MOVEMENTS OF PUBLIC LAND WHITE-TAILED DEER HUNTERS AND ADULT
FEMALE DEER AND AN EVALUATION OF HUNTER SATISFACTION, MOTIVATIONS,
AND PREFERENCES IN THE MOUNTAINS OF NORTHERN GEORGIA

by

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(Under the Direction of GINO J. D'ANGELO)

ABSTRACT

During 1979–2018, the white-tailed deer (*Odocoileus virginianus*) population and number of hunters on Wildlife Management Areas (WMAs) in northern Georgia declined significantly. The purpose of this research was to help managers minimize the effects of hunting on the declining deer population while providing recreational opportunities for hunters that improved their satisfaction. First, I analyzed location data from 58 hunters and determined their movement and stand location characteristics and mapped hunting pressure on WMAs based on these characteristics. Next, I evaluated fine-scale movements of 26 GPS-collared adult female deer during pre-hunt, hunt, and post-hunt periods, which suggested hunting pressure caused no significant behavioral responses in deer. Last, I sent mail questionnaires to hunters. Data from 441 completed questionnaires suggested the primary motivation for hunting was experience-related (i.e., enjoying nature and escaping the daily routine), but hunter satisfaction could be improved by increasing opportunities to see and harvest deer.

INDEX WORDS: Appalachians, Chattahoochee National Forest, Georgia, human dimensions, hunter distribution, hunter satisfaction, hunting, management, movement ecology, *Odocoileus virginianus*, white-tailed deer

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DEDICATION

I would like to dedicate this work to my family who has always supported, encouraged, and pushed me to work hard and be the best version of who God created me to be. They fostered a loving and supporting environment that has helped me to thrive in my career and life. This thesis is a culmination of 2.5+ years of work that would not have been possible without their support.

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CHAPTER 1

GENERAL INTRODUCTION

The white-tailed deer (*Odocoileus virginianus*) has important economic and conservation value in the U.S. because hunters pursue them more than any other species (QDMA 2018). Since the Pittman-Robertson Act was passed in 1937, hunters have funded conservation by generating \$12.2 billion in tax revenues for state wildlife agencies across the U.S. (Crafton 2019). Excise taxes on hunting, fishing, and shooting equipment and revenue from hunting and fishing licenses collectively fund approximately 75% of state wildlife agencies' annual budget (Heffelfinger et al. 2013). These funds are used to conduct wildlife management activities for both game and non-game animals, such as habitat acquisition and improvement, research, surveys, and reintroductions (USFWS 2018, Crafton 2019). Regarding the broader economy, the U.S. Fish and Wildlife Service estimated in the most recent National Survey of Fishing, Hunting, and Wildlife Associated Recreation that big game hunters (88% of which were deer hunters) in the U.S. spent \$14.9 billion on hunting-related equipment, hunting trip-related expenditures (i.e., lodging, food), and hunting licenses and fees (U.S. Department of the Interior et al. 2016).

White-tailed deer populations and deer hunter participation in the southern Appalachian Mountains of northern Georgia have experienced significant declines since 1979. On 8 Wildlife Management Areas (WMAs) throughout the Chattahoochee National Forest, total buck harvest declined 80% and hunter success rates (i.e., bucks harvested/hunter/day) declined 64% from 1979 to 2018 (C. Killmaster, Georgia Department of Natural Resources, unpublished data). Over the same time period, populations of black bears (*Ursus americanus*), coyotes (*Canis latrans*),

bobcats (*Lynx rufus*), and wild pigs (*Sus scrofa*) increased (Kilgo et al. 2010, Roberts and Crimmins 2010, Crimmins et al. 2012, Little et al. 2017, Lewis et al. 2019), while forests matured (Little et al. 2018). Predation, competition, and lack of early successional plant communities and early forest stages have been suggested as potential contributors to deer population declines (Little et al. 2018). Current deer density estimates are 1.9–3.9 deer/km² compared to 7 deer/km² in 1953 (Little et al. 2018). Also, during 1979–2018, the number of hunters on the 8 WMAs decreased 68%, which constituted an 81% decrease in hunters/days available for buck harvest (C. Killmaster, Georgia Department of Natural Resources, unpublished data). In contrast, the estimate of active deer hunters in Georgia increased 12% from 1979 to 2017 (C. Killmaster, Georgia Department of Natural Resources, unpublished data), strongly indicating hunters chose to stop participating in public land hunts in northern Georgia rather than quitting hunting altogether.

To tackle the issues regarding declining deer and hunter numbers, Georgia Department of Natural Resources funded research that would help identify potential drivers and evaluate various management actions. This thesis focuses on the hunting-related aspects of this research and aims to understand the following: 1) temporal and spatial characteristics of hunter movements, 2) effects of hunting pressure on deer movements and space use, and 3) satisfaction, motivations, and preferences of current deer hunters. These objectives collectively contribute to helping managers understand how to ensure continued recreational opportunities for hunters that would maintain or improve their satisfaction while minimizing potential negative effects on the declining deer population.

LITERATURE REVIEW

Understanding the importance of various access points to hunter movements helps identify factors that affect the spatial distribution of hunting pressure across the landscape. For example, if hunting pressure is concentrated near access points, animals with home ranges closest to those areas may experience more disturbance and pressure than those with home ranges farther from those access points (Gross et al. 2015). This could result in areas of "de facto refugia," which are open to hunting but serve as refuges for game because of their physical characteristics (Diefenbach et al. 2005). Although relatively few studies have focused on the spatial distribution and movements of hunters, most have found hunters are more likely to choose areas closer to roads, trails, and other access points and are less likely to travel as slope increases (Thomas et al. 1976, Fuller 1988, Diefenbach et al. 2005, Keenan 2010, Gross et al. 2015). Given their strong association to access roads, hunters typically under-utilize the amount of public land available to them (Diefenbach et al. 2005, Gross et al. 2015). Manipulation of hunter access via roads and trails may be more effective at influencing deer harvest than changing bag limits or lengths of hunting seasons (Thomas et al. 1976, Diefenbach et al. 2005, Lebel et al. 2012), but first, hunter movements relative to these access points must be understood.

Deer responses to hunting depend on a variety of site-specific factors, including habitat conditions, level of hunting pressure, length or intensity of hunting season, and method of hunting (e.g., sit and wait, hunters driving deer) and, thus, vary across studies (Root et al. 1988, VerCauteren and Hygnstrom 1998, Kilpatrick and Lima 1999, Little et al. 2016, Simoneaux et al. 2016). When hunters are present on the landscape, deer tend to move less in areas with greater availability of escape cover (Simoneaux et al. 2016). While increased hunting pressure can cause deer to increase movements (Marshall and Whittington 1969), areas of dense cover may buffer

the effects of high hunter densities (Root et al. 1988). Some research indicates deer may tighten their core areas and shift to where hunting pressure is lower or absent (Downing et al. 1969, Kilgo et al. 1998, VerCauteren and Hygnstrom 1998, Kilpatrick and Lima 1999), while some demonstrate increase in core area size (Kilpatrick and Lima 1999), concentration of activities within core areas and decrease in overall movements (Marantz et al. 2016), or decrease in diurnal movement and increase in nocturnal activity (Kilgo et al. 1998, Little et al. 2016, Simoneaux et al. 2016, Sullivan et al. 2018). Some have reported overall increases in deer movements in response to hunting (Marshall and Whittington 1969, Root et al. 1988, Naugle et al. 1997). Deer typically demonstrate high levels of fidelity to their home ranges even under hunting pressure (Marshall and Whittington 1969, Downing et al. 1969, VerCauteren, and Hygnstrom 1998, Kilpatrick and Lima 1999, D'Angelo et al. 2003) but a few exceptions have been documented (Root et al. 1988, Naugle et al. 1997). Movements outside their home ranges in response to hunting pressure are typically short distance and short-term (VerCauteren and Hygnstrom 1998, Karns et al. 2012). Some studies have demonstrated certain levels of hunting pressure were not sufficient to cause changes in deer movements (Karns et al. 2012, Bakner et al. 2020).

Deer responses to hunting are important to study in low-density populations because hunters may act as predators on the landscape, inducing periods of "risk" for deer (Proffitt et al. 2009, Spitz et al. 2019, Brown et al. 2020). Perceived risk can cause deer to shift their activity away from key foraging areas to those associated with lower risk (Hernández and Laundré 2005, Benhaiem et al. 2008, Lone et al. 2015, Spitz et al. 2019). Infrequent periods of high risk may also cause deer to devote less energy to activities related to reproduction (Lima and Bednekoff 1999) or alter normal activity related to breeding (Little et al. 2016, Marantz et al. 2016). Male white-tailed deer in southcentral Oklahoma decreased movements due to hunting pressure when

increased movements were expected due to breeding activity, suggesting there was a trade-off between risk avoidance and reproduction (Little et al. 2016, Marantz et al. 2016).

A comprehensive concept of hunter satisfaction, called the Multiple Satisfactions Approach, was introduced by Hendee (1974) and is now widely accepted (Decker et al. 1980, Hammitt et al. 1990, Gigliotti 2000, Ebeling-Schuld and Darimont 2017). This approach lessens the emphasis of harvest success and accounts for additional sources of hunter satisfaction (Hendee 1974, McCullough and Carmen 1982), including spending time with friends and family, experiencing the outdoors, appreciating nature, relaxing, and escaping everyday problems (Kennedy 1974, Decker et al. 1980, Decker and Connelly 1989, Hammitt et al. 1990, Gigliotti 2000, Mehmood et al. 2003). Motivations for hunting also affect satisfaction of the hunting experience. Hunters who chose getting outdoors as their primary motivation for hunting had greater satisfaction with their hunting experience than those who considered getting shots at deer as their main motivation (Decker et al. 1980). Harvest success played the most significant role in satisfaction for Black Hills deer hunters who were motivated by obtaining meat and killing a trophy compared to those motivated by experiencing nature, solitude, excitement, exercise, or socialization (Gigliotti 2000). When hunters were unsuccessful, those primarily motivated by experiencing nature were left with higher satisfaction than hunters with other primary motivations (Gigliotti 2000).

Hunt quality still remains a significant contributor to satisfaction (Decker and Connelly 1989, Gigliotti 2000, Brunke and Hunt 2007). Hunt quality describes the direct attributes of the hunt, including number of game harvested, number of game seen, perceived population density of game, and number of hunters encountered (Hammitt et al. 1989). In a New York study, getting shots at deer was an important driver of satisfaction for hunters (Decker et al. 1980), whereas in

California, deer population size and kill rate accounted for 28% of hunter satisfaction (McCullough and Carmen 1982). Similarly, hunt quality was a significant predictor of satisfaction for public land hunters in Tennessee, yet the researchers concluded hunters could still be satisfied during a poor-quality hunt due to non-success related factors (Hammitt et al. 1990). The greatest sources of hunter dissatisfaction include feeling over-crowded due to perceived high hunter densities (Hammitt et al. 1989, Gigliotti 2000, Heberlein 2002) or feeling unsafe due to inappropriate actions by other hunters (Hammitt et al. 1990, Mehmood et al. 2003).

JUSTIFICATION

Regarding hunter movements, the distances travelled, proximity to access points, and slopes that hunters traverse are most likely influenced by location, landscape characteristics, hunting type (e.g., deer, elk, turkey), and hunting strategy (e.g., sit and wait, hunters driving game). To our knowledge, only two studies have tracked white-tailed deer hunters using GPS units and those studies occurred in Pennsylvania, USA, (Stedman et al. 2004) and Quebec, Canada (Lebel et al. 2012). Therefore, research on the movements of deer hunters in the southeastern U.S. is warranted.

Regarding deer movements relative to hunting, deer populations have reached a critical level on the WMAs and antlerless harvest is currently prohibited. However, multiple hunts are still conducted on each WMA for antlered deer, black bears, and wild pigs. The northern Georgia Mountains are part of a mast-driven system (Feldhamer et al. 1989, Wentworth et al. 1990, Wentworth et al. 1992, Carlock et al. 1993, Kammermeyer and Carlock 2000). Behavioral responses of does to hunting pressure could indicate the potential for negative effects on their procurement of key food resources, such as acorns, or breeding-related activities. Therefore, even though female deer are not available for harvest, the effects of hunting on their movement

patterns should be understood. Furthermore, because previous research has reached a multitude of conclusions regarding deer responses to hunting pressure that are largely dependent on site-specific factors, such as habitat and hunter density, we designed a study to measure the effects of hunting on female deer in northern Georgia.

Regarding hunter satisfaction, our study contributes to the human dimensions literature by focusing on a reduced population of hunters on public lands, which experienced drastic declines in deer densities. We determined why some hunters have decided to hunt the WMAs after 40 years of declines in hunter numbers and deer populations and what would contribute to increasing their hunt satisfaction. The Multiple Satisfactions Approach describes many potential sources of hunter satisfaction, therefore, we designed a study to specifically address various factors driving satisfaction or dissatisfaction of deer hunters on WMAs in northern Georgia.

OBJECTIVES

The first objective was to determine the movement characteristics of deer hunters on Blue Ridge and Coopers Creek WMAs in northern Georgia, particularly relating to slope and distance from open roads, wildlife openings, and trails. The second objective was to determine the effects of hunting pressure on adult female deer movements and space use by comparing movement rates and characteristics of home ranges and core areas among pre-hunt, hunt, and post-hunt periods. The third objective was to measure the satisfaction, motivations, and preferences of northern Georgia WMA deer hunters and determine how managers could increase hunter satisfaction.

THESIS FORMAT

This thesis is written in manuscript format. Chapter 1 presents a general introduction and literature review pertaining to the research topics covered throughout this thesis. Chapter 2 includes an analysis of deer hunter movements, Chapter 3 delves into the effects of hunting

pressure on adult female deer movements, Chapter 4 covers the satisfaction, motivations, and preferences of deer hunters, and Chapter 5 provides conclusions and recommendations for management. Appendices A and B supplement Chapter 4 by presenting survey materials and additional results not included within the chapter.

LITERATURE CITED

- Bakner, N. W., S. S. Madere, J. Bordelon, S. Durham, and B. A. Collier. 2020. Behavioral responses of female white-tailed deer to small game hunting activities. Journal of the Southeastern Association of Fish and Wildlife Agencies 7:202–209.
- Benhaiem, S., M. Delon, B. Lourtet, B. Cargnelutti, S. Aulagnier, A. J. M. Hewison, N. Morellet, and H. Verheyden. 2008. Hunting increases vigilance levels in roe deer and modifies feeding site selection. Animal Behaviour 76:611–618.
- Brown, C. L., J. B. Smith, J. J. Wisdom, M. M. Rowland, D. B. Spitz, and D. A. Clark. 2020.

 Evaluating indirect effects of hunting on mule deer spatial behavior. Journal of Wildlife

 Management 84:1246–1255.
- Brunke, K. D., and K. M. Hunt. 2007. Comparison of two approaches for the measurement of waterfowl hunter satisfaction. Human Dimensions of Wildlife 12:443–457.
- Crafton, R. E. 2019. Pittman-Robertson Wildlife Restoration Act: understanding apportionments for states and territories. Congressional Research Service Report 45667, Washington D.C., USA.
- Crimmins, S. M., J. W. Edwards, and J. M. Houben. 2012. *Canis latrans* (Coyote) habitat use and feeding habits in central West Virginia. Northeastern Naturalist 19:411–420.

- D'Angelo, G. J., J. C. Kilgo, C. E. Comer, C. D. Drennan, D. A. Osborn, and K. V. Miller. 2003.

 Effects of controlled dog-hunting on the movements of female white-tailed deer.

 Proceedings of the Southeastern Association of Fish and Wildlife Agencies 57:317–325.
- Decker, D. J., and N. A. Connelly. 1989. Motivations for deer hunting: implications for antlerless deer harvest as a management tool. Wildlife Society Bulletin 17:455–463.
- Decker, D. J., T. L. Brown, and R. J. Gutierrez. 1980. Further insights into the multiple-satisfactions approach for hunter management. Wildlife Society Bulletin 8:323–331.
- Diefenbach, D. R., J. C. Finley, A. E. Luloff, R. Stedman, C. B. Swope, H. C. Zinn, and G. J. San Julian. 2005. Bear and deer hunter density and distribution on public land in Pennsylvania. Human Dimensions of Wildlife 10:201-212.
- Downing, R. L., B. S. McGinnes, R. L. Petcher, and J. L. Sandt. 1969. Seasonal change in movements of white-tailed deer. Pages 19–24 *in* Proceedings of the Symposium: White-tailed Deer in Southern Forest Habitat. Southern Forest Experiment Station, U.S. Forest Service, 25–26 March 1969, Nacogdoches, Texas, USA.
- Ebeling-Schuld, A. M., and C. T. Darimont. 2017. Online hunting forums identify achievement as prominent among multiple satisfactions. Wildlife Society Bulletin 41:523–529.
- Fuller, T. K. 1988. Hunter harvest of white-tailed deer in the Bearville study area, northcentral Minnesota. Minnesota Wildlife Report 6:1–45.
- Gigliotti, L. M. 2000. A classification scheme to better understand satisfaction of Black Hills deer hunters: the role of harvest success. Human Dimensions of Wildlife 5:32–51.
- Gross, J. T., B. S. Cohen, T. J. Prebyl, and M. J. Chamberlain. 2015. Movements of wild turkey hunters during spring in Louisiana. Journal of the Southeastern Association of Fish and Wildlife Agencies 2:127-130.

- Hammitt, W. E., C. D. McDonald, and F. P. Noe. 1989. Wildlife management: managing the hunt versus the hunting experience. Environmental Management 13:503–507.
- Hammitt, W. E., C. D. McDonald, and M. E. Patterson. 1990. Determinants of multiple satisfaction for deer hunting. Wildlife Society Bulletin 18:331–337.
- Heberlein, T. A. 2002. Too many hunters or not enough deer? Human and biological determinants of hunter satisfaction and quality. Human Dimensions of Wildlife 7:229–250.
- Heffelfinger, J. R., V. Geist, and W. Wishart. 2013. The role of hunting in North American wildlife conservation. International Journal of Environmental Studies 70:399–413.
- Hendee, J. C. 1974. A multiple-satisfaction approach to game management. Wildlife Society Bulletin 2:104–113.
- Hernández, L., and J. W. Laundré. 2005. Foraging in the 'landscape of fear' and its implications for habitat use and diet quality of elk *Cervus elaphus* and bison *Bison bison*. Wildlife Biology 11:215–220.
- Karns, G. R., R. A. Lancia, C. S. DePerno, and M. C. Conner. 2012. Impact of hunting pressure on adult male white-tailed deer behavior. Proceedings of the Conference of the Southeastern Association of Fish and Wildlife Agencies 66:120–125.
- Keenan, M. T. 2010. Hunter distribution and harvest of female white-tailed deer in Pennsylvania.

 Thesis, The Pennsylvania State University, State College, USA.
- Kennedy, J. J. 1974. Attitudes and behavior of deer hunters in a Maryland forest. Journal of Wildlife Management 38:1–8.

- Kilgo, J. C., R. F. Labisky, and D. E. Fritzen. 1998. Influences of hunting on the behavior of white-tailed deer: implications for conservation of the Florida panther. Conservation Biology 12:1359–1364.
- Kilgo, J. C., H. S. Ray, C. Ruth, and K. V. Miller. 2010. Can coyotes affect deer populations in southeastern North America? Journal of Wildlife Management 74:929–933.
- Kilpatrick, H. J., and K. J. Lima. 1999. Effects of archery hunting on movement and activity of female white-tailed deer in an urban landscape. Wildlife Society Bulletin 27:433–440.
- Lebel, F., C. Dussault, A. Masse, and S. D. Cote. 2012. Influence of habitat features and hunter behavior on white-tailed deer harvest. Journal of Wildlife Management 76:1431-1440.
- Lewis, J. S., J. L. Corn, J. J. Mayer, T. R. Jordan, M. L. Farnsworth, C. L. Burdett, K. C. VerCauteren, S. J. Sweeney, and R. S. Miller. 2019. Historical, current, and potential population size estimates of invasive wild pigs (*Sus scrofa*) in the United States.
 Biological Invasions 21:2373–2384.
- Lima, S. L., and P. A. Bednekoff. 1999. Temporal variation in danger drives antipredator behavior: the predation risk allocation hypothesis. The American Naturalist 153:649–659.
- Little, A. R., S. L. Webb, S. Demarais, K. L. Gee, S. K. Riffell, and J. A. Gaskamp. 2016.

 Hunting intensity alters movement behaviour of white-tailed deer. Basic and Applied Ecology 17:360–369.
- Little, A. R., A. Hammond, J. A. Martin, K. L. Johannsen, and K. V. Miller. 2017. Population growth and mortality sources of the black bear population in northern Georgia. Journal of the Southeastern Association of Fish and Wildlife Agencies 4:130–138.
- Little, A. R., G. J. D'Angelo, C. H. Killmaster, K. L. Johannsen, and K. V. Miller. 2018.

 Understanding deer, bear, and forest trends in the North Georgia Mountains: the value of

- long-term data. Journal of the Southeastern Association of Fish and Wildlife Agencies 5:97–105.
- Lone, K., L. E. Loe, E. L. Meisingset, I. Stamnes, and A. Mysterud. 2015. An adaptive behavioural response to hunting: surviving male red deer shift habitat at the onset of the hunting season. Animal Behaviour 102:127–138.
- Marantz, S. A., J. A. Long, S. I. Webb, K. L. gee, A. R. Little, and S. Demarais. 2016. Impacts of human hunting on spatial behavior of white-tailed deer (*Odocoileus virginianus*).Canadian Journal of Zoology 94:853–861.
- Marshall, A. D., and R. W. Whittington. 1969. A telemetric study of deer home ranges and behavior of deer during managed hunts. Proceedings of the Conference of the Southeastern Association of Fish and Wildlife Agencies 22:30–46.
- McCullough, D. R., and W. J. Carmen. 1982. Management goals for deer hunter satisfaction. Wildlife Society Bulletin 10:49–52.
- Mehmood, S., D. Zhang, and J. Armstrong. 2003. Factors associated with declining hunting license sales in Alabama. Human Dimensions of Wildlife 8:243–262.
- Naugle, D. E., J. A. Jenks, B. J. Kernohan, and R. R. Johnson. 1997. Effects of hunting and loss of escape cover on movements and activity of female white-tailed deer, *Odocoileus virginianus*. Canadian Field Naturalist 111:595–600.
- Proffitt, K. M., J. L. Grigg, K. L. Hamlin, and R. A. Garrott. 2009. Contrasting effects of wolves and human hunters on elk behavioral responses to predation risk. Journal of Wildlife Management 73:345–356.
- Quality Deer Management Association [QDMA]. 2018. QDMA's whitetail report. Quality Deer Management Association, Bogart, Georgia, USA.

- Roberts, N. M., and S. M. Crimmins. 2010. Bobcat population status and management in North America: evidence of large-scale population increase. Journal of Fish and Wildlife Management 1:169–174.
- Root, B. G., E. K. Fritzell, and N. F. Glessman. 1988. Effects of intensive hunting on white-tailed deer movement. Wildlife Society Bulletin 16:145–151.
- Simoneaux, T. N., B. S. Cohen, E. A. Cooney, R. M. Shuman, M. J. Chamberlain, and K. V. Miller. 2016. Fine-scale movements of adult male white-tailed deer in northeastern Louisiana during the hunting season. Journal of the Southeastern Association of Fish and Wildlife Agencies 3:210–219.
- Spitz, D. B., M. M. Rowland, D. A. Clark, M. J. Wisdom, J. B. Smith, C. L. Brown, and T. Levi. 2019. Behavioral changes and nutritional consequences to elk (*Cervus canadensis*) avoiding perceived risk from human hunters. Ecosphere 10:1–17.
- Sullivan, J. D., S. S. Ditchkoff, B. A. Collier, C. R. Ruth, and J. B. Raglin. 2018. Recognizing the danger zone: response of female white-tailed to discrete hunting events. Wildlife Biology 1:1–8.
- Thomas, J. W., J. D. Gill, J. C. Pack, W. M. Healy, and H. R. Sanderson. 1976. Influence of forestland characteristics on spatial distribution of hunters. Journal of Wildlife Management 40:500–506.
- U.S. Department of the Interior, U.S. Fish and Wildlife Service, U.S. Department of Commerce, and U.S. Census Bureau. 2016. National survey of fishing, hunting, and wildlife-associated recreation. U.S. Fish and Wildlife Service Report FHW/16-NAT(RV), Washington, D.C., USA.

- U.S. Fish and Wildlife Service [USFWS]. 2018. Digest of Federal Resource Laws: Federal Aid in Wildlife Restoration Act. https://www.fws.gov/laws/lawsdigest/FAWILD.HTML. Accessed 11 June 2019.
- VerCauteren, K. C., and S. E. Hygnstrom. 1998. Effects of agricultural activities and hunting on home ranges of female white-tailed deer. Journal of Wildlife Management 62:280–285.

CHAPTER 2

HUNTER MOVEMENTS DURING MANAGED HUNTS IN THE SOUTHERN ${\bf APPALACHIAN\ MOUNTAINS\ ^1}$

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ABSTRACT Reaching management goals on the landscape requires understanding and managing the spatial distribution of hunters and how it relates to the distribution of "de facto refugia" for white-tailed deer (*Odocoileus virginianus*). We collected data from 58 GPSinstrumented deer hunters during hunts on 2 Wildlife Management Areas (WMAs) in the mountains of northern Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons. We identified 158 hunting bouts. Hunters averaged 1.7 (SD \pm 1.2) hunting bouts/day and spent an average total time hunting/day of 4 hr 47 min (SD \pm 2 hr 43 min). Hunting bouts averaged 3 hr 20 min (SD \pm 2 hr 3 min) in duration, 210 m from the nearest open road (SD \pm 200), 650 m from the nearest wildlife opening (SD \pm 780), and 1,550 m (SD \pm 1,110) to the nearest trail or closed road. Based on an analysis of percentiles for slope and distance to nearest open access road and wildlife opening, we projected that 50% of the total hunting pressure on the WMAs would occur on only 3% of the WMA area, 75% of hunting pressure would occur on 18% of the WMA area, and 90% of hunting pressure would occur on 51% of the WMA area. Stand locations averaged 226 m (SD \pm 221) from the nearest open road, 709 m (SD \pm 845) from the nearest wildlife opening, 1,550 m (SD \pm 1,120) from the nearest trail or closed road, and 13.2 degrees $(SD \pm 7.2)$ in slope. While moving (travel to stand locations or stalk hunting), hunter travel distance averaged 1.37 km (SD \pm 1.24), duration averaged 1 hr 0 min (SD \pm 1 hr 1 min), and speed averaged 1.56 km/hr (SD \pm 1.20). Our results suggest that hunters under-utilized the WMAs, thereby creating un-hunted, or lightly hunted, refuge areas for deer. Our results also suggest that access to open roads is an important factor in hunter movements that could be manipulated by managers in order to alter the spatial distribution of hunters and, in turn, availability of refugia for deer.

KEY WORDS Global Positioning System, hunter distribution, hunting, management, movements, national forest, public land, spatial ecology, tracking, white-tailed deer. The white-tailed deer (*Odocoileus virginianus*) is the most widespread big game animal in North America and manipulation of hunting seasons and bag limits is key for managing deer populations (Hewitt 2015, QDMA 2019). However, effective management also requires understanding and managing the spatial distribution of hunters. For example, management goals to increase harvest of overabundant deer may prove ineffective when hunting pressure is uneven across the landscape (Keenan 2010). Increasing hunter access via roads and trails, may effectively distribute hunting pressure, especially on large tracts of public lands (Thomas et al. 1976, Diefenbach et al. 2005, Lebel et al. 2012). However, minimal research has focused on the spatial distribution and movements of hunters. Early studies relied on self-reporting by hunters via written questionnaires or interviews with researchers (Thomas et al. 1976, Millspaugh et al. 2000, Stedman et al. 2004). Aerial surveys have been used to measure hunter density and distribution but this method is less effective at capturing fine-scale spatiotemporal information, is subject to weather conditions, and is ineffective in areas that remain canopied during hunts (Fuller 1988, Stedman et al. 2004, Diefenbach et al. 2005, Keenan 2010). GPS technology allows more accurate spatial information to be collected in hunter movement studies (Lyon and Burcham 1998, Broseth and Pederson 2000, Stedman et al. 2004, Mecozzi and Guthery 2008, Lebel et al. 2012). For example, Stedman et al. (2004) reported significant discrepancies in locations and distances travelled that were self-reported by hunters versus those recorded by GPS tracking devices. However, data are limited to GPS-instrumented hunters and total hunter distribution may be unknown.

Hunters typically choose areas closer to roads, trails, and other access points and are less likely to travel as slope increases (Thomas et al. 1976, Fuller 1988, Diefenbach et al. 2005, Keenan 2010, Gross et al. 2015). Elk hunters (*Cervus elaphus*) in Montana spent more time on roads the farther they travelled (Lyon and Burcham 1998). Similarly, 90% of turkey (*Meleagris gallopavo*) hunter locations were within 26% of a 1,440-ha Wildlife Management Area (WMA) in Louisiana and 50% of locations were ≤18 m from a road (Gross et al. 2015). Similarly, 40% of all turkey hunter locations on a 10,483-ha WMA complex in South Carolina were <25 m from roads that were open for vehicle or foot traffic (Gerrits et al. 2020).

Understanding how access impacts hunter movements and the spatial distribution of hunting pressure are critical to effective management. If hunting pressure is concentrated near access points, animals with home ranges closest to those areas may experience more disturbance and pressure than those with home ranges farther from those access points (Gross et al. 2015). This could result in areas of "de facto refugia," which are open to hunting but serve as refuges for game because of their physical characteristics (Diefenbach et al. 2005). An understanding of hunter movements could allow managers to manipulate the spatial distribution of hunting pressure, thus, the spatial distribution of refugia, according to management needs. For example, if managers seek to decrease deer harvest, increasing refugia may be more effective than reducing bag limits or shortening the length of hunting seasons (Keenan 2010).

The distances travelled, proximity to access points, and slopes that deer hunters traverse may be influenced by location, landscape characteristics, climate, hunting tradition, and hunting strategy (e.g., sit and wait, stalking). However, to our knowledge, only two studies have tracked white-tailed deer hunters using GPS units and those studies occurred in Pennsylvania, USA, (Stedman et al. 2004) and Quebec, Canada (Lebel et al. 2012). Therefore, additional research on

the movements of deer hunters is warranted. Our study focused on white-tailed deer hunters on WMAs within the Chattahoochee National Forest of northern Georgia, USA. Historically, the region provided a mountain hunting experience with abundant deer populations. However, from 1979 to 2018, total buck harvest on 8 WMAs within the Chattahoochee National Forest declined 80% and harvest success rates (i.e., bucks harvested/hunter/day) declined 64%, signifying a decline in the deer population (C. Killmaster, Georgia Department of Natural Resources, unpublished data). Concurrently, the number of hunters on the 8 WMAs decreased 68% which constituted an 81% decrease in hunters/days available for buck harvest (C. Killmaster, Georgia Department of Natural Resources, unpublished data). Studying the distribution and movements of deer hunters on northern Georgia WMAs is necessary for managers to understand how changes in hunting regulations or access could be manipulated to ensure continued recreational opportunities for hunters while minimizing potential negative effects on the deer population. Our objectives were to describe basic hunter movement characteristics, as well as calculate and map hunter space use relative to various access points and features across the WMAs.

STUDY POPULATION AND AREA

We recruited deer hunters (≥18 years of age) on Blue Ridge and Coopers Creek WMAs, which collectively comprise 212 km² within the Chattahoochee National Forest in northern Georgia, USA (Fig. 2-1). Through a cooperative agreement, Georgia Department of Natural Resources maintains wildlife openings (i.e., food plots), sets hunting regulations, and conducts hunts on the WMAs, while the U.S. Forest Service conducts the remaining management activities, including timber harvest and prescribed fire (S. Frazier, Georgia Department of Natural Resources, personal communication). The Chattahoochee National Forest is within the Blue Ridge physiographic province of the Appalachian Mountain Range and spans 3,043 km². It

is 96.8% forested (USGS 2019) with a forest age distribution of 77.9% late forest, 21.9% middle forest, and 0.2% early forest (USFS 2017). From 1979 to 2015, the frequency of timber harvest declined resulting in a mature forest age structure, as the two youngest age classes (0-10 years and 11-20 years) declined in coverage by 95% (Little et al. 2018). Northern hardwood communities occurred on north-facing slopes at elevations greater than 1,200 m and largely consisted of American beech (Fagus grandifolia), northern red oak (Quercus rubra), and birch (Betula spp.) in the overstory and rhododendron (Rhododendron maximum) or striped maple (Acer pensylvanicum) in the understory (Little et al. 2018). Cove hardwoods occurred at elevations less than 1,200 m (Little et al. 2018). These mesic communities were dominated by American basswood (*Tilia americana*), northern red oak, and tulip poplar (*Liriodendron* tulipifera, Little et al. 2018). Mixed-pine hardwood communities generally occurred on southfacing side slopes and predominantly consisted of red maple (Acer rubrum), scarlet oak (Q. coccinea), chestnut oak (Q. montana), and yellow pines (Pinus spp.) in the overstory and mountain laurel (Kalmia latifolia) in the understory (Little et al. 2018). Upland hardwood communities were present on submesic to xeric sites of all elevations and were composed of white oak (Q. alba), black oak (Q. velutina), northern red oak, red maple, and hickories (Carya spp.) in the overstory and rhododendron or mountain laurel in the understory (Little et al. 2018). Streamside communities included eastern hemlock (Tsuga canadensis) and white pine (Pinus strobus) in the overstory and rhododendron in the understory (Little et al. 2018). Average annual temperatures range from 6.3 to 19.9 degrees Celsius and average annual rainfall and snowfall are 142 cm and 10.2 cm, respectively (based on weather data from Blairsville, Georgia; U.S. Climate Data 2019).

Blue Ridge and Coopers Creek WMAs have elevations ranging 592–1,302 m ($\bar{x} = 836$, SD \pm 101) and slopes ranging 0–56 degrees (\bar{x} = 18, SD \pm 8; USGS 2013). Eighty-six wildlife openings are located within these WMAs to provide food sources for wildlife (E. Mavity, USFS, unpublished data). Cool season openings are managed as perennial plantings to provide winter nutrition and act as buffers during poor mast years, while warm season openings are planted to annual crops to provide summer nutrition. Approximately 8 ha of openings are planted on each WMA annually and are evenly split between the fall and spring planting seasons (F. Manning, Georgia Department of Natural Resources, personal communication). This constitutes 5–7 wildlife openings planted per season. Typical cool season plantings include various combinations of wheat (Triticum aestivum), oats (Avena sativa), rye (Secale cereale), chicory (Cichorium intybus), white clover (Trifolium repens), and red clover (Trifolium pratense), while typical warm season plantings include corn (Zea mays), grain sorghum (Sorghum vulgare), and buckwheat (Fagopyrum esculentum). Most wildlife openings are maintained by mowing 1–3 times each year and those containing clover are fertilized in the fall. Wildlife openings average 0.71 ha (range = 0.07-3.33, SD ± 0.60) and are connected to either administrative-only or public use roads (E. Mavity, USFS, unpublished data). The WMAs contained 230 km of county roads and USDA Forest Service roads that were open to vehicular traffic during hunts (U.S. Census Bureau 2015a, b; USFS 2020). An additional 279 km of county and USDA Forest Service roads were located within 1 km of the WMA boundaries (U.S. Census Bureau 2015a, b; USFS 2020). In addition, 87 km of hiking trails traversed the WMAs with an additional 42 km within 1 km of the WMA boundaries (USFS 2012).

One primitive weapons deer hunt and 2 firearms deer hunts occurred on each WMA during the 2018–2019 and 2019–2020 seasons (Table 2-1). There was no limit to the number of

hunters who could hunt on the WMAs. Hunters could check-in and sign-in online or at kiosks located outside each WMA check station. For check-in hunts, hunters received bonus permits (i.e., not counted toward personal statewide bag limit) to harvest 2 deer that had to be taken to a WMA check station. For sign-in hunts, hunters were required to count deer harvested towards their personal state bag limits and report their harvest to Georgia Department of Natural Resources. During the 2018–2019 season, most hunts were antlered-only with a few limited opportunities for antlerless harvest, whereas during the 2019–2020 season, hunts were antlered-only. Harvest of black bears (*Ursus americanus*) and wild pigs (*Sus scrofa*) was permitted during all deer hunts. Legal hunting hours were 30 minutes before sunrise and 30 minutes after sunset.

METHODS

Data Collection

We recruited hunters on Blue Ridge WMA to carry handheld GPS units (eTrex 10, GARMIN, Olathe, Kansas, USA) programmed to record 30-sec locations during the 2018–2019 and 2019–2020 hunting seasons. We included Coopers Creek WMA hunters during the 2019–2020 hunting season. We intercepted hunters in vehicles or at the Blue Ridge and Coopers Creek WMA check stations one day prior to and the days of the primitive weapons and firearms deer hunts on the WMAs, including mornings before sunrise. We explained the research and asked hunters to participate by taking a GPS unit and completing a participation form. For the first 2 hunts during the study, we provided participants with GPS units already turned on and instructed them to keep the unit on until they finished hunting. When returning units to the check station drop box, we asked participants to fill out a form with their unit number and approximate days and times hunted. For the remaining hunts, we provided GPS units turned off to participants and instructed them to only turn on the units when they started hunting and to turn off the units when they

stopped hunting. Hunters could keep the units for any length of time as long as they continued to hunt. When GPS units were returned, we downloaded data and cleared the units for redeployment. Our study was approved by the University of Georgia Institutional Review Board (Protocol ID#PROJECT00001075), ensuring that our methods relating to human subjects complied with applicable federal, state, and institutional policies and procedures.

Spatial Analyses

All spatial analyses were conducted in ArcMap 10.7.1 (Environmental Systems Research Institute, Inc., Redlands, CA, USA) using a spatial reference system of North American Datum 1983 and the western zone of the Georgia State Plane Coordinate System. We eliminated locations not associated with legal hunting hours. We erased locations falling within 150 m of campgrounds, picnic areas, and other WMA facilities (Gerrits et al. 2020) and locations falling within 61 m of WMA check stations, which was based on the proximity of open hunting areas to these check stations. We clipped locations to a 610-m buffer around the WMAs. This buffer accounted for potential discrepancies between our GIS layer of WMA boundaries and boundary-indicating signs on the ground and also accounted for possible hunter ventures off the WMAs that were still within the Chattahoochee National Forest. We eliminated locations associated with distances >84 m within 30 seconds, assuming those represented non-foot travel by hunters (Gross et al. 2015). Finally, we censored locations during legal shooting hours that were associated with overnight stays, indicating a camp site in a non-designated camping area.

We separated filtered data into hunting bouts, which were independent periods of hunting activity in a continuous spatial and temporal sequence (Gerrits et al. 2020). We considered a continuous string of hunting locations for ≥30 minutes as a hunting bout, thus a hunter could have >1 hunting bout per day. White-tailed deer hunters typically hunt from stationary locations

called stands, where they spend most of their time. They also travel to, from, and among stands and may engage in stalk hunting. Therefore, we separated hunting bouts further into individual stand locations and travel routes. To isolate stands, we calculated a point density surface for each hunting bout using a cell size equal to the GPS unit error, a radius equal to twice the GPS error, and an extent that incorporated a 30-m buffer around the minimum bounding rectangle of the corresponding hunting bout. We reclassified the point density surface to assign pixels with ≥ 1 location as "1" and all other pixels as "NoData." We converted the reclassified surface to polygon and added a buffer equal to the GPS error. Then, we clipped the original hunting bout by the buffered polygon to extract all locations associated with the stand. We eliminated stands <25 minutes in duration. To produce 1 point location for each stand, we calculated the mean center of the stand locations. We created a merged dataset of all locations associated with stands and another merged dataset of all mean center locations. To create polygons of stand areas, we calculated a convex hull around all locations associated with each stand and added a buffer equal to the GPS error. To isolate travel routes, we censored locations within each hunting bout that fell within the stand area. Then, we removed all routes <5 minutes in duration (Fig. 2-2). We merged all travel routes to create one travel dataset.

We calculated the following for hunting bouts, stands, and travel routes: total duration, distance from the nearest road open to vehicular traffic, distance from the nearest trail or road open to foot traffic only, distance from the nearest wildlife opening, elevation, and slope. For travel routes, we also calculated total distance travelled and speed. For stand areas, we calculated the proportion of various land cover classes (Table 2-2). Lastly for hunting bouts, we generated 50th, 75th, and 90th percentiles for distance to nearest open road, distance to nearest wildlife opening, and slope. To map all areas within the WMAs that would contain 50%, 75%, and 90%

of total hunting pressure, we calculated the intersection of areas corresponding to these percentiles. We calculated the horizontal positional error of the GPS units by comparing 182 locations recorded by 1 unit while placed on top of a National Geodetic Survey benchmark in Blairsville, Georgia, USA to the actual benchmark coordinates. We used the distance in x and y from each recorded location to the true location to determine a 95% confidence interval root mean square error of 1.74 m (Bolstad 2019).

