Movements of Wild Turkey Hunters During Spring in Louisiana

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Abstract: Interest in hunting wild turkeys (*Meleagris gallopavo*) continues to increase, and agencies are challenged with balancing hunter access and activity with management of sustainable turkey populations. Understanding turkey hunter behavior, particularly on public lands, would greatly assist agencies with achieving this balance. We used GPS to track the movements of wild turkey hunters during spring hunting seasons of 2012 and 2013. We used 151 hunter track logs on the 1440-ha southern tract of the Tunica Hills Wildlife Management Area (WMA) located in West Feliciana Parish, Louisiana, to better understand turkey hunter behavior and space use. On average, hunters hunted 6 hours each day, traveling 5.9 km during a hunt. However, on average hunters stayed within 0.3 km of roads and access trails and the mean daily maximum distance from a starting location (parking area) was 1.5 km. We found that 50% of hunter locations occurred within 18 m of an access trail or road, with 2.9% of the WMA containing 50% of hunter locations. Differential exposure to hunting pressure or hunter activity may differentially affect individual behavior and ecology of male wild turkeys, but this relationship is poorly understood. Future research should more directly quantify the effects of hunter behavior and hunting pressure on ecology of wild turkeys.

Key words: wild turkey, hunter movement, hunting, Louisiana, *Meleagris gallopavo*

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Wild turkeys (*Meleagris gallopavo*) are an important game species in North America and numbers of turkey hunters have increased despite national trends showing declines in some other forms of hunting (Tapley et al. 2001, 2010). Spring harvest is the primary mortality factor for male wild turkeys (Wright and Vangilder 2005) and factors such as season length and bag limits are known to influence survival rates of males (Chamberlain et al. 2012). Beyond hunting days and bag limits, agencies also regulate hunting equipment or methods for take, implement age or sex restrictions, issue restricted numbers of permits, and ultimately limit hunter access to influence harvest of turkeys, particularly on public lands.

Hunters typically access public lands through defined parking areas and access routes (e.g., trails and roads), and these features may influence hunter behavior (Diefenbach et al. 2005, Lebel et al. 2012). Agencies responsible for ensuring sustainable populations of wild turkeys, while also balancing issues associated with hunter access, would benefit from a working knowledge of hunter behavior on public lands. Specifically, understanding how hunters behave while hunting and their spatial distribution across the landscape may allow natural resource agencies to manipulate hunter efficiency to better achieve management goals. Likewise, managers may be able to identify tracts of public land where game species are at greater risk and adjust their management accordingly (Stedman et al. 2004).

Behavior of wild turkey hunters is poorly understood, yet could provide useful information for agencies charged with managing sustainable populations of wild turkeys and ensuring consistent hunter opportunity. Therefore, our objective was to describe movements and space use of wild turkey hunters during spring hunting seasons.

Study Site

We conducted research on the 1440-ha southern tract of the Tunica Hills Wildlife Management Area (WMA) located in West Feliciana Parish, Louisiana. Tunica Hills WMA was bisected by Old Tunica Trace Road, which represented the only two access points to the WMA. The area had four major parking areas that provided hunters access to three major trail heads, and hunter access from the main road was otherwise limited.

Tunica Hills and surrounding private lands were composed of dissected uplands characterized by steep bluffs, ravines, and rugged hills. The major soil type was wind-deposited silt loams from the Mississippi River. Common overstory species included American beech (*Fagus grandifolia*), various oaks (*Quercus* spp.), hickory (*Carya* spp.), eastern hophornbeam (*Ostrya virginiana*), yellow-

poplar (*Liriodendron tulipifera*), red maple (*Acer rubrum*), loblolly pine (*Pinus taeda*), and eastern redcedar (*Juniperus virginiana*). Understory species included oak leaf hydrangea (*Hydrangea quercifolia*), two-wing silverbell (*Halesia diptera*), pawpaw (*Asimina triloba*), muscadine grape (*Vitis rotundifolia*), sweetleaf (*Symplocos tinctoria*), and switchcane (*Arundinaria gigantea*).

