Predicting North Carolina Landowner Participation and Interest in Wildlife Related Fee Access

Katherine E. Golden, *Fisheries, Wildlife, and Conservation Biology Program, North Carolina State University, Raleigh, NC 27695*

Christopher S. DePerno, *Fisheries, Wildlife, and Conservation Biology Program, North Carolina State University, Raleigh, NC 27695*

Christopher E. Moorman, *Fisheries, Wildlife, and Conservation Biology Program, North Carolina State University, Raleigh, NC 27695*

M. Nils Peterson, *Fisheries, Wildlife, and Conservation Biology Program, North Carolina State University, Raleigh, NC 27695*

Robert E. Bardon, *Forestry and Environmental Resources, North Carolina State University, Raleigh, NC 27695*

Abstract: Wildlife-related fee access can provide supplemental income to private landowners, potentially protecting wildlife habitat by keeping land undeveloped. We surveyed 1,368 private landowners in North Carolina to determine the factors influencing whether they leased land to hunters or were interested in offering leases for other types of wildlife related recreation. Five percent of landowners allowed access for fee hunting. Twenty-eight percent of landowners provided access to their property for wildlife related activities, but <1% of these landowners earned income from it. Ten and 16% of landowners not currently leasing their property were interested in leasing land to hunters and for non-hunting access at a cost, respectively. Absentee landowners whose land was used to earn income (e.g., through farming or forestry) were more likely to offer fee hunting, while resident landowners who hunted were more apt to offer free access for other wildlife related activities. Landowners living farther from cities were more interested in leasing land for hunting and other forms of recreation than those owning properties near urban centers. Although few landowners sold access to their property, landowners were interested in future opportunities, thus providing potential to protect wildlife habitat on private land by making land revenues more competitive with development.

Key words: hunting, non-hunting access, private landowners, wildlife related recreation

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Human population growth and urban development are leading factors causing habitat loss, degradation, and fragmentation and associated wildlife population declines (Hess 1996, Fahrig 1997, Wilcove et al. 1998, White et al. 2009). Under these pressures, private land becomes progressively more important for wildlife conservation (Rasker et al. 1992, Langholz and Lassoie 2001, Oldfield et al. 2003). Economic incentives can help make land and wildlife habitat conservation an economically viable alternative to development (Williams and Lathbury 1996). Charging access fees for wildlife related recreation can address these challenges by supplementing landowner incomes, promoting sustainable land use, and maintaining habitat diversity (Noonan and Zagata 1982, Jones et al. 2004).

In the southeastern United States, over 75% of forest and agricultural land is privately owned (Wear and Greis 2002, Alig et al. 2003, Hoppe 2006) and these landowners can potentially gain additional income from charging access fees for wildlife related recreation. During 2006, fishing, hunting, and wildlife watching expenditures reached $2.7 billion in North Carolina, and $122.3 billion was spent on wildlife related recreation activities across the United States (U.S. Department of the Interior and U.S. Department of Commerce 2006). Increases in the human population coupled with the desire for outdoor experiences have expanded the potential market available for wildlife related recreation (Reynolds and Braithwaite 2001). Additionally, because the presence of wildlife can influence property values in rural areas where buyers are seeking hunting land, there are considerable incentives for private landowners to conserve, manage, and improve wildlife habitat on their properties (Henderson and Moore 2005, Jones et al. 2006).

Although several studies have addressed hunting lease economics (Zhang et al. 2006, Mozumder et al. 2007), none we are aware of have investigated the opportunities and constraints associated with alternative forms of wildlife related fee access. Hence, our objectives were to determine: 1) the proportion of landowners selling access for hunting and other wildlife related recreation and the proportion interested in selling access for either in the future; 2) factors predicting why landowners sold access for hunting or other wildlife related recreation. We defined fee access for hunting as a landowner leasing property rights to a hunter or hunters for a designated period of time (Thomas et al. 1994, Kilgore et al. 2008). Non-hunting access was defined as providing free public access to private property for the purpose of engaging in any wildlife-related activity (e.g., wildlife or bird watching, nature photography, fishing, hiking, and primitive camping) other than hunting.

