

## Brood Habitat Use and Preference by Wild Turkeys in Central Mississippi

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*Abstract:* Brood habitat use and preference by eastern wild turkey hens (*Meleagris gallopavo silvestris*) were studied by radio telemetry in central Mississippi in 1984 and 1985. Habitat use and preference were determined for 11 broods in the 1–14 days age group and 8 broods in the 1–84 days age group. Mature bottomland hardwood forests with a continuous canopy, sparse shrub and understory, and moderate herbaceous (grasses, forbs, vines, sedges) ground cover were highly preferred ( $P \leq 0.05$ ) brood habitat for both age periods. Mature pine (*Pinus spp.*) stands and pine or hardwood regeneration areas  $>1$  year were avoided. Use of fields or burned pine stands was low and was influenced by their location in reference to preferred habitat.

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To maintain a wild turkey population in Mississippi with increasing demands on the resource and habitat base, comprehensive, data-based management plans must be developed. Reproductive success was found to be related to brood habitat availability (Everett et al. 1980, 1985). Habitat types and structural characteristics of early brood range affected poult feeding activity and may have affected survival (Healy 1985). Therefore, this study was undertaken to determine habitat use and preference by wild turkey broods in Mississippi.

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## Methods

### Study Area

The study area was in the Tallahala Wildlife Management Area (TWMA) in the Strong River District, Bienville National Forest, Mississippi. The area was 16 km southeast of Newton, Mississippi, in the Blackland Prairie Soil Resource Area (Pettry 1977). Mature (>45 years) pine stands, dominated by loblolly pine (*P. taeda*), comprised more than 50% of the area. Basal area averaged 15 m<sup>2</sup>/ha. Commercial thinning and winter prescribed burning were conducted at 10- and 6-year intervals, respectively. Loblolly pine plantations (1–6 years) averages 18 ha in size and were distributed throughout the study area.

Mature (65 years) bottomland hardwood stands occupied 25% of the area and had an average basal area of 19 m<sup>2</sup>/ha. Stands had a continuous canopy and a moderate herbaceous stratum, but sparse shrub and understory strata. Hardwood stands, dominated by oaks (*Quercus* spp.), hickories (*Carya* spp.), and sweetgum (*Liquidambar styraciflua*), occurred on the broad alluvial plains which flooded periodically during late winter and/or early spring. Hardwood management was limited. A few small stands were harvested and regenerated by either coppice or shelterwood methods. Pastures, hay fields, and soybean fields were found only on the periphery of the area.

Hardwood stands had moderate ground cover (65%) which was dominated by poison ivy (*Rhus radicans*) and Virginia creeper (*Parthenocissus quinquefolia*), sedges (*Carex* spp.), grasses (*Panicum* spp.), and forbs. Ground cover in the pine stands averaged 35% and was dominated by young woody vegetation (oaks, sweet gum), poison ivy, and grape (*Vitis* spp.). Ground cover was 60% in pine stands that had been prescribed burned, and the percent cover by forbs increased while woody plant coverage was lower than in unburned stands. The young pine and hardwood regeneration areas had dense ground cover (70%) dominated by forbs (*Eupatorium* spp.). Older regeneration areas had almost 100% ground cover dominated by woody vegetation (Phalen 1986).

### Data Collection and Analysis

Turkeys were captured by drugging them with alpha chloralose (Williams et al. 1966) or cannon-netting (Bailey et al. 1980). Hens were marked with patagial wing tags (black cattle ear tags with white numerals), numbered leg bands, and radio transmitters. Transmitters were solar powered (80 g) or battery powered (75 g).

Turkey locations were determined by triangulation using hand-held three-element directional yagi antenna. To decrease time lapse between paired consecutive telemetry readings and to decrease possible disturbance of turkeys, most telemetry stations were located on Forest Service (FS) roads.

Brood habitat types were classified as mature pine (PT), first-year burned mature pine (BPT), 1 year old pine regeneration (PRT), mature hardwood (HT), 1

year old hardwood regeneration (HRT), >1-year old hardwood and pine regeneration (RT), and field (FT). To determine brood habitat use, attempts were made to locate hens with broods by telemetry on the following schedule for each brood age period: (1) 1–14 days, hourly, 6 days/week; (2) 15–28 days, bihourly, 6 days/week; and (3) 29–84 days, 3 times/day, 3 days/week. Habitat types used were determined by plotting hen/brood locations and overlaying them on aerial photographs.

To obtain an additional data set on brood habitat use, project personnel recorded all broods seen while driving on the area and recorded the habitat type on both sides of the road where the observation occurred.

Available habitat for use by hens with broods was considered to be the entire study area where bait sites (2/section) were placed and hens were caught, and a zone of influence surrounding the area. The zone of influence was determined by calculating yearly home ranges (Mohr 1947) for hens ( $N = 11$ ) on the area, determining the north-south and east-west widths (km) of all home ranges, and extending the area boundary by the average width of the home ranges. Available habitat for broods observed along roadsides was determined by the proportion of roadside in each habitat type. Telemetry locations with  $x$  and  $y$  coordinates were generated using a modified TELEM program (Koeln 1980). Preference ( $P \leq 0.05$ ) was determined using the Preference Assessment Program (Johnson 1980).