Methods

We conducted research during the 2012 and 2013 spring wild turkey hunting seasons. Turkey season began with a one-day youth hunt on the third Saturday in March of both years, followed by three weekends (Saturday and Sunday only) of lottery hunting in which only 15 participants were allowed to hunt. After the final Sunday of lottery hunting, the WMA was open to the public for seven days. An individual hunter was only selected for a single weekend during the lottery hunt, but could hunt at their choosing during the open seven-day hunt. We used data collected from hunters in all hunts conducted on the study area. In Louisiana, hunters are allowed to hunt turkeys from 30 min before legal sunrise to 30 min after legal sunset.

All hunters on Tunica Hills were required to stop at designated check-in stations upon entry into the study area. We briefly discussed our study objectives with each hunter before providing them with a handheld Garmin eTrex GPS unit. We pre-programmed each unit to collect one location every 30 sec for the duration of the hunt. We were not concerned with the influences of autocorrelation on our resulting inferences, as we were interested in estimating as precisely as possible how hunters were using the landscape (DeSolla et al. 1999). We turned each unit on before giving it to the hunter and asked them to carry it throughout the duration of the hunt. We collected units from hunters upon exiting the WMA where we downloaded data and cleared the units for re-deployment. During the 2012 hunting season it was not mandatory for hunters to carry GPS units, but only three hunters refused to participate in the study. During the 2013 hunting season, the Louisiana Department of Wildlife and Fisheries made participation mandatory. Although an individual hunter could contribute more than one day of hunting data, we did not identify individuals in our data records. We assumed each day/GPS track to be independent from each other.

Prior to performing spatial analyses, we manually inspected GPS locations of hunter movements to identify and remove non-hunting locations such as travelling via a vehicle to gas stations or other hunting locations. Thus, each hunter may have had multiple hunt starting locations and routes within a given day. To identify the starting location of each hunt route, we assumed that hunters did not move >100 m in the 15–30 sec interval between GPS locations, and any location that was greater than 100 m from the prior location was considered a new starting location of a hunt route. Additionally, if the time between GPS locations was greater than 10 min we considered the later location a new starting location. We conducted all analyses in Python 2.6 and ArcInfo 10.1 (ESRI 2011). For each hunter/day combination, we calculated the total distance traveled while hunting, maximum straight line distance from a road or trail, maximum straight line distance from a starting location (parking areas), and total time spent hunting. We then calculated the means and standard error (SE) for each of these variables.

Additionally, we wanted to assess how the cumulative use of all hunters was distributed across the WMA in order to understand which areas were receiving the greatest hunting pressure. To this end, we combined all GPS hunting locations into a single dataset and performed two separate analyses. First, we used the combined dataset to calculate the distance to nearest road or trail from each hunting location, and summarized the distribution of the points using 50%, 75%, and 90% percentiles. Second, to estimate the area of the WMA that saw the greatest cumulative hunter use, we calculated a kernel density estimate (KDE) for all points, where the bandwidth parameter was optimized using least squares cross validation in the R package ks (Duong 2014). From the KDE, we extracted isopleth-use polygons representing the areas containing 50%, 75%, and 90% of all hunting locations. Finally, we computed the proportion of the WMA that fell within each of these use polygons.

Results

We collected and analyzed 151 daily hunter tract logs. Hunters traveled an average of 5.87 ± 0.30 km (mean ± SE) each day. The mean maximum distance hunters traveled from a road or trail on a single hunting day was 0.31 ± 0.02 km, whereas the mean daily maximum distance from a starting location was 1.48 ± 0.05 km. Hunters spent an average of 6.07 ± 0.31 hours hunting each day (range: 5 minutes to 14 hours).

We found that 50% of hunter locations occurred within 18 m, 75% occurred within 153 m, and 90% occurred within 404 m of roads (Figure 1). The KDE isopleth-use polygons constructed using all GPS locations revealed that 2.9% of the WMA contained 50% of hunter locations, 9.2% contained 75% of hunter locations, and 26.6% contained 90% of hunter locations (Figure 2).