We developed predictive models for participation and interest in selling access for wildlife related activities with nine variables commonly used in prior research: annual household income, whether income was generated from the land, acreage, age, gender, distance to a city, whether landowners lived on their property, whether landowners hunted, and education. Income can be a positive predictor of participation in wildlife related recreation (Rockel and Kealy 1991, Zhang et al. 2006). Zhang et al. (2006) demonstrated that tract size influenced participation in leasing for hunting access by landowners in Alabama. We included the acreage variable, surmising the amount of land available to lease had the potential to affect a landowner's decision to lease and could deter them from future leases if they believed they did not own enough land to have a leasing operation. We included age and gender because both variables are known to influence beliefs regarding wildlife (Bowman et al. 2004). We included 'distance to city' because landowners closer to a city would be more likely to participate or be interested in leasing because they are closer to populations of potential lessees (Walsh et al. 1992, Nicolau 2008). Lastly, we included whether or not the landowner lived on the property as a predictor because residency status is likely to influence a landowner's willingness to allow certain activities (e.g., discharge of firearms on the property) (Hussain et al. 2007, Kilgore et al. 2008).

Table 1. Summary statistics for variables used to predict landowner interest in selling access for hunting or other forms of wildlife related recreation, North Carolina, 2008.

Variable	Description	Mean	Standard Error
Acreage	Log10 of acreage of landowner's largest tract of land owned in North Carolina	1.6	0.01
Distance to city	Landowners selected from a list of cities and driving distance was estimated in miles from their largest tract of land to the selected city; square root of the distance to nearest city was used	5.8	0.05
Age	Age in years	60.9	0.36
Education	Highest level of education completed (1 = did not complete high school; 2 = high school; 3 = associate's degree or some college; 4 = four year college degree; 5 = graduate degree)	3.4	0.03
Household income	Annual household income in 2007 (1 = <$25,000; 2 = $25,001 – $45,000; 3 = $45,001 – $65,000; 4 = $65,001 – $85,000; 5 = $85,001 – $125,000; 6 = $125,001 – $175,000; 7 = >$175,001)	3.9	0.05
			Proportion of Positive Responses
Live on land	Landowner resided on their largest tract of land owned (0 = No, 1 = Yes)		0.47
Land income	Landowner used the land to generate income (e.g., agriculture or forestry practice) (0 = No, 1 = Yes)		0.46
Hunt	The landowner or family member (e.g., spouse, child, relative) hunts (0 = No, 1 = Yes)		0.47
Gender	Gender of the respondent (0 = Male, 1 = Female)		0.32

Methods

A convenience sample of ten landowners pilot tested the survey and provided comments on how to improve clarity of questions. The final questionnaire included questions to collect data for four dependent variables (selling access and interest in selling access for hunting and non-hunting activities) and nine independent variables (Table 1). We modeled participation and interest in selling hunting and non-hunting access rights using binary logistic regression. The dependent variables in these models were coded as binary variables (no = 0, yes = 1). Two variables were not normally distributed. We used a log-10 transformation to normalize tract size and the distance to city variable was normalized with a square root transformation (Zar 1999). Data were analyzed using SPSS software, version 17.0 (SPSS Inc. 2008).

We randomly selected four counties from each of the seven 2006 North Carolina Cooperative Extension Service Districts to stratify the sample across the state (Figure 1). This ensured coverage in more rural Cooperative Extension Districts, and data relevant to extension efforts conducted by district. We acquired landowner mailing addresses from county tax rolls. We removed duplicate listings and businesses to specifically target individual private landowners owning ≥4 ha. Four hectares was determined to be sufficient area based on previous research that indicated most landowners owned property between 4 and 40 ha in the southeastern United States (Birch 1994). We randomly selected 300 landowners from each of the 28 counties except Dare and Jackson counties, where all 202 and 232 landowners with minimum acreage, respectively, were included in the sample.

Surveys were printed with pre-paid business class return postage. In March 2008, self-administered surveys were mailed to 8,234 non-industrial private landowners owning ≥4 ha in North Carolina. Each envelope included a cover letter explaining the project and a sticker to seal the survey for return mailing. We mailed a reminder postcard to all landowners approximately two weeks after the initial survey mailing. Eighty-six replacement surveys were mailed to landowners who requested another copy after receiving the postcard. We randomly selected 43 nonrespondents who were asked a shortened version of the survey over the phone to detect potential bias between respondent and nonrespondent populations (Chaves et al. 2005). We attempted contacting each nonrespondent six times before excluding them from the sample.

