Movements of Wild Turkey Gobblers in Central Mississippi

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Abstract: The wild turkey (*Meleagris gallopavo*) is an important game species throughout the Southeast. While many long-term research projects have provided quantitative data on wild turkey ecology, information on daily gobbler movements is lacking. Because data on gobbler mobility may affect habitat and population management, we studied gobbler movements by radio-telemetry (N = 2,775 locations) on Tallahala Wildlife Management Area, Mississippi. Gobblers (N = 48) were monitored from 1 February 1989 through 30 September 1990 hourly from roost to 1200 hours (morning) and 1300 hours to roost (afternoon) during spring (1 Feb–31 May), summer (1 Jun–30 Sep), and fall/winter (1 Oct–31 Jan). Daily mean distance moved during the morning was 2,492 m for adults and 2,412 m for juveniles in spring 1989. Daily mean distances moved in the morning in spring 1990 by adults (1,228 m) and juveniles (955 m) were significantly (P <0.05) greater. During afternoon in spring, mean distances moved for adults and juveniles in 1989 were 2,457 m and 1,806 m, respectively, and 1,679 m and 1,526 m, respectively, in 1990. Mean distances moved in summer were significantly (P <0.05) less than those of spring for all periods and both age classes, except adults in the morning. Fall/winter movements of gobblers were significantly (P <0.05) less than those in spring or summer. Managers should consider distances moved and home range size when planning management strategies.

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Wild turkey populations have increased greatly in the Southeast during the past several decades resulting in a corresponding increase in number of turkey hunters. For example, number of turkey hunter-days in Mississippi increased from 8,694 in 1951 to 381,077 in 1987 (Steffen 1987). Private land owners as well as users of public lands have increased their interest in and demand for wild turkeys throughout the Southeast.

Information on gobbler home range size, habitat use, and survival rates is available (e.g., Brown 1980, Kelley et al. 1988, Godwin et al. 1991, Hurst et al. 1991, Godwin et al. 1992). Although sizes of annual and/or seasonal home ranges provide broad scale data on gobbler movements, precise information on seasonal and daily movements is lacking (Martin 1984, Smith et al. 1989). Many studies (e.g., Speake et al. 1975, Wigley et al. 1985, Godwin et al. 1992) have provided habitat management implications based on gobbler preference of specific stand types. However, without reliable information on gobbler mobility, habitat management recommendations would be tenuous at best. Additionally, large daily movements may affect turkey population management efforts on smaller wildlife areas. Therefore, we studied gobbler movements during morning and afternoon periods by season using radio-telemetry.

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Methods

The study area consisted of the Tallahala Wildlife Management Area (WMA), a 14,410-ha tract of the Bienville National Forest, and adjacent privately-owned lands in Jasper, Scott, Smith, and Newton counties, Mississippi. The area was 95% forested and was composed of mature (>50 years old) bottomland hardwood (30%), pine (37%), mixed pine-hardwood (17%) stands, and pine and hardwood regeneration areas (11%). Lobolly pine (*Pinus taeda*) was the dominant species. Fields (e.g., old field, pasture) occurred on private lands on the periphery of Tallahala WMA (Godwin 1991).

Gobblers were captured by cannon-net in summer (Jul–Aug) and winter (Jan–Mar) at permanent bait sites (N = 32) on gated U.S. Forest Service roads or food plots (Bailey et al. 1980). Gobblers received numbered and colored cattle ear tags affixed patagially, numbered metal leg bands, and a backpack style radio-transmitter. We determined age by tail fan contour, barring of primaries 9 and 10, and shape/size of the secondary patch (Williams 1981). All turkeys were released at their capture site. Males that had hatched during the spring just prior to the summer capture effort were considered too small to equip with a radio transmitter.

Gobblers were located by triangulation (Heezen and Tester 1967) from 2 telemetry stations (N = 275) using a hand-held 3-element directional Yagi antenna and a Telonics, Inc. (Mesa, Ariz.) TR-2 receiver. To assess telemetry system error, accuracy tests were performed during leaf-on and leaf-off seasons (Palmer 1990). Gobblers were located each hour during half-day periods: morn-

ing (roost to 1200 hours) and afternoon (1300 hours to roost). Individual gobblers were monitored randomly. If 2 or more radio-equipped gobblers were in the same flock, their movements may not have been independent, thus only 1 was monitored during a given observation period.

Distances between consecutive locations were calculated, and point-to-point distances were summed for each period. Kruskal-Wallis analysis of variance (Zar 1984) (alpha = 0.05) was used to test differences in average movement with gobbler age (adult or juvenile) and season as factors. Seasons were defined as: spring (1 Feb–31 May), summer (1 Jun–30 Sep), and fall/winter (1 Oct–31 Jan), and were based on gobbler behavior (e.g., breeding activities) and food availability.

Results

We monitored 48 gobblers from 1 February 1989 through 30 September 1990. Average telemetry system error was 7.2° (SD = 6.3) (Palmer 1990). Distances moved were determined from 2,775 telemetry locations. Numbers of observation periods (morning and afternoon) varied from 11–55 (spring), 8–26 (summer), and 43–44 (fall/winter) (Table 1).

No significant ($P > 0.05$) interaction was found between age and season effects on gobbler movements, 1989–1990. In 1989, there was no difference in distance moved by adults and juveniles. However, spring movements were significantly ($P < 0.05$) larger than summer movements and both spring and summer movements were significantly ($P < 0.05$) larger than fall/winter movements. In 1990, spring movements were generally larger than those during summer,

Table 1. Mean distances (m) moved by radio-equipped gobblers on Tallahala Wildlife Management Area, Mississippi, during half-day observation periods, 1989–1990.

