

**Exploring the Social Habitat of Alabama Public Land Hunters**

by

Max Harrison Birdsong

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Approved by

Wayde Morse, Chair, Associate Professor of Natural Resource Sociology  
Terrill Hanson, Professor of Fisheries  
Mark Smith, Professor of Wildlife Management  
Todd Steury, Associate Professor of Wildlife Biology

## Abstract

The United States has been facing a decline in the number of licensed hunters since around 1980, posing a serious threat to state conservation agencies who receive funding from hunting license sales. Recent research suggests that this decline can be tied to demographic trends in the United States - such as urbanization, diversification, and an aging population – because they have altered hunting society, or the “social habitat” for hunting. The social habitat for hunting is comprised of multiple levels of factors influencing hunting behavior, these levels range from individual-level (e.g., family support) to very broad (e.g., world news). Conventional hunter recruitment, retention, and reactivation (R3) research has been focused on factors at the individual level. While these individual level factors are important, over-emphasis on their influence has created a gap of information concerning the roles of broader social forces on R3. We developed a survey questionnaire to understand the broader social forces affecting R3, such as demographics, socialization into hunting, and public land use. We examined differences in the recruitment and retention for non-traditional hunting populations (e.g., females, adult-onset hunters, urban hunters). The items affecting recruitment and retention for these groups was different than for traditional hunting populations. Additionally, we modelled the preferences of public land hunters for WMAs to determine which attributes drive hunting participation. We found site-specific characteristics that predict visitation. Preferences for certain attributes also varied by type of game species targeted. These findings have practical significance for state agencies, and contribute to the understanding of the social habitat for hunting.

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## List of Abbreviations

ADCNR	Alabama Department of Conservation and Natural Resources
WMA	Wildlife Management Area
USFWS	United States Fish and Wildlife Service
NGO	Non-Government Organization
R3	Recruitment, Retention, and Reactivation
WVO	Wildlife Value Orientation
NTPH	Non-traditional Path Hunter
TDM	Tailored Design Method
RUCC	Rural-Urban Continuum Code
ANOVA	Analysis of Variance

## Chapter 1: Introduction

### **INTRODUCTION**

The United States has been facing a decline in the number of licensed hunters since around 1980, posing a serious threat to state conservation agencies who receive funding from hunting license sales. A decline in hunter participation would be harmful to local economies and rural stability. The U.S. Fish & Wildlife Service's 2016 National Survey of Fishing, Hunting, and Wildlife – Associated Recreation reported that in 2016, 11.5 million people went hunting in the U.S - over 5% of the U.S. population 16 years and older. On average, these hunters spent \$2,237 on hunting related expenditures in 2016 (equipment, licenses, etc.). In total, hunters in the U.S. spent \$25.6 billion on hunting related expenses in 2016 (USFWS, 2017), with most of these expenditures occurring in non-urban areas.

Hunting in the United States carries many economic and societal impacts. These impacts have long been evident to state conservation agencies, and are widely supported by research. The impacts include increased funding for state conservation agencies generated from license sales (Poudyal et al., 2008), a positive effect on local economies and rural stability (Mozumder et al., 2007), limiting the negative impacts of high deer herd populations (Stedman et al., 2008), increasing agency support from the public, and maintaining traditional culture in rural areas (Larson et al., 2014).

Hunting participation has been declining since around the 1980s (USFWS, 2012). Much attention has been given to this decline, and there is a consensus throughout the research that this decline is significant and is expected to continue. In the national survey recently released by the U.S. Fish & Wildlife Service (2017), it was reported that hunting participation fell by 16% from 2011 to 2016. The 16% decrease in hunting participation was accompanied by a 29% decrease in

hunting related expenditures (USFWS, 2017). A study by Poudyal et al. 2008, empirically supports the consensus that the decline in hunting participation will continue. The study projected the demand for hunting licenses in the Southeast through 2030, and their findings indicate a decline in demand of approximately 9%.

The decline in hunter participation in the United States has sparked an investment in R3 research, and motivated a re-evaluation of R3 goals and strategies. Poudyal et al. 2008 suggests that the projected decline in hunting license demand is due to structural shifts in the U.S. population, particularly age and race. Racial and ethnic minorities are under-represented in the hunting population, comprising 6-8% of all hunting participants (USFWS, 2012) but by 2050 it is projected that over 50% of Americans will be non-white (U.S. Census Bureau, 2012). For this reason, Poudyal et al. 2008 posits that programs encouraging younger and non-white populations to participate in hunting could mitigate the forecast decline in hunter participation. Many federal and state agencies, as well as non-governmental organizations (NGOs) have devoted substantial funding and time to improve R3 through youth hunts, family events, advanced hunter trainings and mentoring programs (Responsive Management & National Wild Turkey Federation, 2011).

## **LITERATURE REVIEW**

Some scholars try to simplify this declining trend in hunter participation as part of a larger trend away from nature-based recreation (Karns et al., 2015). This simplification seems as though it would be supported by the finding that most hunters quit hunting due to lack of time, lack of public hunting areas, aging, and loss of interest (Mehmood et al., 2003) – factors that could affect all nature-based recreation. However, this view is not supported by research. Participation numbers for camping, hiking and birding have all remained stable or increased as hunting participation as declined (Cordell, Betz, & Green, 2008; Siikamaki, 2009). In reality, the

reasons for the decline in hunter participation cannot be simplified, they are numerous and complex.

Using a combination of moral and cognitive development theories, innovation adoption-theory, and empirical evidence from past research the path by which an individual becomes an active hunter has been conceptualized (Decker & Purdy, 1986; Wentz & Seng, 2000). First an individual becomes aware of hunting, which is followed by the individual taking an interest. If the individual continues to grow awareness and interest, they reach the apprenticeship phase, where they learn from active hunters – leading to their first hunting experience. After socialization into hunting culture, participation continues and leads to skill development and commitment to hunting. Although this description is accurate, it ignores all the complex social and environmental factors that affect an individual along this pathway (Larson et al., 2013).

In a landmark review; Larson, Stedman, Decker, Siemer, and Baumer (2014) adopted a social-ecological model of hunting behavior that could include all of the complex social and environmental factors that interact to influence R3 at multiple scales. Social-ecological models of behavior are often used in behavioral and social sciences - positing that individual actions are influenced by higher-order nested systems with social, environmental, and policy-related components extending from well beyond the individual actor. The "social habitat" of the individual is comprised of influences from every level.

Larson et al. 2014 conceptualizes the social-ecological model for R3 as interacting hierarchical layers centered on the individual participant. The individual is influenced by factors at the individual level, the micro level (e.g., family), the meso level (e.g. community), and the macro (e.g., broader society) levels of social structure. In this landmark review Larson, Stedman, Decker, Siemer, and Baumer (2014) note that the amount of research declines as one moves up



towards macro level considerations and that the interactions between the levels are rarely considered. Because of these findings they propose the need for R3 research to move beyond research that focuses exclusively on the individuals and their immediate support mechanisms, in order to investigate the broader forces and their interactions that influence hunter behavior.

Conventional R3 research, looking to explain an individual's probability of hunting with variables at the individual and family levels; typically investigate factors like gender, relationship with father, and where an individual was raised (urban or rural). Moving beyond the individual and their immediate support mechanisms opens up a host of other factors that could affect hunting participation: per capita income, ethnicity, age, education, residential stability, public land availability, land access policies of private landowners, satisfaction with existing hunting regulations and bag limits, human population density, prevalence of electronic media and technology, race, land use/habitat composition, and motivations for hunting (Karns et al., 2015).

More recently, a handful of studies have answered Larson et al.'s (2014) call for research on these broader social factors. Each of the following studies use the broad approach encouraged by the social ecological model to understand the structural shift in hunting participation.

Karns et al. (2015) was able to integrate two factors from the macro level of Larson et al.'s (2014) social- ecological model – technology and land use change- and measure their impact on hunting participation. Quartuch et al. (2017), motivated by anecdotal evidence that new hunters are coming from non- traditional populations (i.e., females, racial/ethnic minorities, suburban/urban residents, those lacking family support), explored the motivations and constraints of the “non-traditional path hunters”. Decker et al. (2015) measured public image of hunting depending on people's perception of the hunter's motivation. Clark et al. 2017 measured wildlife

value orientations (WVO's) across different populations and found that mutualistic WVO's tend to be associated with people with higher education and women; while finding that utilitarian WVO's tend to be associated with a rural upbringing, limited residential mobility, and hunting participation.

This advancement of R3 research to include broader social forces that affect hunting does not mean research at the individual level can be or should be ignored. There is a wealth of research at the individual level that helps to understand the full picture of hunter recruitment, retention, and reactivation. It would not be helpful to move from one end of the social-ecological model (individual level) to the other (the macro level). Research must integrate the whole model because each level comprises the social habitat for hunting.

## **RESEARCH OBJECTIVES**

The overarching goal of this research is to contribute to the understanding of the social habitat for hunting. To address this goal we have four specific research objectives:

1. How do individuals' motivations change as they move from entry into hunting (recruitment) to continuing participation (retention)?
2. How do recruitment and retention differ for non-traditional path hunters?
3. What characteristics of WMAs drive hunter participation?
4. How do preferences for WMA characteristics differ between target species group?

To address these objectives, we prepared two separate chapters for journal submission. In Chapter 2, we explored the recruitment and retention of Non-Traditional Public Land Hunters. This chapter has been formatted and will be submitted as a manuscript to Human Dimensions of Wildlife for Publication. In chapter 3, we modelled hunter preferences for the system of Wildlife

Management Areas in Alabama. Chapter 4 synthesizes the key findings and implications of each chapter and provides suggestions for future research related to R3. This chapter is followed by 2 appendices that contain detailed methodology and survey design and the survey questionnaire.

## References

- Bhandari, P., Stedman, R. C., Luloff, A. E., Finley, J. C., & Diefenbach, D. R. (2006). Effort versus motivation: factors affecting antlered and antlerless deer harvest success in Pennsylvania. *Human Dimensions of Wildlife*, 11(6), 423-436.
- Bryan, H. (1977). Leisure value systems and recreational specialization: The case of trout fishermen. *Journal of leisure research*, 9(3), 174-187.
- Crawford, D. W., Jackson, E. L., & Godbey, G. (1991). A hierarchical model of leisure constraints. *Leisure sciences*, 13(4), 309-320.
- Cordell, H. K., Betz, C. J., & Green, G. T. (2008). Nature-based outdoor recreation trends and wilderness. *International Journal of Wilderness*, 14, 7-13.
- Decker, Daniel J., et al. "Theoretical developments in assessing social values of wildlife: toward a comprehensive understanding of wildlife recreation involvement." *Valuing wildlife: Economic and social perspectives* (1987): 76-95.
- Decker, Daniel J., Shawn J. Riley, and William F. Siemer, eds. *Human dimensions of wildlife management*. JHU Press, 2012
- Decker, D. J., Stedman, R. C., Larson, L. R., & Siemer, W. F. (2015). Hunting for wildlife management in America. *The Wildlife Professional*, 9(1), 26-29.
- Dillman, Don A., Jolene D. Smyth, and Leah Melani Christian. *Internet, phone, mail, and mixed-mode surveys: the tailored design method*. John Wiley & Sons, 2014.
- Hendee, J.C. 1974. A multiple-satisfaction approach to game management. *Wildlife Society Bulletin*. 2:104-113
- Hvenegaard, G. T. (2002). Birder specialization differences in conservation involvement, demographics, and motivations. *Human Dimensions of Wildlife*, 7, 21-36.
- Jackson, E. L. (Ed.) (2005). *Constraints to leisure*. State College, PA: Venture Publishing.
- Jackson, E. L. & Scott, D. (1999). *Constraints to leisure*. In E. L. Jackson & T. L. Burton (Eds.), *Leisure studies: Prospects for the twenty-first century* (pp. 167-175). State College, PA: Venture Publishing.
- Jackson, E. L. & Henderson K. A. (1995). Gender-based analysis of leisure constraints. *Leisure Sciences*, 17, 31-51.
- Karns, Gabriel R., Jeremy T. Bruskotter, and Robert J. Gates. "Explaining hunting participation in Ohio: a story of changing land use and new technology." *Human Dimensions of Wildlife* 20.6 (2015): 484-500.
- Larson, Lincoln R., et al. "Exploring the social habitat for hunting: Toward a comprehensive framework for understanding hunter recruitment and retention." *Human Dimensions of Wildlife* 19.2 (2014): 105- 122.