Discussion

We recognize that our findings are specific to the study area we worked on, which had relatively limited hunter access outside of a seven-day open hunt. Likewise, the terrain on our study area may have influenced hunter use of roads and trails that may not be ob-

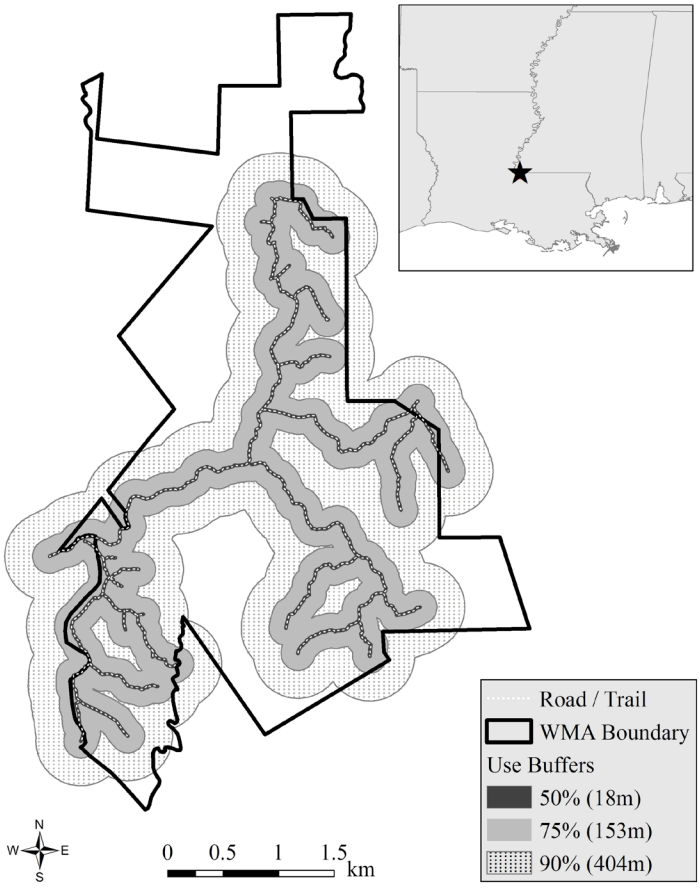

Figure 1. Depiction of 50%, 75%, and 90% quantiles of all turkey hunter locations along trails and roads at the Tunica Hills Wildlife Management Area (WMA) in West Feliciana Parish, Louisiana. Locations were taken every 30 sec with a handheld GPS unit that accompanied each hunter on the WMA.