RESULTS

Of the 73 hunters recruited to carry GPS units, 58 produced data usable for analyses (Table 2-1). Data filtering resulted in 61,405 total hunting locations. We isolated 158 total hunting bouts with an average of 2.7 (SD \pm 2.0) hunting bouts per hunter. Hunters averaged 1.7 (SD \pm 1.2) hunting bouts/day and spent an average total time hunting/day of 4 hr 47 min (SD \pm 2 hr 43 min). Data spanned 10 hunts and 29 different hunting days over 2 hunting seasons providing 109 hunter-day combinations. Fifty-two percent of hunting locations occurred in the morning between 0600 and 1159 and 48% occurred in the afternoon or evening between 1200 and 1939.

Hunting bouts averaged 3 hr 20 min (SD \pm 2 hr 3 min) in duration and averaged 210 m (SD \pm 200) from the nearest open road with an average maximum distance of 290 m (SD \pm 260). The 50th, 75th, and 90th percentiles for distance to nearest open road were 134 m, 314 m, and 536 m, respectively. Hunting bouts averaged 650 m (SD \pm 780) from the nearest wildlife opening with an average maximum distance of 810 m (SD \pm 820 m). The 50th, 75th, and 90th percentiles for distance to nearest wildlife opening were 464 m, 917 m, and 1,984 m, respectively. For distance to nearest trail or road only open to foot traffic, hunting bouts averaged 1.55 km (SD \pm 1.10) with an average maximum distance of 1.74 km (SD \pm 1.15). Hunting bouts averaged 760 m (SD \pm 91) in elevation with an average maximum elevation of 781 m (SD \pm 99) and averaged

13.0 degrees (SD \pm 5.7) in slope with an average maximum slope of 24.1 degrees (SD \pm 7.5). The 50th, 75th, and 90th percentiles for slope were 12.0 degrees, 18.4 degrees and 23.1 degrees, respectively. Based on the intersection of areas corresponding to the percentiles for distance to nearest open road, distance to nearest wildlife opening, and slope, we projected that 50% of the total hunting pressure on the WMAs would occur on only 3% (6.7 km²) of the WMA area, 75% of hunting pressure would occur on 18% (37.4 km²) of the WMA area, and 90% of hunting pressure would occur on 51% (107.5 km²) of the WMA area (Fig. 2-3).

We identified 151 stands composed of 42,660 locations (69% of total hunting locations) with an average of 2.6 (SD \pm 2.1) stands/hunter and 1.6 (SD \pm 1.2) stands/hunter/day. Hunters spent an average of 2 hr 32 min (SD \pm 1 hr 34 min) at each stand and an average of 3 hr 23 min (SD \pm 2 hr 15 min) at stands/day hunted. Mean center stand locations averaged 226 m (SD \pm 221) from the nearest open road, 709 m (SD \pm 845) from the nearest wildlife opening, and 1,550 m (SD \pm 1,120) from the nearest trail or road only open to foot traffic. Regarding elevation and slope, mean center stand locations averaged 762 m (SD \pm 90) and 13.2 degrees (SD \pm 7.2), respectively. Land cover composition of stand areas was similar to land cover composition across the WMAs (Table 2-2). Stand areas were predominantly forested with 50% of the total stand area layer containing deciduous forest.

We identified 142 travel routes composed of 18,266 total locations. Travel per hunting bout averaged 1 hr 0 min (SD \pm 1 hr 1 min), across an average distance of 1.37 km (SD \pm 1.24), and average speed of 1.56 km/hr (SD \pm 1.20). Travel duration per day averaged 1 hr 28 min (SD \pm 1 hr 22 min), across an average distance of 1.96 km (SD \pm 2.05), and average speed of 1.42 km/hr (SD \pm 0.92) traveling per day. Travel routes averaged 179 m (SD \pm 184) from the nearest open road with an average maximum distance of 310 m (SD \pm 262). They averaged 677 m (SD \pm

769) from the nearest wildlife opening with an average maximum distance of 837 m (SD \pm 819). In terms of distance to nearest trail or closed road, travel routes averaged 1.46 km (SD \pm 1.05) with an average maximum distance of 1.66 km (SD \pm 1.12). Elevation averaged 755 m (SD \pm 93) across travel routes with an average maximum of 783 m (SD \pm 101). Slope of travel routes averaged 13.0 degrees (SD \pm 3.9) with an average maximum of 24.8 degrees (SD \pm 6.7).

DISCUSSION

To our knowledge, our study is the first to track white-tailed deer hunters using GPS units in the southeastern U.S. However, movements of public land deer hunters in our study were similar to previous studies in other regions. In particular, hunting pressure tends to be concentrated in areas with more gradual slopes and closer proximity to roads (Keenan 2010, Gross et al. 2015, Gerrits et al. 2020). In our study, 75% of all hunting locations landing at or below the average slope on the WMAs. Similarly, elk hunters in Montana spent 60% of their time hunting in areas with less steep slopes compared to the study area (Lyon and Burcham 1998) and white-tailed deer hunters in northcentral Pennsylvania were less likely to utilize areas as slope increased (Stedman et al. 2004, Diefenbach et al. 2005). This suggests that areas of steep slope within mountainous hunting terrain may provide refugia for deer. In addition, 90% of all hunting locations were within 536 m of an open road, while hunting stands averaged 226 m from the nearest open road. Similarly, in an aerial survey of public land in northcentral Pennsylvania, 87% of white-tailed deer hunters were within 500 m of a road (Diefenbach et al. 2005). Furthermore, an aerial survey of northcentral Minnesota identified 53% of white-tailed deer hunters within 200 m of a drivable road (Fuller 1988). Tracking of white-tailed deer hunters with GPS units on Anticosti Island in Quebec, Canada, revealed 80% of hunter locations remained ≤100 m from a road or trail (Lebel

et al. 2012). Given the close proximity of hunters to open roads, our results suggest that managers could increase hunter utilization of the WMAs by increasing open road access.

Stand locations averaged 709 m from the nearest wildlife opening, which was approximately 3 times greater than the distance associated with open roads. Therefore, our results do not suggest that hunters targeted openings when selecting areas to hunt. Perhaps, hunters perceived that bucks would be less likely to utilize wildlife openings during shooting hours or they may have assumed other hunters would target openings. In addition, trails and roads open only to foot traffic were less important than wildlife openings. Most studies have either disregarded trails or combined them with roads for analysis purposes so individual importance of trails to hunters is not well understood (Stedman et al. 2004, Diefenbach et al. 2005, Gross et al. 2015). One exception found turkey hunters were more closely tied to roads open only to foot traffic than roads allowing vehicle access (Gerrits et al. 2020). We acknowledge that our spatial data likely did not include all available trails on our study area. Relic logging roads are present throughout the southern Appalachians but are not typically designated on maps. However, managers cannot manipulate these relic access points.

We estimated 90% of total hunting pressure for primitive weapons and firearms hunts would be contained within 51% of the WMAs. Hunting participation during the 2018–2019 and 2019–2020 seasons was historically low (77% decline since 1990; C. Killmaster, Georgia Department of Natural Resources, unpublished data). The most attended hunt during our study period was on Blue Ridge WMA (9,285 ha) where 266 hunters checked-in, representing 1 hunter per 35 ha. However, given that 90% of hunters would utilize approximately 45% of Blue Ridge WMA, this would constitute 1 hunter/17 ha within those areas and 1 hunter/189 ha on the remaining area of the WMA. Because we could not sample all WMA hunters, the exact

distribution of hunters within these areas is unknown. It would likely be non-uniformly distributed even within those areas where 90% of hunters are projected to utilize. Given the low projected hunter use of approximately 49% of the 2 WMAs, these areas potentially provided "de facto refugia" for deer (Diefenbach et al. 2005). Refugia is effective at minimizing deer harvest and manipulation of refugia may be a useful tool for managers wanting to minimize the effects of hunting on the deer population (Diefenbach et al. 2005, Keenan 2010). Our results suggest manipulating access to roads open to vehicles would be the most effective method for managers to influence the availability of refugia.

Our findings augment the small pool of literature focused on hunter movements. We recruited approximately 6% of hunters who participated in corresponding WMA hunts. While we acknowledge the possibility that the hunting styles of those willing to participate in our study may differ from the pool of hunters using the area, we found hunters were highly interested in the study and few did not agree to participate when requested. Thus, we contend that our sample of hunters represented the general population of hunters on the WMAs. This information should assist managers in ensuring recreational opportunities for hunters. Increasing access via roads open for vehicular traffic would likely distribute hunters more evenly, thus diluting hunting pressure. However, decreased access would increase refuge areas, which may be important in minimizing harvest. Increasing refugia may be more effective than reducing bag limits or shortening the length of hunting seasons in decreasing deer harvest (Keenan 2010). Additional research should focus on deer movements relative to similar features during hunts on northern Georgia WMAs to determine their vulnerability to harvest and susceptibility to disturbance by hunting pressure.

MANAGEMENT IMPLICATIONS

Deer hunters on northern Georgia WMAs typically hunt in close proximity to roads open to vehicular traffic. Combined with hunter avoidance of areas with steep slopes, limited access to open roads in mountainous areas reduces hunter utilization of a significant portion of the WMAs. Therefore, increasing access through opening roads to vehicular traffic would be effective at increasing utilization of the landscape. Although slope may negatively affect the distances travelled by hunters, increasing open road access should bring hunters to the general area of under-utilized portions of the WMAs. However, increased access will simultaneously reduce refugia available to deer. Thus, manipulation of access must balance the effect on hunter access with the unique deer management objectives on management areas.

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LITERATURE CITED

Bolstad, P. 2019. GIS fundamentals: a first text on Geographic Information Systems. Sixth edition. Pages 617–637. Data standards and data quality. XanEdu, Ann Arbor, Michigan, USA.

- Broseth, H., and H. C. Pederson. 2000. Hunting effort and game vulnerability studies on a small scale: a new technique combining radio-telemetry, GPS and GIS. Journal of Applied Ecology 37:182–190.
- Diefenbach, D. R., J. C. Finley, A. E. Luloff, R. Stedman, C. B. Swope, H. C. Zinn, and G. J. San Julian. 2005. Bear and deer hunter density and distribution on public land in Pennsylvania. Human Dimensions of Wildlife 10:201–212.
- Fuller, T. K. 1988. Hunter harvest of white-tailed deer in the Bearville study area, northcentral Minnesota. Minnesota Wildlife Report 6:1–45.
- Georgia Department of Natural Resources–Wildlife Resources Division Nongame Conservation
 [GDNR–WRDNC]. 2017. U.S. Forest Service lands.

 https://data.georgiaspatial.org/index.asp?body=preview&dataId=41245. Accessed 27
 January 2019.
- GDNR–WRDNC. 2018. DNR managed lands.

 https://data.georgiaspatial.org/index.asp?body=preview&dataId=69>. Accessed 31 May 2018.
- Gerrits, A. P., P. H. Wightman, J. R. Cantrell, C. Ruth, M. J. Chamberlain, and B. A. Collier. 2020. Movement ecology of spring wild turkey hunters on public lands in South Carolina, USA. Wildlife Society Bulletin 44:260–270.
- Gross, J. T., B. S. Cohen, T. J. Prebyl, and M. J. Chamberlain. 2015. Movements of wild turkey hunters during spring in Louisiana. Journal of the Southeastern Association of Fish and Wildlife Agencies 2:127–130.
- Hewitt, D. G. 2015. Hunters and the conservation and management of white-tailed deer (*Odocoileus virginianus*). International Journal of Environmental Studies 72:839–849.

- Keenan, M. T. 2010. Hunter distribution and harvest of female white-tailed deer in Pennsylvania.

 Thesis, The Pennsylvania State University, State College, USA.
- Lebel, F., C. Dussault, A. Masse, and S. D. Cote. 2012. Influence of habitat features and hunter behavior on white-tailed deer harvest. Journal of Wildlife Management 76:1431–1440.
- Little, A. R., G. J. D'Angelo, C. H. Killmaster, K. L. Johannsen, and K. V. Miller. 2018.
 Understanding deer, bear, and forest trends in the North Georgia Mountains: the value of long-term data. Journal of the Southeastern Association of Fish and Wildlife Agencies 5:97–105.
- Lyon, L. J., and M. G. Burcham. 1998. Tracking elk hunters with Global Positioning System.U.S. Department of Agriculture, Forest Service, Rocky Mountain Research StationResearch Paper 3, Ogden, Utah, USA.
- Mecozzi, G. E., and F. S. Guthery. 2008. Behavior of walk-hunters and pointing dogs during northern bobwhite hunts. Journal of Wildlife Management 72:1399–1404.
- Millspaugh, J. J., G. C. Brundige, R. A. Gitzen, and K. J. Raedeke. 2000. Elk and hunter spaceuse sharing in South Dakota. Journal of Wildlife Management 64:994–1003.
- Quality Deer Management Association [QDMA]. 2019. QDMA's whitetail report. Quality Deer Management Association, Bogart, Georgia, USA.
- Stedman, R., D. R. Diefenbach, C. B. Swope, J. C. Finley, A. E. Luloff, H. C. Zinn, G. J. San Julian, and G. A. Wang. 2004. Integrating wildlife and human-dimensions research methods to study hunters. Journal of Wildlife Management 68:762–773.
- Thomas, J. W., J. D. Gill, J. C. Pack, W. M. Healy, and H. R. Sanderson. 1976. Influence of forestland characteristics on spatial distribution of hunters. Journal of Wildlife Management 40:500–506.

- U.S. Census Bureau. 2015a. TIGER Primary and Secondary Roads.

 https://gdg.sc.egov.usda.gov/GDGOrder.aspx. Accessed 7 August 2020.
- U.S. Census Bureau. 2015b. TIGER Streets. https://gdg.sc.egov.usda.gov/GDGOrder.aspx. Accessed 7 August 2020.
- U.S. Climate Data. 2019. https://www.usclimatedata.com/climate/blairsville/georgia/united-states/usga0052. Accessed 7 April 2019.
- U.S. Department of Commerce and U.S. Census Bureau [USDC and USCB]. 2008. TIGER/Line Shapefile, 2008, state, Georgia, County and Equivalent.
 http://www.census.gov/geo/www/tiger. Accessed 19 January 2019.
- U.S. Forest Service [USFS]. 2012. Trails.
 https://www.fs.usda.gov/main/conf/landmanagement/gis. Accessed 7 April 2019.
- USFS. 2017. Forest fast facts: Chattahoochee-Oconee National Forests.

 https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd578895.pdf>. Accessed on 9 April 2019.
- USFS. 2020. Motor Vehicle Use Map: Roads.

 https://data.fs.usda.gov/geodata/edw/datasets.php?xmlKeyword=trails. Accessed 17

 August 2020.
- U.S. Geological Survey [USGS]. 2013. National Elevation Dataset (NED).
 https://viewer.nationalmap.gov/basic/. Accessed 9 April 2019.
- USGS. 2019. National Land Cover Database 2016 Land Cover Conterminous United States. https://www.mrlc.gov/data. Accessed 13 May 2019.

Figure 2-1. The study area for tracking movements of white-tailed deer hunters during the 2018–2019 and 2019–2020 hunting seasons was Blue Ridge (bottom left) and Coopers Creek (top right) Wildlife Management Areas (WMAs), which collectively comprise 212 km² (GDNR–WRDNC 2018). WMAs are located in the northern region of Georgia, USA, within the Chattahoochee National Forest (USDC and USCB 2008, GDNR–WRDNC 2017). Wildlife openings (i.e., food plots), roads open to vehicular traffic during hunts, and trails are shown within a 1-km buffer of the WMAs (E. Mavity, USFS, unpublished data; USFS 2012 and 2020).

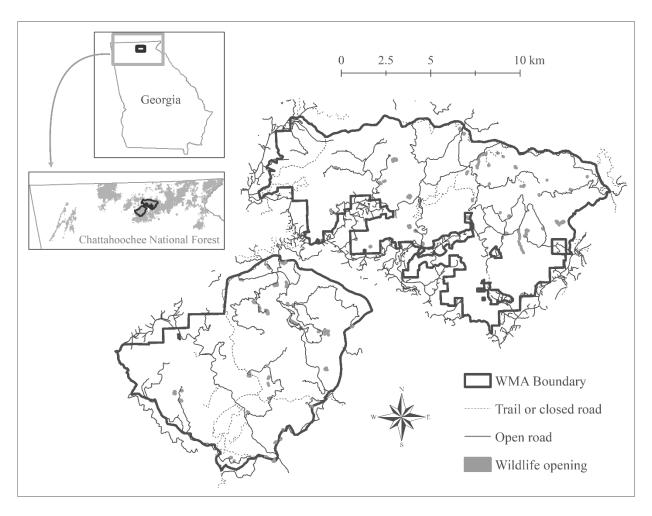


Figure 2-2. Tracking data for white-tailed deer hunters on Blue Ridge and Coopers Creek Wildlife Management Areas in northern Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons. Hunter locations were separated into hunting bouts, which were independent periods of hunting activity in a continuous spatial and temporal sequence lasting \geq 30 minutes. A sample hunting bout is shown in (a). Hunting bouts were further separated into stands (b and c), based on the density of locations. Stand areas (gray area in c) were calculated using a convex hull around all stand locations plus a buffer equal to the GPS error. A single location for each stand was calculated using the mean center (star in c) of all stand locations. Travel routes were considered all hunting bout locations not associated with the stand that lasted \geq 5 minutes.

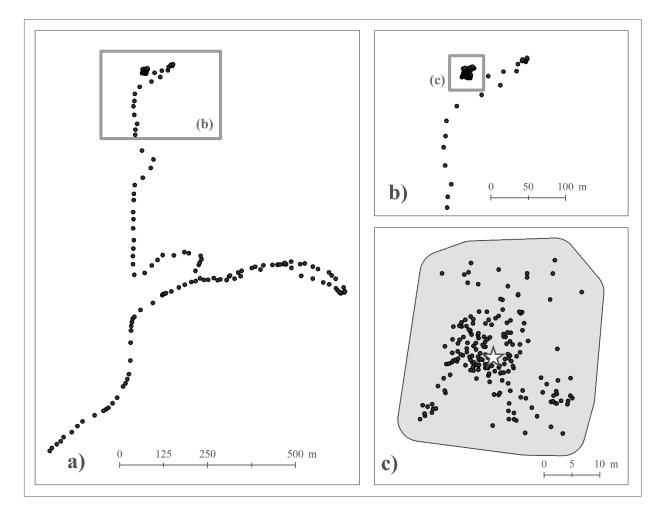
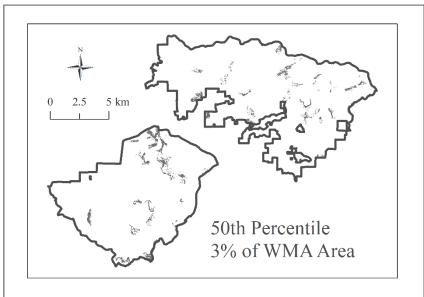
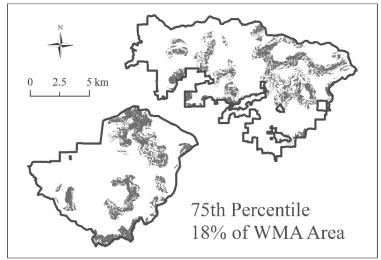


Figure 2-3. The 50th, 75th, and 90th percentiles signifying areas that 50%, 75%, and 90% of all white-tailed deer hunters were likely to utilize given their movement characteristics for distance to the nearest open road, distance to the nearest wildlife opening (i.e., food plot), and slope calculated from hunter tracking data on Blue Ridge and Coopers Creek Wildlife Management Areas (WMAs) in northern, Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons (GDNR–WRDNC 2018). Blue Ridge (bottom left) and Coopers Creek WMAs (top right) are denoted by the dark gray boundaries.





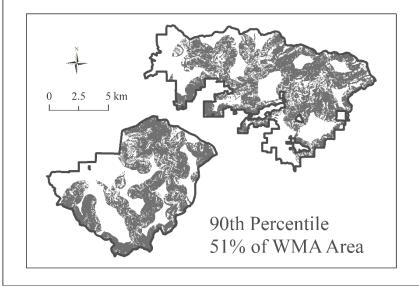


Table 2-1. Primitive weapons and firearms hunts on Blue Ridge (BR) and Coopers Creek (CC) Wildlife Management Areas (WMAs) in northern Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons and the number of hunters recruited to carry GPS units and the number of hunters checked-in or signed-in for each hunt.

Season	WMA	Hunt type	Dates	Hunters recruited to carry GPS ^a	Hunters participating in hunt ^b
2018–2019	BR	Primitive	10/10-10/14	2	107
2018–2019	BR	Firearms	10/24-10/27	16	95
2018–2019	BR	Firearms	11/21-11/24	11	266
2018–2019	CC	Primitive	10/31-11/03	1 ^c	172
2018–2019	CC	Firearms	11/28-12/01	1 ^c	226
2019–2020	BR	Firearms	10/23-10/26	12	78
2019–2020	BR	Firearms	11/27-11/30	11	186
2019–2020	CC	Primitive	10/30-11/03	6	73
2019–2020	CC	Firearms	11/27-12/01	4	159
2019–2020	CC	Firearms	12/26-01/01	6	228

^aNumbers represent hunters with GPS units that produced usable datasets

^bC. Killmaster, Georgia Department of Natural Resources, unpublished data

^cWe did not recruit hunters on CC during the 2018–2019 hunting season but 1 hunter that was recruited on BR used the GPS unit during 2 CC hunts.

Table 2-2. Land cover classes used to calculate the composition of stand areas based on hunter tracking data on Blue Ridge and Coopers Creek Wildlife Management Areas (WMAs) in northern Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons. National Land Cover Database data were reclassified into 8 land cover classes used in analyses (USGS 2019).

2016 NLCD Land Cover Category	Reclassified Land Cover Category	Area within hunting stand (%)	Area within WMAs (%)				
Deciduous Forest	Deciduous Forest	50.0	48.9				
Mixed Forest	Mixed Forest	32.7	39.0				
Evergreen Forest	Evergreen Forest	13.5	9.0				
Developed, Open Space	Developed	1.9	2.7				
Developed, Low Intensity							
Developed, Medium Intensity							
Developed, High Intensity							
Grassland/Herbaceous	Grassland/Herbaceous	1.9	<1				
Pasture/Hay	Pasture	0	<1				
Cultivated Crops		0	<1				
Shrub/Scrub	Shrub/Scrub	0	<1				
Barren	Other	U	<1				
Woody Wetlands							
Emergent Herbaceous Wetlands							
All other classes	NoData	N/A	N/A				

CHAPTER 3

DOE MOVEMENT RESPONSES TO HUNTING IN A LOW-DENSITY POPULATION ²

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² Rosenberger, J. P., A. C. Edge, C. J. Yates, N. P. Nibbelink, K. V. Miller, D. A. Osborn, C. H. Killmaster, K. L. Johannsen, and G. J. D'Angelo. To be submitted to the *Journal of Wildlife Management*.

ABSTRACT Hunting can impact game directly through harvest or indirectly by inducing behavioral responses. We studied the effects of 7 firearms hunts on female white-tailed deer (Odocoileus virginianus) behavior relative to pre-hunt, hunt, and post-hunt periods on 2 Wildlife Management Areas within the Chattahoochee National Forest in the mountains of northern Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons. Deer populations have declined drastically on 8 WMAs across northern Georgia; buck harvest decreased 80% and harvest success rates decreased 64% from 1979 to 2018. Twenty-six GPS-collared does produced data for 55 deer/hunt combinations. We detected no differences among pre-hunt, hunt, and post-hunt periods for home range size and composition, including proportions of land cover, understory, public land, and areas that contain 90% of hunting pressure. We also detected no differences among the periods in mean centers of core areas and movement rates during shooting hours and non-shooting hours. Core area size differed slightly among the periods; pre-hunt core areas were 0.8 ha larger than hunt core areas (Z = 2.56, P = 0.03). Overall, hunting pressure did not appear to result in significant changes in movements and space use of female white-tailed deer. Changes in core area size may have resulted from non-hunting related factors, such as concentrated use of mast or breeding activities. Regulatory adjustments do not appear to be necessary to minimize hunting-related disturbance on female deer. Although not an objective of our research, we also documented 5 excursions during our study period.

KEY WORDS Chattahoochee National Forest, deer behavior, deer management, Georgia, Global Positioning System (GPS), home range, hunting, hunting pressure, movement ecology, white-tailed deer.

Hunting can impact game directly through harvest or indirectly by inducing behavioral responses (Root et al. 1988, Naugle et al. 1997, Simoneaux et al. 2016). Controlled harvest is the most

effective tool for manipulating game populations in line with management objectives (Hewitt 2015). Typically, harvest trends directly inform management by serving as indicators of population trends or informing population models (GA DNR-WRD 2014). However, when faced with a game population of low density and a history of decline, indirect effects of hunting may become equally pertinent to management. For example, in a low-density deer (i.e., members of *Cervidae* family) population where every female is important, antlerless harvest may be limited or prohibited. But, if hunting pressure associated with antlered deer or other game species invokes significant changes in doe movements that hinder normal activities, such as procurement of food resources or breeding, this may have negative population effects (Spitz et al. 2019, Brown et al. 2020). Therefore, where deer population sustainability is a concern, understanding the effects of hunting on doe activity may be important to assist managers in minimizing human disturbance on female deer while continuing to provide recreational opportunities for hunters.

Hunting can alter deer behavior but the nature of behavioral alterations depends on a variety of site-specific factors, including habitat conditions, level of hunting pressure, length or intensity of hunting season, and method of hunting (e.g., sit and wait, hunters driving deer; Root et al. 1988, VerCauteren and Hygnstrom 1998, Kilpatrick and Lima 1999, Little et al. 2016, Simoneaux et al. 2016). Deer may increase movements in areas with less understory cover (Simoneaux et al. 2016) and increase flight responses to avoid hunters (Marshall and Whittington 1969). Likewise, deer may decrease movements in areas with more understory cover (Simoneaux et al. 2016), primarily by decreasing their diurnal movements (VerCauteren and Hygnstrom 1998). When hunters were present on the landscape in northeastern South Dakota, a greater proportion of the diurnal activity of female white-tailed deer (*Odocoileus virginianus*) occurred in areas with escape cover (Naugle et al. 1997). While increased hunting pressure can cause deer

to increase movements (Marshall and Whittington 1969), areas of dense cover may buffer the effects of high hunter densities (Root et al. 1988). A study on Chesapeake Farms in Maryland found hunting pressure levels were not significant enough to impact adult male white-tailed deer behavior (Karns et al. 2012). In southcentral Oklahoma, white-tailed deer reduced distances they traveled and increased site fidelity over the course of the study, but the magnitude of movement reduction increased with level of hunter density (Little et al. 2016). Results from a study on the coast of Connecticut suggested that white-tailed deer behavioral responses to hunting pressure may decrease and harvest vulnerability may increase if a series of short, intense hunt periods are separated by periods of no hunting (Kilpatrick and Lima 1999).

Overall, deer responses to hunting pressure are not consistent across studies. Some research indicates deer may tighten their core areas and shift to where hunting pressure is lower or absent (Downing et al. 1969, Kilgo et al. 1998, VerCauteren and Hygnstrom 1998, Kilpatrick and Lima 1999), while some demonstrate increase in core area size (Kilpatrick and Lima 1999), concentration of activities within core areas and decrease in overall movements (Marantz et al. 2016), or decrease in diurnal movement and increase in nocturnal activity (Kilgo et al. 1998, Little et al. 2016, Simoneaux et al. 2016, Sullivan et al. 2018). Some have reported overall increases in deer movements in response to hunting (Marshall and Whittington 1969, Root et al. 1988, Naugle et al. 1997). Deer typically demonstrate high levels of fidelity to their home ranges even under hunting pressure (Marshall and Whittington 1969, Downing et al. 1969, VerCauteren, and Hygnstrom 1998, Kilpatrick and Lima 1999, D'Angelo et al. 2003) but a few exceptions have been documented (Root et al. 1988, Naugle et al. 1997). Movements outside their home ranges in response to hunting pressure are typically short distance and short-term (VerCauteren and Hygnstrom 1998, Karns et al. 2012). In a northeastern Missouri study, white-

tailed deer with home ranges that included parts of a refuge (i.e., area closed to hunting) focused their activity on the parts of their home ranges that were on refuge areas during the hunting season while deer with home ranges that did not include part of a refuge area did not leave their home ranges to seek protection from hunters (Root et al. 1988). Furthermore, an increase in home range size was detected during hunts compared to pre-hunt periods for South Dakota white-tailed deer (Naugle et al. 1997). Females also increased activity during crepuscular periods, while maintaining high levels of diurnal activity during hunts (Naugle et al. 1997). Additionally, adult male white-tailed deer in a hunted population in southern Florida occupied larger home ranges compared to those in an un-hunted population (Sargent and Labisky 1995).

Hunters may act as predators on the landscape, inducing periods of "risk" for deer (Proffitt et al. 2009, Spitz et al. 2019, Brown et al. 2020). Perceived risk can cause deer to shift their activity away from key foraging areas to those associated with lower risk (Hernández and Laundré 2005, Benhaiem et al. 2008, Lone et al. 2015, Spitz et al. 2019). Male European red deer (*Cervus elaphus*) in central Norway utilized different habitats when hunters were present on the landscape, trading off the best foraging opportunities for increased survival (Lone et al. 2015). In Oregon, behavioral responses of female elk (*Cervus canadensis*) were measured relative to multiple 5-day hunts over a 6-year period (Spitz et al. 2019). Female elk shifted their habitat use away from areas of optimal forage and avoided roads and trails during hunts, which had significant nutritional costs, especially for lactating females, as they entered winter (Spitz et al. 2019). Infrequent periods of high risk may also cause deer to devote less energy to activities related to reproduction (Lima and Bednekoff 1999) or alter normal activity related to breeding (Little et al. 2016, Marantz et al. 2016). Stress associated with perceived risk can induce physiological responses that suppress reproduction (Creel et al. 2007, Cherry et al. 2016).

Moreover, female white-tailed deer in low density populations have been demonstrated to adopt a mate-searching strategy by increasing movements during the rut (i.e., breeding season; Labisky and Fritzen 1998, D'Angelo et al. 2004). Hunting pressure may cause deer to decrease movements, potentially disrupting their normal approach to connecting with mates (Little et al. 2016). Male white-tailed deer in southcentral Oklahoma decreased movements due to hunting pressure when increased movements were expected due to breeding activity, suggesting there was a trade-off between risk avoidance and reproduction (Little et al. 2016, Marantz et al. 2016).

Our study focused on adult female white-tailed deer in the southern Appalachian Mountains of northern Georgia. From 1979 to 2018, total buck harvest on 8 Wildlife Management Areas (WMAs) within the Chattahoochee National Forest declined 80% and harvest success rates (i.e., bucks harvested/hunter/day) declined 64%, signifying a decline in the deer population (Little et al. 2018, C. Killmaster, Georgia Department of Natural Resources, unpublished data). Concurrently, the number of hunters on the 8 WMAs decreased 68% which constituted an 81% decrease in hunters/days available for buck harvest (C. Killmaster, Georgia Department of Natural Resources, unpublished data). Deer populations have reached a critical level on the WMAs and antlerless harvest is currently prohibited. However, multiple hunts are still conducted on each WMA for antlered deer, black bears (Ursus americanus), and wild pigs (Sus scrofa). The northern Georgia Mountains are part of a mast-driven system. Deer body condition, antler characteristics, timing of breeding, reproductive rates, seasonal home range sizes, and hunter success rates have been correlated to the quality of the acorn crop (Feldhamer et al. 1989, Wentworth et al. 1990, Wentworth et al. 1992, Carlock et al. 1993, Kammermeyer and Carlock 2000). Behavioral responses of does to hunting pressure could indicate the potential for negative effects on their procurement of key food resources, such as acorns, or breedingrelated activities. Therefore, even though female deer are not available for harvest, the effects of hunting on their movement patterns should be understood. Furthermore, because previous research has reached a multitude of conclusions regarding deer responses to hunting pressure that are largely dependent on site-specific factors, such as habitat and hunter density, we designed a study to measure the effects of hunting on female deer in northern Georgia. Our objective was to evaluate the impact of hunting on does by comparing 13 variables of movement and space use before, during, and after public land hunts.

STUDY AREA

We captured deer and analyzed their movements on a 135-km² study area that includes private land (11%) and portions of the Chattahoochee National Forest (89%) in northern Georgia, USA (Fig. 3-1). Blue Ridge and Coopers Creek WMAs comprise 76% of the public land portion of the study area and 67% of the total study area. Through a cooperative agreement, Georgia Department of Natural Resources maintains wildlife openings (i.e., food plots), sets hunting regulations, and conducts hunts on the WMAs (S. Frazier, Georgia Department of Natural Resources, personal communication). The U.S. Forest Service conducts the remaining management activities, including timber harvest and prescribed fire (S. Frazier, Georgia Department of Natural Resources, personal communication). The Chattahoochee National Forest is within the Blue Ridge physiographic province of the Appalachian Mountain Range and spans 3,043 km². It is 96.8% forested (USGS 2019) with a forest age distribution of 77.9% late forest, 21.9% middle forest, and 0.2% early forest (USFS 2017). From 1979 to 2015, the frequency of timber harvest declined resulting in a mature forest age structure, as the two youngest age classes (0-10 years and 11-20 years) declined in coverage by 95% (Little et al. 2018). Northern hardwood communities occur on north-facing slopes at elevations greater than 1,200 m and

largely consist of American beech (Fagus grandifolia), northern red oak (Quercus rubra), and birch (Betula spp.) in the overstory and rhododendron (Rhododendron maximum) or striped maple (Acer pensylvanicum) in the understory (Little et al. 2018). Cove hardwoods occur at elevations less than 1,200 m (Little et al. 2018). These mesic communities are dominated by American basswood (*Tilia americana*), northern red oak, and tulip poplar (*Liriodendron* tulipifera, Little et al. 2018). Mixed-pine hardwood communities generally occur on south-facing side slopes and predominantly consist of red maple (Acer rubrum), scarlet oak (Quercus coccinea), chestnut oak (Quercus montana), and yellow pines (Pinus spp.) in the overstory and mountain laurel (Kalmia latifolia) in the understory (Little et al. 2018). Upland hardwood communities are present on submesic to xeric sites of all elevations and are composed of white oak (Quercus alba), black oak (Quercus velutina), northern red oak, red maple, and hickories (Carya spp.) in the overstory and rhododendron or mountain laurel in the understory (Little et al. 2018). Streamside communities include eastern hemlock (*Tsuga canadensis*) and white pine (*Pinus strobus*) in the overstory and rhododendron in the understory (Little et al. 2018). Average annual temperatures range from 6.3 to 19.9 degrees Celsius and average annual rainfall and snowfall are 142 cm and 10.2 cm, respectively (based on weather data from Blairsville, Georgia; U.S. Climate Data 2019).

The study area has elevations ranging 570–1,101 m (\bar{x} = 760, SD ± 95) and slopes ranging 0–56 degrees (\bar{x} = 17, SD ± 8; USGS 2013). It is 94.6% forested and contains 35 wildlife openings to provide food sources for wildlife (E. Mavity, USFS, unpublished data). Cool season openings provide winter nutrition and act as buffers during poor mast years, while warm season openings provide summer nutrition. Twenty four percent of the study area contains mountain laurel or rhododendron understories (J. Hepinstall-Cymerman, University of Georgia,

unpublished data). The study area also contains 220 km of county roads and USDA Forest Service roads that were open to vehicular traffic during hunts (U.S. Census Bureau 2015*a*, *b*; USFS 2020).

Following restoration efforts, the first deer hunt in this area was held in 1940 (Little et al. 2018) and populations continued to increase until declines became evident during the early 2000s (C. Killmaster, Georgia Department of Natural Resources, unpublished data).

Concurrently, as deer harvest and hunter success rates declined on WMAs within the Chattahoochee National Forest, populations of black bears (*Ursus americanus*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), and wild pigs (*Sus scrofa*) increased (Kilgo et al. 2010, Roberts and Crimmins 2010, Crimmins et al. 2012, Little et al. 2017, Lewis et al. 2019) and forests matured (Little et al. 2018). Predation, competition, and lack of early successional plant communities and early forest stages have been suggested as potential contributors to deer population declines (Little et al. 2018). Current deer density estimates are 1.9–3.9 deer/km² compared to 7 deer/km² in 1953 (Little et al. 2018).

Each WMA hosted 1 primitive weapons hunt (4–5 days), 2 firearms hunts (4–7 days each), and 4–5 weeks of archery hunting during the 2018–2019 and 2019–2020 seasons. During the 2018–2019 season, most hunts were antlered-only with a few limited opportunities for antlerless harvest, whereas during the 2019–2020 season, hunts were antlered-only. Harvest of black bears and wild pigs was permitted during all deer hunts. There was no limit to the number of hunters who could hunt on the WMAs. On private land, either-sex archery deer hunting occurred from mid-September to mid-January. Muzzleloader and firearms hunting occurred from mid-October to mid-January with alternating weeks of either-sex and antlered-only opportunities. Legal hunting hours were 30 minutes before sunrise until 30 minutes after sunset.

METHODS

We captured female white-tailed deer (≥1.5 years) during 01 January–31 March in 2018 and 2019 using drop nets, rocket nets, Clover traps, and dart projectors on sites baited with whole kernel corn. We fitted each doe with a GPS radio-collar (VERTEX Plus Iridium V 3.2, Vectronic Aerospace GmbH, Berlin, Germany) that recorded locations every 30 min during our study period. Our study period included pre-hunt, hunt, and post-hunt periods relative to 7 public land firearms hunts that occurred on Blue Ridge and Coopers Creek WMAs during the 2018–2019 and 2019–2020 hunting seasons (Table 3-1). Hunts typically lasted 4 days with a range of 4–7 days. Each pre-hunt and post-hunt period equaled the length of the corresponding hunt and occurred immediately before or after the hunt, respectively. Our methods related to deer capture and handling were approved by the Institutional Animal Care and Use Committee at the University of Georgia (Animal Use Protocol #: A2019 08-042-R1).

We filtered all location datasets to remove extreme outliers with >10 GPS dilution of precision (D'eon and Delparte 2005, Marantz et al. 2016). We analyzed the differences in 8 metrics among pre-hunt, hunt, and post-hunt periods, including the size and composition of home ranges, size and shifts of core areas, and movement rates. To calculate home ranges, core areas, and movements for each deer/hunt/period combination (~190 locations each), we used the dynamic Brownian bridge movement model in RStudio Team (2018; RStudio, Inc., Boston, MA, USA). This model calculates an animal's utilization distribution using estimated movement paths, rather than assuming each location as independent from others (Kranstauber et al. 2012). We used the 90% and 50% utilization distributions for home ranges and core areas, respectively. Model parameters included a window size of 9 locations, margin of 3 locations, resolution of 30 m, and collar error of 20.8 m. We calculated the horizontal positional error of the GPS collars by

comparing 67 total locations recorded by 2 collars while placed on top of a National Geodetic Survey benchmark in Blairsville, Georgia, USA to the actual benchmark coordinates. We used the distance in x and y from each recorded location to the true location to determine a 95% confidence interval root mean square error (Bolstad 2019).

We used ArcMap 10.7.1 (Environmental Systems Research Institute, Inc., Redlands, CA, USA) to calculate the following: mean center locations of each core area and proportion of each home range that contained: 1) public land (GDNR–WRDNC 2017), 2) forest, agriculture, developed, and low vegetation land cover types (USGS 2019), 3) rhododendron or mountain laurel understory (J. Hepinstall-Cymerman, University of Georgia, unpublished data), and 4) areas that contain 90% of hunting pressure based on observed hunter use of the WMAs (Rosenberger, chapter 2). To quantify movement during shooting hours and non-shooting hours, we averaged step length, which was the distance between successive 30-min locations, during the corresponding ranges of time. We tested the effects of period on each set of metrics using mixed effects models with package nlme in RStudio Team (2018) with period as the fixed effect and Collar ID, month, and year as random effects. We performed an ANOVA on model output and Tukey's HSD Multiple Comparisons tests on variables with significant *P*-values from ANOVA using the multcomp package in RStudio Team (2018). We used an alpha level of 0.05 to determine significance.

RESULTS

Over the course of the study, we analyzed movements of 26 adult female deer, which provided data for 55 deer/hunt combinations. We did not detect a difference in size and composition of home ranges, shifts in core areas, or movement rates among pre-hunt, hunt, and post-hunt

periods (Table 3-2). Core area size was the only variable that differed among periods. Pre-hunt core areas were 0.8 ha larger than hunt core areas (Z = 2.56, P = 0.03).