- Lee, J. H., & Scott, D. (2004). Measuring birding specialization: A confirmatory factor analysis. *Leisure Sciences*, 26(3), 245-260.
- Lessard, S. K., Morse, W. C., Lepczyk, C. A., & Seekamp, E. (2017). Perceptions of Whooping Cranes among waterfowl hunters in Alabama: using specialization, awareness, knowledge, and attitudes to understand conservation behavior. *Human Dimensions of Wildlife*, 1-15.
- Manfredo, Michael J., Tara L. Teel, and Kimberly L. Henry. "Linking society and environment: A multilevel model of shifting wildlife value orientations in the western United States." *Social Science Quarterly* 90.2 (2009): 407-427.
- McGuire, F. A. & O'Leary, J. T. (1992). The implications of leisure constraint research for the delivery of leisure services. *Journal of Park and Recreation Administration*, 10(2), 31-40.
- McFarlane, B. L., & Boxall, P. C. (1996). Participation in wildlife conservation by birdwatchers. *Human Dimensions of Wildlife*, 1(3), 1-14.
- Mehmood, Sayeed, Daowei Zhang, and James Armstrong. "Factors associated with declining hunting license sales in Alabama." *Human Dimensions of Wildlife* 8.4 (2003): 243-262.
- Miller, C. A., & Graefe, A. R. (2000). Degree and range of specialization across related hunting activities. *Leisure Sciences*, 22(3), 195-204.
- Mozumder, Pallab, et al. "Lease and fee hunting on private lands in the US: A review of the economic and legal issues." *Human Dimensions of Wildlife* 12.1 (2007): 1-14.
- Poudyal, Neelam, Seong Hoon Cho, and J. Michael Bowker. "Demand for resident hunting in the Southeastern United States." *Human Dimensions of Wildlife* 13.3 (2008): 158-174.
- Purdy, Ken G., Daniel J. Decker, and Tommy L. Brown. "New York's new hunters: Influences on hunting involvement from beginning to end." (1989).
- Purdy, K. G., & Decker, D. J. (1986). A longitudinal investigation of social-psychological influences on hunting participation in New York.
- Quartuch, Michael R., et al. "Exploring Nontraditional Pathways into Hunting in New York State: Implications for Recruitment and Retention." *Human Dimensions of Wildlife* 22.5 (2017): 391-405.
- Responsive Management, & National Wild Turkey Federation. (2011). Effectiveness of hunting, shooting, and fishing recruitment and retention programs: Final report. Harrisonburg, VA: Responsive Management.
- Scott, D. & Munson, W. (1994). Perceived constraints to park usage among individuals with low incomes. *Journal of Park and Recreation Administration*, 12(4), 79-96.
- Siikamäki, J. (2009). Use of time for outdoor recreation in the United States, 1965-2007. RFF Discussion Paper No., 09-18

- Searle, M. S. & Jackson, E. L. (1985). Socioeconomic variations in perceived barriers to recreation participation among would-be participants. *Leisure Sciences*, 7, 227–249.
- Shores, K. A., Scott, D., & Floyd, M. F. (2007). Constraints to outdoor recreation: A multiple hierarchy stratification perspective. *Leisure Sciences*, 29(3), 227-246.
- Stedman, R. C., et al. "Deer hunting on Pennsylvania's public and private lands: A two-tiered system of hunters?." *Human Dimensions of Wildlife* 13.4 (2008): 222-233.
- United States Census Bureau. (2012). The 2012 statistical abstract: The national data book. Retrieved from <http://www.census.gov/compendia/statab/cats/population.html>
- United States Fish and Wildlife Service. (2012). 2011 National survey of fishing, hunting, and wildlife– associated recreation: National overview. Washington, DC: US Department of the Interior, US Fish & Wildlife Service
- United States Fish and Wildlife Service. (2017). 2016 National survey of fishing, hunting, and wildlife– associated recreation: National overview. Washington, DC: US Department of the Interior, US Fish & Wildlife Service
- Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. Venture Publications.

## Chapter 2: Exploring Recruitment and Retention of Nontraditional Public Land Hunters in Alabama

### **ABSTRACT**

Recent research has addressed the possibility of new, emerging sub-populations of hunters from non-traditional groups: females, urban residents, hunters without family support, younger generations of hunters, and those that start hunting as adults. It is important for the future of hunting participation to understand what drives non-traditional hunters to start and continue hunting. We investigated the recruitment and retention for members of these non-traditional groups, and found that there are substantial differences between them and their more traditional counterparts. Data for this analysis was collected by a mail-survey sent to 4,000 hunters with public hunting license in Alabama. The survey measured age, gender, level of family support, age that respondents started hunting, and respondent location to separate traditional from non-traditional hunters. While we found substantial differences between groups, our findings suggest that recruitment and retention messages do not need to be tailored as nature-oriented motivations are highest for all groups.

### **INTRODUCTION**

Hunting participation has been declining since around the 1980s (USFWS, 2018). In the national survey recently released by the U.S. Fish & Wildlife Service (2017), it was reported that hunting participation fell by 16% from 2011 to 2016. The 16% decrease in hunting participation was accompanied by a 29% decrease in hunting related expenditures (USFWS, 2018). Hunting in the United States carries many economic and societal impacts. Hunting generates funding for state conservation agencies through license sales and corresponding matches through Pittman Robertson funds (Poudyal et al., 2008), supports rural economies (Mozumder et al, 2007), limits

the negative impacts of deer herds (Stedman et al., 2008), increases agency support from the public, and maintains traditional culture in rural areas (Larson et al., 2014). The decline in hunter participation has sparked an investment in recruitment, retention and reactivation research (R3).

The traditional hunter is a white male, socialized into hunting by a family member at a young age (Bissell, Duda, & Young, 1998). Active hunters, compared to inactive hunters, are more likely to come from this traditional pathway; social support, initiated by the hunter's father at a young age, and on the rural side of the rural-urban continuum (Responsive Management & National Shooting Sports Foundation, 2008; Purdy et al., 1989). The traditional pathways of hunter recruitment are effective and create avid hunters but have not been adequate in stemming the decline in hunter participation (Ryan & Shaw, 2011).

There has been a movement in the R3 community to embrace new, emerging sub-populations of hunters. This movement is motivated by anecdotal evidence and popular writings (Cerulli, 2012; McCaulou, 2012), that more people are entering hunting as adults without previous experience or family support, and from historically under-represented groups (e.g., females, racial/ethnic minorities, urban residents). These surmised non-traditional hunters are not following the traditional socialization into hunting. As less is known about these non-traditional hunters, it is important to investigate how their motivations and constraints differ (Larson et al., 2013). Non-traditional hunters may be driven by new motivations to hunt, such as the desire to obtain food from a "natural" source (Cerulli, 2012; McCaulou, 2012; Larson et al., 2014), wildlife conservation, and a desire to manage deer populations (Larson et al., 2014).

Multiple studies have found that male and female hunters differ in motivations to hunt (Duda et al., 1998; Oquendo, 2010), but little other analysis has been done on other non-traditional groups. Quartuch et al. (2017) explored the motivations and constraints of new



hunters entering the hunting population in New York. They sampled multiple non-traditional hunting groups - females, racial/ethnic minorities, males from suburban/urban areas, and hunters that did not grow up in a household with other hunters – and compared them with traditional hunters. They found that non-traditional hunter motivations and constraints did not differ substantively from traditional hunters.

In our analysis we explore the motivations of Non-traditional hunters as it affects both entry into hunting (recruitment) and continuing participation (retention). Motivations of hunters change over time (Larson et al., 2013), and it is important to understand that change to keep non-traditional hunters in the hunting population. In this analysis we explore the differences in recruitment and retention between the following non-traditional groups: females, individuals without family support, individuals that started hunting after the age of 18, hunters from urban and suburban areas, and hunters under the age of 35.

### ***Recruitment vs Retention***

We apply the concepts of motivations to explore the differences in recruitment and retention. Hunters find satisfaction in reasons beyond harvest as they have a wide variety of motivations for participation (Hendee, 1974). Purdy and Decker (1986) identified three primary categories of hunter motivations: achievement, affiliative, and appreciative. Achievement hunters have specific goals, such as harvesting a large antlered deer. Affiliative hunters hunt for the enjoyment of being with others. Appreciative hunters seek time in nature and scenic environments (Purdy et al., 1989). Conservation and civic oriented motivations have been included in recent investigations of hunter's motivations (Siemer, Decker, & Stedman, 2012; Larson et al., 2014; Quartuch et al., 2017). An individual's motivation to hunt is what initiates and sustains interest in hunting (Decker, Provencher, & Brown, 1984; Purdy & Decker, 1986).

An individual's motivation may change over time, so what initiates interest may not be the same as what sustains their interest (Larson et al., 2013).

## **RESEARCH OBJECTIVES**

The purpose of our study was to describe the recruitment and retention of non-traditional hunters in Alabama, using a sample of public land (WMA) hunters. Specifically we address the following research questions:

- 1) How do recruitment and retention differ for non-traditional hunting groups and their traditional counter-parts?
- 2) What are the most important factors affecting recruitment and retention?

## **METHODS**

### ***Survey Method and Sampling Frame***

A stratified random sampling method was employed to select a sample of 4,000 hunters from a list of all Alabama Wildlife Management Area hunting license holders (34,708 total) supplied by the Alabama Department of Conservation and Natural Resources (ADCNR). The list of WMA hunters was divided into four strata: 19-35 years of age, 36-50 years of age, 51+ years of age, and Non-Residents. A simple random sample (n=1,000) was selected from each of the four strata, to comprise the sample (n=4,000). We stratified by age so that we could explore differences in recruitment and retention among age cohorts, because cohort effects have been found to be the strongest driver in hunting and fishing participation (Chase, 2016).

### ***Survey Instrument and Implementation***

The survey instrument was constructed following best practices for formatting, wording, and question order to eliminate responder bias (Vaske et al., 2008). The instrument consisted of 57 questions and measured demographics, hunter behaviors, and a multitude of concepts related to R3 and Economic Impact analysis.

The survey instrument was disseminated following the Tailored Design Method (TDM) which utilizes sampling, contact, presentation and multiple mailings designed to reduce measurement and nonresponse bias and increase response rates (Dillman et al. 2014). Utilizing a full TDM, a series of four contacts were made with recipients over a ten-week time frame using an initial contact survey packet, a reminder postcard, a second survey packet, and a final email with an online-survey option.

A mail survey was selected because the mailing address was part of the license information, the length of the survey, and because respondents can give more time and thought to their answers and therefore can provide more accurate information than other survey methods (Vaske et al., 2008).

### ***Rural vs Urban***

The groups for urban vs rural analysis were determined from home addresses gathered during data collection. Counties were classified by Rural-Urban Continuum codes (RUCC) which distinguish counties by population size, degree of urbanization, and adjacency to a metro area (USDA, 2013). The classification scheme assigns one of nine codes to a county based of these criteria. RUCC were assigned to each individual based off county of residence. For the purpose of this analysis we reduced the nine codes into three categories: urban, suburban, and rural.

### ***Recruitment vs Retention***

To measure how motivations of individuals may change over time, we asked two questions: “How important were the following items for you first becoming a hunter?” and “Now that you are a hunter, how important are the following items for you continuing to be a hunter?” The first question measures the impact the items had on an individuals’ recruitment, while the second measures their impact on retention. These questions were measured on a 7-point Likert scale.

### ***Data Analysis***

The means for items affecting both recruitment and retention were compared between the non-traditional groups and their traditional counterparts, using independent sample t-tests. A paired samples t-test was used to compare the importance of an item for recruitment with its importance toward retention. These comparisons were made for all groups of interest. To compare items affecting recruitment and retention across age groups and urban/rural groups, we used a one-way ANOVA. A Tukeys post-hoc test was used to identify differences among groups. Large sample sizes can inflate statistical significance, so we used Cohen’s d to measure the relative size of the effect (Cohen, 1988).

## **RESULTS & DISCUSSION**

Of the 4,000 contacted, 966 participants responded to the survey, 869 submitted the hard copy mail version and 97 using the online option. There were 205 non-deliverable (bad addresses) and 2,829 non-respondents. The response rate for each age cohort was different, including the non-resident group. We had a response rate of 14.2% for ages 19-35, 29.7% ages 36-51, 34.5% 51+, and 21.8% for non-residents. The final response rate for the entire sample was

25.5%. We compared key demographics between respondents and non-respondents to test for non-response bias.

Most respondents began to hunt at an early age (mean=10.3 years), and the vast majority (90%) have other family members who hunt. The average number of years that respondents have been hunting in AL is 29 years. The majority are yearly resident license holders (69%), another 20% were non-resident license holders, and 11% are lifetime license holders. The most popular species to hunt were deer (84%), turkey (39%), dove (34%), squirrel (33%), wild hog (26%), and duck (21%).

The mean scores for items affecting recruitment and retention (Table 2.2) for all respondents (traditional and non-traditional) indicate that the most important items for both recruitment and retention are related to being outside. The top 3 items affecting recruitment are *the opportunity to be in nature (M=6.51)*, *the relaxation/stress relief that hunting provides (M=6.28)*, *time spent outdoors in youth (M=6.47)*. The top 3 items affecting retention are *the opportunity to be in nature (M=6.61)*, *the relaxation/stress relief that hunting provides (M=6.55)*, and *having confidence in my outdoor abilities (M=6.30)*.

For recruitment (Table 2.2) these items are followed by: *A family member/relative who taught/mentored me (M=5.98)*, *having friends who also hunt (M=5.93)*, *being part of hunting culture (M=5.89)*, *hunting is part of my family tradition (M=5.61)*, *the desire to manage the wildlife herd (M=5.20)*, *the desire to provide meat for myself/family (M=5.13)*, *having a neighbor or close family friend who taught/mentored me (M=4.60)*. Lastly, none of the group-participation items had means above 4.0: *participating in a local hunting/wildlife conservation group (M=3.70)*, *participating in a national hunting/wildlife conservation group (M=3.48)*,

*participating in groups like Scouts & 4H (M=3.14), and Summer Outdoor Youth Camps (M=2.56).*

Like recruitment, the second most important group of factors affecting retention (Table 2.2) are socially-oriented: *hunting is part of my family tradition (M=5.99), having friends who also hunt (M=5.91), and being a part of hunting culture (M=5.80)*. These items are followed in importance by *the desire to manage the wildlife herd (M=5.55) and the desire to provide meat for myself/family (M=5.32)*. Lastly, similar to recruitment, the group-participation items were scored with below-average importance: *participating in a local hunting/wildlife conservation group (M=3.99) and participating in a local hunting/wildlife conservation group (M=3.83)*.

### ***No Family Support vs Family Support***

Family provides the foundation for traditional hunting socialization, and individuals with family support are more likely to hunt at an earlier age and become more avid hunters (Larson et al., 2014; Purdy et al., 1989). Not surprisingly, we found that individuals without family support were substantially less influenced by family during recruitment (Table 2.3). The importance of a family member/relative ( $d=1.073$ ;  $p=0.000$ ) and *hunting as part of my family tradition* ( $d=0.996$ ;  $p=0.000$ ) were both substantially lower than for individuals with family support. Co-workers, friends, neighbors, and spouses are crucial sources of support for these groups. We found this to be true, as *having friends who also hunt (M=5.79) and having a neighbor/close family friend (M=4.07)*, both scored above-average importance. However, the importance of these items were not substantially different from hunters with family support.

