

## Habitat Use by Wild Turkeys in Northwest Alabama

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*Abstract:* Seasonal habitat preferences for 74 wild turkey (*Meleagris gallopavo*) hens and 38 gobblers were studied using radio telemetry over a 5-year period in northwest Alabama. Sixty-seven nests of radio-instrumented hens were found; 54 were in mixed herbaceous, low, brushy habitats and 13 were in open hardwood forest. Improved grazed pastures were the preferred brood-rearing habitat for the 23 hens whose broods survived to 14 days of age. Small plots with little growing vegetation were primarily preferred by 15 unsuccessful hens with broods surviving <14 days. Spring habitat preferences in 77 hen and 36 gobbler ranges included pastures, creekbottom hardwoods, and wildlife openings. Summer habitat preferences in 50 hen and 37 gobbler ranges were pastures, creekbottom hardwoods, and wildlife openings. Winter habitat preferences in 56 hen and 32 gobbler ranges were creekbottom hardwoods and wildlife openings.

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Knowledge of the types, amounts, and distribution of preferred habitats is basic to proper management of the wild turkey (*Meleagris gallopavo*). Speake et al. (1975) noted that while turkeys tolerate a wide range of conditions, the majority of them select ranges with a diversity of habitat types. The highest population densities were also found on areas with a diversity of habitat types. The seasonal habitat use by a wild turkey population in northwest Alabama from January 1976 to October 1980 is presented in this paper.

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## Methods

The study area consisted of lands on and adjacent to the Thomas Wildlife Management Area in northwest Alabama and is on the intersection of the Coastal Plain and the westward extension of the Appalachian Plateau. The soils were of the Hartselles-Rockland, limestone-Hector series and the Flomaton-Smithdale-Rockland limestone series (Hajek et al. 1975). The topography was steep with narrow ridges and deep ravines. The area was well watered with numerous springs and 5 small creeks.

The range used by the turkey population under investigation was about 14,170 ha in the following types: 71.2% upland hardwoods, 10.4% creekbottom hardwoods, 5.1% loblolly pine (*Pinus taeda*) plantations less than 8 years since planting, 4.4% open-grazed pastures, 2.7% agricultural fields, 2.1% loblolly pine stands 18 to 23 years old established by Timber Stand Improvement (TSI) methods, 0.9% in powerline and gas pipeline rights-of-way (ROW), 0.3% in wildlife openings on the management area, 1.0% in 1- 5-year-old prescribed burned hardwoods, and 1.8% hardwood timber selectively harvested in 1975.

The area was stocked in 1945 with 39 wild-trapped turkeys (26 hens, 13 gobblers) from the state game sanctuary in southern Alabama. Turkey hunting was first allowed in the spring of 1961 on a gobbler-only basis but was suspended in 1970 after several years of declining harvest. The hunting season was reopened in the spring of 1978 for gobblers only. Based on sightings of marked and unmarked birds, the population increased from 1 per 142 ha to 1 per 58 ha during this study (Everett et al. 1980).

Everett et al. (1979) found that mean annual ranges for wild turkeys were 1,547 ha. Spring ranges, summer ranges, and winter ranges averaged 348, 714, and 783 ha, respectively for hens and 503, 665, and 973 ha, respectively, for gobblers.

Between January 1976 and April 1980, 99 wild turkeys (65 hens and 34 gobblers) were captured on the study area. Additionally, 9 hens and 4 gobblers, captured on the Fred T. Stimpson Sanctuary were released on the area between January and March 1976. Turkeys were captured with rocket-projected netting and alpha-chloralose treated baits and were instrumented with radio transmitters. Telemetry equipment and techniques were described by Everett et al. (1978). The use of solar-powered transmitters enabled monitoring the movements of some individuals for up to 3 years.

The minimum home range method (Mohr 1947) was used to delineate seasonal

ranges. Spring ranges were based on radio locations taken from 15 March to 31 May. Summer ranges were from 1 June to 30 September. The fall and winter seasons were combined because instrumented turkeys used the same cover types throughout the period 1 October to 14 March. Ranges of hens with broods were measured from hatching until September 30 or until all poults were lost, and the habitats used by the broods recorded.