Although not an objective of our study, visualization of all doe home ranges and core areas revealed 5 excursive events during our study period, which are significant movements outside of an animal's home range over a relatively short period of time (D'Angelo et al. 2004, Kolodzinski et al. 2010, Karns et al. 2011, Olson et al. 2015). We used the criteria found in Olson et al. (2015) to define excursions. Four excursions occurred in early December while 1 occurred in late December (Table 3-3). Mean maximum distance from a starting location was 3.6 km (range 2.0–5.7 km), mean total movement was 8.7 km (range 4.2–12.0 km), mean movement between 30-min locations was 206 m (range 100–338 m), and mean duration was 28 hr (range 14–51.5 hr, Fig. 3-2).

DISCUSSION

Our results indicate that hunting pressure relative to firearms hunts on our study area was not sufficient to cause significant changes in deer movements, as 12 of our 13 movement and space use-related variables did not differ among pre-hunt, hunt, and post-hunt periods. Home ranges of does in our study were consistent in size and composition over the course of the hunt periods. This was not unexpected, as prior research indicates deer exhibit fidelity to their home ranges even when faced with hunting pressure (Marshall and Whittington 1969, Downing et al. 1969, VerCauteren, and Hygnstrom 1998, Kilpatrick and Lima 1999, D'Angelo et al. 2003). Doe home ranges consisted of roughly 25% of areas that were suitable for 90% of public land hunters on northern Georgia WMAs, suggesting that does may be experiencing little to no hunting pressure within the majority of their home ranges. Hunters generally choose areas close to roads with vehicular access and less steep slopes, which may create areas of "de facto refugia" for deer in

less accessible areas (Stedman et al. 2004, Diefenbach et al. 2005, Lebel et al. 2012). Home ranges of does in our study also had similar land cover composition compared to the availability of land cover types across the study area. Both were predominantly forested with approximately 25% rhododendron or mountain laurel understories. The agricultural and developed land makeup of home ranges most likely corresponded to private land areas, which included pastures and mowed lawns.

Core areas of does in our study did not shift in location relative to pre-hunt, hunt, and post-hunt periods. In contrast, a study in Connecticut found deer core areas shifted to areas where hunting activity was less or absent (Kilpatrick and Lima 1999). Doe movement rates also did not differ among pre-hunt, hunt, and post-hunt periods in our study, even when considering shooting hours versus non-shooting hours. Other studies have documented deer responding to hunters on the landscape by decreasing their diurnal movements and increasing their nocturnal activity (Kilgo et al. 1998, Little et al. 2016, Simoneaux et al. 2016, Sullivan et al. 2018). Doe core areas were smaller during hunt periods relative to pre-hunt periods, but post-hunt core areas were not different from pre-hunt or hunt core areas. Some studies found that deer use smaller areas more intensively in response to hunting (Little et al. 2016, Marantz et al. 2016). However, this was the only observed difference in our analysis of 13 variables and the magnitude of decrease in core area size was only 0.8 ha. Changes in core area size may have resulted from non-hunting related factors, such as concentrated use of mast or breeding activities. Deer have been demonstrated to alter movement patterns in response to acorn drop (Carlock et al. 1993, McShea and Schwede 1993) and our study area is largely a mast-driven system (Wentworth et al. 1990, Wentworth et al. 1992, Carlock et al. 1993, Kammermeyer and Carlock 2000). Additionally, does may decrease movements and tighten their core areas when in estrus and

forming tending-bonds with males (Hölzenbein and Schwede 1989, DeYoung and Miller 2011). Therefore, it is plausible that some of our GPS-collared does concentrated their movements in order to utilize areas with large amounts of available mast or does came into estrus and were tended by bucks during a hunt period.

Our results suggest that hunting pressure on our study area did not induce perceived risk in deer and, therefore, did not cause them to shift away from key foraging areas or alter normal activity patterns related to breeding. Therefore, we do not expect hunting to cause changes in doe movements, unless an occasional encounter with a hunter results in a doe being "bumped." A study in Maryland found hunting pressure was not sufficient to affect adult male white-tailed deer behavior (Karns et al. 2012). Home range and core area size remained constant between pre-hunt and hunt periods and decreases in overall movement and activity were attributed to the coincident transition from rut to post-rut, rather than hunting activities (Karns et al. 2012). Similarly, female white-tailed deer in Louisiana did not change their home ranges, core areas, or movement rates in response to small game hunting activities (Bakner et al. 2020). Moreover, hunting pressure on 3 study areas in Sweden did not affect moose (*Alces alces*) activity ranges, movement rates, or diurnal versus nocturnal activity (Neumann et al. 2009).

Our results are not surprising, given the decline in hunting participation on northern Georgia WMAs. Over our study period, the most attended hunt was on Blue Ridge WMA (9,285 ha) where 266 hunters checked-in, representing 1 hunter per 35 ha. Since 90% of hunters would utilize approximately 45% of the WMA (Rosenberger, chapter 2), this would constitute 1 hunter/17 ha within those areas and 1 hunter/189 ha on the remaining 55% of the WMA. Additionally, the majority of each doe's home range across the study periods did not contain areas that hunters were likely to utilize. Overall, it appears that female deer on the public land

portions of our study area were not affected by buck-only hunting. However, future regulatory changes involving hunts may necessitate further research on behavioral responses of female deer.

We documented 5 excursions by our GPS-collared does during our study. Although reasons for excursions are not well-understood, some have suggested female excursions and increased movements during the rut could be a mate-searching strategy for does when normal sitand-wait strategies are less successful due to unbalanced sex ratios or low density populations (Hölzenbein and Schwede 1989, Labisky and Fritzen 1998, D'Angelo et al. 2004). Other studies suggest females engage in excursive behaviors during the rut as a discrete form of mate selection, even in high-density populations with balanced sex ratios (Sawyer et al. 1989, Kolodzinski et al. 2010, Sullivan et al. 2017). Based on fawn birth dates from ongoing research in northern Georgia (A. Edge, University of Georgia, unpublished data), it is possible that each excursion we identified was associated with estrus. However, excursive behaviors have been documented in both male and female white-tailed deer and at various times of the year (D'Angelo et al. 2004, Karns et al. 2012, Olson et al. 2015). For example, nine of 13 GPScollared adult male white-tailed deer in Pennsylvania made excursions from 6 April to 6 June during one season of monitoring (Olson et al. 2015). Further research using GPS data from female deer in northern Georgia could provide more comprehensive insights into the occurrence of excursions on a yearly basis.

MANAGEMENT IMPLICATIONS

Because deer populations in the mountains of northern Georgia have reached a critically low level and antlerless hunting has been eliminated, it is important for managers to consider the indirect effects of hunting on female deer behavior. We did not detect significant changes in doe movements relative to 7 firearms hunts on 2 WMAs, therefore, it is unlikely that hunting

pressure induced perceived risk in deer that may have otherwise caused them to shift away from key foraging areas or alter normal activity patterns related to breeding. These findings pertain to regulations, hunter numbers, and other aspects associated with firearms hunts during the 2018–2019 and 2019–2020 hunting seasons. Regulatory adjustments do not appear to be necessary to minimize hunting-related disturbance on female deer.

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LITERATURE CITED

- Bakner, N. W., S. S. Madere, J. Bordelon, S. Durham, and B. A. Collier. 2020. Behavioral responses of female white-tailed deer to small game hunting activities. Journal of the Southeastern Association of Fish and Wildlife Agencies 7:202–209.
- Benhaiem, S., M. Delon, B. Lourtet, B. Cargnelutti, S. Aulagnier, A. J. Mark Hewison, N. Morellet, and H. Verheyden. 2008. Hunting increases vigilance levels in roe deer and modifies feeding site selection. Animal Behaviour 76:611–618.

- Bolstad, P., editor. 2019. GIS fundamentals: a first text on Geographic Information Systems. Sixth edition. Pages 617–637. Data standards and data quality. XanEdu, Ann Arbor, Michigan, USA.
- Brown, C. L., J. B. Smith, J. J. Wisdom, M. M. Rowland, D. B. Spitz, and D. A. Clark. 2020.

 Evaluating indirect effects of hunting on mule deer spatial behavior. Journal of Wildlife

 Management 84:1246–1255.
- Carlock, D. M., K. E. Kammermeyer, L. E. McSwain, and E. J. Wentworth. 1993. Deer movements in relation to food supplies in the southern Appalachians. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 47:16–23.
- Cherry, M. J., K. E. Morgan, B. T. Rutledge, L. M. Conner, and R. J. Warren. 2016. Can coyote predation risk induce reproduction suppression in white-tailed deer. Ecosphere 7:1–10.
- Creel, S., D. Christianson, S. Liley, and J. A. Winnie. 2007. Predation risk affects reproductive physiology and demography of elk. Science 315:960.
- D'Angelo, G. J., J. C. Kilgo, C. E. Comer, C. D. Drennan, D. A. Osborn, and K. V. Miller. 2003.

 Effects of controlled dog-hunting on the movements of female white-tailed deer.

 Proceedings of the Southeastern Association of Fish and Wildlife Agencies 57:317–325.
- D'Angelo, G. J., C. E. Comer, J. C. Kilgo, C. D. Drennan, D. A. Osborn, and K. V. Miller. 2004.
 Daily movements of female white-tailed deer relative to parturition and breeding.
 Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies 58:292–301.

- D'eon, R. G., and D. Delparte. 2005. Effects of radio-collar position and orientation on GPS radio-collar performance, and the implications of PDOP in data screening. Journal of Applied Ecology 42:383–388.
- DeYoung, R. W., and K. V. Miller. 2011. Biology and management of white-tailed deer. Pages 311–351 *in* D. G. Hewitt, editor. White-tailed deer behavior. CRC Press Taylor and Francis Group, Boca Raton, FL, USA.
- Diefenbach, D. R., J. C. Finley, A. E. Luloff, R. Stedman, C. B. Swope, H. C. Zinn, and G. J. San Julian. 2005. Bear and deer hunter density and distribution on public land in Pennsylvania. Human Dimensions of Wildlife 10:201-212.
- Downing, R. L., B. S. McGinnes, R. L. Petcher, and J. L. Sandt. 1969. Seasonal change in movements of white-tailed deer. Pages 19–24 *in* Proceedings of the Symposium: White-tailed Deer in Southern Forest Habitat. Southern Forest Experiment Station, U.S. Forest Service, 25–26 March 1969, Nacogdoches, Texas, USA.
- Feldhamer, G. A., T. P. Kilbane, and D. W. Sharp. 1989. Cumulative effect of winter on acorn yield and deer body weight. Journal of Wildlife Management 53:292–295.
- Georgia Department of Natural Resources—Wildlife Resources Division [GA DNR-WRD]. 2014.

 Georgia's deer management plan 2015-2024. Georgia Department of Natural Resources—
 Wildlife Resources Divisions—Game Management Section, Social Circle, Georgia, USA.
- Georgia Department of Natural Resources—Wildlife Resources Division Nongame Conservation
 [GDNR–WRDNC]. 2017. U.S. Forest Service lands.

 https://data.georgiaspatial.org/index.asp?body=preview&dataId=41245. Accessed 27
 January 2019.

- GDNR–WRDNC. 2018. DNR managed lands.

 https://data.georgiaspatial.org/index.asp?body=preview&dataId=69. Accessed 31 May 2018.
- Hernández, L., and J. W. Laundré. 2005. Foraging in the 'landscape of fear' and its implications for habitat use and diet quality of elk *Cervus elaphus* and bison *Bison bison*. Wildlife Biology 11:215–220.
- Hölzenbein, S., and G. Schwede. 1989. Activity and movements of female white-tailed deer during the rut. Journal of Wildlife Management 53:219–223.
- Kammermeyer, K. E., and D. M. Carlock. 2000. Relationship of mast, ovarian activity, recruitment and deer condition in northeast Georgia. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 54:274–281.
- Karns, G. R., R. A. Lancia, C. S. DePerno, and M. C. Conner. 2011. Investigation of adult male white-tailed deer excursions outside their home range. Southeastern Naturalist 10:39–52.
- Karns, G. R., R. A. Lancia, C. S. DePerno, and M. C. Conner. 2012. Impact of hunting pressure on adult male white-tailed deer behavior. Proceedings of the Conference of the Southeastern Association of Fish and Wildlife Agencies 66:120–125.
- Kilgo, J. C., R. F. Labisky, and D. E. Fritzen. 1998. Influences of hunting on the behavior of white-tailed deer: implications for conservation of the Florida panther. Conservation Biology 12:1359–1364.
- Kilgo, J. C., H. S. Ray, C. Ruth, and K. V. Miller. 2010. Can coyotes affect deer populations in southeastern North America? Journal of Wildlife Management 74:929–933.
- Kilpatrick, H. J., and K. J. Lima. 1999. Effects of archery hunting on movement and activity of female white-tailed deer in an urban landscape. Wildlife Society Bulletin 27:433–440.

- Kolodzinski, J. J., L. V. Tannenbaum, L. I. Muller, D. A. Osborn, K. A. Adams, M. C. Conner,W. M. Ford, and K. V. Miller. 2010. Excursive behaviors by female white-tailed deerduring estrus at two Mid-Atlantic sites. The American Midland Naturalist 163:366–373.
- Kranstauber, B., R. Kays, S. D. LaPoint, M. Wikelski, and K. Safi. 2012. A dynamic Brownian bridge movement model to estimate utilization distributions for heterogeneous animal movement. Journal of Animal Ecology 81:738–746.
- Labisky, R. F., and D. E. Fritzen. 1998. Spatial mobility of breeding female white-tailed deer in a low-density population. Journal of Wildlife Management 62:1329–1334.
- Lebel, F., C. Dussault, A. Masse, and S. D. Cote. 2012. Influence of habitat features and hunter behavior on white-tailed deer harvest. Journal of Wildlife Management 76:1431-1440.
- Lima, S. L., and P. A. Bednekoff. 1999. Temporal variation in danger drives antipredator behavior: the predation risk allocation hypothesis. The American Naturalist 153:649–659.
- Little, A. R., A. Hammond, J. A. Martin, K. L. Johannsen, and K. V. Miller. 2017. Population growth and mortality sources of the black bear population in northern Georgia. Journal of the Southeastern Association of Fish and Wildlife Agencies 4:130–138.
- Little, A. R., G. J. D'Angelo, C. H. Killmaster, K. L. Johannsen, and K. V. Miller. 2018.
 Understanding deer, bear, and forest trends in the North Georgia Mountains: the value of long-term data. Journal of the Southeastern Association of Fish and Wildlife Agencies 5:97–105.
- Little, A. R., S. L. Webb, S. Demarais, K. L. Gee, S. K. Riffell, and J. A. Gaskamp. 2016.

 Hunting intensity alters movement behaviour of white-tailed deer. Basic and Applied Ecology 17:360–369.

- Lone, K., L. E. Loe, E. L. Meisingset, I. Stamnes, and A. Mysterud. 2015. An adaptive behavioural response to hunting: surviving male red deer shift habitat at the onset of the hunting season. Animal Behaviour 102:127–138.
- Marantz, S. A., J. A. Long, S. I. Webb, K. L. gee, A. R. Little, and S. Demarais. 2016. Impacts of human hunting on spatial behavior of white-tailed deer (*Odocoileus virginianus*).Canadian Journal of Zoology 94:853–861.
- Marshall, A. D., and R. W. Whittington. 1969. A telemetric study of deer home ranges and behavior of deer during managed hunts. Proceedings of the Conference of the Southeastern Association of Fish and Wildlife Agencies 22:30–46.
- McShea, W. J., and G. Schwede. 1993. Variable acorn crops: responses of white-tailed deer and other mast consumers. Journal of Mammalogy 74:999–1006.
- Naugle, D. E., J. A. Jenks, B. J. Kernohan, and R. R. Johnson. 1997. Effects of hunting and loss of escape cover on movements and activity of female white-tailed deer, *Odocoileus virginianus*. Canadian Field Naturalist 111:595–600.
- Neumann, W., G. Ericsson, and H. Dettki. 2009. The non-impact of hunting on moose *Alces alces* movement, diurnal activity, and activity range. European Journal of Wildlife Research 55:255–265.
- Olson, A. K., W. D. Gulsby, B. S. Cohen, M. E. Byrne, D. A. Osborn, and K. V. Miller. 2015.

 Spring excursions of mature male white-tailed deer (Odocoileus virginianus) in north central Pennsylvania. American Midland Naturalist 174:96–104.
- Proffitt, K. M., J. L. Grigg, K. L. Hamlin, and R. A. Garrott. 2009. Contrasting effects of wolves and human hunters on elk behavioral responses to predation risk. Journal of Wildlife Management 73:345–356.

- Root, B. G., E. K. Fritzell, and N. F. Glessman. 1988. Effects of intensive hunting on white-tailed deer movement. Wildlife Society Bulletin 16:145–151.
- Sargent, R. A., and R. F. Labisky. 1995. Home range of male white-tailed deer in hunted and non-hunted populations. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 49:389–398.
- Sawyer, T. G., R. L. Marchinton, and K. V. Miller. 1989. Response of female white-tailed deer to scrapes and antler rubs. Journal of Mammalogy 70:431–433.
- Simoneaux, T. N., B. S. Cohen, E. A. Cooney, R. M. Shuman, M. J. Chamberlain, and K. V. Miller. 2016. Fine-scale movements of adult male white-tailed deer in northeastern Louisiana during the hunting season. Journal of the Southeastern Association of Fish and Wildlife Agencies 3:210–219.
- Spitz, D. B., M. M. Rowland, D. A. Clark, M. J. Wisdom, J. B. Smith, C. L. Brown, and T. Levi. 2019. Behavioral changes and nutritional consequences to elk (*Cervus canadensis*) avoiding perceived risk from human hunters. Ecosphere 10:1–17.
- Stedman, R., D. R. Diefenbach, C. B. Swope, J. C. Finley, A. E. Luloff, H. C. Zinn, G. J. San Julian, and G. A. Wang. 2004. Integrating wildlife and human-dimensions research methods to study hunters. Journal of Wildlife Management 68:762-773.
- Sullivan, J. D., S. S. Ditchkoff, B. A. Collier, C. R. Ruth, and J. B. Raglin. 2017. Breeding behavior of female white-tailed deer relative to conception: evidence for female mate choice. Ecology and Evolution 7:2395–2402.
- Sullivan, J. D., S. S. Ditchkoff, B. A. Collier, C. R. Ruth, and J. B. Raglin. 2018. Recognizing the danger zone: response of female white-tailed to discrete hunting events. Wildlife Biology 1:1–8.

- U.S. Census Bureau. 2015a. TIGER Primary and Secondary Roads.
 https://gdg.sc.egov.usda.gov/GDGOrder.aspx. Accessed 7 August 2020.
- U.S. Census Bureau. 2015b. TIGER Streets. https://gdg.sc.egov.usda.gov/GDGOrder.aspx. Accessed 7 August 2020.
- U.S. Climate Data. 2019. https://www.usclimatedata.com/climate/blairsville/georgia/united-states/usga0052. Accessed 7 April 2019.
- U.S. Department of Commerce and U.S. Census Bureau [USDC and USCB]. 2008. TIGER/Line Shapefile, 2008, state, Georgia, County and Equivalent.
- U.S. Forest Service [USFS]. 2017. Forest fast facts: Chattahoochee-Oconee National Forests.

 https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd578895.pdf>. Accessed on 9 April 2019.
- USFS. 2020. Motor Vehicle Use Map: Roads.

 https://data.fs.usda.gov/geodata/edw/datasets.php?xmlKeyword=trails. Accessed 17

 August 2020.
- U.S. Geological Survey [USGS]. 2013. National Elevation Dataset (NED).
 https://viewer.nationalmap.gov/basic/. Accessed 9 April 2019.
- USGS. 2019. National Land Cover Database 2016 Land Cover Conterminous United States. https://www.mrlc.gov/data. Accessed 13 May 2019.
- VerCauteren, K. C., and S. E. Hygnstrom. 1998. Effects of agricultural activities and hunting on home ranges of female white-tailed deer. Journal of Wildlife Management 62:280–285.
- Wentworth, J. M., A. S. Johnson, and P. E. Hale. 1990. Influence of acorn use on nutritional status and reproduction of deer in the southern Appalachians. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 44:142–154.

Wentworth, J. M., A. S. Johnson, P. E. Hale, and K. E. Kammermeyer. 1992. Relationship of acorn abundance and deer herd characteristics in the southern Appalachians. Southern Journal of Applied Forestry 16:5–8.

Figure 3-1. The 135-km² study area (dark gray boundary in *a* and *c*) for tracking movements of GPS-collared female white-tailed deer relative to firearms hunts during the 2018–2019 and 2019–2020 hunting seasons included parts of Blue Ridge and Coopers Creek Wildlife Management Areas (WMAs, *a*) and private land (white areas in *a*, GDNR–WRDNC 2018). WMAs are located in the northern region of Georgia, USA (*b*), within the Chattahoochee National Forest (*c*; USDC and USCB 2008, GDNR–WRDNC 2017).

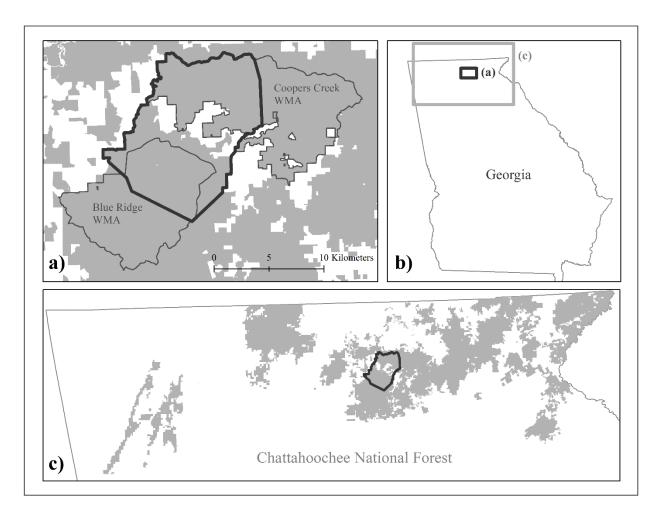


Figure 3-2. An excursion from a GPS-collared female white-tailed deer (Doe 27987) during a post-hunt monitoring period during 1–2 December 2019 in northern Georgia, USA. Points are based on a 30-min GPS fix rate and the hunt period home range (HR) was calculated from the 90% utilization distribution of the dynamic Brownian bridge movement model.

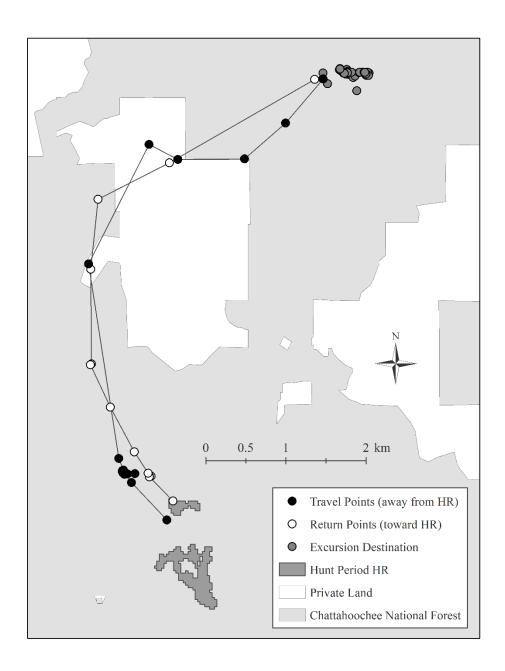


Table 3-1. Movements of GPS-collared female white-tailed deer were compared among prehunt, hunt, and post-hunt periods relative to 7 firearms hunts on Blue Ridge (BR) and Coopers Creek (CC) Wildlife Management Areas (WMAs) in northern Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons.

Season	WMA	Pre-hunt dates	Hunt dates	Post-hunt dates	Number of does with usable GPS
					datasets
2018–2019	BR	10/20-10/23	10/24-10/27	10/25-10/28	9
2018–2019	BR	11/20-11/23	11/21-11/24	11/25-11/28	8
2018–2019	CC	11/24-11/27	11/28-12/01	12/02-12/05	2
2019–2020	BR	10/19-10/22	10/23-10/26	10/27-10/30	10
2019–2020	BR	11/23-11/26	11/27-11/30	12/01-12/04	19
2019–2020	CC	11/22–11/26	11/27-12/01	12/02-12/06	4
2019–2020	CC	12/19–12/25	12/26-01/01	01/02 - 01/08	3

Table 3-2. Thirteen movement and space use variables for 26 GPS-collared female white-tailed deer were compared among pre-hunt, hunt, and post-hunt periods relative to 7 firearms hunts on Blue Ridge and Coopers Creek Wildlife Management Areas in northern Georgia, USA, during the 2018–2019 and 2019–2020 hunting seasons. Home ranges, core areas, and step lengths were calculated with 30-min GPS locations using the dynamic Brownian bridge movement model for 55 deer/hunt combinations.

Variable name	Variable explained	Pre-hunt \bar{x}	Hunt \bar{x}	Post-hunt \bar{x}	F-statistic	<i>P</i> -value
Home range (HR) size	Area of 90% utilization distribution	34.8 ha	31.3 ha	32.5 ha	1.20	0.31
Public land HR	Percentage of HR containing public land	88.9%	88.7%	88.0%	0.41	0.66
Understory HR	Percentage of HR containing rhododendron or mountain laurel understory	26.2%	25.5%	26.2%	0.28	0.76
90% hunter HR	Percentage of HR containing suitable areas for 90% of hunters	27.2%	25.2%	25.3%	0.88	0.42
Forest HR	Percentage of HR containing original NLCD 2016 land cover classes deciduous, evergreen, and mixed forest	88.1%	87.7%	88.3%	0.26	0.77
Agriculture HR	Percentage of HR containing original NLCD 2016 land cover classes cultivated crops and pasture/hay	2.0%	2.2%	2.1%	0.27	0.76
Developed HR	Percentage of HR containing original NLCD 2016 land cover class developed open space	6.0%	5.8%	5.8%	0.06	0.94
Low Vegetation HR	Percentage of HR containing original NLCD 2016 land cover classes shrub/scrub and grassland/herbaceous	<1%	<1%	<1%	1.04	0.36
Core area size	Area of 50% utilization distribution	6.7 ha	5.9 ha	6.0 ha	3.85	0.02
Mean center (x)	X-coordinate (m) of mean center of core area	N/A	N/A	N/A	0	0.65

Mean center (y)	Y-coordinate (m) of mean center of core area	N/A	N/A	N/A	0.60	0.54
Diurnal movement	Mean step length during legal shooting hours	88.7 m	78.6 m	81.3 m	2.07	0.13
Nocturnal movement	Mean step length during non-shooting hours	72.3 m	64.8 m	65.7 m	1.21	0.30

Table 3-3. Five excursion events were detected among GPS-collared female white-tailed deer when tracking movements relative to 7 public land firearms hunts during the 2018–2019 and 2019–2020 hunting seasons on Blue Ridge and Coopers Creek Wildlife Management Areas in northern Georgia, USA.

Deer	Date	Period	Max distance from starting location (km)	Total movement (km)	Mean step length (m)	Duration (hr)
27987	1–2 Dec 2019	Post-hunt	5.7	12.0	211	30.5
27991	4–5 Dec 2018	Post-hunt	4.6	11.5	268	21
36546	26 Dec 2019	Hunt	2.9	5.8	338	14
36558	3–5 Dec 2019	Post-hunt	2.7	10.1+	115	$47-56^{a}$
36562	4 Dec 2019	Post-hunt	2.0	4.2+	100	$21-25^{a}$

^aExcursion event extended beyond the post-hunt monitoring period, so several locations were based on 4-hr GPS fix-rate, rather than 30-min GPS fix rate.

CHAPTER 4

SATISFACTION OF PUBLIC LAND HUNTERS DURING LONG-TERM DEER POPULATION DECLINE 3

³ Rosenberger, J. P., B. B. Boley, A. C. Edge, C. J. Yates, K. V. Miller, D. A. Osborn, C. H. Killmaster, K. L. Johannsen, and G. J. D'Angelo. Submitted to *The Wildlife Society Bulletin*, 10/21/2020.

ABSTRACT From 1979 to 2018, the number of white-tailed deer (*Odocoileus virginianus*) hunters on 8 Wildlife Management Areas (WMAs) within the Chattahoochee National Forest in northern Georgia decreased from 12,220 to 3,901 constituting a 68% decline. Over the same period, harvest success rates (i.e., bucks harvested/hunter/day) declined 64% on the WMAs, signifying a decline in the deer population. To evaluate how to stem further decline in hunters, we sent mail questionnaires to 1,271 hunters in February 2019. Using 441 completed questionnaires (36% adjusted response rate), we gauged hunter satisfaction and derived a prescription for increasing satisfaction through a series of 4 analyses. First, we used Principal Components Analysis to identify 4 unique motivations for deer hunting: 1) escaping the daily routine and spending time outdoors, 2) harvesting deer for food, 3) socializing with hunting partners, and 4) harvesting trophy bucks. Second, ordinal logistic regression indicated that perception of a low deer population density and low hunt quality negatively affected satisfaction while the perception of the "right number" of hunters positively affected satisfaction. Third, Importance-Performance Analysis (IPA) on 19 aspects of WMA deer hunting revealed that respondents were dissatisfied with 15 aspects. For the best chance at improving hunter satisfaction, managers should focus on increasing opportunities for hunters to see and harvest deer, especially bucks. Last, IPA conducted on 5 WMA management practices, including timber harvest, prescribed fire, predator management, wild pig (Sus scrofa) control, and food plot management, revealed that all were underperforming relative to respondent expectations. Our results suggest there is a reduced population of hunters on northern Georgia WMAs that, despite low deer densities, continue to hunt on these areas. The primary motivation for hunting is experience-related (i.e., enjoying nature and escaping the daily routine). Nevertheless, their satisfaction could be improved by increasing opportunities to see and harvest deer. Overall, our

findings support the goal of managers to increase the deer population on northern Georgia WMAs.

KEY WORDS Appalachian, deer, forest, Georgia, human dimensions, hunting, management, motivations, preferences, satisfaction.

Human dimensions research is essential to help agencies understand hunter satisfaction and preferences. In 1935, Aldo Leopold identified the need for human-related research in wildlife management (Meine 1988) but the groundwork for human dimensions research was not laid until 1971 by Hendee and Potter (Manfredo 1989). Prior to this research, biologists assumed hunter satisfaction solely depended on harvest success (Hendee and Potter 1971, Hendee 1974). A more accurate and comprehensive concept of hunter satisfaction, called the Multiple Satisfactions Approach, was introduced by Hendee (1974) and is now widely accepted (Decker et al. 1980, Hammitt et al. 1990, Gigliotti 2000, Ebeling-Schuld and Darimont 2017). This approach lessens the emphasis of harvest success and accounts for different sources of hunter satisfaction (Hendee 1974, McCullough and Carmen 1982), including spending time with friends and family, experiencing the outdoors, appreciating nature, relaxing, and escaping everyday problems (Kennedy 1974, Decker et al. 1980, Decker and Connelly 1989, Hammitt et al. 1990, Gigliotti 2000, Mehmood et al. 2003). For example, deer hunters in Washington considered nature-related attributes (e.g., "getting away from civilization," "being close to nature") and skill-related attributes (e.g., "outsmarting game," "teaching someone else the skills of hunting") as more significant drivers of hunting satisfaction than harvest-related attributes (Hautaluoma and Brown 1978). Moreover, the statement "being in the outdoors is more satisfying to me than being successful at bagging a deer" was the most significant determinant of satisfaction for a group of public land deer hunters in Tennessee (Hammitt et al. 1989).

Motivations for hunting affect satisfaction of the hunting experience. Hunters who chose getting outdoors as their primary motivation for hunting had greater satisfaction with their hunting experience than those who considered getting shots at deer as their main motivation (Decker et al. 1980). The primary drivers of satisfaction of Quality Deer Management participants in Mississippi and South Carolina were hunter conduct, image to non-hunters, and direct involvement in management, rather than harvest success (Woods et al. 1996).

Furthermore, harvest success played the most significant role in satisfaction for Black Hills deer hunters who were motivated by obtaining meat and killing a trophy compared to those motivated by experiencing nature, solitude, excitement, exercise, or socialization (Gigliotti 2000). When hunters were unsuccessful, those primarily motivated by experiencing nature were left with higher satisfaction than hunters with other primary motivations (Gigliotti 2000).

Despite the de-emphasis of harvest success in the Multiple Satisfactions Approach, hunt quality remains a significant contributor to satisfaction (Decker and Connelly 1989, Gigliotti 2000, Brunke and Hunt 2007). Hunt quality describes the direct attributes of the hunt, including number of game harvested, number of game seen, perceived population density of game, and number of hunters encountered (Hammitt et al. 1989). In a New York study, getting shots at deer was an important driver of satisfaction for hunters (Decker et al. 1980), whereas in California, deer population size and kill rate accounted for 28% of hunter satisfaction (McCullough and Carmen 1982). Similarly, hunt quality was a significant predictor of satisfaction for public land hunters in Tennessee, yet the researchers concluded hunters could still be satisfied during a poorquality hunt due to non-success related factors (Hammitt et al. 1990). In an analysis of online hunting forums, achievement (i.e., harvest) proved to be the greatest source of satisfaction for ungulate and carnivore hunters in North America (Ebeling-Schuld and Darimont 2017). The

greatest sources of hunter dissatisfaction include feeling over-crowded due to perceived high hunter densities (Hammitt et al. 1989, Gigliotti 2000, Heberlein 2002) or feeling unsafe due to inappropriate actions by other hunters (Hammitt et al. 1990, Mehmood et al. 2003).

Our study focused on white-tailed deer (Odocoileus virginianus) hunters on 8 Wildlife Management Areas (WMAs) within the Chattahoochee National Forest of northern Georgia, USA. Historically, the region was a destination for hunters seeking abundant deer populations and a mountain hunting experience. However, from 1979 to 2018, the number of hunters on these WMAs decreased 68%, which constitutes an 81% decrease in hunters/days available for buck harvest (C. Killmaster, Georgia Department of Natural Resources, unpublished data). In contrast, the estimate of active deer hunters in Georgia increased 12% from 1979 to 2017 (C. Killmaster, Georgia Department of Natural Resources, unpublished data), strongly indicating hunters chose to stop participating in public land hunts in northern Georgia rather than quitting hunting altogether. Additionally, harvest success rates (i.e., bucks harvested/hunter/day) declined 64% from 1979 to 2018 on the 8 WMAs, signifying a decline in the deer population (Little et al. 2018, C. Killmaster, Georgia Department of Natural Resources, unpublished data). Our study contributes to the human dimensions literature by focusing on a reduced population of hunters on public lands, which experienced drastic declines in deer densities. We determined why some hunters have decided to hunt the WMAs after 40 years of declines in hunter numbers and deer populations and what would contribute to increasing their hunt satisfaction. The Multiple Satisfactions Approach describes many potential sources of hunter satisfaction, therefore, we designed a study to specifically address various factors driving satisfaction or dissatisfaction of deer hunters on WMAs in northern Georgia. We used the following objectives to gauge hunter satisfaction and to derive a prescription for increasing their satisfaction: 1) understand

motivations to deer hunt, 2) determine the roles of hunt quality and motivations in satisfaction of WMA deer hunting experiences, 3) identify preferences for WMA deer hunting, and 4) evaluate preferences for WMA deer management. We hypothesized that satisfaction would be low due to deer population declines and resulting low hunt quality. We also expected that motivations unrelated to harvest, such as nature and social-related aspects of hunting, would be important.

STUDY POPULATION AND AREA

We surveyed hunters from 8 WMAs, including Blue Ridge, Chattahoochee, Chestatee, Cohutta, Coopers Creek, Rich Mountain, Swallow Creek, and Warwoman, which collectively comprise 974 km² within the Chattahoochee National Forest in northern Georgia, USA. Through a cooperative agreement, Georgia Department of Natural Resources maintains wildlife openings (i.e., food plots), sets hunting regulations, and conducts hunts on the WMAs (S. Frazier, Georgia Department of Natural Resources, personal communication). The U.S. Forest Service conducts the remaining management activities, including timber harvest and prescribed fire (S. Frazier, Georgia Department of Natural Resources, personal communication). The Chattahoochee National Forest is in the Blue Ridge physiographic province of the Appalachian Mountain Range and spans 3,043 km². Elevations range 198–1,458 m (\bar{x} = 688, SD \pm 217) and slopes range 0–89 degrees ($\bar{x} = 20$, SD \pm 9; USGS 2013). The Chattahoochee National Forest is 96.8% forested (USGS 2019) with a forest age distribution of 77.9% late forest, 21.9% middle forest, and 0.2% early forest (USFS 2017). From 1979 to 2015, the frequency of timber harvest declined resulting in a mature forest age structure, as the two youngest age classes (0-10 years and 11-20 years) declined in coverage by 95% (Little et al. 2018). Fifteen percent of the Chattahoochee National Forest (470 km²) is within the National Wilderness Preservation System with 287 km² within the WMAs included in our study (30% of the total WMA area, USFS 2020).

Following extirpation of white-tailed deer from northern Georgia in 1895, restocking efforts began in 1928 (Little et al. 2018). The first deer hunt was held in 1940 (Little et al. 2018) and populations continued to increase until declines became evident during the early 2000s. From 1979 to 2018, total buck harvest on the 8 WMAs in our study declined 80% and hunter success rates (i.e., bucks harvested/hunter/day) declined 64% (C. Killmaster, Georgia Department of Natural Resources, unpublished data). Over the same time period, populations of black bears (*Ursus americanus*), coyotes (*Canis latrans*), bobcats (*Lynx rufus*), and wild pigs (*Sus scrofa*) increased (Kilgo et al. 2010, Roberts and Crimmins 2010, Crimmins et al. 2012, Little et al. 2017, Lewis et al. 2019), while forests matured (Little et al. 2018). Predation, competition, and lack of early successional plant communities and early forest stages have been suggested as potential contributors to deer population declines (Little et al. 2018). Current deer density estimates are 1.9–3.9 deer/km² compared to 7 deer/km² in 1953 (Little et al. 2018).

Dates and lengths of hunts varied among the WMAs (Table 4-1) and there was no limit to the number of hunters who could hunt on these areas during the 2015–2016, 2016–2017, and 2017–2018 hunting seasons. The statewide bag limit included 10 antlerless and 2 antlered deer. An antlered deer was considered one with antlers visible above the hairline but 1 of the 2 antlered deer harvested had to have ≥4 points (≥2.5 cm) on 1 side. For check-in deer hunts on the WMAs, hunters received bonus permits (not counted toward personal statewide bag limit) to harvest 2 deer that had to be taken to a WMA check-in station. Majority of check-in hunts were antlered-only with few opportunities for antlerless harvest. For sign-in hunts, hunters were required to count deer harvested toward their personal state bag limits and report their harvest to Georgia Department of Natural Resources. No more than 2 deer could be harvested for hunts <10 days, whereas the statewide bag limit applied for hunts ≥10 days.

METHODS

Data Collection

We surveyed hunters who checked-in or signed-in for a deer hunt on >1 of the 8 WMAs during the 2015–2016, 2016–2017, and 2017–2018 hunting seasons. Georgia Department of Natural Resources provided a list of hunters with 1 WMA assigned to each individual. For those hunters who participated in hunts on >1 WMA, Georgia Department of Natural Resources randomly assigned them to 1 of those WMAs for survey purposes. We excluded hunters <18 years of age. We designed a mail-based questionnaire to evaluate hunter satisfaction, motivations, perceptions of hunt quality, and preferences for WMA deer hunting and management. We used a slightly modified version of the Tailored Design Method (Dillman et al. 2014) with 3 mail contacts to administer the survey. The first mailing in February 2019 included the questionnaire, postagepaid return envelope, and a letter that described the study and asked for the hunter's participation. The second mailing was a reminder postcard sent to those who had not returned a completed questionnaire 1 week after the first mailing. The third mailing consisted of a second copy of the questionnaire, postage-paid return envelope, and letter which we sent to those who had not returned a completed questionnaire 6 weeks after the second mailing. As an incentive for participation, we informed hunters via the envelope, letter, and postcard of a prize drawing for participants who returned a completed questionnaire. We did not measure non-response bias because we lacked time to conduct an additional survey of non-respondents prior to the start of the 2019–2020 hunting season (Connelly et al. 2000) and we did not keep records of questionnaire return dates (Brunke and Hunt 2007). Our study was approved by the University of Georgia Institutional Review Board (Protocol ID#STUDY00006843), ensuring that our methods

relating to human subjects complied with applicable federal, state, and institutional policies and procedures.