When comparing recruitment (Table 2.3) for hunters with and without family support, many of the items are significantly lower in importance for hunters without family support,

suggesting a lack of enthusiasm during the recruitment process. If this is the case, it may be more important to consider the items that weren't significantly different between the groups. These items were *participating in groups like scouts & 4H* ( $M=2.91$ ), *Summer Outdoor Youth Camps* ( $M=2.48$ ), *having friends who also hunt* ( $M=5.79$ ) and *the opportunity to be in nature* ( $M=6.46$ ). This suggests that *the opportunity to be in nature* and *having friends who also hunt* are potentially successful recruiting messages for hunters who grew up without family support.

As individuals without family support move into the retention phase, they become more similar to individuals with family support, yet there are two substantial differences. Similarly to recruitment, *family tradition* was substantially less important ( $d=.827$ ;  $p=0.000$ ) in retention of individuals without family support (Table 2.4). The *desire to manage the wildlife herd* was substantially less important ( $d=.396$ ;  $p=0.000$ ) for hunters without family support. This is in contrast to anecdotal evidence describing non-traditional hunters as motivated by obtaining meat and conserving wildlife.

### ***Females***

Previous research has shown that women have very different motivations for hunting than men, rating motivations related to meat, nature, and family higher than others (Duda 2001; Metcalf et al., 2015). What we found supports these previous findings, and also adds to them. We found that women were substantially more motivated by *the desire to provide meat* ( $d=.626$ ;  $p=0.001$ ) and *the opportunity to be in nature* ( $d=.733$ ;  $p=0.00$ ) during retention and not recruitment (Table 2.4). We did find that males were substantially more likely to be influenced by *spending time outdoors in my youth* ( $d=.525$ ;  $p=0.006$ ) in recruitment (Table 2.3).

We found no more differences between males and females, but this is probably due to a small sample size of females (n=33). Metcalf et al. (2015) suggested that messages that portray hunting as a nature activity, centered on the family with an opportunity to acquire high quality food, may help to recruit and retain more females hunting. Our findings support this message, while adding that the importance of being in nature and obtaining meat are more important for the retention of female hunters than recruitment.

### ***Adult-Onset Hunters***

Individuals have been starting hunting as adults for many years, and like hunters without family support, often need a spouse/partner or other important non-family member to introduce them and support their entry into the hunting community (Purdy, 1989). For the recruitment (Table 2.3) of individuals that started hunting after the age of 18, *having a neighbor, or close family friend who taught/mentored me* (M=4.74) scored above-average importance. These individuals were substantially less influenced by *a family member/relative who taught/mentored me* (d=0.966; p=0.00), *hunting is a part of my family tradition* (d=1.161; p=0.00), *being a part of hunting culture* (d=0.424; p=0.00), and *spending time outdoors in my youth* (d=0.719; p=0.00). The only substantial difference during the retention (Table 2.4) of adult-onset hunters, is that *hunting as a family tradition* (d=0.565; p=0.00) was substantially less important.

Similarly to hunters without family support, scores for items affecting recruitment of adult-onset hunters were significantly lower for many items. Items that were not different during recruitment include *the opportunity to be in nature* (M=6.42), *the relaxation stress/relief that hunting provides* (M=6.00), *the desire to provide meat* (M=5.32), *having a neighbor or close family friend* (M=4.74), *participating in groups like scouts & 4H* (M=2.81), and *Summer*



*Outdoor Youth Camps* (M=2.30). This suggests that messages surrounding nature and obtaining meat will be just as effective for adult-onset hunters as they are for traditional hunters.

### ***Urban Residents***

Living in urban centers increases travel times to places with hunting opportunities (Miller & Hay, 1981; Poudyal et al., 2008). It is believed that the increase in constraints for urban residents, coupled with a transformation of cultural values (Heberlein & Ericsson, 2005; Stedman & Heberlein, 2001) and shifts in leisure settings (Kraus, 2008), is contributing to the decline in hunting participation. Using rural-urban continuum codes (RUCC) to label respondents as “rural”, “suburban”, or “urban”, we compared recruitment and retention for the three groups (Tables 2.7 & 2.8). We however, did not find any significant differences between the groups. Perhaps investigating differences between urban, suburban, and rural hunters requires a finer spatial scale than the county-level.

### ***Age Groups***

We stratified our sample by age so that we could get an adequate sample of young hunters. Most hunters are old, more than half of them are 45 years or older (USFWS, 2018) and will soon age out of the hunting population, therefore the age composition of the hunter population is about to change considerably (Responsive Management, 2017). The baby boom generation is substantially more likely to hunt than younger generations, especially those born after 1980 (Winkler and Warnke, 2011). A significant amount of research has been done on the leisure preferences of millennial generation and there seems to be challenges to recruiting and retaining them as hunters.

Children's leisure time is shrinking (Louv, 2005), and youth are spending more of that leisure time with electronic media (Vahlberg, 2010). The increased usage of electronic media is problematic for hunting participation, as technological usage negatively impacts an individual's likelihood of hunting (Robison & Ridenour, 2012). There are many challenges with recruiting and retaining the millennial generation: higher technological aptitude, expectation of immediate reward for effort, and sheltered from threatening environments (Millenbah and Wolter, 2009). Despite the challenges to recruiting millennials, they are an important group to target, as they are now seen as the solution to increasing hunting participation, with multiple popular media articles citing the need for "millennial hunters" (New York Times, Fox News). We however, only found a few significant differences between age groups (Table 2.5 & Table 2.6).

*The desire to provide meat* was significantly lower for the oldest age cohort (51+ years old) for both recruitment ( $p=0.023$ ) and retention ( $p=0.00$ ). The oldest age cohort also cared less about *managing the wildlife herd* ( $p=0.044$ ). The importance of scouts/4H in recruitment was significantly higher ( $p=0.00$ ) for the oldest age cohort, but the mean importance of this item ( $M=3.41$ ) was below 4.0, and thus is not considered "important" to hunters.

## **CONCLUSION**

We found that there are some substantial differences between non-traditional and traditional hunters, and there are differences on items' impacts during recruitment and retention. However, there were very few variables that were substantially more important for non-traditional groups than for traditional hunters. Because of this, we support Quartuch et al. (2017) in their conclusion that non-traditional hunters do not differ substantially in their motivations, and we can add that this is true for recruitment and retention.

We found that the most important items affecting recruitment and retention, for all groups, are nature-oriented. This suggests that there is little need for messages targeting non-traditional hunters to differ widely from messages targeting traditional hunters. Agencies trying to recruit, retain, or reactivate hunters should focus on the nature-oriented benefits that hunters seek.

Although we did not find many items that were substantially more important for non-traditional groups, it is helpful to know which items resonate with non-traditional hunters as well as they do for traditional hunters. For example, messages towards adult-onset hunters and hunters without family support should avoid messages and programs centered on family and culture, but should instead focus on the enjoyment of nature, harvesting your own meat, and hunting with friends.

## REFERENCES

- Bissell, S. J., Duda, M. D., & Young, K. C. (1998). Recent studies on hunting and fishing participation in the United States. *Human Dimensions of Wildlife*, 3(1), 75–80. <https://doi.org/10.1080/10871209809359118>
- Cerulli, T. (2012). *The Mindful Carnivore: A Vegetarian's Hunt for Sustenance*. Open Road Media.
- Chase, L. (2018, October 21). Disappearance of Hunting and Fishing – Chase Statistics. Retrieved March 11, 2019, from <http://chasestatistics.com/huntdecline/>
- Cohen, J. (1988). Statistical power analysis for the behavioral sciences. *LEA*.
- Deabler, A. (2019, January 10). Hunters turn to hipsters to help boost sport's declining numbers [Text.Article]. Retrieved February 25, 2019, from <https://www.foxnews.com/great-outdoors/hunters-turn-to-hipsters-to-help-boost-sports-declining-numbers>
- Decker, D. J., Provencher, R. W., & Brown, T. L. (1984). Antecedents to Hunting Participation: An Exploratory Study of the Social-Psychological Determinants of Initiation, Continuation, and Desertion in Hunting.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: the tailored design method*. John Wiley & Sons.
- Duda, M. D. (2001, November). The hunting mind: Women and hunting. *North American Hunter*. Retrieved from <http://www.responsivemanagement.com/download/reports/NAHWomen.pdf> Metcalf 2015
- Duda, M. D., Bissell, S. J., & Young, K. C. (1998). Wildlife and the American mind: public opinion on and attitudes toward fish and wildlife management. *Responsive Management, Harrisonburg, Virginia, USA*.
- Fish, & Wildlife Service (US) (Eds.). (2018). *2016 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*. Fish & Wildlife Service.
- Gigliotti, L. M., & Metcalf, E. C. (2016). Motivations of Female Black Hills Deer Hunters. *Human Dimensions of Wildlife*, 21(4), 371–378. <https://doi.org/10.1080/10871209.2016.1157714>
- Heberlein, T. A., & Ericsson, G. (2005). Ties to the Countryside: Accounting for Urbanites Attitudes toward Hunting, Wolves, and Wildlife. *Human Dimensions of Wildlife*, 10(3), 213–227. <https://doi.org/10.1080/10871200591003454>
- Hendee, J. C. (1974). A Multiple-Satisfaction Approach to Game Management. *Wildlife Society Bulletin (1973-2006)*, 2(3), 104–113.
- Kraus, R. (2008). *Recreation and leisure in modern society*. New York, NY: Jones & Bartlett.
- Larson, L. R., D. J. Decker, R. C. Stedman, W. F. Siemer, M. S. Baumer, and J. W. Enck. 2013. Hunter Recruitment and Retention in New York: A Framework for Research and Action. Human Dimensions Research Unit Series Publication 13-04. Department of Natural Resources, Cornell University, Ithaca, N.Y. 72pp.

- Larson, L. R., Stedman, R. C., Decker, D. J., Siemer, W. F., & Baumer, M. S. (2014). Exploring the Social Habitat for Hunting: Toward a Comprehensive Framework for Understanding Hunter Recruitment and Retention. *Human Dimensions of Wildlife*, 19(2), 105–122. <https://doi.org/10.1080/10871209.2014.850126>
- Louv, Richard. (2005) *Last child in the woods: saving our children from nature-deficit disorder* Chapel Hill, NC: Algonquin Books of Chapel Hill,
- McCaulou, L. R. (2012). *Call of the Mild: Learning to Hunt My Own Dinner*. Grand Central Publishing.
- Metcalf, E. C., Graefe, A. R., Trauntvein, N. E., & Burns, R. C. (2015). Understanding Hunting Constraints and Negotiation Strategies: A Typology of Female Hunters. *Human Dimensions of Wildlife*, 20(1), 30–46. <https://doi.org/10.1080/10871209.2015.957366>
- Millenbah, K. F., & Wolter, B. H. K. (2009). The Changing Face of Natural Resources Students, Education, and the Profession. *The Journal of Wildlife Management*, 73(4), 573–579. <https://doi.org/10.2193/2008-318>
- Miller, J. R., & Hay, M. J. (1981). Determinants of Hunter Participation: Duck Hunting in the Mississippi Flyway. *American Journal of Agricultural Economics*, 63(4), 677–684. <https://doi.org/10.2307/1241210>
- Mozumder, P., Starbuck, C. M., Berrens, R. P., & Alexander, S. (2007). Lease and Fee Hunting on Private Lands in the U.S.: A Review of the Economic and Legal Issues. *Human Dimensions of Wildlife*, 12(1), 1–14. <https://doi.org/10.1080/10871200601107817>
- Oquendo, V. C. (2010). *Effect of gender on Mississippi hunter motivations and substitutability of hunting*. Mississippi State University.
- Poudyal, N., Cho, S. H., & Bowker, J. M. (2008). Demand for Resident Hunting in the Southeastern United States. *Human Dimensions of Wildlife*, 13(3), 158–174. <https://doi.org/10.1080/10871200801922965>
- Purdy, K. G., & Decker, D. J. (1986). A longitudinal investigation of social-psychological influences on hunting participation in New York.
- Quartuch, M. R., Stedman, R. C., Decker, D. J., Larson, L. R., Siemer, W. F., & Baumer, M. S. (2017). Exploring Nontraditional Pathways Into Hunting in New York State: Implications for Recruitment and Retention. *Human Dimensions of Wildlife*, 22(5), 391–405. <https://doi.org/10.1080/10871209.2017.1334247>
- Responsive Management/National Shooting Sports Foundation. (2008). The future of hunting and the shooting sports: Research-based recruitment and retention strategies. *Produced for the US Fish and Wildlife Service under Grant Agreement CT-M-6-0*.
- Robison, K. K., & Ridenour, D. (2012). Whither the Love of Hunting? Explaining the Decline of a Major Form of Rural Recreation as a Consequence of the Rise of Virtual Entertainment and Urbanism. *Human Dimensions of Wildlife*, 17(6), 418–436. <https://doi.org/10.1080/10871209.2012.680174>

- Ryan, E. L., & Shaw, B. (2011). Improving Hunter Recruitment and Retention. *Human Dimensions of Wildlife*, 16(5), 311–317. <https://doi.org/10.1080/10871209.2011.559530>
- Severson, K. (2019, February 11). A New Breed of Hunters Focuses on the Cooking. *The New York Times*. Retrieved from <https://www.nytimes.com/2019/02/05/dining/game-hunting-food.html>
- Siemer, W. F., Decker, D. J., & Stedman, R. C. (2012). Cornell University lands deer hunting program: Profile of active participants in 2011.
- Stedman, R. C., & Heberlein, T. A. (2001). Hunting and rural socialization: Contingent effects of the rural setting on hunting participation. *Rural sociology*, 66(4), 599-617.
- Stedman, R. C., Bhandari, P., Luloff, A. E., Diefenbach, D. R., & Finley, J. C. (2008). Deer Hunting on Pennsylvania's Public and Private Lands: A Two-Tiered System of Hunters? *Human Dimensions of Wildlife*, 13(4), 222–233. <https://doi.org/10.1080/10871200802010513>
- Vahlberg, V. (2010). Fitting into their lives: A survey of three studies about youth media usage. Retrieved from [http://www.americanpressinstitute.org/docs/foundation/research/fitting\\_into\\_their\\_lives.pdf](http://www.americanpressinstitute.org/docs/foundation/research/fitting_into_their_lives.pdf)
- Vaske, J. J. (2008). *Survey research and analysis: Applications in parks, recreation and human dimensions*. Venture Pub.
- Winkler, R., & Warnke, K. (2013). The future of hunting: an age-period-cohort analysis of deer hunter decline. *Population and Environment*, 34(4), 460–480. <https://doi.org/10.1007/s11111-012-0172-6>