Vegetation on the study area was analyzed in July 1977 (Everett 1982), after methods described by Phillips (1959). Habitat types were delineated and turkey ranges were plotted on maps of the study area.

Measurement of habitat parameters at next sites were performed when there was no danger of causing hens to desert their nests; usually after the eggs had hatched or the eggs had been eaten by a predator. As a measurement of cover density the farthest distance a nest could be seen from ground level up to 1 m was measured. Distances were measured to roads, fields, or other breaks in the vegetation that could be used as a travel lane. Crown closure by brush or trees above the nest site was estimated by an observer standing at the nest. The plants comprising the area within 1 m of the nest were listed and their relative importance determined by their percent coverage of the area. Other parameters noted were cattle grazing, distance to water, and flooding.

Habitat preferences in seasonal ranges were determined by a family of confidence intervals calculated about the actual number of telemetry locations that occurred in each habitat type (Neu et al.). The upper and lower confidence limits were compared with the expected number of locations based on the proportional area in each habitat type. Preference for a habitat type was indicated by a significantly greater use of a habitat type than the calculated expected value. A *t*-test was used to compare successful and unsuccessful hens with respect to distances moved from nest to initial brood range.

## Results and Discussion

### Nest Site Selection

Sixty-seven nests of radio-instrumented hens were found during the 5-year study in 8 habitats (Table 1). Improved pastures and agricultural fields were not used for nesting. Fifty-four (81%) of the nest sites were located so that the nest could not easily be seen by predators, especially from ground level up to 1 m. Of the 27 nests found in the mature upland and streambottom hardwoods, 14 were in dense patches of greenbriar (*Smilax bona-nox*) and huckleberry (*Vaccinium* spp.), and 13 of the nests in the open hardwoods were visible from more than 20 m away. Vegetative structure that hid the nest from view was best provided by mixed-herbaceous, low-brushy cover in the early stages of secondary succession or by plants providing a dense screen of cover from ground level up to about 1 m.

Many nests were in close proximity to a road, field, utility ROW, or other break in the vegetation that could be used as a travel lane or as both a travel lane and feeding area. Forty-eight (71%) of the nests were within 25 m of a travel lane,

**Table 1.** Nest habitats selected by radio-instrumented wild turkey hens on the Thomas Study Area, 1976–80.

Habitat Type	Percentage of Study Area	Nests (N=67)
Utility rights-of-way	0.9	21
Upland hardwood	71.2	20
Pine plantations	5.1	8
Creekbottom hardwood	10.4	7
18–23-year old pine plantations	2.1	6
2- & 5-year old burns	1.0	2
Wildlife openings	0.3	2
Timber harvested 1975	1.8	1
Open pastures	4.4	0
Agricultural fields	2.7	0

14 nests were within 100 m of a travel lane, and 5 nests were >100 m from a break in the vegetation (these 5 were in the open forest with little screening cover near the ground). Pine plantations used for nesting had access roads and utility ROW had roads beaten out by vehicles.

Crown closure was estimated to be <30% for 32 nest sites, 31%–60% for 9 nests, and 61%–100% for 26 nests. Only 6 nests were in forested pastures grazed by cattle, and 1 nest was in an area subject to flooding. Water was available within 0.8 km of any point on the study area and did not seem to be a factor in nest site selection.

The 5 most common herbaceous plants at nest sites were greenbriar, blackberry (*Rubus argutus*), panic grasses (*Panicum* spp.), broomsedge (*Andropogon virginica*), and the legume, *Clitoria mariana*. The 5 most common woody understory plants around nests were blackgum (*Nyssa sylvatica*), tree sparkleberry (*Vaccinium arboreum*), dogwood (*Cornus florida*), persimmon (*Diospyros virginiana*), and white oak (*Quercus alba*).

The few openings scattered throughout the large tract of mature upland hardwoods on our study area and the heavy cover selected by turkey hens for nesting were provided by man's activities—farming, tree planting, burning, ROW maintenance, and timber harvest.