Data Analyses

We analyzed data from WMA questionnaires using SPSS Version 26 (International Business Machines Corp., Armonk, NY, USA) and used an alpha level of 0.05 to determine significance. We conducted 4 analyses corresponding to our 4 study objectives. First, we measured motivations for deer hunting by presenting a chart with a list of 16 motivations for deer hunting derived from Gigliotti (2000), input from Georgia Department of Natural Resources, and the authors' perceptions of issues pertinent to hunters and management within our study area. We asked respondents to rate the importance of reasons for why they deer hunt based on a 7-point Likert-type scale (Likert 1932) ranging from 1 = "Not At All Important" to 7 = "Very Important." We used Principal Components Analysis with varimax rotation to reduce the number of motivations and assign them to overarching latent constructs (Watkins et al. 2018). We considered constructs with eigenvalues ≥ 1.0 and motivations with factor loadings ≥ 0.600 to be valid for analysis (Pruitt 2018, Watkins et al. 2018). We conducted Kaiser-Meyer-Olkin measure of sampling accuracy and Bartlett's Test of Sphericity to ensure the appropriateness of Principal Components Analysis for our data (Hair et al. 2010). To determine the reliability of constructs, we calculated Cronbach's alpha and considered values ≥0.700 to be acceptable (Pruitt 2018). We ranked constructs in order of importance based on the percentage of responses that included ratings of 5–7 in the corresponding original motivations. We also calculated the overall mean rating for each construct based on all corresponding original motivation responses on the 7-point scale.

Second, we performed ordinal logistic regression to determine the effects of hunt quality, motivations, and years of hunting experience on responses to the question: "How satisfied are you with your overall deer hunting experience on [WMA name]?" Potential responses to this question were based on a 5-point Likert-type scale ranging from 1 = "Completely Dissatisfied" to 5 = "Completely Satisfied." Ordinal logistic regression was appropriate for our data since our dependent variable was ordinal, a discrete categorical variable with ordered categories (Guisan and Harrell 2000, Agresti 2013, Fernandez et al. 2019). Ordinal variables do not have known numerical distances between categories, as do interval response variables used in linear regression; rather, distances between ordinal categories are only relative to one another (Guisan and Harrell 2000, Agresti 2013). Although there is support that the stereotype model for ordinal logistic regression performs better in certain cases, it also has the potential to resemble an unordered polytomous model (Greenland 1994, Fernandez et al. 2019). Therefore, we chose the proportional odds model, the most popular model for ordinal logistic regression (McCullagh 1980, Fernandez et al. 2019). To meet the required assumptions and model-fitting criteria of the ordinal logistic regression proportional odds model, we used binary data (dummy coded from ordinal data) and continuous data as predictor variables (Table 4-2). We conducted tests of Pearson's correlation and Spearman's rank correlation for all pairs of variables to eliminate multicollinearity. Further, we tested our model to ensure it met the assumption of proportional odds and we conducted a likelihood ratio Chi-square test to compare the fit of our model to that of the null model. We also conducted Deviance and Pearson chi-square tests to determine additional measures of our model's "Goodness-of-Fit" to our data.

Third, we conducted Importance–Performance Analysis (IPA, Martilla and James 1977) to identify respondents' preferences for WMA deer hunting. We presented a chart with a list of

19 WMA deer hunting aspects based on input from Georgia Department of Natural Resources and the authors' perceptions of issues pertinent to hunters and management within our study area. We asked respondents to rate both the importance of individual aspects in providing a satisfying hunting experience and the performance of the WMA in providing that aspect. Importance ratings were based on a 7-point Likert-type scale ranging from 1 = "Not At All Important" to 7 = "Very Important." Performance ratings were also based on a 7-point Likerttype scale ranging from 1 = "Extremely Poor" to 7 = "Exceptional." We plotted mean importance versus performance values for each hunting aspect. We interpreted plotted points using 2 approaches: iso-priority line and data-centered (Bacon 2003, Boley et al. 2017). The isopriority line had a slope of 1 and all points falling directly on this line signified importance equaled performance, thus respondents' expectations were met (Bacon 2003, Boley et al. 2017). Points above the line indicated importance was greater than performance so respondents' expectations were not met, while points falling below the line indicated importance was less than performance, meaning respondents' expectations were exceeded (Bacon 2003, Boley et al. 2017). This approach provided a comprehensive view of satisfaction versus dissatisfaction and exposed all aspects that were under-performing relative to importance. The data-centered approach for IPA divided points into 4 managerial-relevant quadrants: 1) "Concentrate Here" (High Importance, Low Performance), 2) "Keep Up The Good Work" (High Importance, High Performance), 3) "Possible Overkill" (Low Importance, High Performance), and 4) "Low Priority" (Low Importance, Low Performance; Martilla and James 1977). This data-centered approach for crosshair placement demarcated the plot's managerial quadrants based on the mean of all importance values and the mean of all performance values reported by respondents (Bacon 2003, Boley et al. 2017). This approach provided a narrower and more evenly partitioned view of satisfaction versus dissatisfaction and indicated where managers should focus their efforts given limited resources.

Last, we conducted a second IPA to identify respondents' preferences for WMA deer management. We presented a chart with a list of 5 management practices derived from input from Georgia Department of Natural Resources and the authors' knowledge of WMA management. We asked respondents to rate both the importance of individual management practices in maintaining healthy deer populations on the WMA and their satisfaction with the performance of the WMA in delivering those management practices. Importance ratings were based on a 7-point Likert-type scale ranging from 1 = "Not At All Important" to 7 = "Very Important." Satisfaction ratings were also based on a 7-point Likert-type scale ranging from 1 = "Completely Dissatisfied" to 7 = "Completely Satisfied." We plotted mean importance versus satisfaction values for each management practice. We interpreted plotted points using the same iso-priority line and data-centered approaches described for our first IPA. We used descriptive statistics to report all other results.

RESULTS

Our initial sample pool included 1,271 individuals. Of those, we had 1,216 valid mailing addresses and 441 responses providing an adjusted response rate of 36%. The age of respondents ranged 19–87 years and averaged 46 years (SD \pm 14). Most respondents were male (97.2%). In response to the question: "How long have you been a hunter?," answers ranged from 0 to 65 years with a mean of 31 years (SD \pm 15). The range of responses for "How many years have you hunted [WMA name]?" was 0–56 years with a mean of 14 years (SD \pm 13). Of those respondents who hunted at all during 2014–2018 on the WMA for which they were surveyed (herein, the

WMA), 74.5% (n = 295) harvested no deer, 16.2% (n = 64) harvested 1 deer, and 9.3% (n = 37) harvested \geq 2 deer.

The majority of respondents reported that the current deer population on the WMA was "Too Few" (86.6%, n = 368) and the density of hunters was the "Right Number" (73.0%, n = 314). When asked to rate the quality of deer hunting on the WMA, 69.3% of respondents (n = 298) reported low ratings (i.e., "Extremely Poor", "Poor", or "Below Average") with 20.9% (n = 90) rating "Fair" and 9.8% (n = 42) reporting high ratings (i.e., "Above Average", "Good", or "Exceptional"). For overall satisfaction of deer hunting experiences on the WMA, 45.5% of respondents (n = 195) were dissatisfied, 24.9% (n = 107) were neither dissatisfied nor satisfied, and 29.6% (n = 127) were satisfied. Unexpectedly, 79.1% of respondents (n = 349) indicated they would likely return to hunt the WMA next year and only 20.9% (n = 92) indicated they were either unsure or unlikely to return.

Principal Components Analysis decreased the number of motivations for deer hunting from 16 to 13 and identified 4 unique motivational constructs, each consisting of 2–5 original motivations. Constructs collectively explained 62.7% of the variance in motivations. Eigenvalues ranged 1.774–3.219, factor loadings ranged 0.684–0.906, and Cronbach's alpha ranged 0.787–0.843 (Table 4-3). Principal Components Analysis was appropriate for our data as our Kaiser-Meyer-Olkin measure of sampling adequacy was 0.809 and Bartlett's Test of Sphericity was significant ($\chi^2_{120} = 2,618.905$, P < 0.001). Motivational constructs in order from greatest to least importance included: 1) "Escape" (89.1% responses rated 5–7, $\bar{x} = 6.13$, SD \pm 0.86), 2) "Meat" (78.9% responses rated 5–7, $\bar{x} = 5.57$, SD \pm 1.28), 3) "Socialization" (68.7% responses rated 5–7, $\bar{x} = 5.02$, SD \pm 1.51), and 4) "Trophy" (68.2% responses rated 5–7, $\bar{x} = 4.98$, SD \pm 1.50). The

following motivations were excluded due to factor loadings <0.600: "Contribute to conservation," "Experience excitement and adrenaline," and "Kill as many deer as possible."

Our ordinal logistic regression model for satisfaction met the proportional odds assumption ($\chi^2_{30} = 32.205$, P = 0.358). We decreased the number of predictor variables from 16 to 10 to eliminate multicollinearity. Final predictor variables had either non-significant correlation coefficients or significant correlation coefficients $\leq |0.330|$ (Boxall and McFarlane 1995). Our regression model exhibited improved fit compared to the null model ($\chi^2_{10} = 109.648$, P < 0.001). Our model also passed the "Goodness-of-Fit" tests of Deviance ($\chi^2_{1382} = 966.818$, P = 1.000) and Pearson chi-square ($\chi^2_{1382} = 1443.446$, P = 0.122). Three predictor variables influenced WMA hunt satisfaction: perception of deer population density, hunter density, and overall hunt quality (Table 4-4). Responses that indicated the deer population was "Too Few" were associated with lower satisfaction ratings. Responses that indicated hunter density was the "Right Number" were associated with higher satisfaction ratings. Responses indicating hunt quality as low (i.e., "Extremely Poor," "Poor", or "Below Average") were associated with lower satisfaction ratings. No effects on satisfaction were detected for motivation Likert-averages, harvest success rate during 2014–2018, or years of hunting experience.

In the hunting IPA, 15 of 19 hunting aspects fell above the iso-priority line indicating unmet expectations (Fig. 4-1). Four aspects fell below the iso-priority line, indicating exceeded expectations, which included "potential to kill a bear," "potential to kill a wild pig," "seeing nongame species," and "financial cost." Two aspects associated with unmet expectations (i.e., "ease of access to hunting spots" and "convenient location close to home") and 2 aspects associated with exceeded expectations (i.e., "potential to kill a wild pig" and "seeing nongame species") were extremely close to intersecting the iso-priority line, where importance equaled

performance. The data-centered approach yielded 7 aspects of hunting in the "Keep Up The Good Work" quadrant, 4 aspects in "Concentrate Here", 5 aspects in "Possible Overkill," and 3 aspects in "Low Priority" (Fig. 4-2). Of particular note are those aspects in the "Concentrate Here" quadrant: "seeing lots of deer," "seeing mature bucks," "having the opportunity to kill a deer," and "having the opportunity to kill mature bucks."

In the management IPA, all 5 management practices fell above the iso-priority line (Fig. 4-3), indicating unmet expectations. These included "timber cutting," "controlled burning," "food plots/wildlife openings," "predator management," and "wild pig control." The datacentered approach split the management practices into 4 quadrants (Fig. 4-4). "Predator management" fell into the "Concentrate here" quadrant, whereas "wild pig control" landed directly between the "Concentrate here" and "Keep up the good work" quadrants. "Food plots/wildlife openings fell into the "Keep up the good work" quadrant, "controlled burning" fell into the "Possible overkill" quadrant, and "timber cutting" fell into the "Low priority" quadrant.

DISCUSSION

Our results provided support for our hypothesis that low deer populations and the resultant low hunt quality would negatively affect satisfaction of deer hunting experiences on WMAs within the Chattahoochee National Forest. Many respondents were either dissatisfied or indifferent (70%) towards their satisfaction and most respondents provided low to fair ratings of hunt quality (90%). Our regression indicated that factors associated with hunt quality, including perception of deer population density and number of deer seen, had low ratings, which negatively affected overall satisfaction. Harvest success rates were low with 75% of respondents harvesting no deer from 2014 to 2018, but our analysis indicated this factor had no direct effect on satisfaction. Hunter density was the only aspect of hunt quality with which respondents were

satisfied and it positively affected their overall satisfaction. Furthermore, the iso-priority line approach to IPA revealed 15 of the 19 hunting-related items were associated with dissatisfaction or unmet expectations. Respondents indicated that those 15 aspects were important for having a satisfying hunting experience but were not being adequately provided on the WMAs. At least 10 of the 15 unmet expectations were "activity-specific factors" (Fisher 1997) that could be improved directly by managers via manipulation of deer populations, hunting regulations, or hunting access. Of the remaining 4 items associated with satisfaction or exceeded expectations, 2 involved the potential to kill bears and wild pigs, which is logical considering the increase in black bear and wild pig populations over the past few decades (Little et al. 2017, Lewis et al. 2019). The data-centered approach to IPA identified priorities on which managers should focus to increase hunter satisfaction when faced with limited resources. Managers should concentrate efforts on increasing opportunities for hunters to see and harvest deer, especially bucks. However, managers should be aware that redirecting resources from those aspects in the "Keep Up The Good Work" and "Possible Overkill" categories could potentially lead to decreased WMA performance and, consequently, decreased satisfaction (Boley et al. 2017). Our isopriority line approach to the management practices IPA revealed that WMAs underperformed relative to timber harvest, prescribed fire, predator management, wild pig control, and food plot management. Our data-centered approach to IPA identified which practices managers should prioritize when using limited resources in order to improve satisfaction. Improvements in predator management and wild pig control have the best chance at increasing respondents' satisfaction of WMA management, relative to timber harvest, prescribed fire, and food plot management.

Our findings align with previous studies in which aspects of hunt quality played a significant role in satisfaction (Decker et al. 1980, McCullough and Carmen 1982, Hammitt et al. 1990, Brunke and Hunt 2008, Ebeling-Schuld and Darimont 2017). Our findings also support those studies in which hunter perceptions of deer population size and their ability to see deer played a significant and sometimes larger role in satisfaction than actually harvesting a deer (Decker et al. 1980, Hammitt et al. 1990, Gigliotti 2000). Declines in the Black Hills deer herd had a strong negative influence on hunter satisfaction (Gigliotti 2000). Pennsylvania hunters based their perception of deer herd size on the harvest success of themselves and other hunters they knew (Miller and Graefe 2001). Therefore, it was only through perception of herd size that harvest success influenced their satisfaction (Miller and Graefe 2001). Additionally, hunter perceptions of "not enough game" was a situational constraint to hunter effort in Illinois (Miller and Vaske 2003).

Motivations unrelated to harvest were important for why respondents hunt deer in the mountains of northern Georgia. The most important motivations fell under the "Escape" latent construct and included escaping the daily routine and spending time outdoors. Getting outdoors and enjoying nature was also of primary importance in hunting satisfaction in previous studies (Decker et al. 1980, Gigliotti 2000). In our study, the "Socialization" latent construct ranked third in importance and included spending time with friends and family in a hunting party.

Additionally, our analysis of hunting preferences revealed that tradition and being close to nature were important aspects of a satisfying hunting experience. Our results resemble those of Gigliotti (2000) who found the greatest proportion of hunters identified as 'nature' or 'social' hunters. Furthermore, Decker and Connelly (1989) identified 3 distinct groups of hunters based on motivations, 2 of which were "appreciative" (i.e., nature-oriented) and "affiliative" (i.e., social-

oriented). It is difficult for agencies to manage for "activity-general experiences," such as enjoying the outdoors and spending time with family (Fisher 1997). However, understanding motivations of hunters can help facilitate management efforts in encouraging hunters to harvest deer according to management goals (Decker and Connelly 1989). Managers also produce the settings in which nature experiences occur via management of land and wildlife, thus, influencing the nature-related aspects of hunting (Hammitt et al. 1990).

Respondents found motivations from all 4 constructs (i.e., Escape, Meat, Social, and Trophy) as important reasons for why they deer hunt. We were unable to divide respondents among the 4 motivational constructs, rather, we simply ranked the constructs based on mean importance values from all respondents. "Meat" was the second most important motivational construct. And although "Trophy" was the least important, it was still a viable motivation for deer hunting. These harvest-related motivations also align with previous studies (Decker and Connelly 1989, Gigliotti 2000, Gigliotti and Metcalf 2016). None of the motivational constructs were significant predictors of hunter satisfaction, perhaps due to the collective influence of motivations on our sample of northern Georgia WMA hunters. Moreover, 90% of respondents rated hunt quality as low to fair, therefore, it is possible that the overwhelming effect of respondents' perceptions of low deer populations, might have masked any effects of motivations on their satisfaction. Despite a hunter's primary motivation for hunting, most go afield wanting a realistic chance at harvesting a deer (Decker et al. 1980). Furthermore, dissatisfaction with the number of deer seen may degrade the aspects of hunting related to experiencing nature since game animals are part of nature (Hammitt et al. 1990). Respondents seem to desire improvements in their hunt quality within realistic and responsible limits. Although they want better opportunities to see and harvest deer, the motivation "To kill as many deer as possible" did not fit into any of the 4 motivational constructs. Additionally, the 3 low-priority hunting aspects in the first IPA involved opportunities to kill multiple deer, does, and bonus bucks not included in the general bag limit.

Respondents in our study expressed receiving a number of benefits from hunting on WMAs in the Chattahoochee National Forest, providing support for the Multiple Satisfactions Approach concept (Hendee 1974, Decker et al. 1980, Hammitt et al. 1990, Gigliotti 2000, Ebeling-Schuld and Darimont 2017). We found factors, such as tradition, being close to nature, convenient location close to home, financial cost, and spending time with hunting companions to be important for a satisfying hunting experience. Although 70% of respondents were not satisfied and 90% provided low to fair ratings of hunt quality, 80% indicated they would likely return to hunt the WMA next year. The importance of variables not related to hunt quality (i.e., nostalgia, socialization) may have contributed to responses indicating a high likelihood to return. Perhaps, hunters who remained on the WMAs after significant declines in deer numbers are those who are loyal to hunting in these areas or those seeking a mountain setting for deer hunting. We were not able to survey hunters who stopped hunting the WMAs, but this would have potentially provided additional insights.

We identified 2 potential limitations to our study. First, we could not conduct a non-response bias survey, which would have strengthened the applicability of our results to all WMA deer hunters in northern Georgia. Consequently, our results are based on the 441 hunters who responded. However, we recognize that non-response error is not inherent to low response rates. This error only occurs when those who were not part of the completed sample differ in items of interest compared to those who were part of the completed sample (Dillman et al. 2014). The second limitation is that our study does not provide direct evidence for why participation in

WMA hunts in northern Georgia decreased by 68% during 1979–2018. Because we could not survey hunters who stopped hunting on the WMAs, we can speculate that our findings of low hunt quality and the resulting negative effects on satisfaction may have contributed to their displacement. Despite low deer densities, a residual population of hunters continues to hunt on WMAs in northern Georgia. Their primary motivation for hunting is experience-related (i.e., enjoying nature and escaping the daily routine). Nevertheless, their satisfaction could be improved by increasing opportunities to see and harvest deer. Overall, our findings support the goal of managers to increase the deer population on northern Georgia WMAs. Our findings may also serve as a reference for managers facing similar challenges elsewhere, particularly on federal public lands.

MANAGEMENT IMPLICATIONS

Given the severe decline in hunter numbers on WMAs in the Chattahoochee National Forest since 1979, increasing hunter satisfaction and retention should be priorities for managers. Improving aspects of hunt quality, such as deer population densities and, in turn, the number of deer seen and harvested, has the greatest likelihood of improving hunter satisfaction. Altering the number of hunters allowed to hunt on the WMAs is unlikely to increase harvest success rates and would potentially lead to dissatisfaction given that our respondents were satisfied with current hunter densities. Hunters also seek improvements in the following management practices: timber harvest, prescribed fire, food plot management, predator management, and wild pig control. Therefore, we recommend that managers put considerable effort into educating hunters on the capabilities and limitations of the Georgia Department of Natural Resources and U.S. Forest Service in managing WMAs on the Chattahoochee National Forest. Informing hunters about science-driven wildlife management and about the political process involved in managing

national forests would improve their awareness and better equip hunters to participate in the public process for U.S. Forest Service projects that impact deer populations and hunting.

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LITERATURE CITED

- Agresti, A. 2013. Categorical data analysis. Pages 1–35. Introduction: distributions and inference for categorical data. John Wiley and Sons, Inc., Hoboken, New Jersey, USA.
- Bacon, D. R. 2003. A comparison of approaches to Importance-performance analysis.

 International Journal of Market Research 45:55–77.
- Boley, B. B., N. G. McGehee, and A. L. T. Hammett. 2017. Importance-performance analysis (IPA) of sustainable tourism initiatives: the resident perspective. Tourism Management 58:66–77.
- Boxall, P. C., and B. L. McFarlane. 1995. Analysis of discrete, dependent variables in human dimensions research: participation in residential wildlife appreciation. Wildlife Society Bulletin 23:283–289.
- Brunke, K. D., and K. M. Hunt. 2007. Comparison of two approaches for the measurement of waterfowl hunter satisfaction. Human Dimensions of Wildlife 12:443–457.

- Brunke, K. D., and K. M. Hunt. 2008. Mississippi waterfowl hunter expectations, satisfaction, and intentions to hunt in the future. Human Dimensions of Wildlife 13:317–328.
- Connelly, N. A., T. L. Brown, and B. A. Knuth. 2000. A multiple market segmentation of Great Lakes anglers in New York. North American Journal of Fisheries Management 20:399–407.
- Crimmins, S. M., J. W. Edwards, and J. M. Houben. 2012. *Canis latrans* (Coyote) habitat use and feeding habits in central West Virginia. Northeastern Naturalist 19:411–420.
- Decker, D. J., and N. A. Connelly. 1989. Motivations for deer hunting: implications for antlerless deer harvest as a management tool. Wildlife Society Bulletin 17:455–463.
- Decker, D. J., T. L. Brown, and R. J. Gutierrez. 1980. Further insights into the multiple-satisfactions approach for hunter management. Wildlife Society Bulletin 8:323–331.
- Dillman, D. A., J. D. Smyth, and L. M. Christian. 2014. Internet, phone, mail, and mixed-mode surveys: the tailored design method. John Wiley and Sons, Hoboken, New Jersey, USA.
- Ebeling-Schuld, A. M., and C. T. Darimont. 2017. Online hunting forums identify achievement as prominent among multiple satisfactions. Wildlife Society Bulletin 41:523–529.
- Fernandez, D., I. Liu, and R. Costilla. 2019. A method for ordinal outcomes: the ordered stereotype model. International Journal of Methods in Psychiatric Research 28:e1801.
- Fisher, M. R. 1997. Segmentation of the angler population by catch preference, participation, and experience: a management-oriented application of recreation specialization. North American Journal of Fisheries Management 17:1–10.
- Gigliotti, L. M. 2000. A classification scheme to better understand satisfaction of Black Hills deer hunters: the role of harvest success. Human Dimensions of Wildlife 5:32–51.

- Gigliotti, L. M., and E. C. Metcalf. 2016. Motivations of female Black Hills deer hunters. Human Dimensions of Wildlife 21:371–378.
- Greenland, S. 1994. Alternative models for ordinal logistic regression. Statistics in Medicine 13:1665–1677.
- Guisan, A., and F. E. Harrell. 2000. Ordinal response regression models in ecology. Journal of Vegetation Science 11:617–626.
- Hair, J. F., W. C. Black, B. J. Babin, and R. E. Anderson. 2010. Multivariate data analysis.

 Seventh edition. Pages 91–151. Exploratory factor analysis. Pearson Education, Upper Saddle River, New Jersey, USA.
- Hammitt, W. E., C. D. McDonald, and F. P. Noe. 1989. Wildlife management: managing the hunt versus the hunting experience. Environmental Management 13:503–507.
- Hammitt, W. E., C. D. McDonald, and M. E. Patterson. 1990. Determinants of multiple satisfaction for deer hunting. Wildlife Society Bulletin 18:331–337.
- Hautaluoma, J., and P. J. Brown. 1978. Attributes of the deer hunting experience: a cluster-analytic study. Journal of Leisure Research 10:271–287.
- Heberlein, T. A. 2002. Too many hunters or not enough deer? Human and biological determinants of hunter satisfaction and quality. Human Dimensions of Wildlife 7:229–250.
- Hendee, J. C. 1974. A multiple-satisfaction approach to game management. Wildlife Society Bulletin 2:104–113.
- Hendee, J. C., and D. R. Potter. 1971. Human behavior research and wildlife management.

 Transactions of the North American Wildlife and Natural Resources Conference 36:383–395.

- Kennedy, J. J. 1974. Attitudes and behavior of deer hunters in a Maryland forest. Journal of Wildlife Management 38:1–8.
- Kilgo, J. C., H. S. Ray, C. Ruth, and K. V. Miller. 2010. Can coyotes affect deer populations in southeastern North America? Journal of Wildlife Management 74:929–933.
- Lewis, J. S., J. L. Corn, J. J. Mayer, T. R. Jordan, M. L. Farnsworth, C. L. Burdett, K. C. VerCauteren, S. J. Sweeney, and R. S. Miller. 2019. Historical, current, and potential population size estimates of invasive wild pigs (*Sus scrofa*) in the United States.

 Biological Invasions 21:2373–2384.
- Likert, R. 1932. A technique for the measurement of attitudes. Archives of Psychology 22:1–55.
- Little, A. R., A. Hammond, J. A. Martin, K. L. Johannsen, and K. V. Miller. 2017. Population growth and mortality sources of the black bear population in northern Georgia. Journal of the Southeastern Association of Fish and Wildlife Agencies 4:130–138.
- Little, A. R., G. J. D'Angelo, C. H. Killmaster, K. L. Johannsen, and K. V. Miller. 2018.
 Understanding deer, bear, and forest trends in the North Georgia Mountains: the value of long-term data. Journal of the Southeastern Association of Fish and Wildlife Agencies 5:97–105.
- Manfredo, M. J. 1989. Human dimensions of wildlife management. Wildlife Society Bulletin 17:447–449.
- Martilla, J. A., and J. C. James. 1977. Importance-performance analysis. Journal of Marketing 41:77-79.
- McCullagh, P. 1980. Regression models for ordinal data. Journal of the Royal Statistical Society 42:109–142.

- McCullough, D. R., and W. J. Carmen. 1982. Management goals for deer hunter satisfaction. Wildlife Society Bulletin 10:49–52.
- Mehmood, S., D. Zhang, and J. Armstrong. 2003. Factors associated with declining hunting license sales in Alabama. Human Dimensions of Wildlife 8:243–262.
- Meine, C. 1988. Aldo Leopold: his life and work. Pages 340–361. The value of wilderness. University of Wisconsin Press, Madison, USA.
- Miller, C. A., and A. R. Graefe. 2001. Effect of harvest success on hunter attitudes toward white-tailed deer management in Pennsylvania. Human Dimensions of Wildlife 6:189–203.
- Miller, C. A., and J. J. Vaske. 2003. Individual and situational influences on declining hunter effort in Illinois. Human Dimensions of Wildlife 8:263–276.
- Pruitt, H. 2018. Contributions of deer management cooperatives to wildlife conservation. Thesis, University of Georgia, Athens, USA.
- Roberts, N. M., and S. M. Crimmins. 2010. Bobcat population status and management in North America: evidence of large-scale population increase. Journal of Fish and Wildlife Management 1:169–174.
- USDA Forest Service [USFS]. 2017. Forest fast facts: Chattahoochee-Oconee National Forests. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd578895.pdf>. Accessed on 9 April 2019.
- USFS. 2020. National Wilderness Areas.

 https://data.fs.usda.gov/geodata/edw/datasets.php?xmlKeyword=wilderness. Accessed 15 June 2020.
- U.S. Geological Survey [USGS]. 2013. National Elevation Dataset (NED).
 https://viewer.nationalmap.gov/basic/. Accessed 9 April 2019.

- USGS. 2019. National Land Cover Database 2016 Land Cover Conterminous United States. https://www.mrlc.gov/data. Accessed 13 May 2019.
- Watkins, C., N. C. Poudyal, C. Caplenor, D. Buehler, and R. Applegate. 2018. Motivations and support for regulations: a typology of eastern wild turkey hunters. Human Dimensions of Wildlife 23:433–445.
- Woods, G. R., D. C. Guynn, W. E. Hammitt, and M. E. Patterson. 1996. Determinants of participant satisfaction with Quality Deer Management. Wildlife Society Bulletin 24:318–324.

Figure 4-1. Results of Importance–Performance Analysis for 19 aspects of Wildlife Management Area (WMA) hunting plotted relative to a diagonal iso-priority line. White-tailed deer hunters (n = 441) on 8 WMAs in northern Georgia, USA, rated aspects of WMA deer hunting (via mail questionnaires in 2019) based on the importance of an aspect in providing a satisfying hunting experience and the performance of the WMA in providing that aspect. Points falling directly on the iso-priority line signified importance equaled performance, thus respondents' expectations were met.

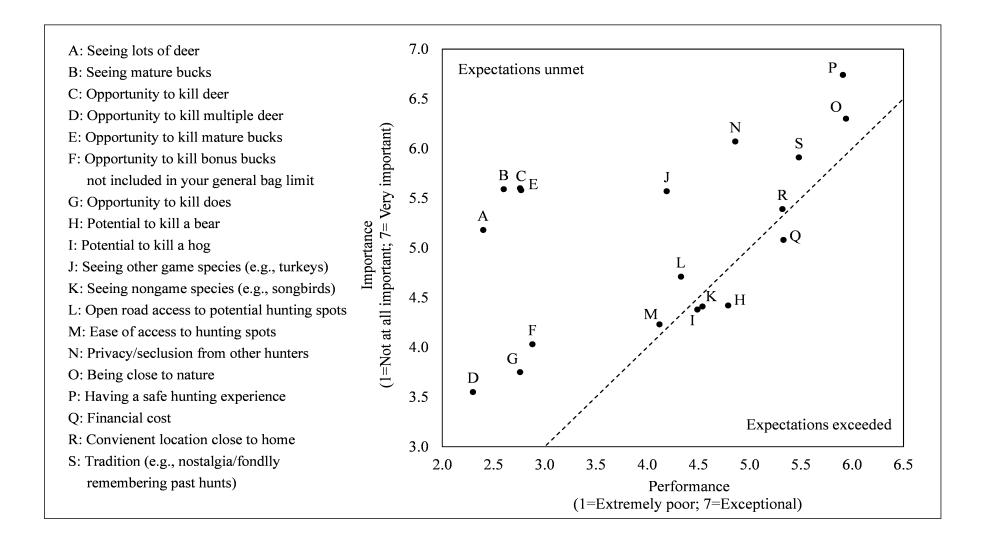


Figure 4-2. Results of Importance–Performance Analysis for 19 aspects of Wildlife Management Area (WMA) hunting plotted within quadrants relevant to management via a data-centered approach. White-tailed deer hunters (n = 441) on 8 WMAs in northern Georgia, USA, rated aspects of WMA deer hunting (via mail questionnaires in 2019) based on the importance of an aspect in providing a satisfying hunting experience and the performance of the WMA in providing that aspect. The quadrants were demarcated based on the mean of all importance values and the mean of all performance values reported by respondents. Improvements in aspects of Quadrant 2 (high importance, low performance) had the greatest likelihood of increasing respondents' satisfaction.

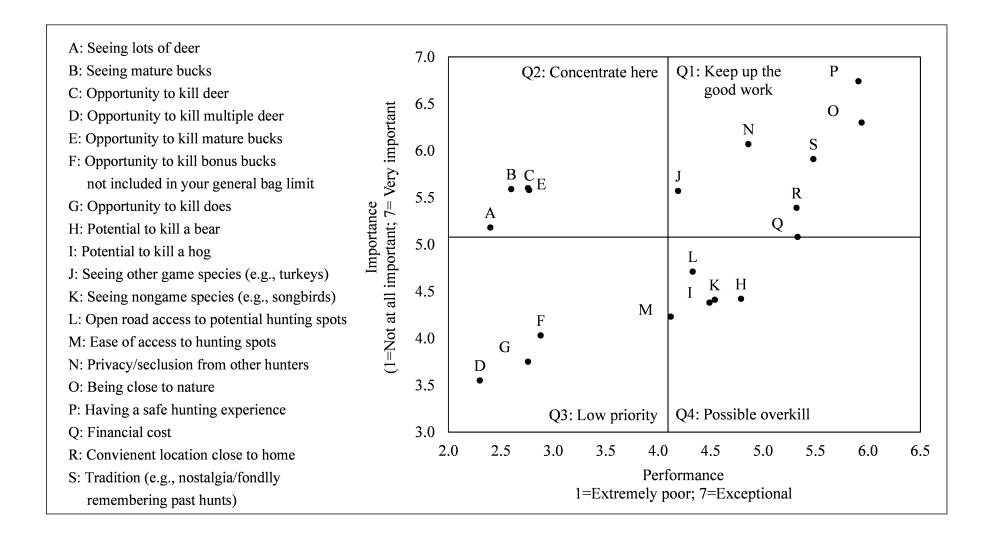


Figure 4-3. Results of Importance–Performance Analysis for 5 Wildlife Management Area (WMA) management practices plotted relative to a diagonal iso-priority line. White-tailed deer hunters (n = 441) on 8 WMAs in northern Georgia, USA, rated management practices (via mail questionnaires in 2019) based on their opinion of the importance of the management practice in maintaining healthy deer populations on the WMA and their satisfaction with the performance of the WMA in delivering the management practice. Points falling directly on the iso-priority line signified importance equaled performance, thus respondents' expectations were met.

Management practices included timber harvest (A), controlled burning (B), food plot management (C), predator management (D), and wild pig control (E).

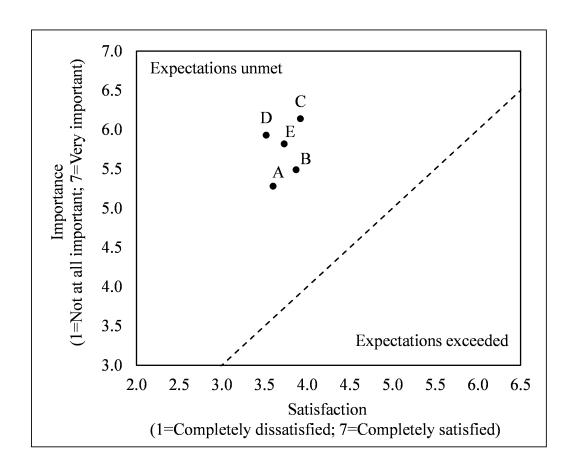


Figure 4-4. Results of Importance–Performance Analysis for 5 Wildlife Management Area (WMA) management practices plotted within quadrants relevant to management via a datacentered approach. White-tailed deer hunters (n = 441) on 8 WMAs in northern Georgia, USA, rated management practices (via mail questionnaires in 2019) based on their opinion of the importance of the management practice in maintaining healthy deer populations on the WMA and their satisfaction with the performance of the WMA in delivering the management practice. The quadrants were demarcated based on the mean of all importance values and the mean of all performance values reported by respondents. Improvements in management practices of Quadrant 2 (high importance, low performance) had the greatest likelihood of increasing respondents' satisfaction. Management practices included timber harvest (A), controlled burning (B), food plot management (C), predator management (D), and wild pig control (E).

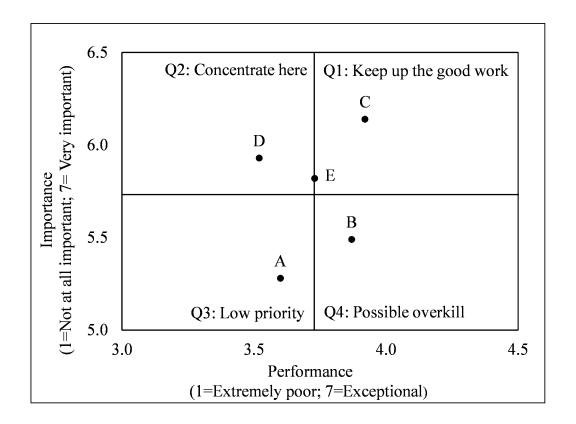


Table 4-1. Number of days available for white-tailed deer hunting by weapon type on 8 Wildlife Management Areas (WMAs) within the Chattahoochee National Forest of northern Georgia, USA, during the 2017–2018 hunting season. All hunts occurred from September to January and were also open for harvest of black bears and wild pigs.

WMA	Archery ^a	Primitive	Firearms ^b	Firearms ^a	Total
Blue Ridge	41	5 ^a	8	0	54
Chattahoochee	41	0	8	9	58
Chestatee	41	0	8	6	55
Cohutta	41	0	9	0	50
Coopers Creek	41	4^{b}	0	6	51
Rich Mountain	41	0	7	0	48
Swallow Creek	34	0	8	6	48
Warwoman	20	0	8	0	28

^aSign-in hunts; hunters required to count harvest toward statewide bag limit.

^bCheck-in hunts; hunters received 2 bonus harvest permits.

Table 4-2. Predictor variables used in ordinal logistic regression for hunter satisfaction. Variables based on responses to 2019 mail questionnaire for white-tailed deer hunters (n=441) on 8 Wildlife Management Areas within the Chattahoochee National Forest of northern Georgia, USA.

Description	Type
Deer population density: Too few (1), right number or too many (0)	Binary
Deer population density: Too many (1), right number or too few (0)	Binary
Hunter density: Right number (1), too few or too many (0)	Binary
Hunt quality: Extremely poor, poor, below average (1), fair, above average, good, exceptional (0)	Binary
Motivations for deer hunting: Mean importance on Likert scale ranging 1–7 for motivations related to escaping the daily routine and experiencing nature (Averages 6–7 were coded as '1' while averages <6 were coded as '0')	Binary
Motivations for deer hunting: Mean importance on Likert-type scale ranging 1–7 for motivations related to harvesting deer for meat consumption (Averages 6–7 were coded as '1' while averages <6 were coded as '0')	Binary
Motivations for deer hunting: Mean importance of Likert-type scale ranging 1–7 for motivations related to socializing with friends and family (Averages 6–7 were coded as '1' while averages <6 were coded as '0')	Binary
Motivations for deer hunting: Mean importance of Likert-type scale ranging 1–7 for motivations related to harvesting a trophy buck (Averages 6–7 were coded as '1' while averages <6 were coded as '0')	Binary
Number of years as a hunter	Continuous
Number of deer harvested/years hunted (2014–2018)	Continuous
Completely dissatisfied (1), Somewhat dissatisfied (2), Neither dissatisfied nor satisfied (3), Somewhat satisfied (4), Completely satisfied (5) ^a	Ordinal

^a Dependent variable

Table 4-3. Motivation constructs derived from Principal Components Analysis of 13 motivations for deer hunting with their associated values of significance. White-tailed deer hunters (n = 441) on 8 Wildlife Management Areas within the Chattahoochee National Forest of northern Georgia, USA, rated motivations based on importance via mail questionnaires in 2019.

Constructs	Motivations	Factor	Eigen-	Cronbach's
		loadings	values	alpha
Escape	Have time to disconnect from	0.684	3.219	0.787
	technology			
	Experience solitude	0.702		
	Get away from the regular routine	0.758		
	Get away from crowds of people	0.780		
	Be outdoors	0.723		
Meat	Kill deer for eating	0.813	2.385	0.825
	Be more sustainable/procure meat locally	0.771		
	Know where my meat comes from	0.767		
Socialization	Spend time with friends and family	0.822	2.650	0.843
	Be with others who enjoy the same things as me	0.881		
	Socialize with others in a hunting	0.834		
	party			
Trophy	Kill a mature buck	0.906	1.774	0.810
	Kill a trophy buck	0.886		

Table 4-4. Results from ordinal logistic regression of hunter satisfaction. White-tailed deer hunters (n = 441) on 8 Wildlife Management Areas within the Chattahoochee National Forest of northern Georgia, USA, rated their satisfaction on a scale 1–5 ranging from 1="Completely Dissatisfied" to 5="Completely Satisfied" via mail questionnaires in 2019.