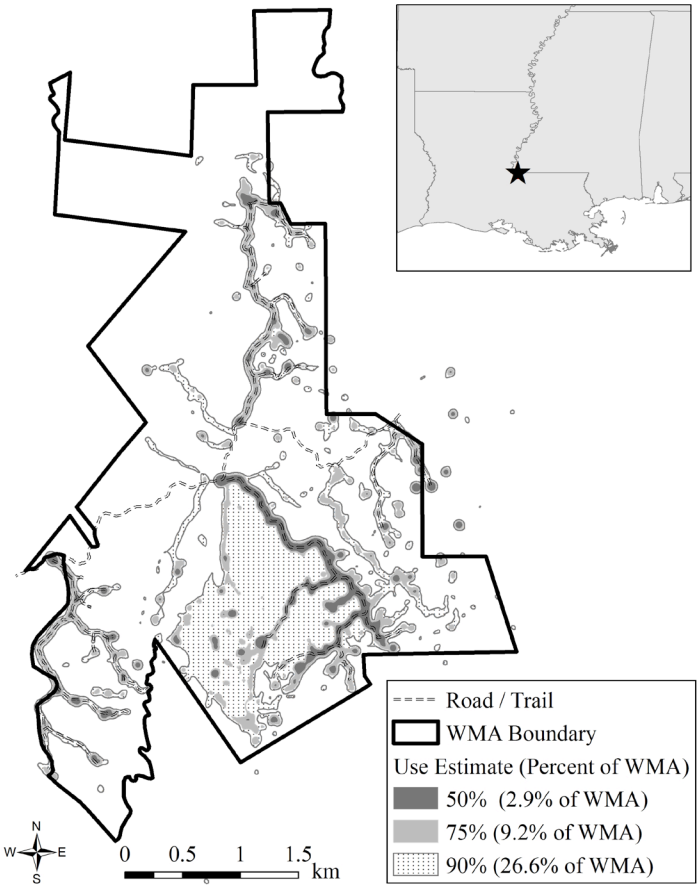

Figure 2. Isopleth-use polygons representing the areas containing 50%, 75%, and 90% of all turkey hunter locations from the Tunica Hills Wildlife Management Area (WMA) in West Feliciana Parish, Louisiana. Locations were taken every 30 sec with a handheld GPS unit that accompanied each hunter on the WMA.

served on areas with different terrain and habitats. Furthermore, public areas managed with lottery hunting likely witness hunter movements that are not typical of movements on areas with open-access hunting, and we did not partition our data between the lottery and open hunting periods. Nonetheless, we found that turkey hunters spent an average of approximately six hours in the field on each hunt, focusing much of their activity along roads and trails. Hunters traveled approximately 1.5 km during each hunt, but on average did not travel farther than 0.5 km from where they parked their vehicle. Collectively, this indicates that most turkey hunters on our study area moved along easy to access and navigate trails, listening and looking for signs of turkeys (e.g., gobbling). Likewise, previous studies have shown hunters to focus their activity near access roads and trails (Diefenbach et al. 2005, Keenan et al. 2008, Lebel et al. 2012). Diefenbach et al. (2005) concluded that 87% of white-tailed deer (*Odocoileus virginianus*) hunters stayed within 500 m of a road or trail, whereas Lebel et al. (2012) found that 80% of all deer hunter movements were within 100 m of a road or trail.

Previous research detailing movements of deer and ptarmigan (*Lagopus lagopus*) hunters noted that they had a spatially limited impact on their prey (Brøseth and Pedersen 2000, Lebel et al. 2012). Likewise, we found that most (75%) hunting activity occurred on less than 10% of the geographic area of Tunica Hills WMA; 50% of all hunter-GPS locations occurred on <3% of the WMA. This suggests considerable variability of harvest exposure across the landscape, wherein turkeys maintaining home ranges and core areas centered on hunter access points (e.g., roads, parking lots) likely experience a greater exposure to harvest. Conversely, turkeys maintaining home ranges, and particularly core areas, away from these areas likely experience much reduced exposure. However, the linkage between exposure to harvest and mortality risk may to some degree be mitigated for as individuals in hunted populations show behavioral adaptations to avoid hunting pressure (Naugle et al. 1997, VerCauteren and Hygnstrom 1998, Lebel et al. 2012,

Gross 2014). Nevertheless, differential exposure to predation risk (in the form of hunting pressure or hunter activity) may differentially affect individual turkey behavior and ecology, although this relationship is poorly understood. Gross (2014) noted considerable plasticity in how individuals male turkeys responded to hunting pressure on our study site.

Agencies managing hunter activities on public lands must balance challenges associated with ensuring hunter access and opportunity while attempting to ensure quality of hunting. Understanding hunter behavior, including how hunters move on the landscape, may allow agencies to better assess potential influences of hunter activity on quality of hunting. Our findings suggest that manipulating parking areas and access trails could perhaps increase the amount of public lands accessible to turkey hunters. Conversely, increasing hunter access could potentially result in unacceptable increases to harvest susceptibility for male turkeys on some public lands, particularly relatively small acreages like our study site. We recommend that future studies more specifically examine how hunting activity, hunter distribution, and hunter access influence turkey behavior and ecology. For instance, research that relates hunting pressure to potential for direct increases in individual mortality risk is sorely needed. Furthermore, studies should examine the possible effects of hunter activity and hunting pressure on turkey behavior and ecology across different habitats with differing intensities of hunting activity. This would help agencies quantify the impacts of hunting activity on turkey populations at local levels, and facilitate the improved management of public lands for sustainable turkey populations and hunting.

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