### Brood Range

Forty-one broods were hatched by radio-tagged hens. The peak of hatching occurred between 22 May and 28 May (Everett et al. 1980). Thirty-eight broods were monitored to determine habitat use but only 23 broods survived until 14 days of age. The average composition of cover types in the 23 brood ranges were: upland hardwoods (68.9%), pastures (11.4%), 18- to 22-year-old pine stands (2.5%), creek-bottom hardwoods (7.4%), recently cutover upland hardwoods (1.4%), agricultural fields (1.8%), wildlife openings (1.5%), prescribed burns (1.1%), utility ROW (0.8%), and pine plantations (3.4%).

Brood habitats preferred by the 23 hens whose broods survived to 14 days of age were improved pastures, cutover hardwoods, wildlife openings, and utility ROW. Upland hardwoods were avoided (Table 2). Creekbottom hardwoods and 18- to 22-year-old pine woods were used but were not preferred. Hens with broods moved away from nest sites in the most direct route to pastures, wildlife openings, or fields, apparently as soon as the newly hatched poults were ready to travel. There was no significant difference ( $P = 0.35$ ) in the initial distance moved from the nest to the first brood range between hens that raised poults and those that did not. The longest initial movement was 4.8 km in 2 days. Most broods moved 0.8 km to 3.2 km in 1 day and only in the case above did the first movement from a nest to brood range take more than 1 day.

Grazed pastures were the most preferred brood rearing habitat and were located along creekbottoms. These pastures were grazed by cattle as were the adjacent upland and creekbottom hardwoods. Pastures were generally heavily grazed and the grasses kept short. Broods using pastures were often found along the border between the forest and pasture. Hardwood stands around pastures were relatively open due to grazing but sunlight penetrated into the forest along the pasture edge and stimulated herbaceous ground cover.

The area where timber had been selectively cut in 1975 was used by 3 broods for part of a summer before they moved to pastures. Logs were pulled to loading sites by mules resulting in less slash, less damage to the remaining forest, and less soil disturbance than would have resulted by mechanical harvesting. Timber removal opened the canopy and stimulated growth of ground cover.

Powerline ROW were used for 1-day to 2-day periods by several of the broods,

**Table 2.** Comparison of habitat types used by 23 radio-instrumented wild turkey hens that raised poults to 14 days of age (Successful) and 15 hens whose poults failed to reach 14 days of age (Unsuccessful) on the Thomas Study Area, 1976–1980. Observed values are the actual number of radiofixes in each habitat type. Expected values were calculated from the average percent of each habitat type in brood ranges used by successful and unsuccessful hens.

Habitat type	Successful Hens		Unsuccessful Hens	
	Observed	Expected	Observed	Expected
Pine plantations	12	19	0	0
Wildlife openings	29 <sup>a</sup>	8	38 <sup>a</sup>	9
18–23-year old pines	22	14	1	1
Creekbottom hardwoods	88	42	10	9
Prescribe burns	10	6	0	0
Agricultural fields	6	10	0	1
Upland hardwoods	155 <sup>a</sup>	397	38 <sup>a</sup>	72
Pastures	183 <sup>a</sup>	66	12	4
Timber harvested 1975	24 <sup>a</sup>	8	0	0
Utility rights-of-way	47 <sup>a</sup>	4	1	0

<sup>a</sup>Observed and expected differ ( $P < 0.10$ ) using Bonferoni normal statistics with Chi-square analyses.

usually as they moved to an improved pasture. The ROW were mowed in the winter of 1976 and, except for the following spring and summer, were covered by dense vegetation. A gas pipeline was used by 4 broods and was mowed annually maintaining the ROW in herbaceous plants, primarily grasses. It is believed the pipeline ROW would have been used more, but it was on the very edge of the range used by this turkey population and improved pastures were more centrally located.

The average composition of cover types in the ranges of 15 hens whose poults failed to survive to 14 days of age were: upland hardwoods (72%), wildlife openings (9%), improved pastures (4%), creekbottom hardwoods (9%), and 18- to 23-year-old pines (4%). The brood habitat preferred by these hens was wildlife openings on the Thomas Wildlife Management Area. These openings were generally within the winter turkey range and were nearer to nesting habitat than were improved pastures. Therefore, they were easily accessible for newly hatched broods. These openings were plowed and planted in annual rye grass each fall and by late spring the rye grass was rank, had mature seed, and there was little apparent food for turkeys. Two hens whose broods failed to survive used grazed improved pastures as brood range.