Variable	Estimate	Significance	95% CI		
	(β)	(<i>P</i>)	Lower	Upper	
			Bound	Bound	
Deer population density is too few	-1.098	< 0.001	-1.694	-0.501	
Deer population density is too many	-1.049	0.344	-3.223	1.125	
Hunter density is the right number	0.795	< 0.001	0.372	1.219	
Hunt quality is poor	-1.593	< 0.001	-2.043	-1.143	
Motivations for deer hunting related to escaping the daily routine and experiencing nature	0.243	0.249	-0.171	0.657	
Motivations for deer hunting related to harvesting deer for meat consumption	0.200	0.318	-0.193	0.594	
Motivations for deer hunting related to socializing with friends and family	0.273	0.185	-0.131	0.677	
Motivations for deer hunting related to harvesting a trophy buck	-0.257	0.209	-0.659	0.144	
Number of years as a hunter	-0.003	0.597	-0.016	0.009	
Number of deer harvested/years hunted (2014–2018)	0.235	0.567	-0.570	1.041	

CHAPTER 5

CONCLUSIONS AND MANAGEMENT IMPLICATIONS

This research occurred on WMAs within the Chattahoochee National Forest of the northern Georgia mountains that have experienced multiple decades of declines in white-tailed deer populations and hunting participation. Although a broad scope of research is being conducted to investigate factors that have led to low deer densities on these areas, the studies presented here focused on hunting-related aspects of the research. GPS-tracking revealed that 90% of hunters would be contained within 51% of the total area of the WMAs. Hunters utilized areas that averaged 210 m from a road open to vehicular traffic and slopes of 13.0 degrees. Studying female deer movements during pre-hunt, hunt, and post-hunt periods relative to 7 firearms hunts on the WMAs revealed that hunting pressure had little to no effect on doe behavior. Therefore, it is unlikely that hunting pressure induced perceived risk in deer that may have otherwise caused them to shift away from key foraging areas or alter normal activity patterns related to breeding. Given this lack of hunting-related disturbance on does, adjustments in hunting regulations and hunter distribution does not appear to be necessary. However, if managers desire to manipulate the spatial distribution of hunters, they should focus on access to roads open to vehicular traffic. Slope may negatively affect the distances travelled by hunters but increasing open road access could bring hunters to the general area of under-utilized portions of the WMAs. Increasing hunter utilization of the WMAs would simultaneously decrease refugia available to deer so managers must balance hunter access with deer management objectives.

Given the severe decline in hunting participation, increasing hunter satisfaction and retention should be priorities for managers. Results from our mail survey of deer hunters on 8 Chattahoochee National Forest WMAs suggested there is a reduced population of hunters that, despite low deer densities, continue to hunt on these areas. The primary motivation for hunting is experience-related (i.e., enjoying nature and escaping the daily routine). However, improving aspects of hunt quality, such as deer population densities and, in turn, the number of deer seen and harvested, have the greatest likelihood of improving hunter satisfaction. Altering the number of hunters allowed to hunt on the WMAs is unlikely to increase harvest success rates and would potentially lead to dissatisfaction given that our respondents were satisfied with current hunter densities. In addition, greater focus on predator management and wild pig control would increase hunter satisfaction of WMA deer management. Managers should put considerable effort into educating hunters on the capabilities and limitations of the Georgia Department of Natural Resources and U.S. Forest Service in managing WMAs on the Chattahoochee National Forest. Informing hunters about science-driven wildlife management and about the political process involved in managing national forests would improve their awareness and better equip hunters to participate in the public process for U.S. Forest Service projects that impact deer populations and hunting. Ultimately, managers and hunters appear to have similar goals for deer population management on northern Georgia WMAs.

APPENDIX A

NORTHERN GEORGIA WMA DEER HUNTER QUESTIONNAIRE

Chestatee WMA Deer Hunter Survey



As a Chestatee Wildlife Management Area (WMA) deer hunter, you have been selected to participate in the following survey to help managers better understand your needs as a hunter. The survey should take about 10 minutes to complete. Your responses are <u>confidential</u> and your participation is <u>voluntary</u>. If you are less than 18 years old, please do not complete the survey.

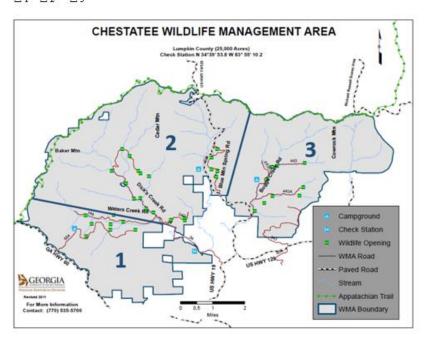




							Pg. 1/6
l. Was 201	8 your firs	t time hunting on C	hestatee WMA?				
□ Yes	-	-					
□ No -	→ How ma	any years have you h	inted on Chestatee V	VMA?#	years		
. P ♣ fil	ll out the f	ollowing chart of yo	ur kill success over	the past 5 years on	Chestatee WMA		
	Year	Did <u>Not</u> Hunt Chestatee WMA	Number of antlered deer you killed	Number of antlerless deer you killed	Number of bears you killed	Number of wild hogs you killed	
	2018	0					
	2017	0					
	2016						
	2015						
	2014	_					
_							
. How man	nv davs di	d you hunt for deer	on Chestatee WM	A in 2018? #	davs		
		•					
. Which da	ays did yo	u <u>firearms hunt</u> for	deer on Chestatee	WMA in 2018? (ple	ase mark all that	apply)	
□ Did not		vember 14 th (Wed)		(Thurs) 🗆 Noven		□ November 17 th (S	
hwnt any q these dates	, LDe	cember 13 th (Thurs)				☐ December 16 th (S	
		cember 27 th (Thus) cember 31 st (Mon)		(Fri) 🗆 Decemb	per 29 ^m (Sat) [□ December 30 th (Su	n)
	□ Бе	temoer 31" (Mon)	□ January I (Iu	es)			

Pg. 2/6

- 5. Please indicate the zone in which you spend most of your time hunting on Chestatee WMA (see map below).
 - □1 □2 □3



- 6. Given your experience with Chestatee WMA, which statement do you think best describes the current deer population on Chestatee WMA?
 - ☐ Too few deer
 - ☐ Right number of deer
 ☐ Too many deer
- 7. From your experience, please indicate which statement you think best describes the trend in deer numbers on Chestatee WMA over the last 5 years?
 - ☐ I have not hunted at least 3 of the past 5 years on Chestatee WMA
 - Large decrease in deer numbers
 Slight decrease in deer numbers
 Stable deer numbers
 Slight increase in deer numbers

 - ☐ Large increase in deer numbers

Pg. 3/6

8. First, circle the <u>importance</u> of the following aspects to deer hunting in general. Second, circle the <u>performance</u> of Chestatee WMA on the same list of aspects.

	How important is/are to	How well does this WMA perform
	deer hunting?	on providing
	1 = Not At All Important	1 = Extremely Poor
	2 = Unimportant	2 = Poor
	3 = Somewhat Unimportant	3 = Below Average
Aspects of Deer Hunting	4 = Neutral 5 = Somewhat Important	4 = Average 5 = Above Average
	δ = Important δ = Important	6 = Good
	7 = Very Important	7 = Exceptional
	Importance Rating (1-7)	Performance Rating (1-7)
Seeing lots of deer	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Seeing mature bucks	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Having the opportunity to kill a deer	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Having the opportunity to kill multiple deer	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Having the opportunity to kill mature bucks	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Having the opportunity to kill bonus bucks not included in your general bag limit	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Having the opportunity to kill does	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
The potential to kill a bear	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
The potential to kill a wild hog	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Seeing other game species (e.g., turkeys)	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Seeing nongame species (e.g., songbirds)	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Open road access to potential hunting spots	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Ease of access to hunting spots	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Privacy/seclusion from other hunters	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Being close to nature	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Having a safe hunting experience	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Financial cost	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
A convenient location close to home	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Tradition (e.g., nostalgia/fondly remembering past hunts)	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7

*Don't forget to fill out both columns *Don't forget to fill out both columns

9. Given your exper Too few hunters Right number of h Too many hunters	unters	Chestatee WMA, which	ı statement b	est describes the hunter	density on the	WMA?
		rent quality of deer hu resenting "Exceptiona		statee WMA on a scale f	rom 1 to 7 wit	h 1 representing
\square 1) Extremely Poor	□ 2) Poor	☐ 3) Below Average	☐ 4) Fair	☐ 5) Above Average	☐ 6) Good	☐ 7) Exceptional

			Pg. 4/6
11.	н	as the quality of deer hunting on Chestatee WMA decreased, stayed the same, or improved over the last 5 years	?
		I have not hunted at least 3 of the past 5 years on Chestatee WMA Decreased in quality Stayed the same in quality Improved in quality	
12.	н	ow likely are you to hunt on Chestatee WMA next year on a scale from "Very Unlikely" to "Very Likely?"	
		Very Unlikely Unlikely Somewhat Unlikely Unsure Somewhat Likely Likely Very Likely	

13. How important are the following motivations to why you go deer hunting? The scale ranges from 1 = "Not at all Important" to 7 = "Very Important." (Please circle one number per statement)

Motivations for deer hunting		Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Important	Very Important
To kill a mature buck	1	2	3	4	5	6	7
To have time to disconnect from technology	1	2	3	4	5	6	7
To know where my meat/food comes from	1	2	3	4	5	6	7
To experience solitude	1	2	3	4	5	6	7
To kill as many deer as possible	1	2	3	4	5	6	7
To kill deer for eating	1	2	3	4	5	6	7
To socialize with others in a hunting party		2	3	4	5	6	7
To spend time with friends and family		2	3	4	5	6	7
To get away from the regular routine		2	3	4	5	6	7
To get away from crowds of people	1	2	3	4	5	6	7
To be outdoors	1	2	3	4	5	6	7
To experience excitement and adrenaline	1	2	3	4	5	6	7
To contribute to conservation	1	2	3	4	5	6	7
To be more sustainable/procure meat locally	1	2	3	4	5	6	7
To be with others who enjoy the same things as me	1	2	3	4	5	6	7
To kill a trophy buck	1	2	3	4	5	6	7

Controlled burning		atee WMA? (Please mark all that a	pp(y)
My friends' or relatives' private land (which ones) Another state (which one) (please specify)	-		
Other Georgia WMAs		land	
Another state			(which ones)
Completely Dissatisfied Somewhat Dissatisfied Somewhat Dissatisfied Somewhat Dissatisfied Somewhat Satisfied Completely Satisfied Completely Satisfied Somewhat Satisfied Completely Satisfied Completely Satisfied Somewhat Satisfied Completely Satisfied	☐ Another state		(which one)
Completely Dissatisfied Somewhat Dissatisfied Neither Dissatisfied Nor Satisfied Completely Satisfied Completely Satisfied Somewhat Satisfied Completely Satisfied Completely Satisfied How important is/are to deer populations on the wMA's performance of the management practices. How important is/are to deer populations on the wMA's performance of the management practices. How important is/are to deer populations on the wMA's performance of How satisfied are you with the wMA's performance of How satisfied are you with the wMA's performance of I = Not At All Important	□ Other:		(please specify)
Somewhat Dissatisfied Neither Dissatisfied Somewhat Satisfied Completely Satisfied WMA. Second, circle your level of satisfaction with Chestatee WMA's performance of the management practices. How important is/are to deer populations on the WMA's performance of How satisfied are you with the WMA's performance of	5. How satisfied are you with your overall dec	r hunting experience on Chestatee	WMA?
Neither Dissatisfied Completely Satisfied Completely Satisfied			
Somewhat Satisfied Completely Satisfied		.a	
6. First, circle the importance of the following management practices in maintaining healthy deer populations on Chestatee WMA. Second, circle your level of satisfaction with Chestatee WMA's performance of the management practices. How important is/are to deer populations on the WMA?		su.	
How important is/are to deer populations on the WMA's performance of the management practices.	□ Completely Satisfied		
How important is/are to deer populations on the WMA's performance of the management practices.	6 First circle the importance of the following	managament practices in maintai	ning healthy deer nonulations on Chestatee
How important is/are to deer populations on the WMA? I = Not 4st All Important 2 = Unimportant 2 = Unimportant 3 = Somewhat Unimportant 4 = Neutral 5 = Somewhat Unimportant 5 = Somewhat Important 6 = Important 7 = Very Important 7 =			
Amagement Practices	· · · —		
Note		How important is/are to	How satisfied are you with the
I = Not d£ All Important 2 = Unimportant 2 = Dissatisfied 2 = Dissatisfied 3 = Somewhat Unimportant 3 = Somewhat Unimportant 4 = Neutral 4 = Neutral 5 = Somewhat Important 6 = Important 7 = Very Important 7 = Very Important 7 = Completely Satisfied 7 = Completely			WMA's performance of
2 = Unimportant 2 = Dissatisfied 3 = Somewhat Dissatisfied 4 = Neutral 5 = Somewhat Important 6 = Important 7 = Very Impo		WMA?	
Management Practices 3 = Somewhat Unimportant 4 = Neutral 4 = Neutral 5 = Somewhat Important 5 = Somewhat Important 5 = Somewhat Important 5 = Somewhat Satisfied 6 = Important 7 = Very Important 7 = Completely Satisfied 7 = Completely Satis			
Management Practices			
S = Somewhat Important S = Somewhat Satisfied 6 = Important 6 = Important 7 = Very Important 7 = Very Important Satisfied 7 = Completely Satisfied 7 = Very Importance Rating (1-7) Satisfaction Rating (1-7)	Management Practices		
7 = Very Important 7 = Completely Satisfied Satisfaction Rating (1-7)	_	5 = Somewhat Important	
Importance Rating (1-7) Satisfaction Rating (1-7)			
Timber cutting			
Food plots/wildlife openings	Timber cutting		
Food plots/wildlife openings		1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
Wild hog control 1 - 2 - 3 - 4 - 5 - 6 - 7 1 - 2 - 3 - 4 - 5 - 6 - 7 7. How long have you been a hunter? # of years 8. How many total days did you spend deer hunting in 2018 both on and off Chestatee WMA? # of total days hunted 9. What is your identified gender?	Food plots/wildlife openings	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
7. How long have you been a hunter? # of years 8. How many total days did you spend deer hunting in 2018 both on and off Chestatee WMA? # of total days hunted 9. What is your identified gender?	Predator management	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
8. How many total days did you spend deer hunting in 2018 both on and off Chestatee WMA?# of total days hunted 9. What is your identified gender?	Wild hog control	1 - 2 - 3 - 4 - 5 - 6 - 7	1 - 2 - 3 - 4 - 5 - 6 - 7
8. How many total days did you spend deer hunting in 2018 both on and off Chestatee WMA? # of total days hunted 9. What is your identified gender?	7. How long have you been a hunter? #	of years	
9. What is your identified gender?		-	untata NOSA2 — # afaatal daan laanata
· · · ·		unting in 2018 <u>both on and oil</u> Che	statee www.
□ Female □ Male	 How many total days did you spend deer h 		
			
	9. What is your identified gender?		
0. What year were you born? (year)	9. What is your identified gender?		
	9. What is your identified gender? □ Female □ Male		
	9. What is your identified gender?		

22. Please provide any add	tional comments on how the GA Department of Natu	Pg. 6/6
experience on Chestate	WMA.	



Thank you for participating in this survey! Please place it in the pre-paid envelope provided and mail it back to us. No stamp needed!

If you have any additional questions, please contact: Jackie Rosenberger, University of Georgia, 180 E. Green St. Athens, GA 30602 email: jacalyn.rosenberger@uga.edu, phone: 706-542-3929

APPENDIX B

NORTHERN GEORGIA WMA DEER HUNTER SURVEY RESULTS

1. Was 2018 your first time hunting on [WMA Name]?

$$No = 342 (84\%)$$

$$Yes = 65 (16\%)$$

2. Please fill out the following chart of your kill success over the past 5 years on [WMA Name].

Year	Did <u>Not</u> Hunt [WMA Name]	Number of <u>antlered</u> deer you killed	Number of antlerless deer you killed	Number of bears you killed	Number of wild hogs you killed
2018	345 (85%)	25	8	18	50
2017	300 (77%)	41	5	9	49
2016	247 (66%)	26	6	2	40
2015	222 (60%)	26	5	11	22
2014	163 (44%)	18	6	12	35

3. How many days did you hunt for deer on [WMA Name] in 2018?

$$\bar{x} = 3.79$$
, SD = 4.45, Range = 0–30

4. Which days did you primitive weapons hunt on [WMA Name] in 2018?

WMA	Date	Number of respondents	% of those that completed a [WMA Name] questionnaire
Blue Ridge	Did not hunt any of these dates	29	71
Blue Ridge	Wed, Oct 10	5	12
Blue Ridge	Thurs, Oct 11	4	10
Blue Ridge	Fri, Oct 12	6	15
Blue Ridge	Sat, Oct 13	10	24
Blue Ridge	Sun, Oct 14	6	15
Coopers Creek	Did not hunt any of these dates	41	65
Coopers Creek	Wed, Oct 31	11	17
Coopers Creek	Thurs, Nov 1	14	22
Coopers Creek	Fri, Nov 2	14	22
Coopers Creek	Sat, Nov 3	9	14

5. Which days did you firearms hunt on [WMA Name] in 2018?

WMA	Date	Number of respondents	% of those that completed a [WMA
Blue Ridge	Did not hunt any of these dates	11	Name] questionnaire 27
Blue Ridge	Wed, Oct 24	4	10
Blue Ridge	Thurs, Oct 25	6	15
Blue Ridge	Fri, Oct 26	7	17
Blue Ridge	Sat, Oct 27	10	24
Blue Ridge	Wed, Nov 21	10	24
Blue Ridge	Thurs, Nov 22	13	56

Blue Ridge	Fri, Nov 23	21	51
Blue Ridge	Sat, Nov 24	16	39
Chattahoochee	Did not hunt any of these dates	15	28
Chattahoochee	Wed, Oct 24	8	14
Chattahoochee	Thurs, Oct 25	6	11
Chattahoochee	Fri, Oct 26	6	11
Chattahoochee	Sat, Oct 27	7	12
Chattahoochee	Sat, Nov 17	13	23
Chattahoochee	Sun, Nov 18	10	18
Chattahoochee	Mon, Nov 19	7	12
Chattahoochee	Tues, Nov 20	10	18
Chattahoochee	Wed, Nov 21	6	11
Chattahoochee	Thurs, Nov 22	13	13
Chattahoochee	Fri, Nov 23	10	18
Chattahoochee	Sat, Nov 24	8	14
Chattahoochee	Sun, Nov 25	2	4
Chattahoochee	Wed, Dec 5	9	16
Chattahoochee	Thurs, Dec 6	9	16
Chattahoochee	Fri, Dec 7	11	19
Chattahoochee	Sat, Dec 8	9	16
Chestatee	Did not hunt any of these dates	13	46
Chestatee	Wed, Nov 14	4	14
Chestatee	Thurs, Nov 15	6	21

Chestatee	Fri, Nov 16	6	21
Chestatee	Sat, Nov 17	4	14
Chestatee	Thurs, Dec 13	2	7
Chestatee	Fri, Dec 14	7	25
Chestatee	Sat, Dec 15	6	21
Chestatee	Sun, Dec 16	3	11
Chestatee	Thurs, Dec 27	0	0
Chestatee	Fri, Dec 28	1	4
Chestatee	Sat, Dec 29	1	4
Chestatee	Sun, Dec 30	2	7
Chestatee	Mon, Dec 31	0	0
Chestatee	Tues, Jan 1	2	7
Cohutta	Did not hunt any of these dates	42	31
Cohutta	Thurs, Oct 11	33	24
Cohutta	Fri, Oct 12	48	35
Cohutta	Sat, Oct 13	41	30
Cohutta	Sun, Oct 14	25	18
Cohutta	Wed, Nov 28	26	19
Cohutta	Thurs, Nov 29	38	28
Cohutta	Fri, Nov 30	42	31
Cohutta	Sat, Dec 1	39	29
Cohutta	Sun, Dec 2	28	21
Coopers Creek	Did not hunt any of these dates	27	43

Coopers Creek	Wed, Nov 28	19	30
Coopers Creek	Thurs, Nov 29	19	30
Coopers Creek	Fri, Nov 30	20	32
Coopers Creek	Sat, Dec 1	21	33
Coopers Creek	Thurs, Dec 27	14	22
Coopers Creek	Fri, Dec 28	12	19
Coopers Creek	Sat, Dec 29	16	25
Coopers Creek	Sun, Dec 30	8	13
Coopers Creek	Mon, Dec 31	6	10
Coopers Creek	Tues, Jan 1	5	8
Rich Mountain	Did not hunt any of these dates	16	30
Rich Mountain	Mon, Nov 19	19	36
Rich Mountain	Tues, Nov 20	17	32
Rich Mountain	Wed, Nov 21	15	28
Rich Mountain	Thurs, Nov 22	15	28
Rich Mountain	Fri, Nov 23	17	32
Rich Mountain	Sat, Nov 24	25	47
Rich Mountain	Sun, Nov 25	15	28
Swallow Creek	Did not hunt any of these dates	9	43
Swallow Creek	Thurs, Nov 15	3	14
Swallow Creek	Fri, Nov 16	4	19
Swallow Creek	Sat, Nov 17	6	29
Swallow Creek	Sun, Nov 18	3	14

Swallow Creek	Thurs, Dec 13	3	14
Swallow Creek	Fri, Dec 14	4	19
Swallow Creek	Sat, Dec 15	4	19
Swallow Creek	Sun, Dec 16	3	14
Swallow Creek	Thurs, Dec 27	2	10
Swallow Creek	Fri, Dec 28	3	14
Swallow Creek	Sat, Dec 29	2	10
Swallow Creek	Sun, Dec 30	0	0
Swallow Creek	Mon, Dec 31	2	10
Swallow Creek	Tues, Jan 1	1	5
Warwoman	Did not hunt any of these dates	4	31
Warwoman	Thurs, Nov 8	4	31
Warwoman	Fri, Nov 9	4	31
Warwoman	Sat, Nov 10	3	23
Warwoman	Sun, Nov 11	0	0
Warwoman	Thurs, Nov 29	6	46
Warwoman	Fri, Nov 30	5	38
Warwoman	Sat, Dec 1	7	54
Warwoman	Sun, Dec 2	2	15

6. Please indicate the zone in which you spend most of your time hunting on [WMA Name].

7. Given your experience with [WMA Name], which statement do you think best describes the current deer population on [WMA Name]?

Too few deer =
$$368 (87\%)$$

Right number of deer = $54 (13\%)$
Too many deer = $3 (<1\%)$

8. From your experience, please indicate which statement you think best describes the trend in deer numbers on [WMA Name] over the last 5 years?

I have not hunted at least 3 of the past 5 years on [WMA Name] = 144 (34%)

Large decrease in deer numbers = 123 (29%)

Slight decrease in deer numbers = 77 (18%)

Stable deer numbers = 55 (13%)

Slight increase in deer numbers = 19 (5%)

Large increase in deer numbers = 1 (<1%)

9. First, circle the <u>importance</u> of the following aspects to deer hunting in general. Second, circle the <u>performance</u> of [WMA Name] on the same list of aspects.

	How important is/are to	How well does this WMA
	deer hunting?	perform on providing
Aspects of Deer Hunting	1 = Not At All Important 2 = Unimportant 3 = Somewhat Unimportant 4 = Neutral 5 = Somewhat Important 6 = Important 7 = Very Important	1 = Extremely Poor 2 = Poor 3 = Below Average 4 = Average 5 = Above Average 6 = Good 7 = Exceptional
	Importance Rating (1-7)	Performance Rating (1-7)
Seeing lots of deer	$\bar{x} = 5.2$	$\bar{x} = 2.4$
Seeing mature bucks	$\overline{x} = 5.6$	$\overline{x} = 2.6$
Having the opportunity to kill a deer	$\bar{x} = 5.6$	$\overline{x} = 2.8$
Having the opportunity to kill multiple	$\bar{x} = 3.6$	$\bar{x} = 2.3$
Having the opportunity to kill mature	$\overline{x} = 5.6$	$\overline{x} = 2.8$
Having the opportunity to kill bonus bucks not included in your general bag limit	$\bar{x} = 4.0$	$\overline{x} = 2.9$
Having the opportunity to kill does	$\overline{x} = 3.8$	$\overline{x} = 2.8$
The potential to kill a bear	$\overline{x} = 4.4$	$\overline{x} = 4.8$
The potential to kill a wild hog	$\overline{x} = 4.4$	$\overline{x} = 4.5$
Seeing other game species (e.g., turkeys)	$\overline{x} = 5.6$	$\overline{x} = 4.2$
Seeing nongame species (e.g., songbirds)	$\overline{x} = 4.4$	$\overline{x} = 4.5$
Open road access to potential hunting	$\overline{x} = 4.7$	$\overline{x} = 4.3$
Ease of access to hunting spots	$\overline{x} = 4.2$	$\bar{x} = 4.1$
Privacy/seclusion from other hunters	$\bar{x} = 6.1$	$\bar{x} = 4.9$
Being close to nature	$\bar{x} = 6.3$	$\bar{x} = 5.9$
Having a safe hunting experience	$\bar{x} = 6.7$	$\bar{x} = 5.9$
Financial cost	$\bar{x} = 5.1$	$\bar{x} = 5.3$
A convenient location close to home	$\bar{x} = 5.4$	$\bar{x} = 5.3$
Tradition (e.g., nostalgia/fondly remembering past hunts)	$\bar{x} = 5.9$	$\bar{x} = 5.5$

10. Given your experience with [WMA Name], which statement best describes the hunter density on the WMA?

Too few hunters = 49 (11%)

Right number of hunters = 314 (73%)

Too many hunters = 67 (16%)

11. How would you rate the current quality of deer hunting on [WMA Name] on a scale from 1 to 7 with 1 representing "Extremely Poor" and 7 representing "Exceptional?"

Extremely Poor = 80 (18.6%)

Poor = 107 (24.9%)

Below Average = 111 (25.8%)

Fair = 90 (20.9%)

Above Average = 18 (4.2%)

Good = 20 (4.7%)

Exceptional = 4 (0.9%)

12. How has the quality of deer hunting on [WMA Name] decreased, stayed the same, or improved over the last 5 years?

I have not hunted at least 3 of the past 5 years on [WMA Name] = 140 (32.4%)

Decreased in quality = 165 (38.2%)

Stayed the same = 113 (26.2%)

Improved in quality = 14 (3.2%)

13. How likely are you to hunt on [WMA Name] next year on a scale from "Very

Likely" to "Very Likely?"

Unlikely =
$$14 (3.2\%)$$

Somewhat Unlikely = 20 (4.5%)

Unsure =
$$30 (6.8\%)$$

Somewhat Likely = 58 (13.2%)

Likely =
$$76 (17.2\%)$$

Very Likely = 215 (48.8%)

14. How important are the following motivations to why you go deer hunting? The scale ranges from 1 = "Not at all Important" to 7 = "Very Important."

Motivations for deer hunting	Not at All Important	Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Important	Very Important
To kill a mature buck					$\overline{x} = 5.3$		
To have time to disconnect from technology					$\bar{x} = 5.8$		
To know where my meat/food comes from					$\bar{x} = 5.6$		
To experience solitude						$\bar{x} = 6.0$	
To kill as many deer as possible		$\bar{x} = 2.1$					
To kill deer for eating					$\bar{x} = 5.7$		
To socialize with others in a hunting party				$\overline{x} = 4.3$			
To spend time with friends and family					$\bar{x} = 5.5$		
To get away from the regular routine						$\bar{x} = 6.0$	
To get away from crowds of people						$\bar{x} = 6.2$	
To be outdoors						$\overline{x} = 6.7$	
To experience excitement and adrenaline					$\bar{x} = 5.4$		
To contribute to conservation					$\overline{x} = 5.8$		
To be more sustainable/procure meat locally					$\overline{x} = 5.4$		
To be with others who enjoy the same things as me					$\bar{x} = 5.2$		
To kill a trophy buck				$\overline{x} = 4.7$			

15. Where else do you deer hunt besides [WMA Name]? (Please mark all that apply)

I only hunt on [WMA Name] = 12 (3%)

My own private land = 169 (39%)

My friends' or relatives' private land = 194 (45%)

Other Georgia WMAs = 324 (74%)

Another state = 108 (25%)

Other = 126 (29%)

16. How satisfied are you with your overall deer hunting experience on [WMA Name]?

Completely Dissatisfied = 46 (10.7%)

Somewhat Dissatisfied = 149 (34.7%)

Neither Dissatisfied Nor Satisfied = 107 (24.9%)

Somewhat Satisfied = 101 (23.5%)

Completely Satisfied = 26 (6.1%)

17. First, circle the <u>importance</u> of the following management practices in maintaining healthy deer populations on [WMA Name]. Second, circle your level of <u>satisfaction</u> with [WMA Name]'s performance of the management practices.

	How important is/are to deer populations on the WMA?	How satisfied are you with the WMA's performance of
Management Practices	1 = Not At All Important 2 = Unimportant 3 = Somewhat Unimportant 4 = Neutral 5 = Somewhat Important 6 = Important 7 = Very Important	 1 = Completely Dissatisfied 2 = Dissatisfied 3 = Somewhat Dissatisfied 4 = Neutral 5 = Somewhat Satisfied 6 = Satisfied 7 = Completely Satisfied
	Importance Rating (1-7)	Satisfaction Rating (1-7)
Timber cutting	$\overline{x} = 5.3$	$\overline{x} = 3.6$
Controlled burning	$\bar{x} = 5.5$	$\bar{x} = 3.9$
Food plots/wildlife openings	$\bar{x} = 6.1$	$\bar{x} = 3.9$
Predator management	$\bar{x} = 5.9$	$\bar{x} = 3.5$
Wild hog control	$\bar{x} = 5.8$	$\bar{x} = 3.7$

18. How long have you been a hunter?

$$\overline{x} = 31 \text{ years}$$
, SD = 15, Range = 0–65

19. How many <u>total days</u> did you spend deer hunting in 2018 <u>both on and off</u> [WMA Name]?

$$\bar{x} = 30$$
, SD = 25, Range = 0–300

20. What is your identified gender?

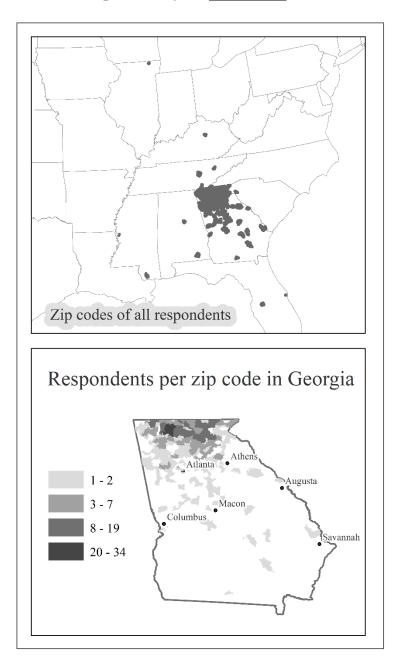
Male =
$$419 (97.2\%)$$

Female =
$$12 (2.8\%)$$

21. What year were you born?

$$\bar{x} = 1972$$
, SD = 14 years, Range = 1932–2000

22. What is the Zip Code of your **PRIMARY** current residence?



Data Sources:

U.S. Census Bureau. 2019. National Nation-Level Geography Geodatabase: State. https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-geodatabase-file.html. Accessed 4 November 2020.

 $U.S\ Census\ Bureau.\ 2018.\ ZIP\ Code\ Tabulation\ Areas\ (ZCTAs). < https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html>.\ Accessed\ 4\ November\ 2020.$

U.S. Census Bureau. 2019. Tiger/Line Geodatabase-Georgia: County. https://www.census.gov/geographies/mapping-files/time-series/geo/carto-boundary-file.html. Accessed 4 November 2020.

23. Please provide any additional comments on how the GA Department of Natural Resources can improve your deer hunting experience on [WMA Name].

BLUE RIDGE WMA

- 6- Between military using the WMA, along with two hiking trials. Deer, bear and other wildlife stay away in lower areas. DNR needs to do better job of deer management. They have let hunters down. Keep gates closed during small game hunts is terrible. NEED more officers! Not contractors! Better management! Deer have moved out of mountains to valleys were people are feeding them years around. Reason: acorn/food supplies has been terrible over past few years. This WMA has too many other groups using the land and area for outdoor use. From military, bikers, hikers or just weekend drive. To busy for wildlife to enjoy the habit.
- 8- As a Warnell grad I appreciate your efforts. The mountain WMAs need more timber (clearcut is not a bad word) and more aggressive bear and predator control. I enjoy the mountain hunting experience.
- 21- I would like to see better food plot management, and less doe days to help the population, more bear and hog hunts to keep them in check, possibly even dog hunts on them because I think the bear are getting out of control. Maybe even trophy only hunts at least 4 on one side to stop killing all the young bucks. Honestly it probably needs to shut down for about 5 years and restocked because the deer numbers are just not there.
- 25- I bowhunted for bear on my hunt we had three hunters in our group all of us saw bear and 2 shot bear was very pleased with bear sign and activity only saw 2 deer (doe) but that was fine since we were bear hunting did see some buck sign I will definatly hunt Blue Ridge again
- 31- We need to continue researching ways to sow the spread of wild hogs. Blue Ridge WMA is beautiful with deer covering a broad expanse. Hogs can and will impact that. Warwoman WMA is destroyed for deer thanks to the hogs. I'd hate to see Blue Ridge look the same.
- 36- Take what I filled out w/ a grain of salt. I have never hunted BR WMA before but my buddy went with says he always gets a bear or a deer when he goes/usually the weekend of Thanksgiving. I was surprised I didn't see anything. Very surprised. Saw some sign that was a day or two old but it was like everything was gone. The rain and fog didn't help but I hiked miles over that area open areas, up & down the mountain we were at. I thought I would at least see hogs. I guess it just wasn't the right areaw. I probably will go again, but I was not impressed. The trails I was on and old logging roads were uncleared for sometime. Sometimes pretty annoying when I had to climb over and through a large tree and limbs many times. But I don't expect a walk in the park. I wish the days available to hunt were more plentiful. Pretty slim pickings.
- 38- The only one thing that really concerned to me is that I would like to see is some open along the road for car or truck to maneuver around each other and not have to back up a long way back

when you meet another vehicle coming in oposite direction. Meaning some road are to tight for a long ways out some time.

- 44- Open more during firearms.
- 48- Have game management employees do the job they did prior to 2014.
- 50- Cut out doe days till the population improves. Plant food plots. Turn the WMA into a quality buck management area. Better patrol the WMA to discourage poachers.
- 54- No doe days and cut small tracts of timber and food plots and burn. Will also help small game!
- 58- Need to see more game warden inforcing law, to many people don't where hunter orange and there are hunters that like to walk wright in front of hunters that are hunting. Need to have more hunting dates.
- 61- 1) For one I think they need to manage the food plots better, back about 5 to 6 years ago the food plots was nice cutt and very maintained, last 5 years not so good... 2) I have noticed in the last 3 to 4 years the preditor population has pick up I have seen more coyotes and bobcats than deer. 3) Please Read: the biggest problem I have seen, is the none hunter, on trails walking roads and touring the sites during hunting day. Back years ago the clossed toring sites during mangment Hunting day. last year I had a hiker and dog walk up on me in middle of forest miles from food plots or atracions. Think this would help.
- 63- I would like the DNR to consider more hog and coyote hunting opportunities. Also I would hope the DNR would provide more game wardens on duty, even off season. I was the victim of an attempted strong arm robbery by 4 persons (I believe drug users (meth. This was during the summer. Georgia carry permit and weapon (hand gun) stopped their attempt. Many non-hunters, non gun carrying citizens are using the mountain WMA's and the isolation provides a chance for those criminals to do bad things. Robbery, theft is a problem everywhere. Law abiding citizens want and deserve more law enforcement on WMA's. More game wardens, more hog and coyote hunts. Thanks for your service!
- 66- This was my first year on Blue Ridge WMA area. I can see that there are few deers in certain areas that are moving in a group. I have set up few trail cameras on zone 2 and I can only see few deers passing by and once in a while a nice bucks. I can see alot of wild hogs on my trail cameras with is something I like as I like to hunt them but haven't got the chance as they are moving at night with I can't hunt on WMA. But probably this is the reason I only see few deers on the spot I like to hunt. I wish the GA Department would allow to hunt wild hogs at night or open a special hunting season for them on WMA as they are all uear but it's hard to hunt them during the day.
- 67- Develop a better plan on ways to improve deer/turkey habitat through timber management, food resources, controlled burns. I've been hinting the North GA WMA's and National Forest lands sine I was 5 years old. I am lucky enough to have a dad who was a great teacher and mountain hunter, and still is. As a yung kid we would go to different WMA's and public land and

see many deer and turkey. He would always tell me storys of how the hunting in those particular places was when the timber cuts were fresh, and the forest had less wide open over mature trees and good edges. Over the years I have personaly noticed a steady decline in deer and turkey in the mountain region. I still see a few deer here and there, and some are spikes. Small bucks, some mature bucks, but very few does and hardly ever my fawns. In my teens I would see many does with fawns during archery season. The only places I see deer are secluded and the same spots. You can walk miles and miles in places and never see any sign, much less a critter. Maybe the old ways of game management/forest management need to be implemented with new ways. And a strict NO DOE! rule would be helpful. Thanks for your concern.

- 68- Fix food plots plant anything but grass kil hogs and coyotes
- 76- very good experience. Wish to hunt here more.
- 82- Every time I went this season at Blue Ridge WMA, I would find glowsticks, trash and empty MRE's from Army ranger (?) soldiers. It'd be around the food plots which I think are used as jump sites for ranger school. I've even found whole loaded magizine clips of blanks on the ground. The bears seem to like the MREs though. I always see bear scrapes next to the MRE trash and toilet paper. I think there needs to be more regulation on the Army's use of food plots as jump sites. And the Army needs to pick up their glowsticks and MREs. I ways clean them up. It's a mess. Thank you for doing this survey. It shows me that someone else cares about the Blue Ridge WMA.
- 85- Army messes up a lot of hunts
- 87- Have primitive weapon hunts later. Have there hunt dates that are not the same as open hunt date's or the same as other WMA. After big game hunt's leave the gates open to public where a hunter can get in to kill HOGS. It's just hard to get a hog out after a hunter has walked for a couple of hour's past the closed gate's. It's just to hard to get them out.
- 88- I wish it was open more days, but I understand the heard management aspect of over hunted land. Wild hog control should be a priority. Year around hog hunting would allow hunters to scout more and help control the hog population.
- 95- I only hunted at Blue Ridge WMA once, and that was in 2017. My answers probably are not accurate with only hunting at this location once, but maybe you still got good info!
- 97- We need more timber cutting, thinning to open up understory to provide more browse when we have a poor acorn, mast crop, the deer, turkey suffer, along with other species. I see all the tractors and equipment around the check station, but not very much food plot planting, always wonder why. Went to Blue Ridge the other day to do some turkey scouting, alot of roads were gated off. Bummer. I have had Army rangers in the woods around me while hunting, even with a rifle during gun hunts, all camo no orange on. Don't think this is safe, I would not want to do it, I know they need to train but maybe not on a gun hunt. "God bless our military"
- 100- Reopen raods that have been closed: 58D, 58F, 58H, 58C, etc. -Repair roads 58E, 58B/reopen the road @58E that went to Bryson Gap Road -institute a rule that no

hikers,horseback riders, motorcyclist or any other recreational activities during hunt dates or at least before noon on these hunt dates. -large controlled burns need to happen on both sides of Noontootla Rd/FSR58, and on the northside of Blue Ridge Rd (the road to Springer Mtn) off of Double head Gap Rd across from Mt Pleasant Church. -the military maneuvers last season were unbearable! the amount of trash and debris left behind was appalling. They blew two of my favorite hunting areas. The shell casings and machine gun clips they leave behind are detrimental to the soil and wildlife...and tires when they leave piles in the roads like they did on Long Creek Rd/Hickory flats this year.

110- Close WMA for 2 years . Not enough deer. Manage deer wildlife food plots. Open closed roads for axcess.

115- 1) Eleminate bonus tags - this draws "pro" hunters 2) Allow accommodations for non resident disabled hunters like me 3) Coordinate with military to "cease & desist" their activity prior and during hunt. Daniel Marshala Cape Canaveral FL 321-271-1011

118- I have hunted Blue Ridge WMA for 20 years or more. It is a place I hunted with my dad until he passed away in 2008. I've hunted every year since then usually during muzzle loader then again during Thanksgiving. Years past it always seemed when they had the December hunt it was usually good. I've had success in October and in November as well. With any other hunting in the mountains acorns play a big part. This year was poor (2018) but the year before was good and I had success. I always see deer, there is usually a good buck in the area I hunt, and it holds a sentimental value as I hunt the same area where my father did and visit the tree he used to sit in everytime I go. Overawll it is a good place if you wanted to kill a deer. I only shoot a mature buck and pass on smaller ones and does when I go there as I have plenty of places to hunt. Turkeys and bears are plentiful where I hunt and hogs come and go. I did not hunt there as much in years past as the sign was poor due to I'm guessing the lack of acorns this year. I did see plenty of track sign just not alot of buck sign so I hunted in other places I have, but honestly didn't have a good season as 2017 but not alot of acorns where I hunted. One place that I found acorns I had a mature buck sign.

126- Improve/grade/widen Winding Stair Gap RD. USFS 77. I realize this is a USFS domain but both agencies work hand-in-hand with access. (I would think) Blue Ridge is my favorite; I love it up in there. Was very sad area got cut in half; whatever the year was.