**Table 2.1** Descriptives of non-traditional hunting groups

	All		No Family Support		Females		Adult-Onset Hunters		Urban Residents		19-35 Years Old	
<b>Sex</b>												
Male	904	96.5%	90	100%	0	0%	61	76.3%	250	93.6%	146	93.6%
Female	33	3.4%	0	0%	33	100%	19	23.8%	9	3.4%	10	6.4%
Total	937	-	90	-	33	-	80	-	259	-	156	-
<b>Age</b>												
19-35	156	16.7%	13	14.4%	10	30.3%	18	22.5%	46	18.7%	156	100%
36-50	310	33.1%	19	21.2%	11	33.3%	30	37.5%	84	34.1%	0	0%
51+	470	50.2%	58	64.4%	12	36.4%	32	40.0%	116	47.2%	0	0%
Total	936	-	90	-	33	-	80	-	246	-	156	-
<b>Income</b>												
Less than 50k	222	24.4%	25	29.1%	8	25.0%	18	23.1%	61	24.7%	51	33.6%
50-100k	378	41.6%	33	38.4%	14	43.8%	33	42.3%	84	34.0%	59	38.8%
100k +	308	33.9%	28	32.6%	10	31.3%	27	34.6%	102	41.3%	42	27.6%
Total	908	-	86	-	32	-	78	-	247	-	152	-
<b>Race/Ethnicity</b>												
White/Caucasian	891	95.4%	88	97.8%	32	97.0%	80	100%	249	96.1%	151	97.4%
Latino	3	0.3%	0	0%	0	0%	0	0%	1	0.4%	0	0%
Black/African	4	0.4%	1	1.1%	0	0%	0	0%	1	0.4%	1	0.6%
Asian	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Native American	25	2.7%	1	1.1%	1	3%	0	0%	4	1.5%	2	1.3%
Other	11	1.2%	0	0%	0	0%	0	0%	4	1.5%	1	0.6%
Total	936	-	90	-	33	-	80	-	259	-	155	-

**Table 2.2** Mean scores for items affecting recruitment and retention of all respondents (traditional and non-traditional)

<b>Rank</b>	<b>Recruitment</b>		<b>Retention</b>	
1	The opportunity to be in nature	6.51	The opportunity to be in nature	6.61
2	Spending time outdoors in my youth	6.47	The relaxation/stress relief hunting provides	6.55
3	The relaxation/stress relief hunting provides	6.28	Having confidence in my abilities outdoors	6.30
4	Having confidence in my abilities outdoors	6.15	Hunting is part of my family tradition	5.99
5	A family member/relative who taught/mentored me	5.98	Having friends who also hunt	5.91
6	Having friends who also hunt	5.93	Being part of hunting culture	5.80
7	Being part of hunting culture	5.89	The desire to manage the wildlife herd	5.55
8	Hunting is part of my family tradition	5.61	The desire to provide meat for myself/family	5.32
9	The desire to manage the wildlife herd	5.20	Participating in a local hunting/wildlife conservation group	3.99
10	The desire to provide meat for myself/family	5.13	Participating in a local hunting/wildlife conservation group	3.83
11	Having a neighbor, or close family friend who taught/mentored me	4.60		
12	Participating in a local hunting/wildlife conservation group	3.70		
13	Participating in a national hunting/wildlife conservation group	3.48		
14	Participating in groups like Scouts & 4H	3.14		
15	Summer Outdoor Youth Camps	2.56		



**Table 2.3** Comparing recruitment across non-traditional hunting groups

	<b>Family Support (n=842)/No Family Support (n=91)</b>	<b>Male (n=895)/Female (n=33)</b>	<b>Early Starters (n=866)/Adult Onset Hunters (n=83)</b>
<b>The opportunity to be in nature</b>	6.51/6.46 p= .612 d= .056	6.51/6.73 .042* .374	6.51/6.42 .428 .092
<b>Spending time outdoors in my youth</b>	6.54/5.91 .002* .356	6.53/5.64 .006* .525*	6.60/5.12 .000* .719*
<b>The relaxation/stress relief hunting provides</b>	6.34/5.77 .000* .322	6.30/6.18 .587 .096	6.30/6.00 .066 .213
<b>A family member/relative who taught/mentored me</b>	6.24/3.63 .000* 1.073*	5.99/6.39 .120 0.283	6.19/3.71 .000* 0.966*
<b>Having confidence in my abilities outdoors</b>	6.20/5.73 .007* 0.304	6.18/6.00 .434 .138	6.18/5.81 .011* .294
<b>Having friends who also hunt</b>	5.96/5.79 .321 .110	5.98/5.22 .062 .343	5.98/5.42 .007* .315
<b>Being part of hunting culture</b>	5.95/5.29 .002* .356	5.92/5.61 .270 .196	5.97/5.17 .000* .424*
<b>Hunting is part of my family tradition</b>	5.83/3.40 .000* 0.996	5.67/5.15 .224 .219	5.86/3.08 .000* 1.161*
<b>The desire to manage the wildlife herd</b>	5.31/4.28 .000* 0.488*	5.20/5.39 .574 .100	5.24/4.75 .025* .257
<b>The desire to provide meat for myself/family</b>	5.21/4.52 .004* 0.325	5.13/5.52 .265 .199	5.12/5.32 .314 .116
<b>Having a neighbor, or close family friend who taught/mentored me</b>	4.66/4.07 .013* .274	4.62/4.50 .756 .055	4.59/4.74 .551 .057
<b>Participating in a local hunting/wildlife conservation group</b>	3.76/3.20 .010* .280	3.70/3.91 .556 .105	3.74/3.25 .031* .248

<b>Participating in a national hunting/wildlife conservation group</b>	3.53/3.12 .067 .202	3.49/3.36 .720 .063	3.53/3.06 .043* .232
<b>Participating in groups like Scouts &amp; 4H</b>	3.16/2.91 .309 0.11	3.13/3.06 .865 .030	3.16/2.81 .156 .163
<b>Summer Outdoor Youth Camps</b>	2.58/2.48 .635 .052	2.53/3.03 .153 .254	2.58/2.30 .204 .146

Notes: Responses measured on a scale of 1 (not at all important) to 7 (very important); \*p < .05;  
\*Cohen's d > 0.4

**Table 2.4** Comparing retention across non-traditional hunting groups

	<b>Family Support (n=841)/No Family Support (n=93)</b>	<b>Male (n=896)/Female (n=33)</b>	<b>Early Starters (n=866)/Adult Onset Hunters (n=84)</b>
The opportunity to be in nature	6.63/6.46 p= .137 d= .164	6.61/6.91 .000* .733*	6.62/6.50 .320 .115
The relaxation/stress relief hunting provides	6.58/6.38 .119 .172	6.57/6.55 .897 .0228	6.58/6.25 .025* .259
Having confidence in my abilities outdoors	6.31/6.23 .501 .074	6.32/6.33 .942 .0129	6.31/6.28 .830 .025
Hunting is part of my family tradition	6.17/4.28 .000* .827*	6.00/6.12 .689 .071	6.11/4.82 .000* .565*
Having friends who also hunt	5.94/5.60 .196 .196	5.95/5.52 .207 .230	5.95/5.57 .055 .223
Being part of hunting culture	5.83/5.53 .101 .179	5.81/5.94 .658 .0785	5.84/5.44 .037* .239
The desire to manage the wildlife herd	5.63/4.87 .000* .396	5.55/5.88 .283 .190	5.57/5.26 .120 .177
The desire to provide meat for myself/family	5.35/5.11 .241 .128	5.29/6.24 .001* 0.626*	5.28/5.73 .038* .237
Participating in a local hunting/wildlife conservation group	4.02/3.80 .344 .103	4.00/4.21 .558 .104	4.02/3.76 .273 .126
Participating in a national hunting/wildlife conservation group	3.83/3.86 .916 .011	3.82/4.03 .566 .101	3.84/3.67 .453 .086

Notes: Responses measured on a scale of 1 (not at all important) to 7 (very important); \*p < .05;

\*Cohen's d>0.4

**Table 2.5** Comparing recruitment across age cohorts

	<b>19-35 (n=155)</b>	<b>36-50 (n=307)</b>	<b>51+ (n=431)</b>	<b>P-Value</b>
The opportunity to be in nature	6.50	6.53	6.50	.927
Spending time outdoors in my youth	6.49	6.58	6.45	.319
The relaxation/stress relief hunting provides	6.20	6.33	6.30	.568
A family member/relative who taught/mentored me	6.15	6.07	5.93	.340
Having confidence in my abilities outdoors	5.97a	6.14ab	6.25b	.060
Having friends who also hunt	5.79	6.03	5.98	.269
Being part of hunting culture	5.79	5.98	5.86	.455
Hunting is part of my family tradition	5.62	5.65	5.67	.956
The desire to manage the wildlife herd	5.32	5.25	5.19	.768
The desire to provide meat for myself/family	5.34	5.34	4.98	.023*
Having a neighbor, or close family friend who taught/mentored me	4.72	4.68	4.54	.599
Participating in a local hunting/wildlife conservation group	3.81	3.66	3.74	.741
Participating in a national hunting/wildlife conservation group	3.67	3.40	3.51	.408
Participating in groups like Scouts & 4H	2.58a	3.02ab	3.41b	.000*
Summer Outdoor Youth Camps	2.52	2.45	2.66	.355

Notes: Responses measured on a scale of 1 (not at all important) to 7 (very important); \*p < .05; Means with different subscripts are statistically different (Tukey's HSD test)

**Table 2.6** Comparing retention across age cohorts

	<b>19-35 (n=155)</b>	<b>36-50 (n=308)</b>	<b>51+ (n=432)</b>	<b>P-Value</b>
The opportunity to be in nature	6.71	6.64	6.55	.099
The relaxation/stress relief hunting provides	6.65	6.59	6.52	.309
Having confidence in my abilities outdoors	6.25	6.39	6.29	.379
Hunting is part of my family tradition	6.10	6.07	5.91	.310
Having friends who also hunt	6.01	5.96	5.90	.717
Being part of hunting culture	5.83	5.85	5.77	.815
The desire to manage the wildlife herd	5.83a	5.63ab	5.44b	.044*
The desire to provide meat for myself/family	5.68a	5.58a	5.04b	.000*
Participating in a local hunting/wildlife conservation group	4.10	4.13	3.85	.148
Participating in a national hunting/wildlife conservation group	3.97	3.89	3.71	.295

Notes: Responses measured on a scale of 1 (not at all important) to 7 (very important); \*p < .05; Means with different subscripts are statistically different (Tukey's HSD test)

**Table 2.7** Comparing recruitment across urban/rural groups

	<b>Urban (n=261)</b>	<b>Suburban (n=332)</b>	<b>Rural (n=153)</b>	<b>P-Value</b>
The opportunity to be in nature	6.45	6.58	6.50	.238
Spending time outdoors in my youth	6.46	6.47	6.50	.923
The relaxation/stress relief hunting provides	6.20	6.38	6.25	.227
A family member/relative who taught/mentored me	5.98	6.03	5.91	.796
Having confidence in my abilities outdoors	6.10	6.22	6.12	.455
Having friends who also hunt	5.94	5.90	5.91	.932
Being part of hunting culture	5.79	5.98	5.88	.323
Hunting is part of my family tradition	5.47	5.71	5.67	.315
The desire to manage the wildlife herd	5.09	5.19	5.50	.098
The desire to provide meat for myself/family	5.02	5.21	5.39	.145
Having a neighbor, or close family friend who taught/mentored me	4.40	4.65	4.93	.059
Participating in a local hunting/wildlife conservation group	3.56	3.80	3.79	.289
Participating in a national hunting/wildlife conservation group	3.39	3.51	3.56	.675
Participating in groups like Scouts & 4H	2.96	3.16	3.39	.160
Summer Outdoor Youth Camps	2.47	2.51	2.63	.728

Notes: Responses measured on a scale of 1 (not at all important) to 7 (very important); \*p < .05; Means with different subscripts are statistically different (Tukey's HSD test)

**Table 2.8** Comparing recruitment across urban/rural groups

	<b>Urban (n=261)</b>	<b>Suburban (n=332)</b>	<b>Rural (n=153)</b>	<b>P-Value</b>
The opportunity to be in nature	6.58	6.67	6.60	.424
The relaxation/stress relief hunting provides	6.42	6.62	6.57	.029*
Having confidence in my abilities outdoors	6.28	6.32	6.33	.894
Hunting is part of my family tradition	5.94	6.03	6.07	.687
Having friends who also hunt	5.83	5.91	5.97	.655
Being part of hunting culture	5.69	5.86	5.88	.367
The desire to manage the wildlife herd	5.44	5.56	5.82	.097
The desire to provide meat for myself/family	5.22	5.39	5.58	.156
Participating in a local hunting/wildlife conservation group	3.87	4.13	4.09	.262
Participating in a national hunting/wildlife conservation group	3.75	3.94	3.85	.550

Notes: Responses measured on a scale of 1 (not at all important) to 7 (very important); \*p < .05; Means with different subscripts are statistically different (Tukey's HSD test)

## Chapter 3: Modelling hunter preferences for the system of Wildlife Management Areas in Alabama

### **ABSTRACT**

The United States has been facing a decline in the number of licensed hunters since approximately 1980, posing a serious threat to state conservation agencies who receive funding from hunting license sales. In Alabama, hunting supports thousands of jobs, both rural and urban, with 535,000 people hunting in the state each year and spending \$1.1 billion. To combat the decline in participation, state agencies have increased use of recruitment, retention, and reactivation (R3) programs. In order to develop effective R3 programs, agencies need to understand the preferences that hunters have for different attributes of the hunting experience (proximity to home, game, hunting method, etc.). The goal of this analysis is to understand hunter's preferences for hunting individual units within the system of thirty-six different wildlife management areas (WMAs) in Alabama and how those preferences differ across user groups. Data were obtained from a 2018 mail survey sent to 4,000 hunters with an Alabama WMA license. The survey was used to determine hunter's individual-level motivations and constraints, while also obtaining the frequency and distribution of all their WMA hunting trips (n= 9,566) during the previous hunting season (2017-2018). The responses were geocoded to the respondent's home address, allowing for spatial analysis using ArcGIS. Respondent locations and WMA locations were added to a road network, and distances between every in-state respondent (n=757) and WMA (n=36) was calculated using an Origin-Destination Cost Matrix in ArcGIS. We employed a use/availability model with logistic regression to determine the WMA characteristics driving WMA use. We found that proximity to home was the primary driver, but size of WMA and other setting characteristics were also significant variables in our model. We also found that the effects of WMA characteristics differed by the species targeted and thus performed separate analyses for the groups.