In another effort to determine how brood habitat quality affects poult survival, we found that 10 hens raised only 11 of 94 (12%) poults to 14 days of age when they used wildlife openings and the adjacent hardwood forest. However, 20 hens with 201 poults primarily used grazed improved pastures and the adjacent grazed forest and raised 68 (34%) of their poults to 14 days of age. We did not have accurate counts on the other 8 broods due to hens combining their broods.

### Spring Ranges

Spring habitat preferences in 77 hens and 36 gobbler ranges were determined from 15 March to 31 May (Table 3). Hens showed a preference for pine plantations, wildlife openings, utility ROW, creekbottom hardwoods, and pastures. All radio locations in the pine plantations and utility ROW were of nesting hens. Gobblers preferred creekbottom hardwoods, wildlife openings, and improved pastures. Both sexes showed less than expected use of upland hardwoods. Average gobbler spring range had 73% in upland hardwoods and hen ranges averaged 66% in that habitat type. Forty-seven percent of the hen radio locations and 39% of the gobbler locations were in upland hardwoods.

The preference of hens for pine plantations and utility ROW was expected because of the occurrence of mixed herbaceous, low, brushy undergrowth that was preferred for nesting. Though wildlife openings were sought out by both sexes, use of individual plots varied depending on their condition. During the first year of the study, 1 field contained a chufa (*Cyperus esculentus*) patch with a good crop of tubers that attracted considerable turkey use. Three small (<0.3 ha) plots of clover (*Trifolium repens*) were also heavily used. Other wildlife openings were used to a lesser extent, mainly because they were not maintained in preferred vegetation. Eight percent and 11% of the radio locations of hens and gobblers, respectively, were in wildlife openings. Use of these openings by hens decreased later in the spring as they began to nest but gobblers continued occasional use into early summer.

**Table 3.** Habitat use by wild turkeys on the Thomas Study Area, Alabama, 1976-80, presented as the ratio of observed to expected locations in each habitat type; numbers larger than 1.0 indicate more than expected use. P indicates preferred habitat and A indicates avoided habitat using Bonferroni normal statistics with Chi-square analyses and  $P < 0.10$ .

Season	Habitat Type									
	Pine Plant	Wildl Opening	Pine 18-23 yrs	Hardwood Creek Bottom	Prescribe Burn	Agric. Fields	Upland Hardwood	Pasture	Harvest 1975	Utility ROW
Spring										
77 hens	1.7P	2.2P	1.3	1.6P	0.4A	1.0	0.7A	2.6P	0.6A	4.2P
36 gobblers	1.0	2.8P	0.9	2.5P	0.3A	0.5	0.5A	6.0P	2.0	15.0P
Summer										
50 hens	1.5	1.8P	0.9	1.6P	0.8	0.4	0.5A	3.9P	1.1	4.3P
37 gobblers	0	3.3P	0.3A	1.4P	0.3A	3.5	0.5A	6.0P	0.3A	8.9P
Fall-Winter										
56 hens	0.8	2.8P	1.2	3.1P	1.1	2.6P	0.7A	1.3	0.8	2.7P
32 gobblers	0.3A	3.2P	1.5	3.4P	1.1	1.0	0.7A	1.4	1.6	3.0

Creekbottom hardwoods that were used during the early spring were in large areas of upland hardwoods, but later in the spring both sexes tended to move into creekbottoms near grazed pastures. During the spring, creekbottoms contained a greater variety of herbaceous plants and thus had earlier "greens" than upland hardwoods (Everett 1982). Creekbottoms also had a greater variety of mast producing trees than the uplands. Use of pastures increased as the spring season progressed. In general by late spring, hens without poult and gobblers had moved out of large forested areas to the vicinity of pastures.

### Summer Ranges

Summer habitat use was determined in 50 hen and 37 gobbler ranges for 1 June to 31 September (Table 3). Hens used all 10 habitat types but showed preferences for wildlife openings, creekbottom hardwoods, pastures, and utility ROW. Gobblers used all 10 types but preferred wildlife openings, creekbottom hardwoods, pastures, and utility ROW. Upland hardwoods made up 72% of the average gobbler range and 69% of the average hen range, while 38% and 34% of the radio locations for gobblers and hens, respectively, were in this habitat type. All radio locations of hens in pine plantations were for nesting hens, but ROW were used for both nesting and brood rearing. Use of utility ROW by nesting hens during the summer was continuation from the spring because the nesting season overlaps the spring and summer seasons.