143- This is my first year hunting. I've been exploring 10 of the WMAs in NE GA from Blue Ridge to Oconee to Wilson Shoals to Chatahoochee. I've explored Chatahoochee Natonal Forest Non WMA. I've seen a quality buck 30 yards away on Blue Ridge. I bumped him and had no safe shot. I've also seen some does on Wilson Shoals too far for a safe shot. And harvested 2 does on my private property. The nature in NE GA is beutiful, enjoy getting the peace and quiet and the excitement of encountering nature and the prospect of being able to consume the meat that I harvest. I saw an abundance of other animals at Blue Ridge WMA and very much look forward to visiting next season.

CHATTAHOOCHEE WMA

- 145- I am a firm believe in maintain food source for wildlife. What good is a food plot with no food source. The DNR needs to maintain that source to create more wildlife. And to control population of predators. WMA stand for Wildlife Management Area. What is the def. of Management?
- 151- Bikers, hikers, photographers of anyone actively on the WMA during a hunt MUST wear orange. It is a safety issue -bear and hog control dates to hunt these should be increased and incentives, maybe a hat. I believe the deer population is low due to the bear and hog population. More logging for clear cuts that will produce new undergrowth for baby deer, for foraging for older deer to make it through when there is no acorn crop. -Even though there is plenty of acreage, and few hunters, they want to stack up on top of one another. May need to assign areas for those who do not understand. -Tag #s and Drivers License #s should be on entry ballot (including make/model of car). My car was vandalized in a way that could have caused a lot of harm, the only info I could give was appearance, make/model of car, but there is no way to know who they were.
- 152- More agents in the area, too many hunters who camp, drink and shoot their guns during bow season.
- 153- First off: congratulations on your effort and time to make this (and all the WMAs) better, and I'm "more" of a turkey hunter than deer hunter. I mostly deer hunt to be out with nature. I do like to kill one doe a season for the meat. I have hunted this WMA for around 30 years. The amount of wildlife has decreased "big time"!!! The Chatt. National Forest has been mismanaged for several decades!! No forestry (timber removal) don't ever recall a burn and food plots were at a minimal and several years never planted or maintained. Eventhough its open "all" of turkey season I have never understood the very limited # of days to deer hunt. I'm talking about "thousands" of acres, that is owned by every citizen that is underutilized. I cannot remember the last time I saw or heard Ruffed Grouse used to be common!! The turke y population has "plummeted"! I don't even care if I don't kill a turkey, but I sure would like to hear and see them. There isn't even turkey sign: scratching, tracks, roosting sign or much droppings in the clearings (food plots)?? There are several great articles on forest management in the March/April issue of the NWTF "Turkey Country" magazine. If you need a copy, I'll send you mine!! Please feel free to contact me about any questions or my replies. Thanks, Dave. 678-617--5969
- 157- The WMAs should allow hog hunting with appropriate weapons during a longer period of time. Traffic should be 1 way on Trail Ridge Rd. People should not be allowed to camp on the food plots or the access road to them.
- 162- Make hog hunting at night, with night vision legal. Bring back timber cutting instead of never cutting.
- 166- In my opinion all of the mountain WMAs have declined as far as deer population over the years. Back when I first started hunting people would take a full week off to hunt and camp on the local mountain WMAs. But now that does not happen due to too few deer few deer on these

management areas now. No timber cutting to create cover and browse, harldy any controlled to create browse and eliminate undesirable species of plants. Too many bears, too many coyotes, too many wild hogs have created an echosystem that make it hard for a deer to survive in. I feel one small way to help would be to open up trapping on the WMAs to help reduce the number of coyotes. Another would be to open a spring bear hunt that does not interfere with turkeys season. And lastly maybe put a bounty out on wild hogs and open the season to year round on the wild hog. Also the food plots have all but disappeared from the mountain WMAs. Supplimented feeding would not only help the deer population but would also help the wild turkeys, grouse and other species that are currently suffering. I feel the DNR has let us as mountain hunters down in an almost unforgiveable manner!!

167- I did not specifically deer hunt Chattahoochee WMA. I turkey hunted and bera and hog hunted but did not see a deer. Chattahoochee should be opened more for hog hunting. The hogs are decimating the WMA and the food sources for deer. The bear hunting was enjoyable but crowded, especially the November 15-22 hunt. DNR needs to open all the roads. The entire North section is incaccessable.

169- All I have to say is make ease of access for people who do not have 4-wheel drive to make it around the WMA a bit easier. That's all.

172- I have litterly never seen a deer on Chatt WMA. Many bear, no deer. Predator control and selective timber harvest and burning. Many animals depend on knew growth low enough to reach I think burning and cutting would also increase grouse and turkey populations.

173- It's very hard to hunt this WMA because of the steep terrain and very limited open areas. Dawson Ford WMA seems to be managed much better. They have a lot of logging and are very good at doing controlled burns, controlling the undergrowth. Their big draw back is that most of the roads remained closed.

174- I have hunted on the Chattahoochee nearly every year for the past 39 years. When I first started hunting on the hooch I would see about 5-12 deer per season. Now, I am lucky to see any deer at all! In the past 5 years hunting on the hooch I've only seen 3 deer and harvested 1. I now many good places to hunt and see deer on the hooch after hunting on it for so long, the places I'v hunted many times in the past. It concerns me that the deer population is so low, that many hunters will not even try to hunt on the hooch, especially young and new deer hunters. I see less hunters on the hooch now than years in the past. I normally hunt the hooch with 4-5 of my family and friends, that also have hunted it for many years, and have same hunting experience, few deer! I noticed a big decline in deer populations when they stopped cutting timber from the hooch back in the late 80s. I was hoping to see more deer when they went to (buck only) on the gun hunts, but really haven't noticed a difference. I will always hunt the hooch as long as I can, and I try to take young hunters with me when I can. I hunt the hooch because it is one of my favorite places to hunt. I really don't care if I get a deer or not, just love hunting on it.

176- Need to get the predator numbers back to a reasonable number in my opinion. Seems like the coyote and bear numbers are higher and higher every year.

178-1. Food plots are a must when we have a bad acorn crop 2. we must do more to get rid of hogs 3. better bear management to many bears they eat fawns 4. charge other for using WMAs not just hunters and fishers 5. go back to only check in hunts 6. all the hunts seem to miss the rut now 7. Fix the roads! 8. Plant something useful in the food plots 9. Start trapping hogs 10. Hire more Rangers. Hire labors to plant and trap hogs and predators. Not everyone needs to be a game warden. Their are a lot of young men and women in our Great State who would love to work on our WMAs for a living Swallow Creek used to have people who done nothing but work on roads and food plotts all over north ga. We have been neglected here in North Ga for years. All money seems to go to South Ga.

182- I have been hunting Chattahoochee for over 40 years. I have and still do hunt all over GA and several other states but Chattahoochee is still my favorite place. Deer numbers have plummeted over the last several years. I think this is because of the exploding hog population and the abundance of coyotes. Maybe the deer hunts should be closed for a few years and increase bear and hog hunts. Another way to help hunters like myself is to post signs and enforce the control of non hunters driving into hunting areas. I have personally witnessed numerous "weekend warriors" driving around signs and over food plots. They also constantly drive on roads that are temporarily open for hunters. If this survey is to prepare for closing or removing this WMA from managed hunts I hope you fail. My family loves this WMA and wnat to continue using it. Dale McDuffie

185- Question #7 and #11 address the number and quality of deer in the last 5 years. In my opinion the numbers have reached such a low point that the last 5 years have shown no change. I felt like the numbers are so low now that if you ended deer hunting they wouldn't rebound. Food is dependant on the acorn crop since timber cutting stopped. The scattered food plots only concentrate (deer, hunters and predators). This is a losing prospect for the deer. Cutting timber gave deer areas to browse, while also providing cover (based on age of cut). At this point you see where I am going? I'm not a logger. I work public safety (EMS). Instead of sending out these surveys why don't you come to the woods and visit with us being on the ground in the WMA. I hope that the grant money spent on this survey actually helps Chattahoochee WMA, but I'm afraid it won't. When I started hunting Chatt, you'd see deer in the roads. Horned bushes and scrapes along the sides of the road. I hope that the day comes for furute hunters they can enjoy days and sights like that. I'll never see that again in my lifetime.

186- I am an inexperienced hunter who lives full time in metro Atlanta. I typically go once or twice a year w/ my father. We don't really spend a lot of effort but it's still exciting and fun to get outdoors and spend time together.

188- I go to Chattahoochee WMA for the bear. I would never go there for the deer. There are to many better WMAs for deer.

189- I would love to see more habitat improvement and N. Georgia for deer and more work to establish stronger deer populations in the mountains. I would also like to see archery season open on all WMAs in North GA all of deer season to give us some cooler weather to enjoy now gun hunting timeframes.

- 207- A larger presence of law enforcement in the area. There is a lot of people who camp up top who drink, then go and start shooting their gnus. This has happened twice while we were camping during bow season. I usually go up there to bear hunt.
- 217- Saw bear and deer, up until last year did not run into another hunter 15-20 years ago never ran into another hunter. Only bow hunts. 1 gun hunt.
- 218- 1. Reestablish food plots 2. more WMA hunting days
- 225- Open gates for BTV's and ATV's onl!! No passenger vehicles. To be no more than 20' off the road. Which would be easyer for old timbers like me to get to better hunting spots, without having to hike 5 miles just to get to a spot.
- 231- I believe timber cutting would be the best management practice for helping the deer population. The vast majority of the WMA consists of (relatively) old growth forest with little edge habitat and little browse. A swath of land hit by a tornado several years ago seems to be the only successional forest in the area. The area is apparently great for bears as I tend to se e a large number of bears. I understand there are political issues and legal issues with cutting timber on national forest land. I don't blame the DNR or the area managers for the lack of deer. However, I believe if they were allowed some timber harvesting the deer (and grouse, can't forget them...) would greatly benefit. Having even a moderate deer population would make Chatt WMA an outstanding place to see a deer, bear or hog the hunting experience would be great. For now it's a great place to find a bear or a hog.
- 232- Work with the USFS to facilitate more timber cutting to be available for deer. Consider reintroducing deer expecially with genetics that might produce better trophy quality.
- 233- Chattahoochee WMA has a major hog-bear problem! There are so many food resources are all gone early in the year. After the food is gone the wildlife venture off the WMA onto private tracs of land. I know this because I live just off the WMA and see this every year. the bear come down and destroy my property. This happens just before the WMA season starts in Oct. When the WMA starts it has none to little wldlife on it because of lack of food. Lack of food is the next issue. The past 15 years the food plots have been a joke!! I am not sure what the conservation rangers are doing but I know it isn't paying attention to food plots! I almost stopped hunting it because the wildlife tech told me the stae didn't have money to plant the plots. Even went up the chain but it fell on DEAF ears! It is sad to see the place I (was born and raised) hunted as a kid with my dad go downhill as much as it has. I killed the biggest deer of my life in 2017 on US Forest Property just off the WMA. It came off private land on to USFNF property. This was after I walked for miles trying to find a good buck on Chattahoochee WMA. The past 15 years have been a joke on deer population. I would love to see open hog hunting year round on this WMA. This would help with the food situation. Thanks.
- 236- The staff was extremely great folks, giving good advice on potential places that was not hunted by others. For myself deer # are down lots of bear sign and pig sign. Biggest problem I had was the mountain bikes on trails. In which should be closed off for hunting. Late season food

should be planted as whell maybe more hunting day's thru the week before the mountain bikers gets days off.

- 247- When I was 15 years old I started hunting on Chattahoochee with my Dad. You always saw deer on every hunt! After the conservationist took over which meant NO clearcuts, logging etc. The deer population feel way off! No clear cuts meant no grouse, deer or great deer hunts. I've talked with biologists and I have never heard such a line of nonsense about deer population. When you hunt the Chattahoochee, and I love the place, you might see one or two deer each season. Bottom line bring back clearcuts! 30 acres at a time minimum.
- 252- Allow night hunting of feral hogs While on Chattahoochee and other WMA's I have noticed significant amounts of damage caused by hogs. Allowing night hunting or all year hunting would help eradicate this invasive species and contribute to the overall health of the deer herd in GA, as well as eliminate agricultural damage.
- 254- In my estimation, the bear population is way too high and is having a negative impact on fawn survival. Warwoman has many fewer bears, but have many more deer and the habitat it very similar. My friends and I DO NOT want a dog season, but we would like see a spring bear season after turkey season closes. I would like to add that the Wildlife Techs do a great job with the food plots, and they are very passionate about their jobs. More well maintained plots would be great. I would like to see hogs extirpated from the north GA mountains. Over the past 5 years, I mainly hunt Chattahoochee during bow season only. Almost 60 bear sightings from the stand, only 3 deer sightings. This is over FIVE bow season.
- 257- Road maintenance on roads and more gates opened to go further back for the bears and pigs are pushing the deer back and to spread out more hunters and campers there's a lot of land that's been untouched for access is ROUGH and limited. Don't get me wrong I go for a challenge and seclusion and the Mts.
- 258- Too many hunters on Raven's Cliffs now! It used to be you would rarely see anyone, now it's hard to find places to hunt. Greatly thin coyote population everywhere. Continue planting food plots. Bush hog fields when in grasses.
- 261- Improving roads to get to the trailhead. I am also a graduate student and I drive a 2WD car. Sometimes the roads are really difficult to get through.
- 263- Completely remove doe days. Controlled burns with timber cuts will increase forage for many animals. Main roads are so improved that BMW's and Mercedes cars can be seen driving them during active hunts. I witnessed folks/family shooting rifles during open hint beside a wildlife opening. This should not be happening and wouldn't if roads were less improved. Most hunters utilize 4x4 vehicles to be able to access hunting areas. Making raods and areas more accessible to all drive animals further away. Hunting areas should be for hunting and camping areas for camping. One size does not fit all on Chattahoochee WMA. Most of what I'm writing here in my opinion is common sense. Game Warden presence, being seen is important. Also, game wardens have difficult jobs but shouldn't be construed as bad, should be seen on WMA as encouraging hunters and willing to be friendly. I would love to see Chattahoochee WMA thrive

again! Maybe quota hunts would help, I'm not sure but there is too many hunters to hame and there is not much to hunt. The Creeks are fished out due to way too much pressure and access. In the 70s we would catch fish and kill a deer too. Tmes and things here have changed alot and not much for the better and it's such a shame with such a beautiful are as we have. Close it down for 5 years, stock it, open back up with a great management plan especially for those of us who are local and use and contribute to it most and maybe, just maybe, it will get better...

- 266- Something needs to be done about the coyotes and hog population.
- 269- I, as much as anyone, love to see old, mature forest. But uncut, uncontrolled, old growth is hard to hunt deer in. It doesn't provide low, young browse for deer to eat and survive on. Managed cutting is not a part of National Forest planning. But, it is important for animal reproduction and sustainabilty. I would love to see steps put in place to help the NGA deer herd grow.
- 275- I mainly bear hunt and that seems good there. I see bears every year. Last year I saw 12 hogs in a pack off Bear Den Creek. I don't see a lot of deer but I hunt on the mountains pretty good ways from food plots. There are only 2 doe days on Chattahoochee National Forest with a shortened season! to improve you should need to decrease baiting; season; and doe days on private lands in these forests and WMA areas! Thank you for this survey!! Randall 706-968-5923
- 279- Keep nondisable persons off of handicap hunting only areas, and have a few more spots dedicated for handicap hunters only.
- 280- Limit non hunting traffic. Saw dirt bikes on WMA several times.
- 281- Maybe allow night hunting for coyotes and hogs if it is safe to do so.
- 282- More timber management. Too much old growth forest and not nearly enough fawning habitat. I'd like to see a reallocation of bear tags. Instead of 2 fall bears tags, I'd like to see a single fall tag and one June (spring) tag. Hogs outcompete deer for all mast resources. Hogs can totally consume acorns in an area in short order, and leave little mast for deer to eat.
- 287- You guys are do great. Keep up the good work.
- 288- The deer hunting on CWMA is awful. I hunted on the 2 most southern food plots a good bit. The plots where full of green Chickory which was good. I had a trail cam out and got a picture of a 120"+ buck. However in all my pictures and hunt only saw 2 does. A total of two does and 2 bucks coming into a roughly 3 acre food plot is pathetic. Just don't understand why there wasn't more deer. Everybody is saying that the hogs are the problem. I would agree. I would also say that there needs to be more timber cutting to make thickets. Open hardwoods are not going to hold deer and that is all CWMA is. Hogs need to be trapped on the WMA and the NF. They are a big problem. I am a bow hunter so it is important for me to see lots of deer with the possibility to shoot a 120"+ buck. CWMA is not a place for that. There is a good chance of shooting a bear.

289- cut more timber on the tops of Richard Russell parkway. on no acorn years ther is no deer up there, not only do I deer hunt it I coon hunt it. 8 years ago and back, up on Russell at night going in coon hunting you could see deer now you will see none and lots of bears. to many bear is the problem on this WMA and blue Ridge wma. if you dont believe me just put you out some camera there is no need for that many on 1 square mile. you need to run these WMA just like Dawson Forest. 4 on 1 side, and leave the gates open for small game hunters. the DnR need's to invest in the new chestnut trees and start planting them in the mt counties. watch the deer grow and big antlers. 1 tree equals as much food as a 2 acre food plot. if you are serious just get in youre truck and go up and ride around, what good plots there are no good anymore. thanks for your help.

290- This was the first year I hunted Chattahoochee WMA hard for deer. I only archery hunt. I've hunted turkeys the last 3 years and have seen/called in plenty of birds. I've seen 4 bears the last 3 years which is 4 more than mature bucks I have seen on this WMA. I have seen several does and immature bucks, but by gun season they are hard to get to. I would like to see an archery only section added to the WMA. North GA seems to be lacking in archery opportunities after gun season begins. Also, considering the lack of doe days on the WMA, maybe a 1 buck limit should be added to the regs. It seems that would increase shootable deer without lowering doe population and perhaps allow the WMA to be open longer during the season. Just a thought.

291- Create some sort of variation in land cover, CUT TIMBER!!

293- I only hunt Chattahoochee WMA for bear. I've been told by several people there aren't many deer there, however, every time I have hunted there I have seen deer. Not every hunt but at least one deer within a two deer period I hunt. I do not believe the population is great and I have several other places to kill deer for my freezer so I never try to kill a deer even when I see them on this WMA. If by chance I were to see a buck over about 120" then i would try to harvest him. Other than that I'd rather do what I can to see the population grow. If you can keep GON from writing articles about hunts on WMAs it just might help the population. As soon as an article in put in that magazine about how good the hunting is on certain WMA's it is so crowded you can't find a place to hunt. I love the support GON has for hunting and fishing in Georgia but in my personal opinion they are the worst thing that has happened to hunting and fishing in this state.

298- Tough question because deer hunting in North Georgia is plaing tough! I hunt deer secondarily to bear when I come to mountains each year. That being understood I can only suggest that it would be a good idea to plant food plots that specifically target nutritional needs of other game species so that the deer herd can be healthy and do a better job of reproducing at a higher rate. One other thing: allow 1 doe tag "REGARDLESS" of the date!

306- The staff @ Chattahoochee WMA really contributed positively to the hunting experience. They advised best locations on the WMA where to find deer and sightings of bear and wild hogs. There were more signs/tracks for bear and wild hogs, with fewer evidence of the deer population. Hunted the WMA for four days and only saw 2 deer, one doe and one buck for the entire trip. I was concerned about non hunting individuals on WMA during hunting days, hikers and bicyclists where on the roads and trails. There were not significant number of food plotsfor deer

or bear, the wild hogs did appear to consume all natural resources. My overall experience was positive, the nature was beautiful and staff friendly, easily available and helpful. I look forward to returning in 2019, but will most likely choose earlier dates in the season.

307- I would like Chattahoochee WMA to plant more food plots. They should also create more easy access places to hunt. Also control the predator population.

309- I live in Cobb County and mostly hunt Pine Log WMA. I have a cabin on Pink Mountain (Cleveland GA) and plan to hunt this area more (which includes your specific WMA)

CHESTATEE WMA

331-#16: not sure what they are supposed to do or how much on all, food plots seem same every year. Love Chestatee - have had 5 bear encounters in last 12 years but waiting oon the big one.

337- Timber cutting! We have to do something! Controlled burns! I have hunted the MTNS all of my life. Our deer herd is almost gone. Not talking about private land Forest Service. The TRUE MTNS! We have to do something before its too late! More food plots for when there is a acorn crop failure! The DNR "Game Management" doesn't do shit for our WMA's in the MTNS! What do they do? Why no food plots? No timber cutting? Close them all and make them open all deer season and cut the timber for clear cuts.

338- I have spent very little time targeting deer on Chestatee. I have targeted bear, hogs + turkeys. Of all the time I have spent hunting Chestatee WMA, I have seen several bear, many hogs and some turkey. I have never even seen a deer on the property. I know they are there, but see limited sign of them. I absolutely love the early rifle hunt for bear + hog. But I run into a lot of joy riders using the roads when the gates are open and many of the food plots are very close to the road. This changes the habits of the hogs as vehicles come driving in. It makes it difficult t pattern them. I know these plots were put in a long time ago, but I would like for this to be considered on future plot construction. Thanks

340- I've spent a lot of time on Blue Ridge and Coopers Creek the last few years. I feel like all of our mountain WMAs could benefit from select timber cuts and more controlled burns. I usually manage to take one or two mature bucks every year. However, if someone wants to see alot of deer the mountain WMAs are not the place for them to go. The main reason I've not hunted Chestatee recently is that I had places that I felt were better to hunt during the times Chestatee was open. I have checked in on Chestatee a couple of times in case I decided to go but did not actually hunt. The last animals I actually killed on Chestatee was when they were having the primitive weapons hnts which has been several years. One thing that has remained consistent since I began hunting the mountain WMAs in the 70s is that the deer population trends up or down dependent on the mast crop.

342- Open additional gates for fall access. Its extremely difficult to get deep in the mountains if you have to drag a buck up and down cliffs for a mile. If needed for additional questions call me at 678-697-5703 or email me at ceseabott@icloud.com

- 346- Improve food plots.
- 348- Deer populations seem very low. -improve planted food plots -take greater measures to reduce predator numbers -increase timber cutting more open areas -perhaps open an archery only area for a full season
- 354-#1 improve quality of food plots. Need more grass #2 allow hug huting with larger caliber weapons during small game season #3 replace one of the three firearm hunt with a primitive weapon hunt (same dates)
- 356- Open the WMA more days to deer/bear hunting, even if its only for archery hunting. Why reduce the # of days? The national forest is open more days -keep gates closed during hunts, people are driving everywhere parking on/immediately close to food plots, thus reducing game daylight movements -prohibit camping on or immediately adjacent to food plots
- 361- My recommendations! 1) open up hog hunting --24/7 all year -- I have seen hogs on this property and believe they have harmed the turkey population 2) Open up the deer hunting days to include both Saturday and Sunday -- many of the scheduled hunts are during the week and it is difficult for many to take off work 3) I have a truck camper and would love to be able to camp in other areas outside of the designated camping areas, maybe existing parking areas for example! Thank you for sending this out! John
- 362- I suspect that bear and coyotes are killing the deer. I primarily hunt bears at Chestatee, a buck or a hog would be a bonus.
- 369- When I first hunted on Chestatee (or any of the mountain WMAs) the food plots were great. Now they are only weed plots. There may be one or two good ones, but the rest are awful. Clearcuts or select timber cutting seemed to help deer population as well. Basically, if there are are no acorns in the mountains, the deer have very little to eat. I consider myself an old school hunter (thanks to my dad and advice from Herb McClure), I only want to harvest a mature buck. Have no problem letting smaller bucks walk. May or may not harvest a doe; only 1 for meat if I do. Would like to see Chestatee managed better to improve deer population and maturity. All the mountain WMAs need this. Seems to be forgotten by the WRD in Georgia. Only interested in middle and south Georgia. Properly managed, Chestatee could produce quality deer as it did in the past.
- 370- Keep food plots planted. Do something about the coyotes. Maybe do some control burn in areas.
- 372- I am from the mountain hunted all my life if the doesn't do something to provide better hunting here are not going to be any game left. We go up on lincense but no more help on WMA especially the food plots that needs to be address cut the roads off people needs to walk to hunt. The state needs to get its act together. It seems to be about money put it back in game. Thank you.
- 375- I am mainly a bowhunter for bear on Chestatee WMA. Deer are a secondary target while hunting the WMA. I definitely see prescribed burning as the most needed, immediate need for

the WMA. To me, there is plenty of creeks bottoms and some good undergrowth areas from the 2011 tornado impact + resulting timber harvest. I routinely get deer photos on my trail camera surveys I do for bear in June and July. I've gotten some above average mountain bucks on camera over the last 3 years, as well as some 350-400+ lbs bruiser bears. The bear population is healthy in big mature bear. Peak photo activity is 2nd week of June through 3rd weekend of July typically. The end of July is when the deer photo increase as the bear mating season comes to an end, from my 9 years of doing the camera surveys.

on both sides of the access road "Kellium Road" to Logan turnpike. This individual has pravatized this access road and set up private gates with his lock and signs saying "this is private no tresspassing" Now --there is no access to the greater half of your area #3. This area has many prostine creeks and camping areas that are not available to the public. There is a hiking trail "Logan turnpike" that is also no accessable because of this individual's action -- Yes I'm disgusted about this individuals action causing a good portion of Chestatee WMA not available to the public for hiking, hunting and nature!! Dave Patrak

380- I think more either-sex hunts and more over all hunts.

382- Thank you

388- I don't think many management practices will make much difference when it comes to deer numbers. I say this because it is mostly mountainous and the game population is dependent on the mast crop from year to year. You can not manage whether we have a good acorn on a regular basis. Food plots off-set low mast crops to a certain degree. When I started hunting you had to go to the mountains to have a chance of seeing deer or turkey, but over time "populations" reversed. Numbers are small in the mountains whether on management areas or general forest. I don't know if it would make a difference or not but I would start with suspending either sex hunts for a while.

392- Nothing additional

398- I would like to see more dates for firearm, antlerless deer. Unless it is part of a larger management plan.

COHUTTA WMA

414- I love Cohutta been hunting for years and camping I do go hunting but don't expect to kill as I have seen very animals bears/deers/hogs. I do not go miles off the road byt far enough. The more people that hunt push more game around. I usually do not hunt the early hunt and hear its good for bears. This is one of the most beautiful places in the state for me

418- Increase food plots. Allow cart/ATV removal of kills. Cohutta is one of our gems with great hiking opportunities too and I focus on bear hunting there. Too vertical for deer hunting.

426- By cracking down on people that break the law, as well as blocking roads.

428- Not sure if it made a real difference but there were more deer when there were DNR maitainted food plots and salt licks (70s-80s). We all know that this won't happen but I would eliminate all feral hogs and bears. Trivia: my family and I have killed a few deer on Cohutta from 2-12 points with an average age of 3.5 years starting in 1973.

429- IF they don't make some drastic changes to the deer population, I'll just quit hunting all together. I just becomes discouraging when you waste valuable time not seeing deer in areas that shoul hold deer and other wildlife.

431- Improvement of habitat food plots --white oak trees. There needs to be an extreme effort conducted to remove more bear from the WMA very heavily over populated. There needs to be clearings and good plots for the wilderness areas to improve the browse for deer. Maybe devide Cohutta into zones and draw (quota) for the heavier populated areas this past year I walked 3 logging roads and saw 10 people in less than 1 square mile in one case you could see 4 hunters from one ridge. Create restrictions on hikers bikers and maintenance on the 9 days of the hunt. I have had to deal with 50 screaming boy scouts illegally cutting down trees on two occasions on bald mountain (2016 2018). The bikers allowed access to all the roads during the winter where we are locked out. I would like to see the hunters who pay for this land to have the land free from all noise traffic for those 9 days. Introduce more deer to the area between the bear and coyotes they kill a heavy number of new borns each year. I own a cabin on potato patch mountain and I am up there every week FYI. PS Re-Introduce elk back to there original lands in the Cohutta wilderness.

435- As someone who has hunted Cohutta for many years I have see this management area change many times in may ways, during the early 70s there were a good number of quality bucks some hogs but few bears. When the bear population was allowed to grow out of control, the hogs multiplied, preditor populations grew along with doe hunting in the 70s and 80s. The deer population dropped considerably. My opinion the beawr kill has helped in the last 5 years, the burning a couple years ago helped deer movement and population last season. But I don't think this will be enought Cohutta is a rough hard WMA to hunt I think the deer hunt should be limited to quality bucks only for a few years along with some restocking of does, and maybe even a 3 year no deer hunting season to just kill bears and hogs. Maybe a year round coyote and hog hunting permit for a select number of hunters. Whatever the way to up deer heard population of Cohutta WMA. It needs to be done.

438-There are three things I would like to see the DNR do to improve habitat for all animals on the Cohutta WMA. 1. I would like to see the State begin logging the areas of the WMA that were previously logged in the 1980s and early 1990s. These areas have large stands of hemlocks, yellow and white pines that do not provide anything in the way of browse. They may provide cover at times but do to the large canopies, all the lower level browse is absent. Most of the areas still have good road systems tat would only need minor repair to be used for logging operations. The cutting would then provide browse and cover for whitetail deer and many other species liek grouse and turkey. Of course, this would need to be combined with burning and reseeding of desirable plants/trees. 2. Removal of either sex archery regulations and replaces with buck only and bear archery season. Though the harvest of does is low during archery season, I think it hurts

the population due to their already low numbers on the WMA. It would also be a great addition to extend buck only and bear archery season into November to allow more opportunity to harvest mature bucks and bears. 3. Addition of a managed hunt during mid-December, possibly primitive weapons, to take advantage of the often late rut that occurs on the WMA. In years past there was such a hunt held on the WMA and produced many quality bucks.

- 441- Improve the habitat. No cover most of the woods are big and open. I think you would almost have to repopulate the areas. I don't think there are enough deer there to keep up the population.
- 445- I did not hunt in 2018, due to personal reasons. Next year I'll be back at it.
- 447- I was taking this survey serious until the "identified" gender question. Probably not to many sissy liberals hunt Cohutta so that was just a dumb question. Anyways, I think antler restrictions on Cohutta would help. Make it quality buck only and get rid of more bears. They're everywhere up there...but, maybe the bears "identify" as deer? So hey, it may be just fine like this.
- 450- Timber cutting. More control burns. Gun hunt in mid December. Only more early bear hunt.
- 451- 1. Relocated deer from other high populated areas to the WMA. 2. Take care of the food plots, the ones I've seen of Cohutta are over grown and never get cut. 3. Hog control should be done by the hunters not the state. As hunters we love to be able to harvest the hogs, hogs are one of the reasons we try to hunt Cohutta. 4. Change the hunt dates and extend the days. 5. Do this survey on other WMAs (Johns Mtn) 6. Have a muzzle loading hunt 7. Keep archery season open longer on Cohutta (in between the gun hunts). 8. Often the roads on Cohutta are closed (gates) they need to stay open so we can scout way before season opens.
- 456- Although I only hunted two days on Cohutta I scouted for several days before the hunt. I scouted zone 3 for a whole weekend and walked 15.2 miles in one day. Did not find enough deer sign to even hunt. In zone #3. Went to zone #2 to check out places to I have hunted before walked 5.6 miles before I found some decent sign. Also were I killed a eight point the 1st day of the hunt. All your questions has to deal with the last 5 years. I don't think much has really changed the last 5 years. But, Cohutta was really great hunting back in the late 80s and middle to late 90s. I don't really know what would help Cohutta at this point except maybe restocking some deer and to cut some timber especially in zone #3. I would love to see a primitive weapons hunt (muzzleloader) hunt held on Cohutta from Dec 26th-? after the NF land closes that is outside of the WMAs. OR have a muzzleloader hunt 1st part of Nov. either one. Not many opportunity to muzzleloader only hunt in GA. I tend to scout more than I hunt and I done alot of scouting on Cohutta and did not find much sign. Like I said the only two things I think would help is restocking deer and timber cutting. Also they need to find someway to kill the white pines off they are taking the forest over.
- 458- Honestly, I go to the Cohutta to pig hunt and bear hunt. Due from going for lot years, and I see very little deer sign. I mainly bacpack in 2-5 miles. I see pigs almost every time I go and average 1 bear sighting every other trip. I'm hunting with a traditional bow so its hard to get

close enough for a shot. Sinve I have seen very little deer sign, I dont target deer in the Cohuttas. I'm curious to see how the recent fires affect the deer population. I would definitely hunt deer if I start seeing more sign. Maybe more food plots? or timber cutting?

460- Being that I am an archer I would like them to consider adding more archery opportunities close to and during the rut. We only have about 4-5 weeks only in the early season and nothing at all near or in the rut.

461- Plant food plots for the animals.

479- Clear cut. Control burns. Food plot. Hog control. Bear control. There isn't enough food sources for deer. Bears and hogs are eating everything before the deer have a chance.

488- I mainly hunt hog and bear when I hunt Cohutta WMA though I have killed a few deer there over the years. One of the things that would help is planting food plots, not for hunters to hunt over but to add food source on the mtn. Another would be a little more timber managment to give the game more browse when the acorn crop isn't so plentiful. To allow the use of game carts in the wilderness area, not that young anymore and it would be argued that theres not anyway a cart could do anymore damage to the trails as the horses do. Follow suit like some other WMAs and limit horse back and mtn bike riding, and hiking to after 10AM during hunting season I understand that its open land but it stings when you walk the distance some of us do to have a bunch of yahoos come by you yelling, screaming, 1st hour or so of daylight. Have a lot of friends who have quit hunting WMAs and public lands because they feel the land is catered more for the latter when hunters foot the bill and have for years. Kinda a smack in the face when you encounter forestry and they are clearing all the trailheads and yet the money allocated for food plots is a quick bushhogging. Or all the improvements on the horse trailer parking lots and the gated road beds that years ago were planted for deer and turkey are grown up now. Not trying to get on a soapbox just stating facts.

494- We love hunting Cohutta and all WMA

498- After hunting/scouting for 3-4 days we did not see a single deer. We did see hogs on several occasions but they were not open to harvest on the dates we were there. We did find a few food plots while there, and every single one had damage from the hogs. But due to limited dates to harvest them nothing we could do. We were mainly there in hopes of harvesting our first bear. The last evening, we spotted a sow with a single cub. Both appeared very healthy and well fed. But these were also the only bears we came across the whole time. Again we saw more hogs than anything, but couldn't legally harvest any. We can thanks the locals for good information on finding the bears. They seemed to share the same thoughts as we did. Too many hogs. They also advised that the local wardens were out mainly to write tickets for anything they could, and that if you actually harvested a bear they "would run you through the ringer." I'm all for following the rules and punishing those that don't. But I'm just there to enjoy the experience and hopefully legally harvest a nice deer or bear, not be treated like a criminal.

499- not DNR fault, wilderness area, not much they can do. Private land need more anterless days. Need to have 1 kill anything deer tag on any date during season excluding WMA.

- 503- More hunting opportunities for gun hunts or bow hunts that are earlier in the season.
- 504- I utilize Cohutta for bears. I never see deer when I'm glassing, but I encounter seat frequently.
- 509- Stock deer, have dog hunts for bear and hogs, and plant food plots controlled burns and manage it better.
- 511- I try to hunt the 2nd deer hunt at Cohutta every year and have been for almost 10 years. I have seen exactly 1 live deer while hunting. I consider killing a buck @ Cohutta to be one of the most difficult things to do, hunting in GA. I continue to hunt it because I love being up in the mountains. Although, I have seen only 1 deer, others that hunt with me have also seen deer. All the deer seen have been bucks, and most of them have been mature. It is huge property and there are plenty of places for a deer to get old.
- 512- Give more bear tags they are hurting food resources and treating the land up. Possibly have a down season for deer and just open Cohutta for bear, hog and turkey to help the deer population and food resources. Having a lot of coyote hunts could help as well with all the chicken houses around they are overpopulated as well.
- 513- Increase the black bear bag limit, open year round for killing predators (coyotes) and hogs.Re-open either sex dates during firearms season and limit bucks to 4 points or better on one side of 15" spread 16" main beam. Cohutta is known locally as a place that you can go hunt and have a high chance of killing a bear. I believe the black bear population has played a large roll in the decline of deer population in the last few years. I've lived in this area all my life, and the thing I'v noticed with Cohutta in my life are the numbers of deer seen decreasing and the number of bears seen increasing.
- 524- I hunted on Cohutta most of my life. Lost most of my mobilty 5 years ago. I am unable to hunt mountain land anymore. Loved hunting mountain but just not possible anymore.
- 527- STUPID!!! (with red arrow pointing to "identified gender" on other page)
- 529- Nothing was planted in the food plots on windly gap. They were cleared but never planted??? A food plot that is never planted is just a wildlife opening! This would impove hunting if they were planted.
- 530- Thanks for the survey. In my opinion the Cohutta WMA could benefit from more select and clear cut logging operations, as well as controlled burns. Anything to help ground nesting birds such as turkey and grouse would benefit the WMA. Restocking of whitetail deer could easily help deer populations. This could even be done using exisiting deer in Murray County. "Dalton Utility LAS Property" had a abundant deer population that could be trapped and relocated to the WMA. The black bear population and relocation of trouble bears into the Cohutta WMA in my opinion have had a direct impact on deer numbers and should not be continued.
- 537- The year that I hunted Cohutta, we were bow hunting primarily for bears. The area we hunted was not ideal for deer. I believe the bear and hog hunting in Cohutta is better than deer

hunting. I see hogs and bears regularly while driving around the mountain, but seeing a deer is rare.

538- 1st thank you for including me in on survey. I only hunt Cohutta WMA for bear and hog. For a bow hunting wilderness exsperience I kinda wish the clean up trail crews didn't have there day of clean up on opening day of hunting season-because that puts alot of people in the forest-thank you for having them, they are needed and the work they do. If I wasn't hunting I would help them.

542- Close the WMA down for a few years and quality buck only when it reopens. Have bear only hunts to help with the fawn reproduction.

544- From my brief experience, everything seemed pretty well on spot. I look forward to going back.

545- I am an exprerienced and avid hunter. I have killed several trophy bucks through the years. I have went entire hunting seasons without shooting a buck. I believe in controlling the doe/buck ratio so I have harvested a couple of does in certain seasons. I only shoot a buck if it is mature and considered a trophy. 8 points or more and 15 inch wide spread. I've also hunted on properties where the size limit was much bigger than this. I am perfectly aware that the Cohutta area doesn't produce huge bucks lie Kansas or Illinois, Ohio, etc. However, the deer population along with the mature bucks that have been harvested in Cohutta have slowly increased in the last few years. I think this is in part of 2 bears harvested instead of 1 like it was for so long. There are far too many bears in Cohutta!!! I see three bears to 1 deer. In my experienced opinion, if the predator population doesn't go do down considerably th deer hunting is going to stay poor. Thank you for this survey.

549- More cut over, food plots.

552- Allow ATV's on Cohuttato better accommodate an aging hunting group couple hours before daylight and at noon. Also one buck to have 4 points on one side like it is for state regs.

558- I feel that a area the size of Cohutta would be better if it was a trophy or quality buck area only. I feel that the deer would grow to an older age. A area of this size if the smaller/younger bucks are not killed, would be a big help to the area. The number of good bucks, that me and my hunting buddy are seeing is up good since the fire of 2016. I don't know if that has effected it, but we have saw at least 6 very good quality 8 points or better in the 2017 and 2018 season.

559- I hunt Cohutta frequently for turkey and deer hunt there because I love the country. I know when I deer hunt there, that my expectations will be to enjoy the mountains but probably won't kill a deer. In my opinion, the current hunting seasons don't align with the best times to deer hunt. The archery season and early October gun hunt are better for bear hunting. The early December hunt is timed correctly with the rut, but if there's bad weather or I'm unable to attend the dates, I definitely won't have an opportunity to kill a deer. The lack of proper habitat is the reason deer numbers are low there. They will never be as many deer as isn agricultural areas, on Cohutta, but with the continued increase in timber thinning and prescribe burning the habitat can improve, and benefits all species. I buy a npnresident license every year to hunt in Cohutta and

other WMAs in Northwest Georgia. I love the places I hunt in Georgia, and have great success with turkey hunting in Cohutta. I'll continue to deer hunt here, but hope that I will be able to be consistantly successful here in the future.

568- Full disclosure, I've hunted for about 8 years now, all on WMAs and I've never harvested a deer. I'm obviously not good at it. But I enjoy the outdoors and the hunt so its worth it whether I'm successful or not to me. I tell you that because in the survey I rate the area as having too few deer and it could just be that I don't see them because I'm not good. The Cohutta is my favorite place to camp and I've been camping there for 13 years and in all honesty I have never even seen a deer up there hiking, driving or hunting. I haven't seen a hog either, but I did see a bear once. The last two times I hunted there I saw some sign of very large deer which gives me hope but I can't believe I've never seen one up there. One good thing is there doesn't seem to be a lot of hunters up there and i like that for sure. The other WMAs I've been to like Coosawattee and Rich Mtn had a bunch running around but that might have just been luck, I think maybe the terrain in Cohutta is less hospitable to animals maybe, it's pretty steep. I would like to see a linked network of large wildlife openings that strech across with no automobile access to keep hunter #s down. I know Cohutta is classified wilderness s they probably can't do that but I think it would help make it a hunting paradise. Thanks!