Variables tested for nonresponse error included whether the landowner resided on their property, the distance to their property

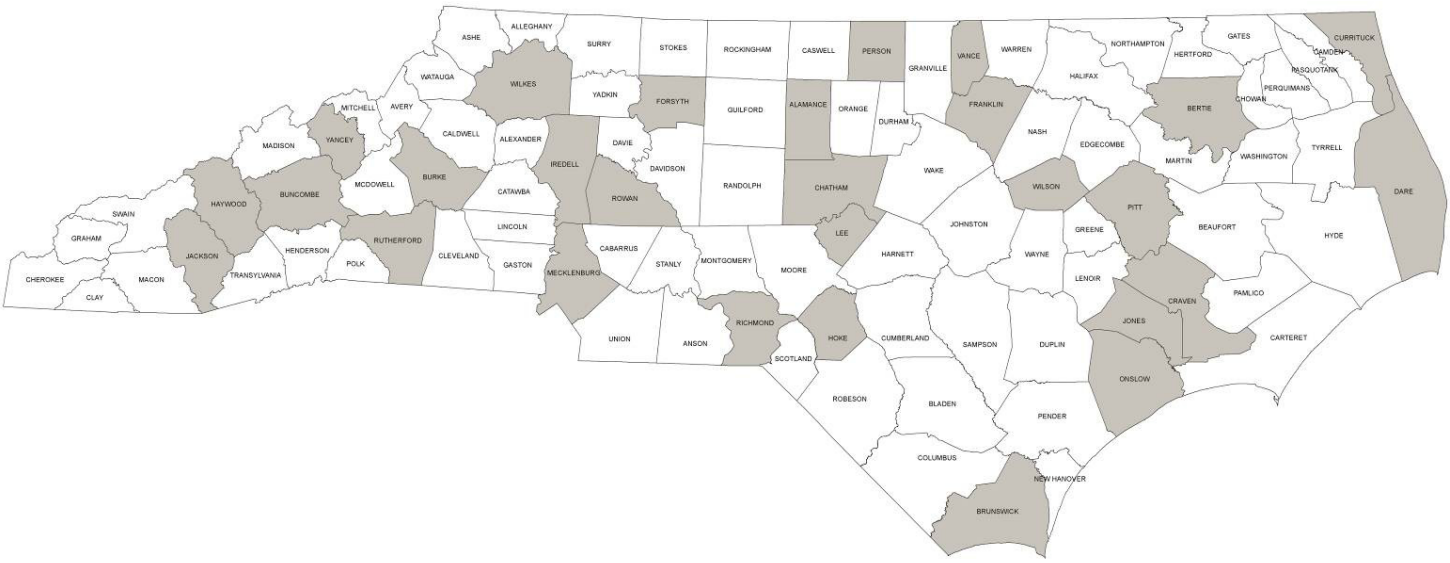

Figure 1. The 28 North Carolina counties sampled in the 2008 survey of private landowners owning four or more hectares.

if they did not reside on the property, largest land tract acreage, distance to closest city, whether the landowner or an immediate family member hunted, leased land for hunting, interest in allowing future access for wildlife related recreation, interest in leasing land to hunters, gender, age, education, and annual household income. A 69% response rate was achieved. We used two sample *z*-tests to detect potential nonresponse error between respondents and nonrespondents on 12 variables with no differences detected between respondents and nonrespondents ($P \leq .05$) in any test, suggesting that our sample was representative of North Carolina landowners owning four or more hectares.

Results

Of the 8,234 surveys mailed, 234 (3%) were undeliverable and 1,368 usable surveys were returned for an overall response rate of 17%. The socio-demographic characteristics of landowners (Table 1) were similar to other studies conducted in the Southeast (e.g., Daley et al. 2004, Measells et al. 2005, Jarrett et al. 2009). The mean age of respondents was 60.9 (SE 0.34) years old, which is similar to previous results in North Carolina (63.5 mean age) (Daley et al. 2009). During our study, 68% of the respondents were male which is similar to results from Arkansas, Mississippi, Louisiana, and Tennessee (Measells et al. 2005). Median household income was between $65,001 and $85,000. Seventy-seven percent of respondents had more than a high school degree, which is similar to the results from landowners in five southern states (69.1%, Jarrett et al. 2009). Eighty percent owned < 40 ha.

