. Walsh et al. (1992) found that as price increased for one outdoor recreational activity, participation would decrease for that activity, but it may increase in another outdoor recreational activity. The possibility also exists that recreationists may spend these dollars on a non-recreational purchase. Therefore, a decrease in participation in the activity an agency is trying to fund by increasing permit fees may increase

participation elsewhere. Reduced participation could swing political support to other activities and have future negative effects on the activity being managed. Moreover, lack of social support for hunting is a well-known barrier to participation (Enck et al. 1996). Pricing turkey hunters from the activity could further decrease hunter participation through a lack of social support and reduced recruitment. Furthermore, hunting and fishing opportunities were intended to be disseminated widely among individuals (Bishop 1987), and high fees may exclude low income people from the activity (More and Stevens 2000). Thus, license prices should be set on the basis of fairness to the public and different strategies need to be applied when determining license fees. For example, license fees could be set at an optimum price instead of an average, median, or maximum price.

To find an optimum price for a permit, one would have to know total cost of management to accomplish a management objective (Sutton et al. 2001). For purposes of this study, an optimum price was defined as the price that maximizes participation while producing enough revenue to meet management costs. To demonstrate, a hypothetical turkey management cost was added to Figure 3 (Fig. 4). Figure 3 was chosen over Figure 2 because a larger range of WTP was captured for fall turkey hunting than for spring turkey hunting. The optimum price is the point where management cost intersects total revenue and was depicted by a circle in Figure 4. In this example, setting permit fees to meet agency management costs resulted in exclusion of fewer hunters from turkey hunting than if an agency set permit costs to maximize revenue.

Management Implications

To attempt to lessen the exclusion of people from hunting, managers should be increasingly cognizant of potential impacts of setting user fees too high. This study demonstrated how the CVM can be used to not only assess how much individuals are willing to pay on average, but how it can also demonstrate demand for recreational activities over a range of potential prices. Using the CVM in this manner allows managers to assess how recreational activities are valued in relationship to other activities, calculate potential revenues from permits, and determine how to set permit fees to maximize participation.

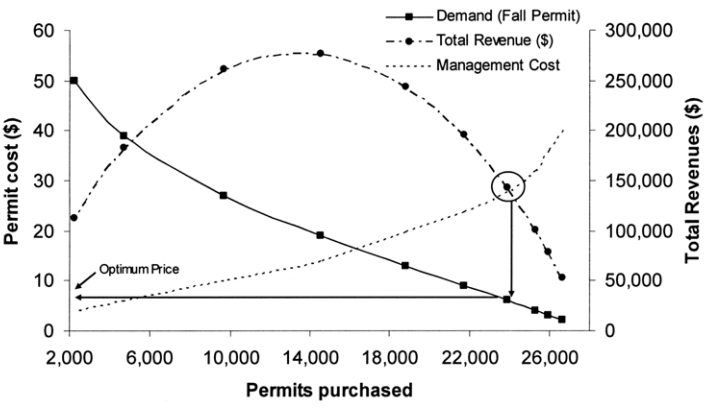

Figure 4. A graphic demonstration of how to use willingness to pay for fall turkey hunting permits in Mississippi to set permit fees at an optimum price. An optimum price maximizes participation while producing enough revenues to meet management costs.

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