570- Control bear and hogs (not enough food) source left for deer, so they are moving down in settlement for food, and have their offspring there and not going back to Mtn. Just my opinion.

571- My success rate and opinion on the quality of deer hunting is likely to vary from others. I averaged a 50% success rate over the last 10 year on a WMA where 2-4% is common. This is due to my familiarity with Cohutta and spending 100+ days per year on Cohutta deer/turkey hunting and trout fishing. Also know that for all practical purpose the only "Deer hunt" on Cohutta is the late Nov/early Dec. hunt. If weather is bad opportunity is decreased further. Killing a buck on Oct. hunt is like winning the lottery. This is due to very low densities and a very late rut (early Dec.). Bucks on Cohutta are not laying down sign on the Oct. hunt and most kills are incidental by bear hunters. That is 100,000 acres areas w/ 5 days of practical der hunter access. We need a longer late hunt, I suggest 10 days. Also, there in Chattahoochee NF adjacent to Cohutta I also hunt. Deer I kill of it could just as easily been killed on Cohutta. I don't see much difference in numbers on Cohutta (managed) and adjacent NF (not managed).

579- We would like to harvest deer for food but the only deer my spouse harvested was on private land in S GA. I did not realize DNR could do anything to increase deer population other than I suppose limited deer collection #s, age and deer etc. But upon writing this, I suppose this is obvious so I just never thought about it. I figured it was just however much resources was available...But management is intertwined with conservation. You can tell that its been a minute since I thought about hunting and conservation. However, in conclusion , 1 increase deer at Cohutta possibly 2 Continue to keep the WMA maintiained as it is 3 try to expand the WMA, is possible and never give it up to private 4 and continue to ensure it is a safe place for hunters.

580- Open the WMA to hogs and coyotes year round. Limit deer tags on WMA for some time and open more bear only hunts to allow deer population to rise and help manage the bear

population. Create more food plots and manage them for deer growth and development. Set antler restrictions during firearm hunts to allow young bucks to mature and reproduce. From speaking with older generation I have heard tales of the dder population and quality in the seventies and eighties and I wonder why the WMA no longer carries this quality and quantity as years pass.

- 582- Close it down for a few years, like back in the early 70s. Cut more timber, plant more food plots, keep bear and hog poulations low.
- 584- Too many bears and hogs and not enough food for the deer.
- 585- No comment. I think the GA DNR does a wonderful job for the state.
- 588- Bear and hog control would need to be controlled to increase food for deer. I understand folks want to hunt all of them but there is not enough food. It's a harsh climate, decreased # of hunters because there is no deer hunt. I wouldn't be opposed to open it only every other year to deer maybe and archery only for hog and bear when close to deer rifle.
- 589- Cohutta was an excellent area to hunt in the early nineties and before (Deer). I was able to see deer on every occasion basically. This 1993 blizzard seemed to have been detrimental to the deer population and it has never been the same. I feel wildlife openings and other habitat improvements may help. Bears are a major draw for hunters now. They seem to have replaced the deer. Is deer rectocking the answer? Cohutta is home to me but the effort just isn't worth the few deer that are left. I appreciate your efforts as survey for Cohutta is long over due.
- 593- There are too many bears! More bear sign than deer sign. Need better access for eldely and physically impaired. More food plots. Better road access to wilderness area. Fewer gated roads. Muzzleloader hunt would be nice
- 594- It would be great to see more wheelchair hunts for the disable.
- 601- By managing the deer herd better they are not do that anymore they manage the bear better then the deer. Need better food plots and better manageing on turkeys, the, bear are over populated on all our north GA WMA. Back when they managed the deer they were lots of deer then they went to stocking bear its went down every since, deer on our WMAs are just about a thing of the past. I remember went they killed 200 year on 6 day hunt now you can't even see one they need restocking deer. (But DNR just done care about our North GA WMAS!!). I'm 57 years old I never live long enough to see the Cohutta, Coopers Creek, Blue Ridge WMA like they once was because of poor management of our deer herd on WMAs. I believe if they would go to a 4 on one side or a 15" inch wide for horns probably 4 points on one side and stop all doe hunting even on archery season and work on overpopulated bear population and also a wild hog population. It might help and open a coyote and a bobcat season year round DNR use to trap bobcats to help the herd, Cohutta is a good WMA that can produce some trophy bucks I know I have seen it.
- 602- Open the WMA to archery between managed hunts. Limit times or eliminate horseback riding during managed hunt.

- 606- Move deer in are shut it down for while let it populate more food plots.
- 608- The primary reason I hunt Cohutta is for bear. Since 2011 I have only seen several deer but usually hunt higher elevations. Cedar Creek Turkey Hunting The reasons at Cedar Creek has been delayed to improve hunting on the WMA, but I fear it gives a unfair hunting opportunity to the private hunting camps located around Cedar Creek WMA. They will have 2 weeks to bait and hunt birds before the public has a chance to hunt. I feel the fair practice would be to delay hunting in the counties surrounding the WMA which would level the playing field. I met a hunter from one of the hunt camps who said the WMA acts as a sanctuary and showed me pictures of many beautiful deer that his club had harvested while the WMA was closed to the public. I feel this is happen with turkey.
- 613- This was my first year hunting Cohutta WMA, so I don't have much of an input. Thanks
- 616- I like the closed roads and timber harvest. I also like the challenge of Cohutta. I see a lot more animals there during the archery season. Also I think coyotes have a very small impact on deer up there. I only hunt public land and I think that the state does a reasonable job managing the wildlife on said land.
- 619- Not enough open road access on zone 3.
- 623- Did see 3 wild hogs, 1 bear all impossible to shoot with xbow = on the road.
- 624- The expanse and location of Cohutta keep me coming back whenever possible. The remoteness and relative lack of access make it desireable to me. I would enjoy some more cultivated food plots as this would help draw in/retain some deer population in years when white oak acorns aren't as plentiful (such as this season). I believe access to Cohutta is in a good place as too much easy access attracts more hunters and increases the potential for crowding. I enjoy the ability to wander for miles and see little to no other hunters. Also, if it hasn't been done already, the UGA deer lab logo should be made into a sticker.
- 625- Well I had rotator cuff repair this year so I had some time to pre hunt Cohutta. Went deep into sections. Saw a lot of hogs, bear and coyote. Very few deer. Also a lot of big timber rattlers. I spend about 3 weeks maybe 10 days prehunting and scouting.
- 626- Have more rifle days and doe or either sex days extend bear and special hog hunts. More days for firearms. More land to hunt, more youth hunts.
- 630- Do whatever you can to keep hunting primitive, I hate watching shows where an individual is sitting by a food plot waiting on a trained cow. That's not hunting, Cohutta definitely provides an awesome hunting experience.
- 631- Due to the rough terrain, I don't think much more could be done in making easier access. I mainly was targeting black bear when hunting Cohutta. The lack of game, and rough terrain makes this the most challenging WMA I've ever hunted. I think the most important thing the DNR could do to make Cohutta better, would be to make clearer maps that show exactly where ATVs are allowed. Being new to the WMA, the maps are so vage its hard to gather enough info to know I would be 100% legal to use an ATV. Also during the rifle hunts I've hunted, the

presence of game wardens were few. That being said my camp was spotlighted at night while eating dinner. Also while my wife stayed at camp, she noted alot of traffic she said "road hunting" during peak movement times.

633- Need to get rid of a lot of the predators a lot of bears coyotes, coons need to be gone. I think they eat a lof of the fawns and break up the turkey nest. You don't see many small deer with the does anymore and the turkey just are not out their anymore. I've hunted Cohutta for 40 plus years and theirs not the deer and turkeys like their use to be. When hunting or just riding through you just don't see the game like you use to. And this burning the woods in March April should not be it burns up the turkey nest and might harm the does that ready to drop fawns. And the grouse and Whooper Whills you don't see the, like you use too. What the fire don't get the coons and coyotes and bears get. Timber cutting would be best when we had some cutting their were alot of deer and turkeys out their of course we did not haveas many of bear either. I wouldn't care if their were no bearat all they ain't worth nothing. Need more roads open for us old people because we can't get to were we used to. I'm 73 years old and I can't get to were I use to with all the roads closed. It just during seasons for deer and turkey would be good. Just open them up.

644- I would love to see bow hunting season extend into cooler weather. I am fairly new to Cohutta and don't get to devote time like I would like but enjoy going bow season dates are so hot it is almost impossible to get far from the road to hunt before sweating too much to control scent.

646- I would like to know why did this survey on Cohutta WMA. Camron Burgess 4311 Flat Branch Rd Ellijay GA 30540

647- Could use some clear cuts and buck management. Deer hunting gets better each year.

649- I am by no means the best hunter in the woodshowever I am generally pretty successful when afield. I have 2 bucks in TN state registry and almost always fill my quota. With that being said, I have not seen a live deer anywhere on Cohutta. The only deer I have seen was helping a stranger I met, drag his deer out and over buckey mtn it was about a 3 year old 8 pt. Your bear hunting is good but your license is overpriced for out-of-state hunters such as myself. I do however enjoy Cohutta the horse riding is excellent for me and my companion when we are bear hunting deep in the WMA. I hope this helps someone else. Just to clarify, I believe the deer population in Cohutta is extremely poor otherwise I would have at least seen a deer crossing the road or jumping it off a bed etc.

654-#1 close deer hunts down for a couple of years to let the deer population build back up #2 Do some bear/hog only hunts #3 Do more select timber cutting outside the wilderness area.

655- I love Cohutta WMA it's home to me. There needs to be more hog and bear killed and also more food plots for deer.

656- I love hunting Cohutta WMA. It's not the place to go kill a deer every year, but allm my best bucks have come from this WMA over years. I saw a beautiful buck this year on the second hunt, however, it smelled me before I was able to get a shot at it, and generally you don't get more than on opportunity on this WMA. I agree with most folks that there are less deer on this

WMAs and 1 national forest also and I don't think any of those areas hold as many deer as they did 20+ years ago. I hear lots of griping from other hunters about the lack of timber cutting, bears killing fawns, hogs eating all the acorns, coyotes etc. etc. however, my two cents is doedays, there are more does being killed by people than neccessary, we can't control acorn production, bears killing fawns, etc. but we could control the amount killed by people. Having different doe days on private lands doesn't help, very few deer living on public land live more than a couple hours walk from private and they move back and forth between the two regularly, especially on bad acorn years lie this one and corn piles laying all over private ground!!! First world problems I know, however I habe the means to hunt other areas of the state where there are more deer but I enjoythe beauty, solitude, and tradition of hunting in the mountain areas of the state and probably won't change my ways. The limited hunting time on WMAs as opposed to National Forest land and private gives more time for bucks to get older and increase the opportunity to hunt and possible see mature deer, so I am thankful for the opportunities provided by the state.

- 657- More hogs hunting days/ year round. Work on feed lots it has been years. One doe per hunt. Sign in made more easy on BR side.
- 662- Better food plots. Limit number of deer taken with a gun. Only take mature bucks. 4 points or better or 15" rule.
- 663- The wilderness area designation restricts G+F from a lot of management practices. The mature forest climax forests does not lend itself to a plentiful supply of deer food year round.
- 664- Cohutta is an outstanding place to kill a nice buck, but they are few and far between. It needs to be stocked and managed. The bear and coyote have really hurt the population. The control burn is devistating to the mountains. Unlike South GA when you burn the mountains it takes years to recover. Just take a trip up Mill Creek Road and you will see what I mean. Its simple control the bears, manage the food plots, stop burning everything and (RE STOCK). Thank you for your concern. I have, along with my family hunted Cohutta all my life. I have seen it at its peak and where it is today. You can thank the man who years ago who traded all the turkeys for all them bear. It to this day, (30 years) later has not recovered. The old timers know what I am talking about. Thanks agin, see what you can do for Johns Mtn. The coyote has almost wiped out the deer there also.
- 667- Have more gun hunts for buck only deer hunting or add days to the two annual hunts. Also, add a doe day to one of the hunts, there has not been a day in a long time. The doe harvest would not be very with just one day of either sex hunting. Also have a buck only primitive weapons hunt and if neccessary make it a quota hunt to keep the kill from being too big and to limit the number of hunters. Have a longer archery season to be open during the statewide gun season.
- 675- Change hunt dates later in the year. Do more to improve food plots. Add more camping areas. At camp sights keep toilets cleaner. Have some weekend hunts after last rifle hunt for deer. Stop people from setting tents and campers at trail heads. Last few years the Dec hunt is always bad weather theres 2 to 3 days can't hunt for rain and fog. Do more clear cutting it helps

natural food sources. The hunt in Dec needs to be a week or 2 later bucks are rutting better. I thing the Forestry should take it over to were people can hunt it during open deer season.

676- Cut timber and burn. 80% of game is on 20% of the property. Nothing does well where the Hemlocks are nothing to eat. Hardwood forest is too old - cut timber. I remember when 20+ and 50+ acre tracts were cut. Game has slowly disappeared since then. Thanks for letting me voice my opinion.

677- Only hunted bear not deer.

686- As much as I enjoy the access and opportunity to hunt Cohutta WMA, I would love to see higher deer populations. My only thoughts would be to possibly reduce the number of days, and harvest limit for the area.

687- I was raised hunting Cohutta. Its been a family tradition for 40+ years. My dad has hunted Cohutta 40+ years and actually killed his very first deer every on Cohutta on November 4, 1978. My biggest buck ever came from Cohutta and so has my dad and uncles, plus many other family members. We have had tremendouse success over the years, but is slowly going away. The bear population is CRAZY now. Can never have a hunt without seeing a bear. Bears cause so much damage to acorn trees, ripping a tearing out every timb in the tree, not leaving no food for deer. Not much you can do besides kill them more to keep the population under control. I think they keep the deer ran off. On a better note, the DNR kept up with the wildlife openings bu mowing them and planting some. First time in years they have done something. They have had prescribed burn signs up since 2013, have they done it? NO. They only focus on the low side, south-west side, where its more popular and flat. The bad wildfire a few years ago was devastating, but the best thing that could've happened on our side of the mountain. I'd love to see timber cutting and burning. Very benificial. The last tree cut our side was 1981. After the cut timber grew up in briars, Dad and uncle had great hunting in it because of bedding. Great hiding area for animals. I swear we never see any DNR guys ever up there. It is a large place, but I want to see it get better and not worse. We will always go to Cohutta though.

688- The southern end of the WMA has too much mature hardwoods. Selective logging and control burns is more aras will help.

692- Cut timber - use sell money for roads, campgrounds, big food plots. Controlled burn on majority of WMA, yearly rotation. Dog hunt for hogs during small gun season, thin herd. Coyote trapping. Rotate every 3 years of NO "deer" hunts between Cohutta, Rich Mtn, Blue Ridge and/or Coopers Creek WMAs. Deer hunt 2 years than no deer hunt on 3rd year. Rotate between all mountain WMAs so deer can rebound and get mature. Please post the outcome of any suggestions that you plan on addressing on DNR website, newsletter or mail.

693- #16 tree cutting: evergreen tree only not enough wild hog or bear season. Predator hunt year around. #7 decrease in deer herd due to wild hog, bear, coyote growth.

694- I have lived next to Cohutta WMA all my life and now work for Murray Co. Sheriff Dept. so I know all the rangers very well. They help me a lot with info as I do them! Even before the Cohutta WMA opened in 1973 my family would spend a lot of time up there, even before part of

it became wilderness. My father and G-fathers taught me names of most all the area, I wish I had paid more attention to them then!! Back before the big snow of 1993 the quality of deer was great and to see a bear or hog was slim. But after the 1st bear hunt which had thousands of hunter show up and then the snow storm of 93 the quality and number of deer declined but then the # of bears and hogs have increased. Now I hunt for hogs every chance I get even during the small game season. I see a lot of bears during archery season but really only hunt trophy bucks which I got two in GONs 100+ section of their magazine. For the last 5 years I have seen some trophy bucks on Cohutta but either missed them or didn't take a bad shot. I have some of my buddies which have taken some quality bucks in the last 5 years. The best thing I could advise you that would help Cohutta in your control would be food plots!! Food is the key to the quality of deer on Cohutta, 2nd maybe control burns. When the acorn crop is poor so is the deer hunting!!

696- I think creating easier access for hunters could help our hunter interest and harvest #s. The WMA is well known but often overlooked by many because of its rugged terrain. A lot of people don't want to put in the leg work to get a harvest. The ruggedness of Cohutta is also a pro because with the amount of acreage the deer have a much greater chance of reaching maturity. Anybody that wanted to put in the effort could increase their chance at harvesting a trophy buck. There is usually a handful of trophy bucks taken off the WMA each year. I think the food plots could use some more attention, there usually isn't a lot of sign around them, which could partially be caused from hunter pressure. Controlled burning would be beneficiary to all wildlife I think. Fresh undergrowth would provide greater forage for all wildlife. After the wildlife around the Jacks River area of the WMA, I expect to see much more wildlife in the area. Especially the turkey activity. Hogs and bears on the WMA are one of Cohutta's "attractions" so to speak. Anybody has a good chance at harvesting one of them. My family has lived in the area and hunted Cohutta for generations. The rough terrain is oftern seen as a downfall but its just the opposite, it adds to the experience and the hunt. The cast acreage is fantastic, there have been deer born and live to maturity and die of natural causes. All their life and never know what a human is. That's amazing in itself. Cohutta WMA is north GA's "last frontier", and I love it for that.

697- I have been hunting Cohutta and the other mountain WMAs for many years I've seen the hunting decline and certain populations of animals becoming scarce. Much of the forest is stagnant and predator populations are very high. Bears, coyotes, and bobcats are wreaking havoc on the deer population and wild hogs are eating limited food sources. However, with some of the timber harvest on west cowpen and the fire in the wilderness area, I've seen increased sign in those areas. I think that keeping the timber harvest going is a great thing along with controlled burning.

700- More access

701- I primarily hunt Cohutta during archery season because of seclusion and multiple opportunities. Bear, deer, hog. I have covered a lot of ground in this WMA and there are some good deer on the WMA but, in my experience the Rish to Reward isn't there. So I don't devote as much time during rifle season. I hunted only in archery season for 2018 and in 2017 I hunted the

late season date with rifle> I will continue to hunt this WMA and contribute to my share of the conservation.

703- I've hunting Cohutta for a long time and the deer hunting used to be really good but starting about 15 years ago the deer have been getting fewer and fewer every year and the bears and coyotes are getting more and more every year. There is still some good quality deer -bucks on Cohutta but a lot fewer than they used to be and are getting very hard to find. I personal believe the big increase in bears and coyotes are the problem especially during fawning seasons, the poor fawns have a hard time surviving because the bear and coyotes have learn to target them this time of year and thats why the deer numbers are so low up there but what bucks do survive can grow some very nice racks, the genetics are there they just need to get some age of them and its just hard to get past fawn stage. The Cohutta and really all Mtn. WMAs are so acorn dependent on a bad mast crop year the game has a hard time, very few cut over areas and few food plots there just no food for them, years ago they did quite a bit of timber harvest but of the last several years hardly any has been cut, I believe on count of the tree huggers stopping it. So I believe the best way to improve Cohutta is to control the bear and coyote numbers and do more timber harvest along with no do harvest it can come back, I love hunting there especially archery for the bears.

705- Haven't hunted that area long enoph to give you a answer on that.

706- Hey my name is Jason Hawkins I think the bear has did a number of the deer on Cohutta. I think if they will make better food plots and plant summer food plots and winter food plots and kill hogs and bears the deer will starting to come back. I rember back in the 80s and 90s was some good deer killed 130s to 170s.

708- Best of luck to you in your studies. Today Cohutta is not the Cohutta of the 70s and 80s - none of the moutain WMAs are. It has all fallen away due to no timber harvesting and DNR is tied to the Forest Service. 2001 was last year a member of I hunted with killed a deer at Cohutta.

718- It would be hard to change much on Cohutta with the wilderness being where it is, but more controlled burns and food plots that are maintained would be a good start. Some of the most beatiful scenery in Georgia just not many deer. Bear are abundant and could be the reason for decline in deer heard. I hunt the front side (Eton) side of the WMA and see bear regularly but few deer. Turkey are hit and miss where I hunt but no fun to chase.

723- Actually plant food plots for deer, turkey, bear and pigs instead of planting for migratory birds or not at all...my personal opinion is that a bird can fly to find food a lot easier than a deer, bear and pigs can travel to eat!!! A few more roads for access wouldn't hurt neither

724- In the 80s or so they were several deer. I just didn't have the knowledge to kill them. Saw several when I hunted with my uncles. They killed several. Then the doe deys set in and hadnt been the same since.

729- Deer just love farm land its easy food. The mountains is a tough life on them, not saying they don't live there. They just seem to attract to large farms = free food.

733- I grew up hunting Cohutta back in the 80s and early 90s. Back then they were 1200 - 1500 hunters, I have seen some good quality deer including one on my wall. The quality bucks are there just far apart and deep. To improve the area they need to continue control burning, plant food plots and provide better access during hunting season. Not sure why they closed Rocky Flats ATV but there some good hunting that is very limited to get to. Also they closed road off of Mill Creek Area that I wish would be open during archery and not just open for the gun hunts. Good luck with research and degree.

748- I understand that timber harvest, burning etc. is forbidden on the wilderness area, but the deer population will never get better if we don't see more of it in the rest of the WMA. No offense to the state biologist (Adam Hammond) that performed the bear population surveys, but I (nor anyone else that consistently hunts Cohutta) don't believe that the # of bears is the same as previous years. We're seeing more bears now than any other time in the last 20 year, and there's no debating their impact on the deer population. Considering not everyone tags out on bears in the fall in hopes of killing a buck, I would love to see a spring bear season in GA, with the same regulations regarding cubs and sows. Long story short, Cohutta desperately needs more timber harvest, burning after the harvest, and more bears killed. I'd also love to see it opened for hogs more often. Nobody wants the DNR to conduct bear harvests to lower population like they do with deer periodically. Allow a spring season, and/or 3 annual tags (3 total including spring and fall season) to promote more hunting opportunities while helping the deer by reducing bear numbers. Open hogs either year round, or have more hog specific hunts. Thanks so much for hearing the voice of us mountain hunters! We need change, but unfortunately the powers that be have let it go too far for too long.

756- Maybe 100 hunters for a few years. We need to get the population of deer up. Or 4 on one side with absolutely no does taken. No either sex days for at least 3 years. And when caught poaching they need to be fined HEAVY.

759- The big fire helped deer hunting where it burned. I think deer moved to this area due to better browse. Controlled burns on other areas would help as would timber cutting. I realize this is not an option on the primitive area on ir national forest, but wildlife officials should communicate for the need for the to lawmakers. Hunters need to also do this. I would also like to see the WMA adn all others open to coyote trappers for January - July. Increase the bear harvest all over North GA.

760- If you guys could make the weather better for me next time I come...Texas is a long way away! But seriously - very much enjoyed my time despite the weather. Go Dawgs! Give 'em hell Warnell!

766- Whatever it takes to get the deer and turkey populations up, timbe cutting, controlled burns, there is not enough mast that occurs naturally to sustain the wildlife. It has to be managed and not just left to become a wasteland. The Cohuttas are too valuable to not me managed better.

771- I didn't have any luck, but seems to be a great area for hunting!

782- Keep bow hunting open all season on ALL WMAs

787- I feel that due to the number (high) of bears within Cohutta limit the amount of deer sustainability. I also believe that if you were to restrict taking does off the mountain, deer numbers would rise. I am also an avid turkey hunter. This past spring season (2018), I saw a total of 13 bears prior to (one day) 1 PM. If increasing bear hunts (days) I feel this could help both turkey and deer populations. As far as hogs, whenever the acorns begin to drop I see an increase in hog sign and decrease in deer sign, mainly because the hogs tend to get and pick up any fallen acorns prior to deer. Myself and those whom I hunt with usually will harvest a hog when given the opportunity. Although plenty of hogs are taken each year I feel we need more taken off because of their destruction, reproductive rates, and their need to use resources others are not receiving to sustain healthy populations.

789- More days open for hunts

795- Doe days and more days.

799- I primarily hunt Cohutta for bear and hog, I have not killed either one but I have seen plenty. I come to camp with friends and hunt for a week at a time. This past year I saw more bears, deer and hogs than all other years combined. I like the rough and far away you can get on the mountains. Thenk you for allowing us to some to Georgia and hunt.

803- It would be nice to have a few more firearms hunt days in late December or early January. The area I have hunted (Area 1) appears to have very little deer sign visible. I have hiked a lot of the area during turkey season and have seen very few deer.

805- I have hunted Cohutta WMA for only two years. In that time I have hunted it only two days. There was an extremely high turn out of hunters on both days. The terrain is steep, rough and not for a new hunter like myself. I spent the majority of my time hunting for signs of deer, which i was unsuccessful at, and then climbing my way back out. In my short time there I saw zero deer and other wildlife for that matter. I never heard a shot while I was there. At the other WMAs I hunt I always hear shots throughout the hunts. I wonder if CWD or fire had anything to do with the lack of successful hunts on Cohutta WMA.

806- More days available to hunt in the Cohutta.

813- Would be nice to have all the gates opened up to the closed roads, as some of the best hunting spots are miles down these closed roads, making it very difficult to traverse up and down the steep roads and inclines. Also makes it very difficult to retrieve your game after a kill has been made. Have actually passed on animals due to the fact of knowing you had to drag for such a substantial distance, and also drag up the inclines. They started to work on clearing a couple of the greenfields close to where we hunt, then guess just stopped and actually left the bulldozer out in the woods. Fields are very thick w/ briars and small trees, actually making it impossible to hunt in those areas. Deer populations are very low I believe where we hunt. Have seen a few scrubbed trees and one or two scrapes. Personally I have never seeen a deer on the hoof up @ Cohutta WMA, but did help drag on tha my brother in law had harvested. I mainly come up to Cohutta to bear hunt, but over past few years, bears sightings in our area have declined. Have considered many times of not returning, but come back, mainly to get away and spend some time

with my father in law and other family members and friends. Good luck with your studies! Thanks you for this opportunity.

COOPERS CREEK WMA

834- There is almost no early successional forest on Coopers Creek because there is no measurable timber cutting. When I was young Coopers Creek had clear cuts and was loaded with deer and grouse. The forest has given way to non scientific environmental groups whos main goal is to eliminate man from being in the forest. Killing doe's even on private land now makes no sense. Furthermore, there is no common sense management of predators and hogs, you can carry a muzzeloader during small game and kill hogs but what happens if you shoot one hi and 35 more hogs runs right by you. I have spoken to game wardens why they won't let us hunt these hogs with modern rifles during small game. They say they're afraid hunters would kill deer also. But whose going to try and kill deer when theyre are few especially when you've made it legal to bait. Then in folks front yards. These hogs need to be thinned out and we have too many coyotes and bears. We must start cutting trees so deer and grouse have sustainable habitat. The food plots are largely neglected or poorly planted for some reason we need more food plots that are well maintained.

835- Didnt even hunt there in 2018 season, First time in 30 yrs we missed those hunts, no deer, but bigger mature Bucks – Coopers Creek has been a tradion since the 1980s, my dad hunter there and my son now 20 has hunter there since 1999 in pull ups. Early 2000 game was still there, 2012 my son killed several bucks and a bear, few does but seeing deer is few and far between, need more timber cut, in the 1990s with DNR is full swing deer were abundant Kent Katameir biologist at that time worked hard on the population, lots of timber cut, food plots put in.

I killed lots of bucks every year in the ninetys, got several mounted in 95 and 99, hunting the mountains has been m passion since the 70s has a boy, my dad loved those mtn's, Chestatee WMA was a his place and at that time Ranger Key was manager and lots of hunters, the country was truly wild at that time.

Its not just Coopers Creek all north GA WMAs are in decline, OK Blue Ridge WMA on the south side of the A.T. is the best I know and nobody hunts there nobody wants to hunt the mtn's too much work now. But few of us love those hills, Frank Manning is a Friend of mine, If he had the resources he could do so much for Coopers and Chestatee WMA – DNR cut backs have hurt our northern herd. I can hunt all wk never see a Ranger, back in the day you could be in your stand and see one. Thanks for doing what you can. Call me 678-316-9073

840- We need more days. The ability to hunt after Christmas the last two years was great. There's a lot of land on Coopers Creek but very limited time to hunt it.

841- Deer and other game need food, by clearcuts, more food plots etc. Deer were somewhat plentiful in the 1960s and 1970s. Do we need to restock some more deer? Close area for a couple of years?

846- I have gotten into bow hunting; so I would Like to see extra days for bow hunting; Later in season, because it would give you more time in the woods to maybe see or kill a quality buck. Seems Like there's not enough time to hunt always scouting. To help with quality of bucks it should be 4 pts or more on one side; unless you are under 16 yrs or over 65 yrs old; and/or handicap.

849- Main thing is cut timber Deer has to Have something to browse on and the sale of timber will help fix roads some you can not travel on with out four wheel drive most of the food plots need Replanting and keep up year after year and plan something Deer will like and made for Deer I have hunted Cooper Creek for about 30 years years ago I could see one to five deer a day Me and some friend would Bow, Gun, Muzzleload Hunt every year and killed Deer. I would kill two or three a year Now I can hunt three or four days and Not even see a Deer. they quit managing of deer years ago. I said twenty years that Cooper Creek is going Just like Cohutta Now I still go to Cooper But my friends will not go because we see nothing. Go Back and check records see how many they killed years ago and how many Now Deer Numbers went down when they quit cutting timber, managing Let food plots go. Deer have to eat they will go where food is plant it they will come first thing cut timber, Plant food plots, get rid of preditors give it Fiver years and we will see a difference.

850- I've been up to Coopers since I was about 8 yrs old. My family loves the place and please note that I don't always get a chance to go there and deer hunt. I do however go there to turkey hunt. Coopers has an outstanding turkey flock that is a challenge to hunt. I will be up shortly for spring season. Thanks! Hope this helps

854- Keep the late Oct./early Nov. BP/PW hunt! Try using some quota hunts. Provide greater detail on harvest statistics/trends. Support more doe harvest. e.g.- 4 day either-sex hunt.

858- I think we need to cut out some of the doe days and improve our food plots. We also need to increase predator control. Anything we can do to increase deer population on our WMA's will help. When I first started hunting Coopers Creek there were a lot more deer and a lot more deer sign. Now it seems all of the deer are not back in the Mountains any more, they are all on private land that you can't even hunt. In my opinion the deer herds have decreased on our WMA's and the U.S. Forest Service lands. I also think it would only be fair if hikers and bicyclers had to buy management stamps just like hunters do to be able to use their trails etc. Thank you for giving me the chance to voice my opinion and please understand I am not trying to be smart or arrogant but this is just my opinion on some ideas to consider on our WMAs as well as US Forest Service lands. Thanks again.

859- Thank you for considering me for the survey. I use to hunt WMA's regularly years ago until too many either sex hunts with rifle and muzzleloader either sex hunts declined the deer herds drastically. There are more deer on private lands and Chattahoochee lands than on the WMA's. I know everyone struggles for funds But we don't have enough DNR officers for WMA's. In early 70's and 80's there were two officers for every WMA now your're lucky to see one. I remember Cooper Creek closed five years once and there were some good deer killed then and you could

see some does come thru. I appreciate your efforts and concern. – Georgia sportsman, Robert W. Loudermilk, 80 Ridge Top Circle, Blue Ridge, Georgia, 30513

862- Not only on Coopers, But all Mountain WMA's. Food plots are very Important on year's when crop's are low, no acorn's, even soft fruits mean's a bad year for all wildlife, food plot's are very important. This past season I've seen deer move long distances to pastures on grassy places, we can make our plot's on area's better. Has been done in the past. Coopers has and still does have good genetics. Taken and seen good bucks taken on area. Took my first deer on Cooper's Area when it had to have 3 points on one side. Can't remember late 70's or early 80's. Hope to take more. My son has hunter Cooper's with me and taken his first 8 point with Bow. When he was 13. Now 34. Great Area.

864- We hunt every year primarily on the Adult Child hunt since my son was 9. We hunt every year with friends. Over the past year nobody in our hunting party has harvested a deer. The coyotes, hogs and bear are plentiful The deer need to be managed better. We will continue to go on our annual trip. Hopes for the future better game management and also food plots should be better managed. Thank you for your time.

866- Manage for wildlife rather than for scenery. We need to focus more on timber harvesting as All species of wildlife benefit from both thinning and early growth timber stands. Cut more trees!!! Controlled burns being necessary as well for proper health. There are simply too many areas that are large stands of nothing except poplar, chestnut oak, mountain laurel and Rhododendron which are completely useless for wildlife on such a large scale. Burn More Forest!!! Food plots go largely unattended most of the year. These openings need proper care – with sustainable forage for deer. There's no reason for an opening to grow wild with briar and broomstraw because we don't mow regularly or plant easily maintained forage. Take proper care of the openings we have and PLANT MORE. As you are aware, most of the deer congregate around private lands for one reason – HABITAT. It's no secret. We need better habitat. More clear cuts for fawn recruitment, more select cut for diversity, more burns for understory, more openings for forage and thus edges for feeding. AGAIN, its no secret. STOP MANAGING for "Looks" and manage with scientifically proven deer management tactics. Next, stop permitting the taking of does until population rebounds. I frequently see does I can kill – But I won't b/c I will not be a part of bad management. We lack the sustainability of ANY doe harvest – except for areas that border private lands. Take more bears! Too much fawn predation – perhaps open a spring bear season to help – OR – leave bear season open throughout deer season – EVEN on closed dates for deer. It's not like there are any deer left to poach and most of us want to help the population anyway. Allow the summer harevest of hogs/early bear season when its easier to kill them in the food plot openings. Less hogs, less Bear – More Deer, more balance. Stop closing the WMA when its easiest to manage for predators and nuisance species. As you can see, I'm passionate, but that's because I remember "the good days" and I know what Cooper's Creek CAN BE. Thanks for your help.

869- I did not hunt CC WMA in '18, but I did hunt the adjacent Chattahoochee national forest, because the hunting dates of the CC WMA did not work with my schedule.

872- Absolutely no does should be taken on Coopers Creek. Need to build more food plots and sustain the upkeep of them. (Not enough food source to keep deer population growing.) If acorn crop is poor, deer have no food source note: Have hunted two full seasons and haven't even seen a deer. Regulate bear and hog numbers. Seems to be more of them than deer. P.S. (might be best to close completely for two years to restock deer.) Sincerely, Steve M. Christopher

874- Plant better food plot, cut doe day out, one week long deer hunt, 1 rifle one muzzle load week

876- Improve the wildlife openings. Only 1 of the 6 areas in the section I hunt, is actually improved/updated annually with quality nutrients. The others appear to be only bush hogged once per year. Cost is always the excuse given. I suggest at a minimum, rotate to each of the the other openings and give them an updated/improved plantings.

880- 1. Get rid of hogs. Dog hunt, trap, night hunt etc. 2. Reduce bears 3. Food plots – plant and maintain 4. Control burn 5. Cut timber 6. Close roads in off season 7. Manage for mature bucks 8. Patrol for poachers 9. Predator control – coyotes

882- First off, thank you for the survey as I feel this was very necessary. Overall, I think Cooper's Creek compared to the rest of the mountain WMA's is about the same. They are all on the downhill spiral. I am no scientist, but I do know how to hunt and I believe that the main cause of the decline is no timber management, which in turn hurts food availability. I have hunter Cooper's Creek at least once a year (majority of the time multiple days) and in 17 years I have shot 3 does and 2 bucks! I have killed more hunting private land in the mountains in two years than the previous 17? Something is wrong. I have never seen a timber crew in there. Most of your deer herd has went to the private settlements because the big mountain can no longer sustain the herd. In the 70s, they shut Cohutta WMA down and the quality and quantity of deer increased significantly, they cut timber during this time too. I think the mountain WMAs should be closer again, atlernating years to make people happy so populations could increase. Timber management is a must, and NO DOE DAYS on mountain WMAs. I have seen 3 deer in three years at Cooper's. This is pathetic, especially when in the 70s/80s/90s they would check out 200+ deer yearly. DNR won't listen though and the WMA's continue to decline if nothing is done. Hunter are now also required to buy WMA stamps yearly, where is that money going? The interest in the outdoors is continuing to decline; maybe these surveys will open some eyes!

883- Need more timber cutting for food plots and wildlife habitat. Controlled burning is a very good thing for all types of wildlife everything love's the new growth that follow's controlled burning. The deer herd on Cooper Creek WMA has moved down to open land and pasturer's for a food source, because the lack of food in wildlife plots and the bad years of mash crop from hardwoods. So I think it is very important to plant other crops besides grass and clover in the plots that Coopers Creek WMA has. I would like to be informed on how your survey goes. cthomas@tsemc.net

893- The department of natural resources can improve our deer hunting in alot of ways. Surveys and open polls like this one. Giving us the hunters an opportunity to provide information on what we see and observe while hunting Coopers Creek WMA. I believe if wildlife officials coud

understand what they had and have now in a management area, some changed could be made. Gradual decrease of species and diversity of them. Squirrels, hog, bear and turkey's. Compared to check in sheets and my observations 10 years ago. These animals are all reliant primarily on one food source; acorns to survive throught the year and winter seasons. The acres and acreing land/trees have to produce enough for all of the species among themselves, and to drop enough to reproduce. Unfortunately, this hasn't been able to happen proficently. Leaving deer with not much to eat in their normal diet except browse, grass, clovers. Forcing them to relocate to other areas where food is sufficient. Along with the overpopulation of wildhog pushing them out eating the few acrons available. With food plots overgrown or insufficient deer move to wherever the most consistent food and other poputations of deer are. I have seen this happen with gray squirrels in the specified areas. I have sat in the wood's for a full 11hrs day at Coopers Creek and never seen, heard or was seen by a squirrel. Over the span of an entire weekend counting 3. Along with the new baiting in effect lands adjocent and parallel with the WMA's are pulling deer off of the WMA lands, on to private land.

894- I think it would be helpful to have more DNR Enforcement patrolling the WMA. ATVs are riding beyond closed-off gates and destroying the food plots. It would also help control poaching. Need an area manager real bad. Better maintenance of foot plots/wildlife openings. They have totally stopped all planting of food plots. I would like to see more controlled burns on the WMA. It would help eliminate the white pine trees that seem to be taking over the WMA. Increase timber thinning to allow browse for deer nesting for turkeys. Reduce/eliminate either sex days.

895- I feel like there should be no doe days. The hunts should be limited to primitive weapons hunts the second Wednesday thru Saturday in November. The rifle hunt should be first Wednesday thru Saturday in December. Buck and Bear and Hog only on both hunts. Archery should also be limited to buck, bear, hog only WMA boundaries should be monitored for ATV + UTV use coming up from primitive property.

930- Food plots are very important!!! Back 10 year or 20 years ago hunting was very good. The years there is no acorns these deer starve to death. Years ago I would only hunt Coopers Creek because it was awesome. I stopped by the check in in station this year and told them if they needed any help planting food plots to give me a call. There is people here in Blairsville that would be very happy to help plant these plots and make it fun again! I have spent many years hunting and scouting Coopers Creek, and I know every tree. I live 5 miles from the WMA. We also need clear cuts for the deer and other game. The state needs to grow some balls, and tell the tree huggers to get out of the way! Having no clear cuts hurts the game not help it. Coopers Creek would be a great WMA, but we need to do some work. I would love the job to keep Coopers Creek up and make it a WMA that everyone would love to come hunt, and have a great time. 15 years ago I would have took my kids there to kill a game animal. Now I have to take them to another state. Please call if you need any help. 706-781-9779. PLEASE HELP THIS WMA!