Use of wildlife openings by hens declined as the hens nested and moved to pastures and associated grazed woodlands. Gobblers continued to use wildlife openings later into the summer than hens but usually by the end of July had moved to the vicinity of grazed pastures. By mid-June, annual rye grass planted on most wildlife openings had seeded out and the stems were dead, creating a field of standing dead grass. One notable exception showed the possibilities of wildlife openings for summer range. During May of the second year of the study, the manager of Thomas Wildlife Management Area plowed 1 of the wildlife openings and planted Bahia grass (*Plaspalum notatum*). This did not germinate but a luxuriant growth of crabgrass (*Digitaria sanguinalis*) covered the entire plot and several radio-tagged hens and gobblers and an unmarked hen with a brood used the plot regularly during July and August. This plot was within 0.5 km of a grazed pasture that the same turkeys were also using. Turkey droppings in the field indicated a diet high in crabgrass seed and insects.

Grazed pastures on private lands appeared to be very important to this turkey population. Pastures made up 9% of the typical hen summer range but 34% of the radio locations were there. Only 4% of the average gobbler summer range was in pastures but 25% of the gobblers' radio locations were there. Speake et al. (1975) recommended that a management area for turkeys have from 12% to 25% in well dispersed openings. We agree strongly with this, and note that the state management area has only about 2% openings and that these are not maintained in legumes and summer grasses for spring-summer brood range. The majority of the turkeys consequently moved to open pastures on private land.



Creekbottom hardwoods used during the summer were those bordering open pastures. These woods were also grazed by cattle, creating an herbaceous understory. Turkeys used these woods for feeding, loafing and as escape cover when feeding in open pastures.

### Winter Ranges

Winter habitat preferences were determined in 56 hen and 32 gobbler ranges from 1 October until 14 March (Table 3). Chi-square analysis showed that hens preferred wildlife openings, creekbottom hardwoods, agricultural fields, and utility ROW. Gobbler preferences were creekbottom hardwoods and wildlife openings.

During the 3 winters of the study acorn crops were abundant in both upland and creekbottom hardwoods. Acorns usually began to fall in late September and early October. Habitat used by turkeys shifted from pastures to hardwood forests at this time. Twenty-three percent of the gobbler and 21% of the hen winter radio locations were in creekbottoms. Seven percent of the average hen and gobbler ranges were in creekbottoms. Creekbottom hardwoods used in winter were generally not associated with pastures but were within the large areas of upland hardwoods.

Upland hardwoods were used less than expected. Seventy-nine percent of the typical gobbler winter range and 76% of the typical hen winter range were in this habitat type, but only 56% of the hen and 53% of the gobbler radio locations fell in this habitat type. Statistical analysis of the data showed this habitat type to be "avoided", i.e., it was used significantly ( $P < 0.10$ ) less than predicted based on its availability. However, the upland hardwoods were very valuable for mast production to this turkey population in winter and over half the observations of both sexes were in this habitat type.

### Management Implications

Radio-tagged wild turkeys in this study utilized a variety of habitat types. Definite movements to preferred seasonal habitats were documented. In spring and summer, the birds moved away from the area of extensive hardwood forest to find openings with short grasses for feeding and brood rearing. In winter they returned to the mature hardwood forest. Absence of adequate brood range interspersed with the wintering and nesting habitat appears to be a serious limiting factor for this population. Existing wildlife openings within the extensive hardwood forest should be enlarged and new ones created where possible to reduce movements of wild turkeys in spring and summer and to reduce distances hens with poults must move to brood-rearing ranges. An increase from the present 2% to at least 10% would be an attainable goal. Openings should be maintained in short grasses such as bahia grass, crabgrass or bermuda grass (*Cynodon* spp.) and clovers. Creation of a less abrupt ecotone between the wildlife openings and mature forest would benefit turkeys and improve conditions for other wildlife on the area. This ecotone could be created by thinning trees along field borders and by allowing herbaceous plants and brush to grow. It would provide additional nesting and escape cover, and a variety of wildlife food plants.

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