## INTRODUCTION

The majority of hunting takes place on private land. Of the 11.5 million individuals that hunted in 2016, 64% of them didn't hunt on publicly owned land. However, it is becoming more difficult for hunters to find access to private land to hunt on (Brown, Messmer, & Decker, 2001; Jagnow 2006; Lauber & Brown, 2000; Responsive Management, 2004). Urbanization is the primary driver for this loss of access (Stedman 2008), through both cultural change (Zinn, 2003) and parcelization, the breaking apart of the landscape (Brown et al., 2001). Parcelization leads to smaller lot sizes, which means fewer hunting-viable lots exist. Also, landowners in urbanizing areas are less likely to allow hunting on private land (Conover & Messmer, 2001; Jagnow et al., 2006). The decrease in private land available for hunting indicates that public land will take on an increasingly important role for providing hunting opportunities (Larson et al., 2013).

Although most hunting takes place on private land, public hunting land already plays an important role in hunting. Poudyal et al. (2008) explored the demand for hunting across the southeast to identify items critical to maintaining a hunter population and found that having a higher amount of public hunting land within 100 miles leads to higher hunting demand.

Although public land is important, it may not offer adequate hunting opportunities, and lack of quality public hunting land has been attributed to declining hunting participation (Adams et al., 2004). Inadequacy of hunting opportunities are caused by lack of places to hunt, crowding and conflict, poor quality habitat, and perceived scarcity of game (Brunke & Hunt, 2007; Heberlein & Kuentzel, 2002; Miller & Vaske, 2003; Responsive Management & National Shooting Sports Foundation, 2008)

Larson et al. (2013) cited the need for research to identify ways to enhance the hunting experience on public land to accommodate for the growing lack of access to private land. In

order to improve the public hunting experience managers must understand hunter preferences for public land. Not much is known about the preferences hunters have for public hunting sites, but a significant amount of research has been done on preferences for private hunting leases.

Lancaster's (1966) consumer demand theory states that consumers derive utility from the characteristics of the good, rather than the composite good. Many studies have used attributes based methods, centered on Lancaster's consumer demand theory, to examine the attributes of private hunting leases that influence an individual's choice. Mackenzie (1990) found that Delaware deer hunters were more likely to select closer, less-congested sites. Boxall et al. (1996) found that site congestion, moose populations, and hunter access affected moose hunter site preferences. Another study found that proximity to residence, forestry activity, hunter access, and site congestion influenced preferences of outdoor recreationists (Boxall and Macnab, 2000). Hussain et al. (2003) found that hunter access and harvest success influenced the willingness to pay for hunting leases in Alabama. Hussain et al. (2010) found that hunters in Mississippi selected hunting leases that had more game diversity, were closer to home, were longer, and were between 500 and 1000 acres. Mingie et al. (2017) used attribute methods to explore the attributes that influence hunting club membership, and found that hunters preferred more acreage and fewer club members.

Other non-market methods of analyzing hunter preferences include contingent valuation and hedonic price modelling. These methods have been used to evaluate the relationship between lease size and lease rate (Hussain et al., 2007; Shrestha and Alavalapati, 2004; Rhyne et al., 2009) or hunting club dues (Livengood, 1983; Pope and Stoll, 1985), site congestion and site choice (Gan and Luzar, 1993; Hussain et al., 2003). Munn et al. (2011) found that crowding increased the likelihood that hunters would choose private leases over public sites.

The methods used to examine lease and hunting club attributes can be used to analyze hunter preferences for public hunting sites. Though these studies have highlighted preferences relating to the public hunting experience, none of them have studied the effects that attributes have within a system of public hunting sites. Instead of a stated preference model, with hypothetical choice sets, we developed a revealed preferences model using setting attributes and actual visitation data for the WMA systems to understand setting selection. The attributes in our model include factors found to be important in private lease and hunting membership choice: distance, game diversity, and size. Our model also includes variables specific to WMAs: regulations, facilities, and overnight accommodations. Revealed preference models have added validity because they study real-life behaviors, but are less flexible in the variables they can include. We were not able to include variables such as site congestion and harvest success, because they are difficult to measure for each hunting site.

### *System of WMAs*

It has been suggested that a systems approach should be used when studying site selection (Hunt, 2005). A systems approach allows for the understanding of how actions at one site may impact recreation choices at many sites. This is particularly useful to state agencies managing public hunting lands, as changes in regulations or hunting quality at a site often have complex consequences. Secondly, managers could use this information to change setting characteristics with the goal of motivating effort shifts by hunters in order to manage for crowding, conflict, and over-hunting at the different sites.

The system of WMAs in Alabama consists of 36 sites, offering over 720,000 acres of public hunting land opportunities for all. The WMAs are financed with funds derived from hunting license sales and a federal excise tax on firearms and ammunition. With a WMA license,

purchased for \$17/year, hunters can hunt any WMA they prefer. The state of Alabama has a variety of hunting opportunities to offer, the northern part of Alabama contains the foothills of the Appalachians while the South falls in the coastal plain. The WMAs are located throughout the state and capture this diversity. WMAs are also unique in their size, regulations, available species, road access, facilities, nearby amenities, level of crowding and quality of harvest opportunity.

## **RESEARCH OBJECTIVES**

Our research objective is to understand the preferences that hunters have for different attributes of WMAs, and how these preferences vary across target species. Specifically, we address the following research questions:

- 1) What characteristics of WMAs drive hunter participation?
- 2) How do preferences for WMA characteristics differ between target species groups?

## **METHODS**

### ***Survey Method***

The survey instrument was constructed following best practices for formatting, wording, and question order to eliminate responder bias (Dillman, 2014). The instrument consisted of 57 questions and measured multiple items related to participation, recruitment and retention, behavior, motivations and constraints to hunting, WMA use, and demographics. For this analysis, respondents were asked which, if any, of the 36 WMAs they visited during the 2017-2018 season, as well as the frequency of visits to those WMAs. The survey instrument measured the type of game hunted for to account for varying WMA preferences by target species (Table 3.1). Utilizing the Tailored Design Method (TDM) a series of four contacts was made with

recipients over a ten-week time frame: an initial survey packet, a reminder postcard, a second survey packet, and a final email with the option to respond online (Dillman, 2014).

The Alabama Department of Conservation and Natural Resources (ADCNR) provided a random probability sample of 4,000 hunters with a WMA hunting license (out of 34,708). The sample was stratified by age: 19-35 years, 36-50 years, 51+ years, and non-residents. A total of 4,000 surveys were sent to Alabama WMA licensed hunters.

### ***WMA Setting Characteristics***

To model hunter preferences we needed to know the setting characteristics of Alabama WMAs. Many of the setting characteristics for each WMA are readily available from the ADCNR ([outdooralabama.com](http://outdooralabama.com)), such as: WMA size, type of game available, number of days open to archery (buck & choice), number of days open to guns (buck & choice), number of days open to primitive weapons, and number of days open to dog hunting.

To obtain data on WMA facilities and accommodations; we administered a survey to ADCNR staff responsible for managing the WMAs. With the aid of ADCNR, WMA managers filled out the survey regarding the different WMAs. Some WMAs were answered for in groups, due to similar characteristics. We had 31 responses regarding all 36 WMAs. However, WMAs with similar characteristics often differed in regulations and size. These differences were captured with data from ADCNR.

### ***Geocoding + Road Network***

To include the effect of distance in the model, we needed to know the distance between every WMA and every in-state respondent. Non-resident respondents were not included in our analysis, because their travel patterns are expected to be different than Alabama residents.

Respondents' addresses were geocoded at their home address, which allows us to utilize finer-scale spatial data than models that utilize point of origin at the county level. To calculate the distance between every respondent and every WMA, we created a road network in ArcGIS using primary and secondary roads (TIGER/LINE, 2017). Distance between individuals (origin) and WMAs (destination) along the road network was then calculated using an Origin-Destination Cost Matrix in ArcGIS.

## **DATA ANALYSIS**

### ***Resource Selection Function***

We used a resource selection function (RSF) to model the selection of WMAs by our hunter sample. RSFs are frequently used to characterize the selection of resources by animals, however the same approach is applicable to modelling the use of resources by humans. A RSF is defined as any model that yields values proportional to the probability of use of a resource unit (Manly et al., 2007). In our analysis, the hunters are selecting WMAs based on the resources available (facilities, regulations, campsites, etc.), and thus our model yields the values proportional to the probability of use based on the resources available. The statistical model for our sampling design is a binomial generalized linear model (GLM), where sites the hunter visited were scored with a 1 and a random sample of available sites were scored with a 0.

We generated our use/availability dataset with 7,780 trip observations collected from our survey, from 513 in-state respondents during the 2017-2018 season. However, due to lack of information, 19 individuals (and 236 trip observations) were not able to be included in the analysis. The remaining 7,544 trip observations were scored with a 1, and an equal number random sample of available sites were scored with a 0. The resulting dataset had 15,088

observations, 50% of rows containing information on ‘used’ sites and 50% containing information on ‘available’ sites.

Our dataset contained 19 site-defining variables (Table 3.2). We had obtained variables related to schedule/regulations (6), type of game (4), facilities (5), overnight accommodations (2), WMA size, and distance. We removed 7 of the 19 variables from consideration due to lack of variance or lack of univariate significance. We removed 4 variables due to lack of variance between WMAs: nearly all WMAs allowed deer and dove hunting, too few WMAs allowed dog hunting, and too few WMAs had a game cleaning station. We then removed 3 WMAs due to lack of univariate significance: Arch\_Choice, Arch\_Buck, and Gun\_Buck. The amount of days open to gun hunting (bucks and does) and primitive weapon hunting were the only significant predictors of visitation.

Forward stepwise regression was used to identify variables as candidates for our model of WMA use. This method allowed us to sequentially include variables based on Pearson’s correlation considerations until none improves the model, while also allowing for the removal of variables that lose statistical significance. Applying this forward and backward stepwise technique to the variables reported in Table 3.2, the predictor variables in Table 3.3 were included in our model.

## **RESULTS**

### ***Regression Analysis***

The final model contains 12 predictor variables, and 5 interactions between the variables. The results of the final model are presented in Table 3.3, but to assist with interpretation of our results, we separated the effects for deer hunters, turkey hunters, and duck hunters (Table 3.4).

The effect of distance was a negative predictor in our model, and we found a significant interaction between distance and duck hunters. For each 10 additional kilometers distance a WMA was from the hunter's residence, deer hunters were 0.808 (0.805-0.817; 95% CL) times as likely to visit, turkey hunters were 0.807 (0.797-0.817; 95% CL) times as likely to visit, and duck hunters were 0.844 (0.737-0.964; 95% CL) times as likely to visit.

The effect of size was a positive predictor in our model, and we found a significant interaction between WMA size and duck hunters. For each 10 km<sup>2</sup> increase in WMA size, deer hunters were 1.073 (1.062-1.083; 95% CL) times as likely to visit, turkey hunters were 1.082 (1.068-1.009; 95% CL) times as likely to visit, and duck hunters were 1.004 (1.020-1.061; 95% CL) times as likely to visit.

The presence of turkey was a positive predictor in our model, and we found a significant interaction between presence of turkey and duck hunters. WMAs with turkey were 1.429 (1.114-1.833; 95% CL) times as likely to be visited by deer hunters, 1.496 (1.067-2.096; 95% CL) times as likely to be visited by turkey hunters, and 0.461 (0.324-0.746; 95% CL) times as likely to be visited by duck hunters.

The presence of duck was a positive predictor in our model, and we found a significant interaction between presence of duck and duck hunters. WMAs with ducks were 2.085 (1.795-2.422; 95% CL) times as likely to be visited by deer hunters, 2.244 (1.067-2.096; 95% CL) times as likely to be visited by turkey hunters, and 3.728 (2.842-4.892; 95% CL) times as likely to be visited by duck hunters.

The number of gun choice days (gun hunting for bucks or does) a WMA had was a positive predictor of WMA visitation, and we found a significant interaction between gun choice



days and deer hunters. For each additional gun choice day a WMA had, deer hunters were 1.034 (1.023-1.045; 95% CL) times as likely to visit, turkey hunters were 1.028 (1.013-1.043; 95% CL) times as likely to visit, and the number of gun choice days was not significant for duck hunters ( $p=0.338$ ).