948- I love hunting Coopers Creek WMA. My brothers and friends have hunted Coopers WMA regular for at least 15 years. It seems in the last several years, at least in the last 5 years we are

not seeing a lot of deer. We started hunting in the early 2000-2001 and for many years we would see lots of does and usually our hunting would kill one or two good bucks. We usually have 6-12 in our group and we all have spots all over the WMA that we hunt. The past several years have been tough. We are not seeing that many deer. I didn't get to hunt 2018 due to we got selected for Flint River WMA. We will certainly be back at Coopers Creek this year 2019. We love the WMA. It's beautiful. What can we (hunters) do to help you manage the deer better? Can we have a company fee or group fee that would pay for food plots planting? I appreciate the Ga DNR asking for our feedback. We love our resources and want to protect them for our kids and grandkids. What can "we" do to help. We can't figure out why the deer density has dropped so drastically. I appreciate the survey because it reminds that Ga DNR is working to make hunting even better in Ga. Ga DNR certainly rocks! Sincerely, Rome Chandler 423-503-3076

- 952- I wish all WMAs were QDM, 4-points on one side, the whole state would be better of QDM. I let small bucks and my neighbors kill them. No chance to grow into a quality buck. Thats why I dont shoot them.
- 955- Only bow hunt so I'm really not able to suggest any, except bowhunting____-during the RUT. My answers were based on observations while turkey hunting and bow hunting. Hope they are useful?
- 957- I would like to see some clear cutting on the local WMA's to improve the deer habitat and population because the only places I have seen deer in the last seven years in North Ga are near areas that have been clear cut. I also hunted a bit on Coopers during archery season and during the youth hunts with my kids.
- 958- More clear cutting/or select cut's. Better manage current food plot's, enlarge or add to food plot's. Better manage the wild hog population. Allow outside organizations i.e. NWTF to participate in helping with management or funding of food plots, select or clear cuts. Solicite or allow volunteers to help with food plot's, planting other mast for wildlife. I dont feel it is being managed as well as it could be;so much potential for improvement. Limited or quota hunt's for QDM for several years.
- 959- Clear cuts small tracts through out the WMA.
- 961- Herd's to think to many preditors, planted plots not kept up good (not from lack of trying) but they need some love.
- 962- Haven't deer hunted because of lack of deer on Coopers Creek WMA in recent years. In my opinion there are too many either sex hunts and not enough Quality Deer Management. Not hard to wipe out deer hers when you can kill anything that walks on every hunt. It would not hurt my feelings if they closed the WMA for a few years to let it build back up and then maybe even only open it every other year until the deer herds and quality bucks grow. I turkey hunt there more because there are several turkeys. Even the turkey hunting is being destroyed because of the hogs.
- 969- I would say make more food plots!!! Some years there are not enough acorns to supply the deer what they want or need. Would be nice to have roads with gates that the game wardens

could open if needed to retreive your kill or for emergency's. Sometimes the kill takes place a few miles in. Would make it more enjoyable to have access to get deer if needed.

970- To reduce/eliminate either sex days. Increase thinning of timber. Follow thru on the controlled burns that they have scheduled. Replace either sex primitive weapn hunt with a buck only rifle hunt. At one time Coopers Creek WMA had it's own Area Manager. Would like to have that again. It would be helpful to have more DNR Law Enforcement to patrol the WMA. I think that would help to control poaching and people riding 4 wheelers/ATV's/dirt bikes beyond closed gates.

978- I love the mountain WMA's but we have to get control of the hog population! The coyotes and bears are bad also, not sure the answer...Also I wish the DNR and Forest Service would work together better on scraping the roads. I know the big Jeeps and stuff rut them out and ruin it for us hunters to get to many places to hunt and trout fish on Coopers Creek WMA. Also Jackie, wasn't sure if the GPS stuff from Blue Ridge WMA had been sent out? No biggie I just hadn't got any info through the mail. Thank you for all ya'll do on these studies. Dustin Rodgers GA Mountain Research Education Center

983- Dear to Whom this may concern...I am a longtime hunter at Coopers Creek WMA. I have hunted along with two great friends, one which hunted Coopers 20+ years ago. from the stories I hear about the "good 'ol days" up at Coopers when the resource division had timber cutting, controlled burns, and food plots. As a hunter in today's time I would not say i'm disapointed in the hunting because it's not about killing. I'm more so dissapointed in deer numbers. One may think Doe days may help in the county, or maybe antler restrictions, or even re-stocking the area. The habitat that has huge potential for Big mature Deer. But I believe the tree population (age) wise would be beneficial in the overall (Health/ecosystem) as also for financial funds. Trees are 25-40 year old trees. When trees are cut it brings new growth and deer need that because in the last 5-10 years the acorn crop from trees has been little to no acorns. Which then sends deer to private food plots in lower land. Coopers is a place in my heart. And if I can help anymore in anyway please keep me in touch would love to hear the feedback...fellow Coopers Hunter - Jesse Bunch

985- The last time I hunted Coopers Creek was probably 20 years ago. The hunting seems t be about the same. My Dad, brother and I hunted in 2018. My Dad is 70 and thought his WMA hunting days were coming to and end, but the traveling is easy enough that he thinks he might have a few more years. My brother got a small hog, while I missed my opportunity. We will be back. I am going to try to do some archery hunting in 2019.

988- I'm from out of state (Alabama). I wish we had more days to hunt. Deer season in Alabama starts October 15 and runs through February 10. I pay ~\$400 to hunt Coopers Creek WMA...and drive 5.5 hours to get there...more time would be nice. Game wardens and forestry people are the best and most helpful I've met...keep up the good work.

989- I would suggest emplying more quota hunts, and also placing stricter regulations on the WMA Harvest. There should also be more active management practices done on Coopers Creek

for the deer, and all the other species such as controlled burning, timber harvesting, and improving the natural vegetation.

1006- Number of hunting days allowed on WMA with modern weapins and doe days need to be more.

1014- This was my first year not only hunting but hunting on Coopers Creek so the only thing I got is keeping taking care of the land and the animal so people can continue to experience the great outdoors.

RICH MOUNTAIN WMA

1020- Keep food plot up on Road #338. Give hunters access to property on Turnip town Creek. Suspend either sex days with firearms to give population to change and recover.

1027- Cut some timber. Plant more food plots. And it does not matter to me if they close all the road on forest service in deer season I love to walk and get away from other hunters. The deer population is one the decline in the mountains. And I hate that they passed the law on baiting in North Georgia that stupid. We don't have enough deer here anyway. I love to deer hunt and no I don't half to kill a deer every time I go hunting. But I do like to see deer and other game. And it would be nice if the DNR would do better letting us know when they have a meeting there have been a lot of things passes that I did not have a clue they were even voting on. I know that they can't please everyone.

1032- The appeal of Rich Mtn WMA is the lack of roads, trails and game management. You get to experience the true essence of wilderness. Although the harvest #'s for game may reflect a poor hunting environment, nothing could be further from the truth. For those willing to put the miles on their boots, there is ample opportunity to harvest mature deer, bear, bore and turkeys. The challenge of the topography makes this land so appealing - nothing comes easly and you truly earny any harvest. I sincerely hope that no further access trails or food plots are added - Rich Mtn needs to remain as is. It's an incredible environment to hunt it and should be appreciate for what it is. PS - I think permanently closing the Rich Mtn road off (off Rock Creed Rd) would be the best thing the DNR could do for the WMA. Let it be wild and remote and primitive and a true challenge for those who are willing to work for it.

1033- Longer periods for hunting.

1039- Roadways would benefit from better maintenance as well as increase number of food plots.

1042- I don't hunt as much as I did when I was a kid. But I hope someday my daughter will want to and we will go together. I still purchase a WMA stamp so I can take her one of the few places that is left to enjoy fishing.

1047- We need law enforcement on our public lands in North Georgia to control poachers who are taking our game illegal or just shooting it and leaving laying to waste away.

1050- I almost exclusively hunt Area 1 with my crossbow. The area closes from early Dec. until the 26th. I think I would have a better chance to hunt during the peak of the rut if the area was open during this times.

1055- I think DNR does good job on Rich Mtn. Keep up the good work it's not about killing something its about having a good time at camp with friends and my son.

1061- It would be nice if the main road went all the way through again from Stanley Creek to the Rock Quarry. They closed it 15 years ago because of erosion and recreational vehicles. I like the overall access. Primitive camping is good. I also love how remote the majority of zone 3 is. My favorite WMA by far.

1062- I would be nice to have late season for either sex, a 3 day in Jan. 2020. Also it would increase hunter numbers and maybe allow one day either sex turkey on the November hunt.

1069- Open access to the north part of tract 2 (from diagram on other page). Some controlled burning especially around the X (marked on diagram) and left of the X. The briars are impassible in some areas. Quality buck only. Saw and heard multiple coyotes last time during the day.

1070- Improve food plots quality on forestry Rd 338. Open access back up at end of Turnip town Rd.

1071- Thank you for the opportunity to complete this survey. However, I haven't killed a deer on Rich Mtn since 2010. Certain years I check places, new and old, for deer sign on WMA. I feel this is the best WMA in my general hunting area to have the chance at a "nice" mountain buck. For the last 5 seasons or so I've hunted mostly Nat'l Forest Land. Im a dad with 3 young kids and limited vacation time for hunting some years it just didn't work out well for when the hunt on the WMA was open. Other years i found "spots" I liked better and wanted to hunt for different reasons. This year, for example, the acorns didn't produce well in the mountains. I found some game in lower elevation Rich WMA that I normally archery hunt, but other hunters were present I did see a small buck but passed. Other hunter friends of mine did have some success, either with sightings or kills (Rich WMA). This year I did take a mtn buck on Nat'l Forest Land that week of WMA hunt. It was near an area with some controlled burning, timber cutting, zero hogs and fewer bears. Still yet, it was a "harder year" due to the acorn crop. In the area where I hunt mostly this year I saw deer, turkey, few bear, *grouse* and squirrels regular. I do think forest management is beneficial for all game and birds. I understand the Wilderness Area and that its off limits for forest management. But areas outside wilderness can be managed better for game. Better care of food plots would help hold game during bad mast years and during winterm months. I will be glad to give more info if needed to help with mtn hunting. I hunt all public land and it's all I really am interested in. I love to solitude and miles to roam.

1072- I will probably not hunt there again. This is not because it's a bad place. I'm just getting to where it's to hard for me to get around in rough ground anymore. Years ago we used to hunt Coopers Creek, Cohutta, and Dawson Forest a lot. Sorry I'm not much help.

1073- I enjoy hunting in Rich Mountain WMA, I wish there were I more opportunities to hunt deer instead of just the one.

1082- I think in my opinion, Rich Mountain WMA should be turned into a Quality Buck Management area...in return the bucks would have time to grow and the population would grow as well. The hogs are taking over and the deer population is decreasing...also the bear and coyotes are on the rise... The turkey population in my opinion is almost nonexistent on the owl town side of Rich Mountain. I've spoken personally to the wildlife biologist concerning this matter. His answer to the problem was we don't have a problem, according to his statistics...He claimed we harvested 15 birds during the 2017-2018 season. But in my opinion Rich Mountain has 19,995 acres so thats not that many birds if you look at the size of the land compared to the number of birds harvested.

1088- Overall I would say satisfied. I don't kill a lot of deer, but I only hunt a few days per season normally. I know other people kill deer on Rich Mtns so I guess it is a fairly good place to hunt. I typically take a few days off from work each year to deer hunt as a type of short vacation. I enjoy being in the woods early and seeing the sun come up, and the wildlife waking up. Rich Mt. is the closest WMA to my house.

1098- Cut timber more, more food plots, close it off for a few years to deer hunt and let the deer catch up. More small game and hog hunts, and more bear hunts to get rid of them all competeting for food with the deer. We need to have hog and bear hunts with dogs too. Maintain the roads better and keep the gates open for all hunters.

1101- close WMA gates on non-hunting days. Better prevention of ATVs to keep out or driving around gates. Having access to other check-in sites closer to the areas of hunts. Have access to deeper parts of WMA without jeopardizing the area with to many hunters. Rolling road blocks to prevent hunters or non hunters from taking any kill out of area without checking in the game.

1105- Since baiting is now legal in the northern zone for deer, WMA hunters cannot bait. This is a disadvantage because private land hunters can attract deer to leave the WMA I own home across street from Cartecay tract. Covenants do not allow hunting. As a result, I see 10-20 deer heads in subdivison, mostly see only a few deer in WMA and only on trail cameras. DeLimna is baiting for deer, not baiting fir bears. I only hunt deer and have no interest in bear.

1111- Maybe do more firearm hunt days on the weekends so its easier to schedule time off. Also "CWD" needs to be watched I know yall know its serious. Kinda scary I hear it is getting close. Thank yall for all the hard work!! And help keeping hunting alive.

1113- I unfortunately work 6 days a week now this obviously cuts into my hunting experience I have enjoyed hunting Rich Mtn since 96-98? My son was young and we had property adjacent to Coopers Creek but drove there to get to our property. I enjoy the solitude as well as the lack of roads which reduces bumping into other hunters. Additional food plots would be nice for ability to see animals or sign otherwise. Perhaps more timber removal to increase browse and habitat diversity. Overall I give yall 100% on all you do. Thanks for the opportunities and the quest to make hunting more enjoyable to multitudes and while everyone would enjoy takes a mature buck mtn does just as big a trophy.

- 1115- Reduce the coyote population! Maybe a few more Friday Saturday Sunday hunts for the ones that work all week and are off on the weekends.
- 1120- Add another weekend hunt.
- 1124- Timber harvesting (clearcut and thinning) Control hog hunting with dogs. Reduce bear population.
- 1125- More budget money should be spent on food plots, supplemental feed and timber management. Large mature woods are not good for deer. There are a couple of good food plots, but there should be more. Some supplemental food stations during the winter would really help the deer herd (after hunting season). Food becomes very sparse in winter in the mountains. Coyotes are also getting bad in areas of Gilmer County.
- 1132- The usual: Maintain roads, increase herd size/deer/sq. mile, more bowhunting time, increase bear and chance to harvest them. In general, it's a good place to hunt and the DNR does a decent job in an area that is a challenge to grow deer herd.
- 1135- Kill no spike has to be at least a 6 point and only 2 doe per person for 5 or so years fo mature bucks can grow back into the system or at least no smaller than a 4 point, no spikes at all.
- 1142- Creating browse and controling large predator's are crusial in white tail deer. Cut small clear cuts controlled burns maintain food plot's. Large group's of men from the area's would donate supply time an money to see food plot's attended as they were in the 90s. I hope this help's some, WMA's are very important to me my favorite place's to hunt. Not alway's about the harvest mostly the experience and the chance at the trophy mountain buck.
- 1145- Not enough natural browse for deer in the mountains, when acorn crops are poor. Timber cutting and controlled burns would greatly help as well as better food plots. My grandfather was a game warden for this particular WMA back in the 70s and I enjoy hearing of his success during the restocking of this area and the Cohutta's. He believes the deer population thrived, due to food plots, less hunting pressure, and new growth from previous timber harvest. I would love to see more emphasis put on improving the mountain area WMAs. They have great potential. Thank you for the opportunity to to share with you my experience as a 4th generation hunter in these mountains. Also thank you for taking an interest in this particular area as I would like to pass on the opportunity for future hunters to enjoy this resources as I have. I look forward to possible changes/improvement.
- 1148- Never see game warden out food plots need more up keep barely any mature bucks closer check in station
- 1149- Keep food plot up on Road #338. Give hunters access to property on Turnip town Creek. Suspend either sex days with firearms to give population to change and recover. Just my opinion mountain WMA cannot handle the removal of several does like WMAs in middle Georgia
- 1151- The deer population is down. There need to be deer stocked does and bucks. The deer ratio's should be 2 doe's to 1 buck. They need to be more hogs stocked also on management. The WMA needs to shut down for about 5 years for the bucks can get mature. So the deer can

repopulate and also be restocked with does and bucks. Let there be a 4 point on one side minimum spread at least 15 inches outside spread. The whole county (state) should be 15 inches outside spread or have points on one side.

1165- To manage the wild hogs because that place is covered up with them. More food plots for summer growing to help support the growth of fawns and yearlings. Also predator control so there is I higher success rate for fawns.

1166- none at this time

1169- I would like to see the opportunity to harvest wild hogs extended. I've witnessed 16-24 hogs, 8-12 deer and 1 mature coyote while hunting Rich Mountain. I think the hog numbers and competition for food are supressing the deer numbers. The increase of hogs harvested may contribute to the rebound of deer numbers. I am thrilled with the abundance of wildlife present on Rich Mountain WMA but think the populations are skewed due to food and cover competition. Thank you for including me in this survey despute my limited experience with the WMA in question.

1176- We moved to GA from Michigan in 2017. I started hunting around Carters Lake because its close to Ellijay but that area seems pretty void of deer. I tried the Bowwater Track as well and saw one or two that season (2017)and more sign as well. I started scouting RIch Mountain last summr and ran several game cameras. The pictures were very promising. A few bear, lots of hogs and quite a few daytime pics of deer including some very nice bucks. I thought I was in! Then they opened the gates and the vehicle's drove the deer further in than I had planned. I then went to Cartecay Archery Area. Saw a couple deer there during the late season. I like my odds on these two pieces but would love to see a late archery season on the Main Rich Mountain Area. The rut here in GA is definitely a December January time frame and that area is closed during prime movement. The seasons open so early that the hot weather kept me from going out. Move them all a but later would be a great idea.

1182- New to hunting saw no deer sign good plots were no existant. After consulting deer density resources found low to deer poputation in area went to sheffield food plots were easy access and saw der tracks and droppings.

1272- I think there should not be a "free" deer tag used on WMA, every deer should be taged from state number allowed from hunting tags. Public land or private. Gates on main rds should be open longer threw-out the year. I think most WMAs should be turned back to outside. Let US Forest Service manage public land that belongs to Fed. government. Let state manage land that belongs to state for WMA. I think if WMAs were removed by US Forest Service, and a longer season was allowed like the outside National Forest, it would be "safer" better quality outdoor exp. better managed, it would relieve the number of people in one location at one time. It would relieve hunting pressure at WMAs hunters on an areaat the same time with in a 4 to 7 day hunt. "Note" the state remved Lake Burton WMA and have of Blue Ridge WMA. the game has increased and it opened more opportunity for people to enjoy.

SWALLOW CREEK WMA

1189- Forest management including cutting and control burning are very important for quality game and hunting experience.

1191- I hunt with my Dad. He tells me stories of seeing 20+ deer a day -- no more. Close the season and allow the deer to repopulate. We see 80 deer a day in Colorado.

1195- I hunted in the 80s when tehre was a 3 week state season and 1 week WMA hunts. 400 hunters would check in and kill 125-150 deer a week. Then came the doe days and too many have been kiled. I have not been checked by a game warden in 10 years, nor have any of my friends. In the 80s you would see 20 deer a day -- now there are not 20 killed in a whole county. WMA Techs should still be law enforcement. Road checks should still be conducted. Small game weapons should still be .257 centerfire along with rim fire and shotguns to help with hog and coyote control. I am most unhappy with the lack of prescribe burns and DNRs management of the wildlife. Even grouse and turkey numbers have decreased. Way too many bear and coyores. Should allow a 2 week dog season and out of state hunters should be charged likewise that it costs a GA hunter to hunt in their state.

1198- spend some money. Food plots. Plaes for rabbit hunting (which I have to do) . Stock deer. Cut timber. Burn. Just do something. THANKS

1199- Take better care of food plots, allow some timber to be cut and control burn periodically. Allow hunter to go in after season's and allow any weapon to kill hogs and coyotes. Something needs to be done to eradicate the hog population. Stop killing does until the numbers increase. Limit the deer harvest to one deer on firearms and allow more archery only hunting. I used to hunt Swallow Creek every year. I've killed one buck and several turkeys. It's hard hunting for the limited opportunity to see deer. I've climbed and walked into a lot of out of the way area's, and I don't mind if there is a reason to put the effort out. But if something is not done to get ride of hogs and coyotes and keep up some good food source, hunting like we have experienced in the past in the mountains will be over. I love to hunt the mountains (my favorite place) but the game just insn't there like it used to be. Not just Swallow Creek either.

1200- I mostly hunt Swallow Creek during bow season for bear, but would shoot a buck if the opportunity presented itself. My ansewers are based on the few deer sign I notive bear hunting. Compared to other areas I deer hunt. I enjoy hunting Swallow Creek its not overly crowded and has plenty of bear, hogs and turkey.

1201- By doing exactly what y'all are doing here. Seek information/feedback to improve overall experience.

1202- I would like to see timber cutting come back to the WMAs. Timber cutting is essential - all game benefits. Food plots need to be taken care of - planted - _____ years of acorns are bad. Back in the mid 80s - earlier 90s when hunting game was plentiful --- deer and turkey. WMAs allowed way to many doe days and hunters didn't use common sense. Then came along more and more bears - coyotes - fawn deer - turkey didn't stand a chance. WMAs need to give beats - coyotas - (hog) some serious thought. I thinl if this issue isn't addressed soon deer - turkey

hunting will be a thing from past. I still love to roam the old GA MTNS and hnt - some of my best memories in life. Thanks for all that you guys do and allowing me to do questionnaire.

1207- Bigger and well plcaed food plots. -no antlerless/doe hunts -one week archery hunt buck only/bear/hog -3day bear and hog hunts with dogs -electronic calling for predators -only open gates for 1 week for turkey and only all big game hunts. All Gates! Keep gates closed from April-October and only open for specific hunts. It's a Wildlife Management and sanctuary - not a jeep trail or playground or trout pont. People that like trout fishing or hiking have thousands of other creeks and acres to go or they can park at the gates and walk. We have plenty of bears and hogs and predators please protect our deer and turkey.

1208- I '______" to get back to Swallow Creek as I spent many weekends up there. I travel a bit too frequently for my job so living in Cherokee County, GA makes driving to Swallow Creek less desireable. Over the years I've had three cabins in N.GA that made getting to Swallow Creek a very short trip. I will hunt S Creek in 2019.

1216- Better forest management based on facts not political correctness. More early successional forest stages. Higher fees for non hunters using both USFS and state managed lands. Less vehicle access to nonhunters.

1219- Pay attention while cutting food plots. On multiple food plots I have seen "fox grape" bushed with tons of grapes one fall only to come back in the spring to see they have been cut at the base. Just simply raise the cutter when you see grape vines. I would like to see more timber management. There's too many old growth hardwoods that provide no cover or browse. Grouse, turkey, deer etc. populations have dropped in the last 20 years due to this in my opinion. Contrary to what I hear from other hunters in the area, I do not believe the bears are the sole issue. Deer and bear can coexist but only when the deer have adequate browse and cover. Improve harvest data/make sure deer are recorded. I know of more deer that were killed on Swallow Creek than are listed on game check.

1223- I think there needs to be more days during rifle season that a hog or bear can be taken (deer firearms). I hunted about 5 days during bow season over a food plot it had plenty of bear which my hunting buddy killed one, but neither of us saw a single deer. We also saw several hogs. We went back during rifle season and both killed a hog. I love this place for bear and hog hunting. But not for deer. We also put out a few trail cameras about 1 month before bow season. We had one deer on camera. A ton of bear and hog. I think the only way to get more deer in there is to thin the predators out. But again, I love this place for hog and bear. I have plenty of places to deer hunt.

1226- The feral hog population on Swallow Creek is out of control. This seems to have affected the amount of deer and turkey on Swallow Creek. I have even witnessed hogs pushing a bear off of acorns. Something must be done to encourage hunters to kill more feral hogs (not just on Swallow Creek, but throughout the state) Let me know if I can be of further assistance.

1227- I grew up in Towns County and our property line meets with the #2 Swallow Creek WMA. I have hunted abut all this WMA from Bill Brown Cave, Mail Creek to Hihg Shoals as I

was growing up. There was a decent population of deer then, plus the season were not open 3 days a month usually on weekdays but a week in Nov. and December. Over the years I have watched and talked to family/friends that still live next to the almost non-existent deer population. Also there were ZERO 'yotes, maybe 1 or 2 bears were seend and no wild pigs. As these species came in and population was increased, the deer population decreased. I did hunt the non-WMA forests along the Unicos Gap where I used to always see deer due to the huge amount of bay grapes and white oaks in that area. Saw no deer and very little sign but plants and hogs. In your research and working with the DNR as them to give you the data (# hunters, # bucks, # deers) harvested in the last 10-15 years. It's very sad and the #'s contain --> in the 1950s the GA DNR imported about 50 deer that were tapped in Michigan and released on the west corner almost into North Carolina. How to fix --> allow year round hunting of wild hogs and yotes; make the seasons more than 3 days; go back to the 1 week each month and just make it user friendly. Ease up the restriction of what type firearm you can carry based solely on the game the season is open. --> the wild hog population has got to be reduced --> same for the yotes

1233- I know cutting and burning is up to the USFS and a lot of Swallow Creek is wilderness so not much can be done but I would like to see some trophy buck management tried and maybe something to help the grouse pop. Thanks for having this survey. The North GA WMAs have some great potential, I seen 4 bears, 2 hogs and 0 deer on Swallow Creek this year 2018.

1235- Greatest problem with Swallow Creek WMA is lack of access roads. Some roads are blocked off during deer hunts which, if opened, would provide easier access.

1237- Update maps to show road blockages. Plant in the wildlife openings.

WARWOMAN WMA

1241- Greatly enjoy Warwoman. Neat place. Is an annual destination for me. Very disruptive hog population in Warwoman (WW). Have seen significant erosion and stream disruption. They can invade a hillside in an evening. Have noted a very strong presence of coyotes. The two combined (pigs and coyotes) I beliece have combined to reduce fawn survival, thus population. I would like to see combined pig and coyote hunts all year long. Example: the first 10 days of each month outside the state Deer/Bear seasons. Including night hunts. Bait stations, and electric calls. Put travel restrictions in place, meaning mandatory stand hours. Sunset to midnight you stay put. Midnight to 02:00 travel hours. 02:00 to sunrise are stand hours again. As stated: pig and coyote only. Good work on maintaining the wildlife openings and food plots. Was impressed with the work off duck ponds/Beckes Mtn Rd. Accessibility is good. I personally hunt the hard to get to areas. It's Big Mtn or bust for 2019-2020 season! Feel free to contact: Steve Meagler, 145 N Main Street Stephens, GA 30667. Oldairmedic@gmail.com

1245- I came to Georgia primarily for the bear hunting. I wasn't looking for deer or really anything else. Warwoman has good numbers of bear and the sign indicates mature bear are in the area. I found a good bit of turkey, but didn't see any. Deer feeding sign was evident in several locations and I did see several doe while hunting. I did see one buck. It appeared to be 2-3 years

old with at least 4 points on one side. The buck sign I found, overall, was very sparse. (new and old sign considered) The hog sign is extroidinary in Warwoman and everywhere else in I hunted in North Georgia. I had several encounters with hogs but never an open shot. It should be considered that I only bow hunt. I did have deer and hog and one coyote within rifle range. I am overall pleased with Warwoman WMA and I will be returning to hunt it in the future seasons. Good luck

1248- The food plots need to be maintained to an acceptable level. Many have not had any attention in several years and are full of nothing but fescue and inedible weeds. There must be an emphasis places on timber removal and secondary growth in order to provide a safe place for deer to hide their fawns. Black Bears and coyotes are desimating the deer herds in the mountains of North Georgia. The deer population has always been low in the mountains and with this level of fawn predation its almost impossible to overcmcome. I have always enjoyed hunting the mountain WMAs and am looking forward to more habitat improvement that I hope are coming our way.

1253- I have injures to leg and back that make climbing hills difficult, would like more access with ATVs and hog hunting year round.

1258- more camping locations

1261- My experience on Warwoman was positive in most respects. I seen deer, hogs and turkey on each of the 10 times I hunted. Roads to hunting areas are well maintained. The area I hunted need a gate put up because the water break has been run over and traffic has been tearin up the food plots. I hunted the bear hunt in Oct and really enjoyed the fact that we had one early early rifle season. Thank you for your interest in our wildlife havitate in Rabun County.

1262- In my opinion great land management, and roads. Really enjoyed hunting the area. Beer and boar hunting the most important to me. Hogs have realy become over populated leaving less food for deer and bear. Coyotes also seem to be plentiful and have an adverse effect to deer reproduction. I and many hunters would be up for extra hunts for hogs and coyotes outside of deer and bear hunt dates. Also, Swallow Creek has some problems with hogs and coyotes. I hint 10 to 15 different WMA all over the state. Thanks for doing the survey and thanks to all who work for the DNR and WMAs. KC Chester "Semper Fi"

1263- 1. continue to encourage the USFS to conduct timber cutting operations/timber stand improvements where feasable and responsible. Especially dead/overstocked white pine stands. 2. High quality food plots are beneficial in facilitating harvest. More plantings needed. 3. Wildlife openings that are not planted should be mowed at least once annually to knock back locust/serecia. Wildlife openings should be expanded/increased/encouraged. 4. Closed roads that access food plots provide the best hunting. Some are in terrible condition such as milksick cove. 5. Encourage daylighting of roads - promote browse. 6. More use of prescribed fire. 7. A mid-December hunt around a new moon has proven to be when peak of rut occurs (traditionally). Thank you for taking a vested interest in this WMA. As a former resident of the Warwoman community as area manager of this property, I hold it near and dear. If I can be of assistance, I'm

available at 404-780-4981. If I don't answer shoot me a text. I've walked every nook and cranny of the place.

1264- Bring black clear cutting in the mountains. -plant existing fields and create new ones - close roads when season is not open -buy a grain drill for Warwoman so the technician doesn't have to borrow one from other areas -Give more resources to Warwoman (roundup ready beans fertilized) -Commend Ryan Watts for the amazing job he has done with little to no recognition, he is the only reason Warwoman has the deer that are there -Close are to non hunters before and during the hunts -Bring back the stocking programs for deer and turkey -run the Second Nature roup off the management area -never allow the killing of does in Rabun County -Impliment a trophy requirement for all bucks killed, something other than just 4 points on one side -make Warwoman a quota hunt -close the area to deer hunting for 5 years -allow the area manager to kill hogs and coyotes by any means neccessary

1265- I understand that this is a waste of mine and your time about like hunting is any more but remember you asked. As far as how the DNR can improve the hunting on Warwoman I think you should change the name to 3 Mile Island Wildlife Area because that descibes it better. Notice I didn't use the word management. The DNR should have to remove the word Management from all the signs on WMAs as this is false advertisment. The first thing I would do is get rid of the DNR or at least fire everyone that works for them and hire someone can count and maybe even read. I then would make so if you worked for the DNR that you could only hunt on these areas. Then I would open deer season year around like they did trout season and when you have killed at least 3 deer on our WMAs you don't have to do anymore survey's and studies. Maybe you should take the time and money it takes to do all of the studies and survey's and get out of your offices and trucks and do something for our wildlife. Not sure why you have to do all of this when every WMA has sign in and kill sheets on them and all you had to do was read them. The first ever January hunt on Warwoman over 1100 hunters checked in and only 7 or so deer was checked out, this should have told you all you need to know. By the way if you need a battery for that tractor that's always sittign there I could loan you one, you know the one that never has any dirt on the tires. Just happened to notice it's always sitting there every time I go by. But I did see where they drove up to a grass patch gate then turned around and left, it was only about waist height. I noticed that this year we didn't have to buy a wildlife management stamp because you couldn't anyone to go hunt on them, so why did I pay for one the last 30 years to get you to have all those doe days and kill everything that walked. Don't guess I can get my money back. But nice trucks and uniforms you have and the state parks are really nice too. Hunting clubs are expensive and takes a lot of time and money, the last one's I was in we didn't see many deer there either. Not everyone has the time and money to get in clubs. I would be willing to pay \$500.00 for a management area stamp a year if Warwoman was as good as it was back in the 90s before the DNR took over, but then you would just spend it on something else. Attached is a study that was done on our WMAs in north Georgia. Wasn't sure if you had read it! Hope you understand that this isn't just on the WMA's its everywhere in north Georgia. But if you did read it may not have noticed that our deer started to decline when the DNR took over from the Game and Fish. In the study from 1979 to 2001 when we had the Game and Fish our deer harvest stayed about the same, but after the DNR took over it has declined by 80.5% on bucks and they said this was

despite a 42% increase in the number of days to harvest a buck. Maybe we shouldn't have had a 42% increase in the days to harvest a buck? Doe harvest has declined by 94.6% since the DNR took over. Deer season closed on December 1st and opened December 26 for a week after Christmas before we had the DNR and we only got 5 tags. Now the DNR has opened deer season through January 15. giving us more days to not see anything. Killing everything that walks is not managment. In this study it said that the DNR had exhausted most deer harvest management options to increase deer population in north Georgia and had satisfied requisites before starting a deer survival study. So I think I can save you the time and money by telling you that this study is a waste of time because after you do this study there are no deer to do anything with. Doing away with doe days on Warwoman 15 years after killing everything everything that moved wasn't going to work and doing away with 1 doe day and ending season December 26 on Chattachoochee National Forest is a day late and a dollar short. Sounds like all of our money that we spend on hunting license is going to do studies. and to give someone a job because I didn't see anyone at Warwoman doing anything. Not sure what you sprayed for for the squirrels and other small game but it worked really well. You can't stay is business if you do away with your customers and you can't run a hog farm if you kill all of the sows. If this is what the University of Georgia and DNR biologist think we need then we need someone else to take over our game management. If this is what UGA teaches then you need to do away with these classes. Just because you have a college degree does not make you smart. The definition of insanity is doing the same thing over and over and expecting different results. In your survey you asked how important timber cutting was to deer population. Well you ride up Finney Creek and Tuckaluge Creek and ook at waht the Forest Service did and let us know if you think that is going to help anything; a snake can't crawl through that. They cut down white oaks and just left those later there that took a lot of years to mature. If this is what you are going to do then no I don't want any timber cutting. It's called clear cutting by the way not just cutting it down in a pile. I don't understand why you are listening to environmentalist who didn't buy a license or even use these areas because what they have you doing isn't working; just in case you hadn't noticed. In your survey you asked about how important predator management was to deer population. There is no predator in the world that could have wiped out our deer as good as the DNR. Maybe this is the problem. And maybe instead of sending me a survey you should do a study on the DNR and compare it to how the Game and Fish ran their department. They have coyotes in other states and they have deer, but what they don't have is Georgia DNR rules on hunting. In other states you get one buck tag and limited doe tags and have a limited rifle season and most states change their limit each year if they think too many deer are being killed in a certain area to see that they have deer for the future. Guess you never though of that! Maybe a 10 year plan is not the best way to go. No place in the world could have 12 tags and 2.5 months of rifle season when the DNR doesn't even enforce that and have any deer left. Did you ever think about that the Game and Fish stocked deer in Georgia for 50 years but it only took the DNR about 15 years or so to wipe them out? When the DNR started all those doe days everybody would kill a doe anywhere they wanted then just tag it in a county that had doe days. A lot of people were killing 5 to 10 bucks in a year when then they seen that the DNR wasn't like the Game and Fish was at checking them, but I guess they can't do that now. And a lot of those deer that you have been checking on WMAs are killed somewhere else and brought to a check station to use your tags in case you

care. You didn't really think they killed them on a WMA did you? The DNR has telecheck for deer now and doesn't even believe their own numbers. Kind of like when you look at the numbers on WMAs and keep having the same regulations. Another question on your survey was how many days did I spend deer hunting in 2018 and I wrote down 15. So I rifle hunted 5 days in Missouri, muzzle loader hunted 2 days in Kentucky, 1 day on Lake Russell and the rest on forest service. 1 day told me all I needed to know on Russell, as I haven't seen a deer down there in a number of years. In the 90s we would go in to work early so we could get off early and go to Warwoman every evening archery hunting and the only days we didn't go was when the weather was too bad. And some of us would keep hunting with archery on in to gun season even before you could kill a doe with archery equipment in gun season. The last few years I have went to Warwoman before season and thought about hunting there but when the regulations came out you have had a special hunt in archery season so I didn't see the point in wasting my time. In case you haven't noticed no one hunts on WMAs anymore. And in the survey you asked how important it is to contribute to conservation. Maybe the DNR should take this survey because I would like to hear there answer to this question and most of the other questions on the survey like food plot openings, seeing lots of deer, predator management and opportunity to kill a deer. You don't have to worry about solitude on WMAs because no one is there or any game to hunt. The other day I saw a bird flying toward Warwoman and when he got to it he went real high and flew over it. Every year the DNR adds regulations to us that will make sure that there will be fewer deer in the future.. If you are going to have baiting it's for a place that does not have 12 tags and 2.5 months of rifle season. The excuse we are given as to why so many doe days, baiting and other regulations is that the state makes these laws. Well who is telling them to do this if not the DNR and if it's not the DNR why do we need them? All of the regulations the DNR has put in since taking over makes it so they don't have to do anything. 10 doe tags so now they don't have to check anyone for having an illegal deer or do road checks like the Game and Fish did back when we hunted middle Georgia. No deer on the WMAs they don't have to plant any grass patches or check anyone. Now you can bait in north Georgia. You never hear of anyone getting caught shooting deer illegally anymore or spot lighting but this was probably the plan all along, if you don't have any deer you don't have to do anything. Was coming off of highway 28 and the Forest Service was having a drivers' license road check and my thought was why were they doing this. In Rabun County we have Talluhah Falls, Clayton, Mountain City, Dillard and Sky Valley police departments and the Rabun county sheriff's department and Georgia State Patrol. If they want to be cops tell them to go get a job with one of these departments and hire somebody that wants to do something for our forests. We don't need Forest Service officers and DNR officers doing license checks and writing speeding tickets. Besides if they were doing their job they wouldn't have time to be doing this. But then again they do have a job to see how little they can do. This is not to be disrespectful of officers as I'm sure they got these jobs because they wanted to be in game management, this is for the way the system if being run. I remember when I was a kid we had Burlington factory here and they would get upset because every man that worked there would put in for their vacation at the same time as Warwoman and Lake Burton was open. Everyone years ago got excited about opening day of archery season and opening day of gun season but when I see these guys now they hunt very little or not at all. The DNR has made it so only people with their own land or people with a lot

of money are hunting. A few years ago I went to Tulluhah Falls non-management area on opening day of archery season and when I got to the check in station to sign in there wasn't a sign in sheet for deer there but the sign in sheet for turkey season was still in the box. This is a manditory daily sign in by the way. Also the date on the board said archery season opened the next day so me and some other guys that had come to hunt left. When I got home I look at the regulations and it did open that day. This shows how much the DNR cares about our hunting and how lazy they are. Not sure if they ever put a sign in sheet out cause I never went back. But I'm sure they would write me a ticket if I didn't do what I was supposed to. Another time I went to check in on Warwoman and some DNR officers were at the check in station and I tried to ask some questions about how many hunters had check in and how many deer had been kiled and they were very short with like they didn't want to answer my questions. Maybe they were ashamed. Hunted the next few days and every time I came by the check station they were just hanging out at the check station. Made me feel like they didn't really want to be there. Only 6 deer was checked that hunt so they could have found something to do if they wanted to, maybe they could have charged that battery. Guess there is no reason to go check anyone when you know they aren't going to see anything. First year I archery hunted Warwoman I shot a doe on open morning and was the 4th deer signed out that morning. Didn't hunt on the gun hunts that year because too many people hunteing it then but went by to see how many had been checked and at the end of season a 129 deer had been killed then the DNR struck and started having doe days on the gun hunts and did this till there was nothing left. They haven't killed that many deer there in the last 10 years. It doesn't do any good to stop having doe days ater you have killed everything. Also remember going to quota hunt on Dukes Creek and an older gentleman said something to a game warden about too many doe days and the game warden was very rude to him about why they did this. I remember thinking when they do away with the game we will not any game wardens so when Al Cruz retired I noticed they didn't replace him and did away with Lake Burton and had already did away with Coleman River and some other WMA's. Well in case you haven't noticed I'm a little angry with the DNR. But I do appreciate the opportunity to give my opinion even though I understand not everyone feels the same as I do. Sorry it took so long but every time I thought I finished I would come up with more ammunition and you didn't give enough room to write what I wanted to say. I didn't write this for me. I have killed deer and enjoyed my time in the woods and have hunted middle Georgia and in the Midwest but always enjoyed hunting around home the best. I have a 5 year old grandson that I would like to have taken hunting one day but we both know that he's not going to hunt when he gets older because no one is going to go hunting and never see anything. Especially a kid when someone like me will not go that's hunted my whole life. We don't need special hunts for kids as much as we need something for them to hunt, just a thought. I bought his lifetime license for his 1st birthday and wondered why they were so cheap but now I see that the DNR knew he wouldn't be hunting when he grew up because there wasn't going to be anything to hunt so they get their money up front. Yep you got me again. So to answer the question how can the DNR improve my deer hunting experience on Warwoman. Our deer are gone and nothing you do is going to bring them back so I really don't care what you do. I will not hunt another WMA or buy another Georgia license that I pay for and get 12 tags and go hunt and only see one deer whre I hunt all season. And if I buy any hunting equipment that I think you get part of the money I'll go to another state

and buy it. And if I want to hunt I'll go to a state that has deer and takes care of them. I'll use the money I save on their license that are a lot more expensive so you lost another customer to another state. I'm sure you are laughing as you throw this in the trash doing the same thing you have done since taking over from the Game and Fish. Again the definition of insanity is doing the same over and over and expecting different results. And yes I wasted my time again with the DNR but it will be the last time. Please don't call, email or mail me anymore of this crap when you know that everything that has been done since the DNR took over our hunting was done with the purpose of doing away with it since there is no way you could have those regulations and expect to have any game. If the DNR has any more bright ideas on how to manage deer our deer try doing the opposite of whatever is being proposed as it can't make it any worse than it is now. Bring back Game and Fish. -EX-GEORGIA DEER HUNTER

1267- Need more food plots. More roads accessible. Burning creates new growth. And to keep the roads that are open manageable and driveable. This younger and newer staff doesn't do as good of a job as Craig Nelson did. The fields and roads have went downhill since he left. And, why are the handicapped fields closed???