Landowners that sold hunting leases indicated the top reasons for leasing were economic diversification (46%), management and enhancement of wildlife populations (19%), reduction of trespassing (19%), reduction of crop or tree damage through the harvest of animals (13.8%), help with wildlife and land management from lessees (10.3%), habitat improvement (5.2%), and environmental stewardship of the property (5.2%). Landowners leasing for hunting ($n = 68$; 5%) predominantly offered annual leases (60%) and seasonal leases (25%) with an average annual lease rate of $6.65 (SE .81) per acre. Most (70%) landowners who sold leases for fee hunting did not live on the property, 94% used the land to earn income other than through fee hunting, and 47% hunted or had a family member that hunted. Landowners with property further from a city were more likely to lease land for hunting than landowners with property closer to a metropolitan area, and landowners that used their land to earn income were more likely to offer hunting leases than landowners who did not use their land to earn income (Model 1, Table 2). As tract size increased, landowners were more likely to offer hunting leases (Model 1, Table 2). Landowners not participating in leasing but interested in leasing for hunting (10%) owned rural lands further from a city, did not live on their property, hunted or had a family member that hunted, and owned larger properties (Model 2, Table 2).

Twenty-eight percent of landowners allowed non-hunting activities including fishing, wildlife watching, and other forms of outdoor recreation (e.g., hiking). However, <1% of these landowners earned income from the activities. Fifty-nine percent of landowners that allowed non-hunting access resided on their property, and 57% hunted or had a family member who hunted. Education

Table 2. Logistic regression models used to predict landowner interest in selling access for hunting or other forms of wildlife related recreation, North Carolina, 2008.

	Coefficients (odds ratios) [standardized odds ratios]			
	Model 1	Model 2	Model 3	Model 4
Independent variables	Participates in leasing for hunting	Interest in leasing for hunting	Participates in allowing non-hunting Access	Interest in leasing for non-hunting fee access
Acreage	1.98*** (7.20) [2.62]	0.78** (2.18) [1.46]	0.72*** (2.06) [1.42]	0.61** (1.85) [1.35]
Distance to city	0.19* (1.21) [1.41]	0.16** (1.18) [1.34]	0.00 (1.00) [1.00]	0.11* (1.12) [1.22]
Live on land	–0.54 (0.58) [0.76]	–0.80*** (0.45) [0.67]	0.96*** (2.61) [1.62]	–0.01 (.99) [1.00]
Land income	1.75*** (5.76) [2.39]	0.38 (1.47) [1.21]	–0.07 (0.94) [0.97]	0.21 (1.23) [1.11]
Hunt	–0.64 (0.53) [0.73]	0.60* (1.83) [1.35]	0.58*** (1.79) [1.34]	–0.07 (0.93) [0.97]
Age	0.02 (1.02) [1.24]	– 0.01 (0.99) [0.89]	–0.01 (0.99) [0.89]	–0.03*** (0.98) [0.72]
Gender	–0.49 (0.61) [0.80]	–0.05 (0.96) [0.98]	–0.13 (0.88) [0.94]	0.37 (1.44) [1.19]
Education	0.09 (1.10) [1.11]	–0.11 (0.90) [0.89]	0.22** (1.24) [1.27]	0.26** (1.29) [1.33]
Household income	–0.09 (0.91) [0.84]	0.02 (1.02) [1.04]	0.02 (1.02) [1.04]	–0.02 (0.98) [0.96]

* = $P \leq 0.05$
** = $P \leq 0.01$
*** = $P \leq 0.001$

level and living on a property were positively related to allowing non-hunting access. Landowners that hunted or had a family member that hunted were more likely to allow non-hunting access on their properties than landowners that did not hunt (Model 3, Table 2). Also, landowners were more likely to allow non-hunting activities and more likely to be interested in non-hunting fee access as the size of the property owned increased. Sixteen percent of landowners who did not sell access to their property were interested in offering non-hunting fee access in the future. Interest in non-hunting fee access was higher for properties located further from cities, on property used to earn income (e.g.,. through farming or forestry), and for younger and better educated landowners when compared to those not interested (Model 4, Table 2).