			Season								
			Spring			Summer			Fall/Winter		
Year	Period	Age	$\bar{x}$	SE[a]	N[b]	$\bar{x}$	SE	N	$\bar{x}$	SE	N
1989	AM[c]	Ad.	2,492	1,152	51	1,687	1,170	26	1,192	1,117	44
		Juv.	2,412	1,350	11	1,077	438	8	—[d]		
	PM	Ad.	2,457	1,585	55	2,082	1,478	20	1,387	940	43
		Juv.	1,806	1,641	11	1,540	889	11	—		
1990	AM	Ad.	1,228	695	24	1,417	780	18	—		
		Juv.	955	465	12	727	451	12	—		
	PM	Ad.	1,679	621	20	1,222	447	17	—		
		Juv.	1,526	948	13	1,326	659	14	—		

[a]Standard error of the mean.
[b]N observation periods used in analyses.
[c]AM = morning, roost to 1200 hours; PM = afternoon, 1300 hours to roost.
[d]No data.

except for adults in the morning period, but no significant ($P > 0.05$) differences between seasons were detected. Adult movements were significantly ($P < 0.05$) larger than those of juveniles in summer.

Discussion

Mean distances moved by gobblers on Tallahala WMA during half-day (morning and afternoon) periods were larger than daily movements reported by Martin (1984) and Smith et al. (1989). However, differences in methods used to determine gobbler movements make between-study comparisons difficult. Martin (1984:19) calculated daily movements using the index "Linedist," which was defined as "the distance between midpoints of 2 lines that connect 3 consecutive fixes." Smith et al. (1989) obtained ≥3 locations/week on radio-equipped gobblers and determined distance traveled during 24-hour periods using a FORTRAN program which was not described. We believe that our hourly sampling scheme may provide a more reliable index of gobbler mobility throughout the diurnal period. Additionally, this method is clearly defined and would be conducive to future comparisons with gobbler movement data from other studies.

Gobbler sample sizes were small for some periods, but were larger than previous studies (e.g., Speake et al. 1975, Exum et al. 1987). High harvest rates on Tallahala WMA decreased sample sizes (Godwin et al. 1990) during some seasons.

Distances moved by gobblers may be affected by several factors including hen movements, food availability, weather, and land management. Greatest movements occurred during spring, which corresponds to when home ranges were largest (Godwin 1991). Increased movements during this season were probably related to breeding behavior. Williams (1981:107) stated that gobblers spent more energy on breeding activities than feeding during spring. Additionally, gobbler movements could have been affected by hen location. Hens on Tallahala WMA preferred mature bottomland hardwood forests throughout the year (Palmer 1990), whereas gobblers preferred this habitat only in spring (Godwin et al. 1992). Lastly, turkeys were hunted on Tallahala WMA from 18 March–1 May, and hunting pressure may have caused some gobblers to move greater distances during spring.

Availability and location of preferred foods (e.g., acorns) also may have affected both gobbler (Wigley et al. 1985) and hen movements. Gobbler movements during spring 1990, were approximately half of distances recorded in 1989. Relatively high (compared to 1988) numbers of acorns were available on Tallahala WMA during winter 1989–90, and acorns remained on the ground and occurred in gobbler crops throughout the 1990 spring hunting season.

Sex ratio and population density may affect gobbler movements. However, number of gobblers and hens on Tallahala WMA did not appreciably change from 1989 to 1990 (Lint et al. 1992), and home range size was not affected by gobbler density (Godwin 1991).

Based on subjective observations, shifts in weather patterns seemed to affect gobbler movements. Gobblers tended to exhibit greater mobility during changes in local weather. Also, gobbler movements may be affected by prescribed burning of mature pine stands in late winter. Gobblers readily moved to pine stands that had been burned recently. Number of years since a pine stand was burned affected gobbler use (Godwin et al. 1992) and may have affected movements. Future research needs to assess effects of weather and habitat management, primarily silvicultural practices, as they affect gobbler movements.

Flock composition and breeding status may affect distances moved. We did not always know number or age class of gobblers in flocks that contained radio-equipped gobblers, and flock composition changed frequently. During spring, movements of some gobblers were restricted when they were with hen flocks. Gobbler movements increased when most hens had started incubation.

Gobbler movement information should be considered when planning turkey population management strategies. Averaging data for both years, gobblers moved 1,772 m (5,814 ft) in the spring morning period and 1,867 m (6,126 ft) in the spring afternoon period. These large movements may result in gobblers leaving the management area during part or all of the spring hunting season. Subsequently, managers should be aware that gobblers may leave a relatively small managed area and be exposed to legal or illegal harvest on adjacent areas. Godwin et al. (1990) reported that 34% of gobblers captured on Tallahala WMA were off the area during the spring hunting season. Managers and private land owners often attempt to "hold" turkeys by providing supplemental food by plantings and feeders. However, the effects of food plots, feeders, habitat management, and silvicultural practices on gobbler movements need to be studied.

Past studies (e.g., Wigley et al. 1985, Godwin et al. 1992) have compared gobbler habitat use to availability, and provided recommendations on habitat management. Seasonal and daily gobbler movements, in addition to habitat preference data, should be considered when developing turkey habitat management plans.

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