## Results

A total of 47 hens was radio-tagged. Analyses of habitat use and preference were performed on data from 11 broods for age 1–14 days and 8 broods for age 1–84 days. All broods were with adult hens. Locations used in the analyses averaged 77 (40–126 range), 61 (15–124), and 98 (64–146) per brood during age periods 1–14, 15–28, and 29–84 days, respectively.

Available habitat for all the hens with broods was calculated to be 9,665 ha. The PT was the most prevalent available habitat (52% in 1984 and 56% in 1985), followed by the HT (25% in both years), RT (10% in 1984 and 8% in 1985), BPT (8% in 1984 and 4% in 1985), FT (5% in both years), and PRT and HRT (<1% in both years).

The HT received the most use by all but 1 brood during age 1–14 and 1–84 days in 1984 and 1985 (Tables 1, 2). The PT was the only other habitat type that received substantial use by more than 1 brood.

Brood habitat use for the age 1–14 days (1984 and 1985 combined) was different from expected use, based on availability ( $P < 0.005$ ). PRT and HT were preferred more than the RT and PT (Table 3). High rankings for PRT and BPT were influenced by high use of a low available habitat type by a single brood. FT and HRT were excluded from analysis because of low availability and low use. The PT, which was preferred less ( $P \leq 0.05$ ) than the HT, received greater than expected use by 1 brood (Fig. 1). Likewise, the HT received greater than expected use by all except 1 brood.

**Table 1.** Habitat types used (%) by radio-tagged wild turkey hens with broods aged 1–14 days in Tallahala Wildlife Management Area, Mississippi, 1984–1985.

Year	Hen/brood <i>N</i>	Habitat types						
		PT <sup>a</sup>	BPT	PRT	RT	HT	HRT	FT
1984	1	12	0	0	4	84	0	0
	4	12	0	0	0	88	0	0
	6	14	57	0	0	29	0	0
	7	45	0	0	5	49	0	6
	8	0	0	0	0	95	5	0
1985	4	21	0	14	0	66	<sup>b</sup>	0
	29	0	0	0	3	97		0
	36	0	0	0	4	96		0
	37	11	0	0	4	85		0
	62	14	0	0	0	86		0
	63	76	0	0	0	24		0

<sup>a</sup>PT = mature pine type, BPT = burned mature pine, PRT = 1-year-old pine regeneration, RT = >1-year-old hardwood and pine regeneration, HT = mature hardwood, HRT = 1-year-old hardwood regeneration, FT = fields.

<sup>b</sup>Habitat type was not available.

**Table 2.** Habitat types used (%) by radio-tagged wild turkey hens with broods during the entire brood season (1–84 days) in Tallahala Wildlife Management Area, Mississippi, 1984–1985.

Year	Hen/brood <i>N</i>	Habitat types						
		PT <sup>a</sup>	BPT	PRT	RT	HT	HRT	FT
1984	4	15	0	0	8	71	6	0
	6	38	21	0	4	37	0	0
	7	45	0	0	0	30	0	25
	8	7	0	0	5	84	4	0
1985	29	1	0	1	3	95	<sup>b</sup>	0
	36	1	0	1	4	93		0
	62	61	0	0	3	35		1
	63	44	0	0	1	54		1

<sup>a</sup>PT = mature pine type, BPT = burned mature pine, PRT = 1-year-old pine regeneration, RT = >1-year-old hardwood and pine regeneration, HT = mature hardwood, HRT = 1-year-old hardwood regeneration, FT = fields.

<sup>b</sup>Habitat type was not available.

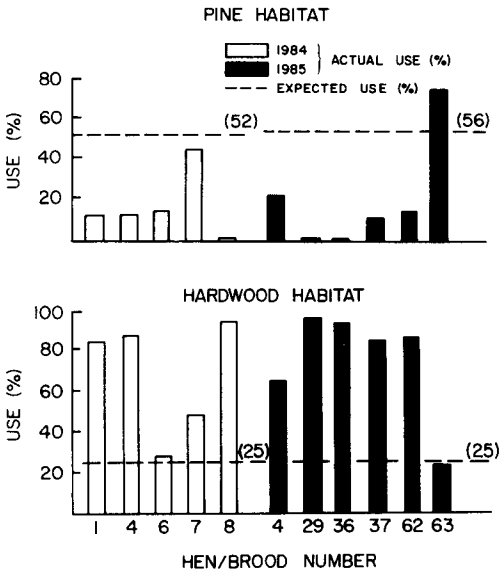
Habitat use for the entire brood season (1–84 days) was found to be different from expected use based on availability ( $P \leq 0.05$ ). HT was most preferred, and RT and PT least preferred (Table 3). High preference of FT and BPT was influenced by high use of a low available habitat type by a single brood. As with the brood period 1–14 days, HT was preferred ( $P \leq 0.05$ ) more than the PT for the entire brood period (1–84 days). All broods used the HT more than expected, while only 1 brood used the PT more than expected (Fig. 2).