Discussion

Economies of rural areas tend to be more distressed, and residents often lack economic opportunities (Tickamyer and Duncan 1990) providing the opportunity to establish wildlife related recreation access on private lands. The dependence of landowners on income from agricultural and timber products is more prevalent in the southern United States than in the northern and western regions of the country (Butler and Leatherberry 2004). Also, rural landowners tend to have less education, resulting in their having lower incomes than their urban counterparts, further exacerbating the inability to capitalize on economic opportunities (Economic Research Service U.S. Department of Agriculture 2003, U.S. Census Bureau 2010). Although rural landowners may have fewer economic opportunities, our results suggest they are interested in capitalizing on opportunities associated with providing access wildlife-related recreation. Most people who participate in wildlife recreation reside in urban areas (Walsh et al. 1992), which creates a geographic barrier between supply and demand for wildlife-related recreation opportunities. Further, landowners may face challenges in establishing non-hunting fee access operations because the public is not accustomed to paying for non-consumptive wildlife related activities and may not believe that non-hunting access is a commodity.

Future research should address whether the public considers non-consumptive wildlife related activities commodities, and the degree to which value-added experiences (e.g., meals, homestays) can make wildlife recreation more of a commodity for the public. Additional research should focus on whether urban residents are likely to travel to more rural areas where landowners are more interested in leasing, what distance they are willing to travel, and the specific activities preferred.

Our results indicate that absentee landowners in North Carolina are more interested than resident landowners in offering hunting leases, which is similar to other studies conducted in Mississippi and Minnesota (Hussain et al. 2007, Kilgore et al. 2008). The reasons our respondents provided for selling hunting access reflect potential benefits associated with having hunters and hunt clubs on a property. Leasing generates additional income and can increase communication between the landowner and their lessees about the status and condition of the property (Swensson and Knight 1998). Additionally, lessees often monitor trespassing and help keep an eye on the land (Guynn and Schmidt 1984), or lessees may help with management and maintenance activities on the property (Lynch and Robinson 1998). Conversely, a growing number of affluent people look to reside on rural land with natural amenities and/or recreation opportunities (Jones et al. 2003) and are interested in using the land for their own and family enjoyment; this might explain why resident landowners allowed free non-hunting

access, possibly to friends and family, but lacked interest in leasing (Nelson and Dueker 1990, Brown et al. 2005, Hussain et al. 2007).

Shifting landowner demographics may also explain why education level influenced landowner interest and participation in non-hunting access but had no impact on hunting access. The average education level of the public is rising throughout the United States, but disparity still exists as urban residents tend to achieve higher levels of education (Crissey 2009, Economic Research Service U.S. Department of Agriculture 2003). As educational attainment levels increase, support of hunting decreases (Teel et al. 2002). The current education system in urban areas does not advocate or teach hunting as a wildlife management strategy; rather, there has been a shift towards focusing education on conservation of non-game and endangered species (Inouye and Brewer 2003, Wyner and DeSalle 2010). Similarly, a societal shift away from utilitarian values to a more protectionist attitude towards wildlife could reduce public support for hunting (Zinn et al. 2002, Manfredo et al. 2003). Educated, urban residents will bring their orientations and values associated with wildlife as they immigrate into rural areas, exacerbating the general shift away from the acceptance of hunting (Manfredo and Zinn 1996, Manfredo et al. 2003).

Our result that property size was positively related to participation in and interest in leasing may relate to landowners with larger properties relying heavily on income generated from the land. Previous research suggests landowners with larger property sizes tend to be more aware of and more likely to participate in government incentive programs (Mehmood and Zhang 2005, Sun et al. 2008). Further, many hunters prefer using larger parcels because they want less crowded conditions (Hammitt et al. 1990). Changing demographics among rural landowners suggests a need for future research exploring means to engage exurban landowners who own smaller properties in programs selling access for wildlife related recreation.

Our result that hunters, or landowners with family members who hunt, allowed free access for non-hunting activities and showed little interest in charging a fee for access in the future may be explained by concerns about disruption of existing outdoor recreation activities (Hussain et al. 2007, Snyder et al. 2008). Another possible explanation is that hunters act as ambassadors of the outdoors by encouraging others to participate in wildlife recreation on their property free of charge (Theodori et al. 1998, Burger and Sanchez 1999). Hunting creates the opportunity to connect people to nature (Peterson 2004), and sportsmen may have the desire to share their experiences with nature and the connection with wildlife with others. Many people associate themselves with hunting or hunters, although they may not hunt themselves (Stedman and Decker 1996, Enck et al. 2000). People that associate with hunters may participate in non-hunting activities with hunters because they share a similar interest in wildlife and have an analogous appreciation of the outdoors.

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