The presence of a boat launch was a positive predictor of WMA visitation, we tested for an interaction between boat launch presence and duck hunters, and did not find a significant interaction. WMAs with a boat launch were 1.252 (1.040-1.506; 95% CL) times as likely to be visited by deer hunters and 1.493 (1.087-2.049; 95% CL) times as likely to be visited by duck hunters. The effect of presence of a boat launch on turkey hunters was not significant ( $p=0.093$ ).

The presence of a shooting range was a negative predictor in our model. WMAs with a shooting range were 0.678 (0.563-0.816; 95% CL) times as likely to be visited by deer hunters and 0.631 (0.496-0.803; 95% CL) times as likely to be visited by turkey hunters. The effects of a shooting range were not significant for duck hunters ( $p=.714$ ).

The presence of a campsite was a positive predictor in our model. WMAs with a campsite were 1.631 (1.355-1.963; 95% CL) times as likely to be visited by a deer hunter and 1.378 (1.115-1.750; 95% CL) times as likely to be visited by a turkey hunter. The effect of campsites on duck hunters was not significant ( $p=0.579$ ).

The presence of RV hookups were a positive predictor in our full model. However, when broken into target species groups, the effects of RV hookups are not significant for deer ( $p=0.102$ ) and turkey hunters ( $p=0.277$ ). WMAs with RV hookups were 0.461 (0.281-0.756; 95% CL) times as likely to be visited by duck hunters as WMAs without RV hookups.

The presence of staffed check-in stations were a positive predictor in our model. WMAs with a staffed check-in station were 1.226 (1.015-1.480; 95% CL) times as likely to be visited by deer hunters and 1.562 (1.209-2.016; 95% CL) times as likely to be visited by turkey hunters. The effects of a staffed check-in station are not significant for duck hunters ( $p=0.127$ ).

Cell service and the number of primitive weapons days a WMA has were not included in the final model, and are not considered significant predictors of WMA visitation.

## **DISCUSSION AND CONCLUSION**

A number of attributes significantly affected site choice, and we found interactions between setting attributes and type of game pursued, showing that preferences vary for deer, turkey, and duck hunters. Consistent with past research (Mackenzie, 1990; Boxall and Macnab, 2000; Hussain et al., 2010), we found that distance from residence had a negative effect on site use, while WMA size had a positive effect (Livengood, 1983; Pope and Stall, 1985; Hussain et al., 2010; Mingie et al, 2017). There was a significant interaction between distance and duck hunters, and we found that duck hunters were less impacted by distance than deer and turkey hunters. Perhaps waterfowl hunters are less impacted by distance, because there are fewer options for duck hunting than for deer and turkey, so they must drive further. Similarly, we found an interaction between WMA size and duck hunters, finding that duck hunters are less impacted by WMA size than deer and turkey hunters. Waterfowl hunting is confined to waterbodies, so size is less likely to be a factor than for big game hunting.

While we could not include the presence of deer or dove in our model, due to lack of variance, the presence of turkey and duck had a positive impact on site use. This result supports past findings that game diversity positively influences site choice (Hussain et al., 2010). We did

find that duck hunters were negatively impacted by the presence of turkey, while deer and turkey hunters were not negatively affected by any game species. This result is not likely due to conflict, as turkey and duck season don't overlap.

Of the six schedule variables we collected, only the amount of days available to hunt bucks & does with a gun (gun choice days) was included in the final model. The amount of gun choice days a WMA had was a positive predictor of site use. The amount of gun choice days a WMA has strictly impacts deer hunting, however it had a positive impact on turkey hunters. Once again, this is likely due to many turkey hunters also being deer hunters. This finding suggests that the most effective scheduling tool at a WMAs disposal is the addition or subtraction of gun choice days.

Multiple facility related variables significantly impacted site choice. Available campsites were the most important facility that WMAs could provide in our model, especially for deer and turkey hunters. It was also beneficial for WMAs to have a staffed check-in station for deer and turkey hunters, as well as a boat launch for duck hunters. RV hookup sites were overall a positive predictor in our model, but were not significant for deer and turkey hunters when separated into groups, and were negatively associated with visitation by duck hunters. We hypothesized that shooting ranges would have a positive effect on site usage. However, the presence of a shooting range was a negative for deer hunters, and not significant for turkey or duck hunters.

This analysis found a variety of attributes to be significant predictors of WMA visitation, as well as varying preferences between target species groups. These findings have practical implications for WMA managers. Hunters prefer large WMAs, with diverse game opportunities, close to home. Managers can increase site visitation by increasing the amount of gun choice

days, adding overnight accommodations (particularly campsites), boat launches for duck hunters, and staffed stations for deer and turkey hunters. Our findings suggest that the addition of a shooting ranges, cell service, or RV hookups are not likely to draw hunting participation.

Accounting for the preferences of WMA hunters will increase WMA usage, and contribute to a more positive experience. A future analysis that is able to account for site congestion and harvest success of hunters will increase the understanding of hunter preferences for the system of WMAs. A future analysis that is able to further separate deer, turkey, and waterfowl hunters will be able to make more definitive claims. Future research should explore varying preferences among levels of specialization, age, and income.

**Table 3.1** Descriptives of target species groups

	<b>Deer (n=446)</b>		<b>Turkey (n=233)</b>		<b>Duck (n=110)</b>	
	Mean	SD	Mean	SD	Mean	SD
<i>Game Hunted</i>						
Deer Hunt	446	-	220	-	88	-
Turkey Hunt	220	-	233	-	58	-
Duck Hunt	88	-	58	-	110	-
<i>Days Spent</i>						
Deer Days	26.13	20.77	27.12	20.36	16.54	18.63
Turkey Days	4.61	7.62	9.49	8.69	5.64	8.51
Other Days	11.74	21.02	12.92	17.26	20.17	20.49
<i>Public v Private</i>						
Public %	42.8 %	37.60	35.60 %	33.75	47.02 %	37.09
Private %	39.91 %	37.90	45.73 %	37.42	38.43 %	36.62
Private I Own	14.62 %	27.50	16.16 %	28.89	14.91 %	28.32

**Table 3.2** Definitions for predictor variables in the WMA attribute model

Variable	Variable Type	Range of Values	Description	Ha
Distance	Numeric	4.82-624 km	Distance from home to WMA	-
Size	Numeric	2.02-369.33 km <sup>2</sup>	Size of WMA	+
<i>Game</i>				
Duck	Binary	0 or 1	WMA allows Duck Hunting	+
Turkey	Binary	0 or 1	WMA allows Turkey Hunting	+
*Deer	Binary	0 or 1	WMA allows Deer Hunting	+
*Dove	Binary	0 or 1	WMA allows Dove Hunting	+
<i>Schedule</i>				
**Arch_Choice	Numeric	0-118 days	# of days archery allowed	+
**Arch_Buck	Numeric	0-26 days	# of days archery allowed (Bucks only)	+
Prim_Choice	Numeric	0-13 days	# of days primitive weapons allowed	+
Gun_Choice	Numeric	0-32 days	# of days guns allowed	+
**Gun_Buck	Numeric	0-52 days	# of days guns allowed (Buck only)	+
*Dog_Hunt	Numeric	0-9 days	# of days dog hunting allowed	+
<i>Facilities</i>				
Boat_Launch	Binary	0 or 1	WMA has boat launch	+
Cell_Service	Binary	0 or 1	WMA has cell service	+
Shooting_Range	Binary	0 or 1	WMA has shooting range	+
Staffed_Station	Binary	0 or 1	WMA has staffed check-in station	+
*Game_Clean	Binary	0 or 1	WMA has Game Cleaning Station	+
<i>Camping</i>				
Campsite	Binary	0 or 1	WMA has campsites	+
RV	Binary	0 or 1	WMA has RV hookups	+
<i>Individual-Level</i>				
Hunt Duck	Binary	0 or 1	Individual hunted duck 2017-18	*
Hunt Turkey	Binary	0 or 1	Individual hunted turkey 2017-18	*
Hunt Deer	Binary	0 or 1	Individual hunted deer 2017-18	*

\*removed due to lack of variance; \*\* removed due to lack of univariate significance

**Table 3.3** Results of full hunter preference model

	Model Parameters	
	Coefficient	Standard Error
Distance (10 km)	0.796***	.0005
Size (10 km <sup>2</sup> )	1.078***	.0005
Turkey	2.139***	.1347
Duck	1.866***	.0833
Campsite	1.441***	.0829
RV	1.332**	.1137
Staffed Station	1.346**	.0909
Shooting Range	0.759**	.0901
Boat Launch	1.209**	.0888
Gun_Choice	0.969*	.0053
Hunt Deer	0.905	.1829
Hunt Duck	1.584**	.2115
Duck:HuntDuck	2.367***	.1488
Gun_Choice:HuntDeer	1.070***	.0160
Turkey:HuntDuck	0.159***	.1879
Size:HuntDuck	0.997***	.0008
Distance: HuntDuck	1.005***	.0007
Intercept	2.239***	.2245
Observations		15088

\*p<0.1 \*\* p<0.05 \*\*\* p<0.01

**Table 3.4** Differences in Hunter preferences for WMA attributes

Attribute	Type	Unit	Deer		Turkey		Duck	
			B	SE	B	SE	B	SE
Intercept	Nominal		2.46***	0.138	2.145***	0.183	2.807***	0.230
Distance	Numeric	10 km increment	0.808***	0.005	0.807***	0.001	0.844***	0.007
Size	Numeric	10 km <sup>2</sup> increment	1.073***	0.005	1.082***	0.001	1.004***	0.010
Gun Choice	Numeric	1 day	1.034**	0.005	1.028***	0.007	1.010	0.011
Duck	Binary	Y/N	2.085***	0.075	2.244***	0.101	3.728***	0.136
Turkey	Binary	Y/N	1.429**	0.125	1.496**	0.169	0.492***	0.208
Campsite	Binary	Y/N	1.631***	0.085	1.378**	0.113	1.081	0.141
RV	Binary	Y/N	1.211	0.117	1.184	0.155	0.461***	0.247
Staffed Station	Binary	Y/N	1.226**	0.094	1.562***	0.128	1.267	0.155
Shoot Range	Binary	Y/N	0.678***	0.926	0.631	0.120	1.063	0.167
Boat Launch	Binary	Y/N	1.252**	0.926	1.231*	0.124	1.493**	0.158

\*p<0.1 \*\* p<0.05 \*\*\* p<0.01



## REFERENCES

- Adams, C. E., Brown, R. D., & Higginbotham, B. J. (2004). Developing a strategic plan for future hunting participation in Texas. *Wildlife Society Bulletin*, 32(4), 1156-1165.
- Boxall, P. C., Adamowicz, W. L., Swait, J., Williams, M., & Louviere, J. (1996). A comparison of stated preference methods for environmental valuation. *Ecological economics*, 18(3), 243-253.
- Boxall, P. C., & Macnab, B. (2000). Exploring the preferences of wildlife recreationists for features of boreal forest management: a choice experiment approach. *Canadian Journal of forest research*, 30(12), 1931-1941.
- Brown, T. L., Messmer, T. A., & Decker, D. J. (2001). Access for hunting on agricultural and forest lands. *Human dimensions of wildlife management in North America*, 269-288.
- Brunke, K. D., & Hunt, K. M. (2007). Comparison of two approaches for the measurement of waterfowl hunter satisfaction. *Human Dimensions of Wildlife*, 12(6), 443-457.
- Conover, M. R., & Messmer, T. A. (2001). Wildlife and rural landowners. *Human dimensions of wildlife management in North America. The Wildlife Society, Bethesda, Maryland, USA*, 243-268.
- Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: the tailored design method*. John Wiley & Sons.
- Duda, M., Michele, D., Zurawski, C., Jones, M., Yoder, J., Testerman, W., & Herrick, J. (2004). Issues related to hunting and fishing access in the United States: A literature review.
- Gan, C., & Luzar, E. J. (1993). A conjoint analysis of waterfowl hunting in Louisiana. *Journal of Agricultural and Applied Economics*, 25(2), 36-45.
- Heberlein, T. A. (2002). Peer-reviewed articles too many hunters or not enough deer? Human and biological determinants of hunter satisfaction and quality. *Human Dimensions of Wildlife*, 7(4), 229-250.
- Hussain, A., Zhang, D., & Armstrong, J. B. (2003). A conjoint analysis of deer hunters' preferences on hunting leases in Alabama.
- Hussain, A., Munn, I. A., Hudson, D., & West, B. (2010). Attribute-based analysis of hunters' lease preferences. *Journal of Environmental Management*, 91(12), 2565-2571.
- Jagnow, C. P., Stedman, R. C., Luloff, A. E., San Julian, G. J., Finley, J. C., & Steele, J. (2006). Why landowners in Pennsylvania post their property against hunting. *Human Dimensions of Wildlife*, 11(1), 15-26.
- Lancaster, K. J. (1966). A new approach to consumer theory. *Journal of political economy*, 74(2), 132-157.
- Larson, L. R., Decker, D. J., Stedman, R. C., Siemer, W. F., Baumer, M. S., & Enck, J. W. (2013). Hunter recruitment and retention: a framework for research and action.