Observations ( $N = 43$ ) on roadsides indicated brood habitat preference similar to telemetry results. Broods showed high performance (80%) for the HT by using it >5 times the expected use (14%). PT use (13%) was below expected use (74%).

**Table 3.** Habitat type preference by radio-tagged wild turkey hens with broods during each brood age period in Tallahala Wildlife Management Area, Mississippi, 1984–85.

Age period (days)	Preference (ranks <sup>a</sup> )				
	1	2	3	4	5
1–14	<u>PRT<sup>b</sup></u>	<u>HT<sup>c</sup></u>	BPT	RT	PT
1–84	HT	FT	BPT	<u>RT</u>	<u>PT</u>

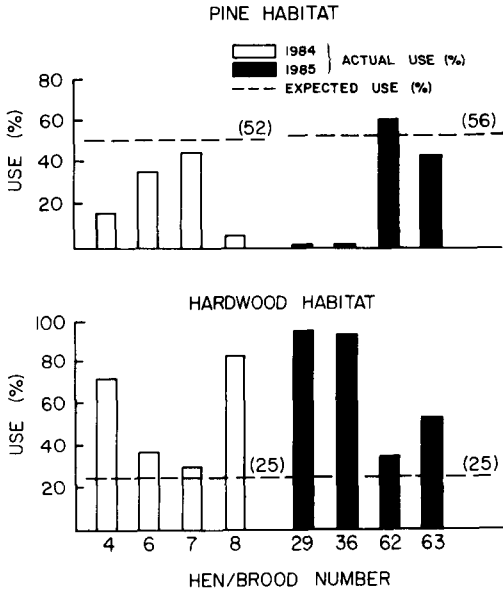
<sup>a</sup>Relative preference decreases as ranks increase.  
<sup>b</sup>PT = mature pine type, BPT = burned mature pine, PRT = 1-year-old pine regeneration, RT = >1-year-old hardwood and pine regeneration, HT = mature hardwood, HRT = 1-year-old hardwood regeneration, FT = fields.  
<sup>c</sup>Habitat types underscored by the same line were not different ( $P > 0.05$ ).



**Figure 1.** Actual and expected use of mature pine and mature hardwood habitat types by radio-tagged wild turkey hens with broods during the brood age 1–14 days in Tallahala Wildlife Management Area, Mississippi, 1984–1985.

**Discussion**

The bottomland hardwood forest type (HT) was found to be preferred brood habitat. Most radio-tagged hens on Tallahala WMA nested in mature loblolly pine forests or pine regeneration areas (2–6 years), and upon hatching moved to HT (Phalen 1986). Bottomland hardwood forests previously have not been reported to



**Figure 2.** Actual and expected use of mature pine and mature hardwood habitat types by radio-tagged wild turkey hens with broods during brood age 1–84 days in Tallahala Wildlife Management Area, Mississippi, 1984–85.

be preferred brood range. Hillestad and Speake (1970), Hon et al. (1978), Pack et al. (1980), and Everett et al. (1985) found that brood range consisted of openings, old fields, grazed pastures, oak-pine, and pine forests. Williams et al. (1973) found that cypress (*Taxodium distichum*) woods were preferred early brood range in Florida. The cypress woods and HT were similar in that both had moderately dense herbaceous ground cover that resembled that of an open field habitat. The above studies and others (Healy 1985, Metzler and Speake 1985) emphasized that brood habitat preference was dependent on structure and composition of ground layer vegetation.

The HT was not typical bottomland hardwood forests, but were old-growth, even-aged, undisturbed forests. The Forest Service obtained ownership of the land in 1935 and basically has practiced custodial management. Forests were clearcut in 1918–1922. The main canopy has excluded development of other hardwood strata. Intensive domestic animal grazing, over-browsing by white-tailed deer (*Odocoileus virginianus*), and late winter and/or early spring flooding also may have contributed to development of HT. Due to the forest's deciduous nature, the herbaceous layer begins its growth in late winter and provides an abundance of green forage for turkeys. This same vegetation layer may account for the brood habitat preference.

The least preferred habitat types for broods were pine stands, and both pine and hardwood regeneration areas >1 year old. These habitats had much more woody vegetation in the ground layer than the bottomland hardwood. Pybus (1977) found that increased woody vegetation was related to lower preference for brood habitat in West Virginia. Victor (1981) reported that dense cover in pine regeneration areas restrained feeding on invertebrates by poults.

Hon et al. (1978) found that hens with broods selected burned areas, and Hurst (1978) reported that total animal foods eaten by poultts were higher on burned pine stands than on stands not burned. In the present study, only 1 brood preferred burned pine forest. This brood used a burned pine stand which was adjacent to more preferred brood habitat, HT. Location of the burned stand probably influenced its use.

A similar situation was found with the field habitat, which was limited on the area. Fields received high use by 1 brood where the fields were located next to the highly preferred brood habitat, HT. This suggests the importance of juxtaposition of habitat types.

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