- Lauber, T. B., & Brown, T. L. (2000). Hunting access on private lands in Dutchess County.
- Livengood, K. R. (1983). Value of big game from markets for hunting leases: the hedonic approach. *Land Economics*, 59(3), 287-291.
- Mackenzie, J. (1990). Conjoint analysis of deer hunting. *Northeastern Journal of Agricultural and Resource Economics*, 19(1204-2016-69638), 109.
- Manly, B. F. L., McDonald, L., Thomas, D. L., McDonald, T. L., & Erickson, W. P. (2007). Resource selection by animals: statistical design and analysis for field studies. Springer Science & Business Media.
- Miller, C., & Vaske, J. (2003). Individual and situational influences on declining hunter effort in Illinois. *Human Dimensions of Wildlife*, 8(4), 263-276.
- Mingie, J. C., Poudyal, N. C., Bowker, J. M., Mengak, M. T., & Siry, J. P. (2017). Big game hunter preferences for hunting club attributes: a choice experiment. *Forest policy and economics*, 78, 98-106.
- Munn, I., Hussain, A., Hudson, D., & West, B. C. (2011). Hunter preferences and willingness to pay for hunting leases. *Forest Science*, 57(3), 189-200.
- Pope, C. A., & Stoll, J. R. (1985). The market value of ingress rights for white-tailed deer hunting in Texas. *Journal of Agricultural and Applied Economics*, 17(1), 177-182.
- Poudyal, N., Cho, S. H., & Bowker, J. M. (2008). Demand for resident hunting in the Southeastern United States. *Human Dimensions of Wildlife*, 13(3), 158-174.
- Responsive Management/National Shooting Sports Foundation. (2008). The future of hunting and the shooting sports: research-based recruitment and retention strategies. *Produced for the US Fish and Wildlife Service under Grant Agreement CT-M-6-0*, 260.
- Rhyne, J. D., Munn, I. A., & Hussain, A. (2009). Hedonic analysis of auctioned hunting leases: A case study of Mississippi sixteenth section lands. *Human Dimensions of Wildlife*, 14(4), 227-239.
- Shrestha, R. K., Alavalapati, J. R., & Kalmbacher, R. S. (2004). Exploring the potential for silvopasture adoption in south-central Florida: an application of SWOT–AHP method. *Agricultural Systems*, 81(3), 185-199.
- Stedman, R. C., Bhandari, P., Luloff, A. E., Diefenbach, D. R., & Finley, J. C. (2008). Deer hunting on Pennsylvania's public and private lands: A two-tiered system of hunters?. *Human Dimensions of Wildlife*, 13(4), 222-233.
- Zinn, H. C. (2003). Hunting and sociodemographic trends: older hunters from Pennsylvania and Colorado. *Wildlife Society Bulletin*, 31(4), 1004-1014.

## Chapter 4: Conclusions

The primary objective of this thesis was to contribute to the understanding of the social habitat for hunting. Larson et al., (2014) noted that the amount of research declines as one moves up towards macro level considerations and that the interactions between the levels are rarely considered. Our research aimed to address this gap of knowledge by assessing the recruitment and retention (individual-level) of non-traditional path hunters (macro-level), as well as the use of public land (meso-level) by different user groups (macro-level).

The results presented in Chapter 2 demonstrate that there are differences in the recruitment and retention of non-traditional path hunters and their traditional counterparts. However, we found that the differences between the groups were not as stark as suggested in the popular media. We also found that all groups shared their most important factor in common, the opportunity to be in nature. From these results we suggest that messages and programs for non-traditional path hunters do not need to differ widely from traditional hunters, and that these initiatives should focus on the nature-based benefits of hunting.

The results presented in Chapter 3 found multiple WMA setting characteristics, as well as individual-level drivers that significantly predict WMA visitation. These findings have practical implications for WMA managers. Managers could use this information to change regulations and habitat with the goal of motivating effort shifts by hunters in order to manage for crowding, conflict, and the over-hunting at WMAs.

While our research contributes to the understanding of the social habitat for hunting in a few ways, it is important to note a limitation of our study. Our survey sample is of WMA hunters in the state of Alabama. Therefore, our findings can only be generalized to public land hunters.

In chapter 2, a sampling of the entire hunting population, not just public land hunters, could allow for the inclusion of more beginner hunters. Future research could look to include more individual-level drivers in our hunter preference model, as well as work to include some variable representing harvest success or game quantity.

## Appendix 1: Detailed Survey Methods

### **SURVEY ADMINISTRATION**

The study was administered through a mail survey. The mail contact of nearly 4,000 hunters with a WMA license was selected randomly by the Alabama Division of Wildlife and Freshwater Fisheries. The sample was stratified into three different age groups (n=1,000 each), and one group of non-resident hunters (n=1000). Mail surveys were selected because the mailing address was part of the license information, the length of the survey, and because respondents can give more time and thought to their answers and therefore can provide more accurate information than other survey methods.

The Tailored Design Method (Dillman et al., 2014) was followed for best practices of survey design and administration. The questionnaire was developed and collaboratively with the ADCNR, Principal Investigator Dr. Wayde Morse, and graduate research assistant Max Birdsong in the School of Forestry and Wildlife Sciences, Auburn University. The survey was administered in 2018 over 10 weeks using a four contact method including: a survey packet with the questionnaire and a return envelope, a follow-up reminder post-card, a second survey packet with the questionnaire and a return envelope, and an email with an online response option.

A total of 4,000 surveys were sent to Alabama WMA licensed hunters. A total of 966 participants responded to the survey with 869 submitting the hard copy mail version and 97 using the online option. There were 205 non-deliverable (bad addresses) and 2,829 non-respondents. The final response rate was 25.5%. To test for nonresponse bias, comparisons in key demographic characteristics were made using the ADCNR license holder data.

Qualtrics software was used for the on-line version and the software used for data analysis was the Statistical Package for Social Sciences (SPSS). All survey data was input through the on-line format to reduce the possibility of data entry errors.

## **SURVEY CONTENT & DESIGN**

The survey instrument was constructed following best practices for formatting, wording, and question order to eliminate responder bias. The first portion of the survey contained questions about our respondent's hunting participation. The next section measured the impact of items related to hunter's recruitment and retention. The next section asked questions concerning respondent's involvement in programs, volunteer behavior, and mentorship relationships. This section included an open ended response regarding motivations to mentor new hunters. The following section gathered more detailed information on hunter participation during the 2017-2018 season. The next section asked questions related to hunting constraints and level of specialization (commitment, identity, economic contribution). The following section measured hunter motivations and satisfaction with the previous hunting season. The next section transitions into the spatial aspect of our project, asking hunters to identify which WMAs they visited during the previous season, and how many times they visited. This section was followed by questions regarding hunter's most previous trip to a WMA, asking questions regarding expenditures, satisfaction and distance travelled. A final section was included to obtain the demographic information of respondents.

# 2018 Alabama Hunter Survey

Understanding hunter recruitment and retention,  
and the positive economic impacts of hunting



**A Study By:**

**Alabama Division of Wildlife and Freshwater Fisheries  
and  
The School of Forestry and Wildlife Sciences  
Auburn University**



Greetings from Auburn University and the Alabama Division  
of Wildlife and Freshwater Fisheries

The Alabama Division of Wildlife and Freshwater Fisheries (WFF) appreciates your support of our hunting heritage through your purchase of a hunting license. The WFF has contracted with Auburn University (AU) to gather information related to the recruitment and retention of hunters and on the positive local and statewide economic impacts of hunting. The preferred method of managing Alabama's wildlife resources is through regulated hunting. WFF strives to keep a balance that is beneficial to Alabama's wildlife populations and its hunters. Proper management requires input from those who hunt in Alabama.

The best way we have of learning about hunting related issues is by asking a diversity of hunters to share their thoughts and opinions. You are one of a number of randomly selected hunting license buyers who we are asking to complete this survey. The questions should take about 10-15 minutes to complete. We appreciate and value your input and look forward to receiving the completed survey.

The information you share with us will be used to enhance hunting and management related decisions in Alabama.

Sincerely,

**Wayde Morse**

Dr. Wayde Morse  
Assistant Professor and Researcher  
School of Forestry and Wildlife Sciences  
Auburn University



Chuck Sykes  
Director  
Division of Wildlife and Freshwater Fisheries

**HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE IF YOU WANT TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO.**

The Auburn University Review Board has approved this document for use from January 25, 2018 to January 25, 2019  
Protocol #17-391 EX 1801



## Hunting In Alabama: Your Participation

1. About how old were you when you went on your first hunt?
  
2. Do other members of your family hunt?
  - Yes
  - No
  
3. About how many years have you hunted in Alabama?
  
4. Which license type did you have or purchase for the 2017-2018 Alabama hunting season?
  - Resident
  - Non-resident
  - Lifetime
  
5. Including the 2017-2018 season, how many of the past 5 seasons have you had a license to hunt in Alabama?
  
6. Did you obtain a Wildlife Management Area (WMA) license for the 2017-2018 season?
  - Yes
  - No (*please skip to question 8*)
  
7. Including the 2017-2018 season, how many of the past 5 seasons have you had a WMA license to hunt in Alabama?
  
8. Did you go hunting during the 2017-18 season in Alabama?
  - Yes
  - No (*please skip to question 10*)
  
9. Which of the following did you hunt during the 2017-2018 season? *Check all that apply*
  - Deer       Squirrel       Fox       Duck       Woodcock
  - Turkey       Rabbit       Coyote       Goose
  - Quail       Raccoon       Bobcat       Coot
  - Dove       Opossum       Wild Hog       Snipe

## Hunter Recruitment and Retention

**10a. Hunter Recruitment: How important were the following items for you first becoming a hunter?**

	← 1 2 3 4 5 6 7 →						
	Not at all important		Important				Very Important
A family member/relative who taught/mentored me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having a neighbor, or close family friend who taught/mentored me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spending time outdoors in my youth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in groups like Scouts & 4H	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Summer outdoor youth camps	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hunting is part of my family tradition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having friends who also hunt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having confidence in my abilities outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being part of hunting culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The desire to provide meat for myself/family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The desire to manage the wildlife herd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The relaxation/stress relief hunting provides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The opportunity to be in nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in a local hunting/wildlife conservation group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in a national hunting/wildlife conservation group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**10b. Hunter Retention: Now that you are a hunter, how important are the following items for you continuing to be a hunter?**

	← 1 2 3 4 5 6 7 →						
	Not at all Important			Important			Very Important
Hunting is part of my family tradition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having friends who also hunt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having confidence in my abilities outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being part of hunting culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The desire to provide meat for myself/family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The desire to manage the wildlife herd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The relaxation/stress relief hunting provides	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The opportunity to be in nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in a local hunting/wildlife conservation group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in a national hunting/wildlife conservation group	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**11. If you participated in any of the following programs, please tell us how important they were for you becoming and/or continuing to be a hunter? Leave the row blank if you did not participate in the program**

	← 1 2 3 4 5 6 7 →						
	Not at all important			Important			Very Important
WFF Hunter Mentor Programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
AL Hunter Education Programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Becoming an Outdoors Woman	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WFF Youth Dove Hunts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WFF Youth Trapping Workshops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Archery in the School Program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other: _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**12. Do you currently subscribe to any hunting/wildlife conservation magazines?**

- Yes
- No

**13. Do you currently belong to any hunting/wildlife conservation clubs or organizations?**

- Yes, how many? # \_\_\_\_\_
- No

**14. Have you financially contributed to any hunting/wildlife conservation organizations during the last year?**

- Yes, approximately how much: \$ \_\_\_\_\_
- No

**15. Have you volunteered your time for any hunting/wildlife conservation organizations during the last year?**

- Yes, approximately how many hours: # \_\_\_\_\_
- No

**16. Have you ever mentored or helped someone to get started in hunting?**

- Yes, approximately how many people # \_\_\_\_\_
- No (*please skip to question 20*)

**17. Was your mentorship part of a program or personal?** *circle one or both*

**18. Who did you mentor?** *Check all that apply*

- Family       Friend(s)       Youth group(s)       Adult group(s)

Other: \_\_\_\_\_

**19. We are interested in what motivated you to mentor new hunters. Please share this or anything else you would like to share about recruiting new hunters in the space below.**

**Hunting in Alabama over the 2017-18 hunting season**

20. How would you rate the overall quality of your hunting experience in Alabama during the 2017-18 season?

1	2	3	4	5	6	7
←						→
Very Poor			Neither Poor nor Good			Very Good
○	○	○	○	○	○	○

21. About how many days did you hunt the following game in Alabama during the 2017-18 season? *(please count any portion of a day as 1 day)*

Deer  Days    Turkey  Days    All other game  Days

22. About how many days did you hunt the following game in a different state or country during the 2017-18 season? *(please count any portion of a day as 1 day)*

Deer  Days    Turkey  Days    All other game  Days

23. How many of the following game did you harvest during the 2017-18 season?

Bucks     Does     Turkey

24. During the 2017-18 season, how many days did you spend hunting with the following weapons? *(please count any portion of a day as 1 day)*

Muzzleloader  Days

Bow/Crossbow  Days

Rifle/Shotgun  Days

**25. Approximately what percentage of your hunting did you do on each of the following types of land during the 2017-18 season?**

Private land that I own  %

Private land that I do not own  %

Public land  %

**26. If you hunted on private land that you did not own, who owned it?** *Check all that apply*

- Family
- Friend
- Co-worker
- Neighbor
- Hunting Club
- Company
- Other \_\_\_\_\_

**27. Did you lose access to any hunting areas during the last 5 years?**

- Yes
- No *(if no, please skip to question 29)*

**28. If yes, how did you deal with that loss of access?** *Check all that apply*

- I found alternative private land to hunt
- I use more public land to hunt
- I hunt less

**29. Did you hunt as many days as you would have liked during the 2017-18 season?**

- Yes *(please skip to question 31)*
- No

30. Please indicate your level of agreement with each of the following reasons that kept you from hunting as much as you would have liked to.

	← 1	2	3	4	5	6	7 →
	Strongly Disagree			Agree			Strongly Agree
It was too expensive to hunt more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I did not have more time due to work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other family commitments limit my time to hunt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My preferred hunting sites were too crowded	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Safety concerns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The distance I have to travel to hunt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bag limits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not enough hunting days open	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do not have a convenient area to go hunt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not interested in hunting anymore	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health related issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not enough deer to hunt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have other <b>outdoor recreation</b> activities I choose to do instead of hunting more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have other <b>indoor leisure activities</b> that I choose to do instead of hunting more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Other:</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



31. Please rate your hunting abilities in comparison to other hunters of your preferred game.

	1	2	3	4	5	6	7
	←-----→						
	Novice			Expert			
Level of hunting skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Level of hunting knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

32. Approximately how much did you spend during the 2017-18 hunting season in each of the following categories?

Private land hunting leases	Dollars
Hunting club membership	Dollars
New hunting weapon (rifle, bow, muzzleloader, etc.)	Dollars

33. Indicate your level of agreement with the following statements about the importance of hunting to you.

	1	2	3	4	5	6	7
	←-----→						
	Strongly Disagree		Agree			Strongly Agree	
Hunting is important to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would rather hunt than any other recreation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I frequently share my hunting experiences on social media like Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hunting is an important part of my identity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**34. How important are each of the following reasons why you participate in hunting in Alabama?**

	← 1 2 3 4 5 6 7 →						
	Not at all Important			Important			Very Important
To enjoy the outdoors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To do something with my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The excitement of seeing wildlife	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To bring home meat to eat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To bring home a trophy animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To view wildlife in their natural setting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ecological stewardship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To enjoy solitude while in the field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To develop my hunting skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To regulate overabundant wildlife	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be with others who enjoy the same things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get away from the regular routine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To share my skills and knowledge with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The challenge of hunting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wildlife conservation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
For relaxation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The physical exercise provided by hunting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To connect with nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowing that I harvested the meat that I eat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Satisfaction with the 2017-18 hunting season

35. Please indicate how strongly you agree or disagree with the following statements about your experiences during the 2017-18 hunting season in Alabama.

	1	2	3	4	5	6	7
	←—————→						
	Strongly Disagree		Agree			Strongly Agree	
I succeeded in harvesting the quality of game I wanted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I succeeded in harvesting the amount of game I wanted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was satisfied with the harvesting success of others in my hunting party	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was satisfied with the number of opportunities I had to harvest game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had a positive experience with my hunting companions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thoroughly enjoyed my hunting experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

36. Please indicate how satisfied you are with the following statements about your experiences during the 2017-18 hunting season in Alabama.

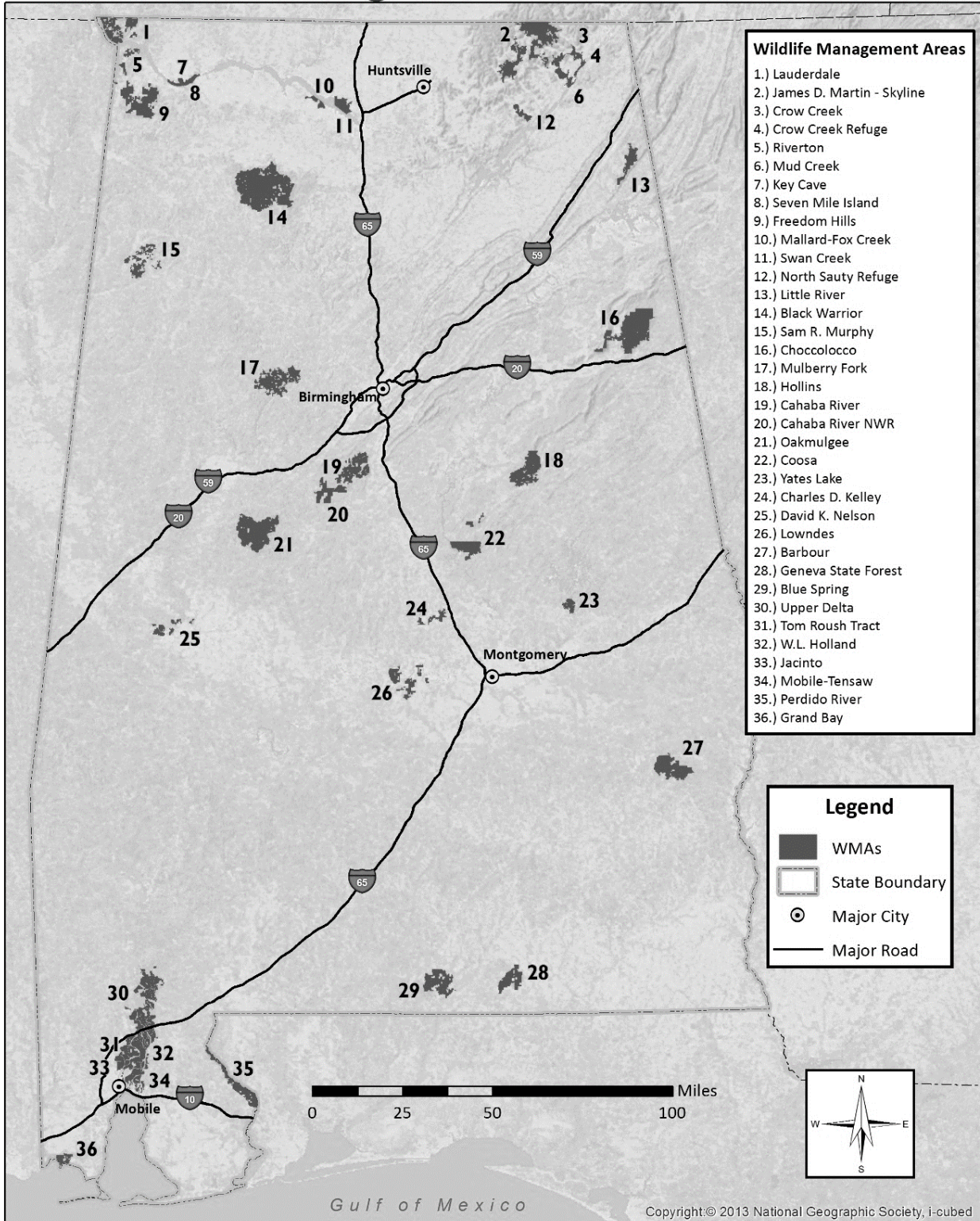
	1	2	3	4	5	6	7
	←—————→						
	Not Satisfied		Satisfied			Very Satisfied	
My ability to find an area to hunt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of public land available for hunting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of private land available for hunting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The distance I have to travel to land available for hunting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<u>The total number</u> of game animals seen or thought to be on property hunted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The <u>quality of game</u> animals seen or thought to be on the property hunted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The length of the bow-only season	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The length of the rifle/shotgun season	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The length of the muzzleloader-only season	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# Alabama Wildlife Management Areas (WMA)

37. Have you hunted any WMAs in the last 5 years?

- Yes     
  No (please skip to question 39)

## Wildlife Management Areas of Alabama



**38. Please check the box if you hunted the following WMAs in the last 5 years. Then fill-in the number of times you hunted any of them during the 2017-2018 season.**

<b>Wildlife Management Area (map #)</b>	<b>Hunted within the last five (5) years or so (check the box if yes)</b>	<b>Number (#) of times hunted in 2017-2018 season only</b>
Barbour County (#27)	<input type="checkbox"/>	#
Black Warrior (#14)	<input type="checkbox"/>	#
Blue Spring (#29)	<input type="checkbox"/>	#
Cahaba River NWR (#20)	<input type="checkbox"/>	#
Cahaba River WMA (#19)	<input type="checkbox"/>	#
Charles D. Kelley / Autauga County (#24)	<input type="checkbox"/>	#
Choccolocco (#16)	<input type="checkbox"/>	#
Coosa (#22)	<input type="checkbox"/>	#
Crow Creek (#3)	<input type="checkbox"/>	#
Crow Creek Refuge (#4)	<input type="checkbox"/>	#
David K. Nelson / Demopolis (#25)	<input type="checkbox"/>	#
Yates Lake (#23)	<input type="checkbox"/>	#
Freedom Hills (#9)	<input type="checkbox"/>	#
Geneva State Forest (#28)	<input type="checkbox"/>	#
Grand Bay Savanna (#36)	<input type="checkbox"/>	#
Hollins (#18)	<input type="checkbox"/>	#
Jacinto (#33)	<input type="checkbox"/>	#
James D. Martin / Skyline (#2)	<input type="checkbox"/>	#
Key Cave (#7)	<input type="checkbox"/>	#
Lauderdale (#1)	<input type="checkbox"/>	#
Little River (#13)	<input type="checkbox"/>	#
Lowndes (#26)	<input type="checkbox"/>	#
Mallard-Fox Creek (#10)	<input type="checkbox"/>	#
Mobile-Tensaw Delta (#34)	<input type="checkbox"/>	#
Mud Creek (#6)	<input type="checkbox"/>	#
Mulberry Fork (#17)	<input type="checkbox"/>	#
North Sauty (#12)	<input type="checkbox"/>	#
Oakmulgee (#21)	<input type="checkbox"/>	#
Perdido River (#35)	<input type="checkbox"/>	#
Riverton (#5)	<input type="checkbox"/>	#
Sam R. Murphy (#15)	<input type="checkbox"/>	#
Seven Mile Island (#8)	<input type="checkbox"/>	#
Swan Creek (#11)	<input type="checkbox"/>	#
Tom Roush Tract (#31)	<input type="checkbox"/>	#
Upper Delta (#30)	<input type="checkbox"/>	#
W.L. Holland (#32)	<input type="checkbox"/>	#

**39. In general, would you say that:**

- WMAs offer a better experience than hunting other lands in Alabama
- WMAs offer about the same experience as hunting on other lands in Alabama
- WMAs offer a worse experience than hunting on other lands in Alabama

**Hunting's Positive Impact on Alabama's Local and State Economy**

We are interested in the economic impact of hunting in Alabama. Specifically, we are interested in hunting on Alabama's WMAs. However, if you did not hunt on a WMA during the 2017-2018 season, we are still interested in **your most recent trip** and expenditures. Please enter information for question 40 either A, B or C and then answer questions 41-49 about that specific trip to that one location.

**40. A. If you took a hunting trip to a WMA in 2017-18 at all, please write-in the name of the most recent WMA trip location. (then skip to question 41)**

**B. If you did not hunt a WMA during the 2017-2018 season at all and your most recent trip was to other public lands, please write-in the name of that public land. (then skip to question 41)**

**C. If you did not hunt a WMA at all during the 2017-2018 season and your most recent trip was to private land, which of the following best describes that area? (then skip to question 41)**

- Land I own
- Private land I don't own but hunt free
- Land leased by my hunting club
- Land I lease from an individual
- Land I lease from a commercial entity

**41. Which of the following game did you hunt during your most recent trip? Check all that apply**

- Deer       Turkey       Small game

**42. Approximately, how far did you travel one way from your home to reach that destination?**

 Miles

**43. Were there any women in your hunting party?**     Yes # \_\_\_\_\_     No

**44. What did you hunt with: (circle one)**    Rifle/shotgun    Muzzleloader    Bow

45. Please indicate how strongly you agree or disagree with the following statements about your experiences hunting this specific location on this trip.

	1	2	3	4	5	6	7
	←-----→						
	Strongly Disagree			Agree			Strongly Agree
I was satisfied with the number of <u>opportunities</u> I had to harvest game	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was satisfied with the harvesting success of others in my hunting party	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was satisfied with the <u>total number of game animals</u> seen or thought to be on property hunted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was satisfied with the <u>quality of game animals</u> seen or thought to be on the property hunted	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thoroughly enjoyed my hunting experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

46. Approximately how many hours (or days) total did you spend on this trip?

Or

47. Including yourself, how many people were in your hunting party? # \_\_\_\_\_

48. Including yourself, how many people on this trip were you responsible for financially?  
# \_\_\_\_\_

49. Approximately how much money did you spend on this trip for yourself and those you were responsible for financially?

<p><b>Grocery store/food/drinks</b> <input style="width: 100px; height: 25px; border: 1px solid black;" type="text" value="Dollars"/></p> <p><b>Restaurant/bar</b> <input style="width: 100px; height: 25px; border: 1px solid black;" type="text" value="Dollars"/></p> <p><b>Travel/gas</b> <input style="width: 100px; height: 25px; border: 1px solid black;" type="text" value="Dollars"/></p> <p><b>Hotel/campsite</b> <input style="width: 100px; height: 25px; border: 1px solid black;" type="text" value="Dollars"/></p>	<p><b>Ammunition</b> <input style="width: 100px; height: 25px; border: 1px solid black;" type="text" value="Dollars"/></p> <p><b>Clothes/equipment</b> <input style="width: 100px; height: 25px; border: 1px solid black;" type="text" value="Dollars"/></p> <p><b>Other:</b> <i>write below</i> <input style="width: 100px; height: 25px; border: 1px solid black;" type="text" value="Dollars"/></p> <p>_____</p>
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## Demographic Information

*For statistical purposes, we need to ask you a few demographic questions.  
Please remember that the information you provide is confidential!*

50. What year were you born?

19

51. What is your gender?

- Female  Male

52. Including yourself, how many people live in your house?

people

53. Are you retired?

- Yes  No

54. What is your ethnicity?

- American Indian  Asian  
 Black/African American  White/Caucasian  
 Latino  Other

55. What is your marital status?

- Single  Divorced  
 Married  Widowed

56. What is your highest degree or level of school completed?

- Did not complete high school  Associate degree (2 year)  
 High School Diploma or GED  Bachelor degree  
 Some college, but no degree  Graduate or professional degree  
 Other

57. Please check the box that corresponds to your household income for 2017. This information is only used to understand hunter satisfaction and management preferences across income groups.

- Less than \$14,999  \$25,000 to \$34,999  \$75,000 to \$99,999  
 \$15,000 to \$19,999  \$35,000 to \$49,999  \$100,000 to \$149,999  
 \$20,000 to \$24,999  \$50,000 to \$74,999  \$150,000 or more



**THANK YOU FOR PARTICIPATING IN THIS STUDY!!**

Your answers to this survey will provide our agency with useful information regarding the management and conservation of our natural resources. We appreciate your participation in the survey and value your continued support and purchase of Alabama hunting licenses.

Please provide any additional comments here.

Please fold this survey along the dotted line and return it to the School of Forestry and Wildlife Sciences at Auburn University in the self-addressed, stamped envelope provided.

