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# DISPERSAL AND ADJUSTMENT TO HABITAT OF RESTOCKED WILD TURKEYS IN GEORGIA[1]

*by*
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## ABSTRACT

Range parameters of 16 wild turkeys (*Meleagris gallopavo*) restocked in a Georgia Piedmont habitat were evaluated following early spring releases. Turkeys were tracked by radio telemetry. On 152 occasions, they were radio-located every two hours all day; other radio and visual locations were determined randomly for a total of 1,850. Turkeys were released in what was considered to be the best habitat; their activities remained oriented around that area throughout the study. Ranges increased throughout the study and turkeys had adjusted to their environment within five weeks after release. Maximum distances traveled from the release point averaged 2.82km (1.76 mi) and varied from 1.17km to 4.62km (0.73 to 2.89 mi) with gobblers generally moving farther than hens. Ranges varied from 90.4 ha to 952.4 ha (226 to 2381 acres) with an average of 376 ha (940 acres). There was a continuous shifting of social groupings during the study.

## INTRODUCTION

Many state game agencies have successfully transplanted wild turkeys in recent years. Although successful restocking efforts have been reported (Powell 1965, Speake et al. 1969, 1975, and others), immediate post-liberation behavior of turkeys released into a new environment has not been intensively studied. This paper includes information on 16 wild turkeys restocked in a Georgia Piedmont habitat where no native turkey population was thought to be present at the time of release.

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## STUDY AREA

The 6,000-ha (15,000-acre) study area consisted of the 1,200-ha (3,000-acre) Central Georgia Branch Experiment Station and the 4,800-ha (12,000-acre) Bishop F. Grant Memorial Forest (BFG), located in the Piedmont physiographic region of Georgia (Fig. 1). Elevation varies from about 128m (420 ft) to 190m (620 ft) with small streams that drain into larger rivers; and the habitat is approximately 73 percent upland pine, 7 percent upland hardwood, 10 percent bottomland hardwood, and 10 percent openings. The openings include 480-ha (1,200 acres) of improved pasture and about 126 ha (315 acres) of agricultural clearings and abandoned fields.

Yearly rainfall averages about 129.5cm (51 in) with maximum rainfall occurring during late winter and mid-summer. Average maximum and minimum temperatures over the 10-year period from 1959 through 1968 were 9.8°C (49.7°F) and −0.7°C (30.7°F) for January, and 28.0°C (82.5°F) and 18.1°C (64.5°F) for July.

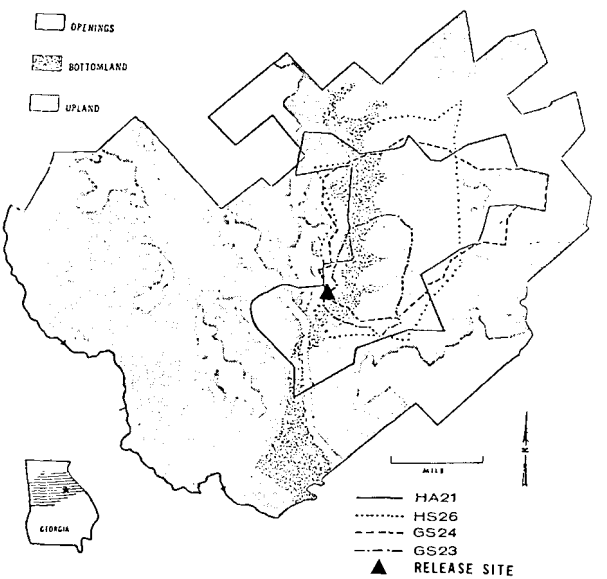


Figure 1. Ranges of four turkeys tracked during spring and early summer. Note the overlapping. Hatched area is Piedmont; inset star is study area located in Putnam County, Georgia.

## MATERIALS AND METHODS

All birds were captured with cannon nets (Austin 1965) from wild populations in Georgia and moved at least 40 miles to the release site. Prior to release, individuals were marked on both wings with colored nylon coated vinyl patagial tags (Knowlton et al. 1964). The turkeys were fitted with transmitters in the 27 and 150 MHz frequency ranges and powered by mercury batteries having a life expectancy of 130 days. Actual life varied from one to 115 days. Two receivers were used. Both were 12 channel, crystal-controlled, portable units; a 27 MHz unit was manufactured by Differential Electronics, Inc. (no longer in business) and a 150 MHz series "W" unit make by Davidson Company, 2415 Glenwood Ave., Minneapolis, Minn. 55405. Two types of antennae were used; a hand-held, 209cm loop for the 27 MHz equipment and a hand-held three element yagi for the 150 MHz unit. Methods of transmitter attachment and use of telemetry equipment were similar to that described by Williams et al. (1968:23).

Radio locations were recorded every two hours (Eastern Standard Time) all day. Movements between sequential radio locations were calculated as a straight line and should be considered minimal. Signal directions were determined with a magnetic compass and plotted on maps by triangulation. Range and analyses were patterned after Marchinton (1969:154-157) and Harvey and Barbour (1965:389-402).

Dispersal is often referred to as the distance traveled from a capture and/or release site, or a center of seasonal activity, but in this paper is defined as the distance from the release site at a given point in time.

## RESULTS AND DISCUSSION

*Travel after Release*

The 16 turkeys were released at the same site in the afternoon between 1300 and 1600 on different days (Table 1). Some flew and alighted in trees where they remained until the following morning. Most turkeys moved on the ground no farther than 0.40km (0.25 mi) away from the release site before roosting the first night. However, two turkeys roosted 0.59 and 0.99km (0.37 and 0.62 mi) from the release site. Direction of initial travel may have been influenced by cover. Thirteen turkeys moved eastward on the day after release; three which had flown west initially, circled back eastward during the next day. Any direction other than eastward necessitated crossing large open areas (150-200m) of improved pasture.

Table 1. Summary of movement parameters of 16 wild turkeys restocked in a Georgia Piedmont habitat.

| *Turkey* | *Release Date* | *No. of Days Studied*[a] | *No. of Tracking Days* | *No. of Radio Locations* | *Minimum Range*[a] *ha* | *acres* | *Range Length km* | *miles* | *Maximum Dispersal km* | *miles* |
|---|---|---|---|---|---|---|---|---|---|---|
| GS23 | 3-16-72 | 115 | 115 | 367 | 205 | 512 | 2.26 | 1.41 | 2.00 | 1.25 |
| GS24 | 3-16-72 | 114 | 114 | 308 | 660 | 1650 | 4.42 | 2.76 | 4.62 | 2.89 |
| GS9 | 3-24-71 | 72 | 21 | 18 | 394 | 985 | 3.44 | 2.15 | 3.73 | 2.33 |
| GA13 | 3-20-71 | 38 | 38 | 30 | 280 | 700 | 3.79 | 2.37 | 2.64 | 1.65 |
| | Average | 85 | 72 | 181 | 385 | 962 | 3.47 | 2.17 | 3.25 | 2.03 |
| HA21 | 3-22-72 | 108 | 108 | 477 | 892 | 2231 | 6.19 | 3.87 | 4.50 | 2.81 |
| HS26 | 4-05-72 | 83 | 83 | 353 | 807 | 2018 | 4.75 | 2.97 | 4.02 | 2.51 |
| HS12 | 3-12-71 | 85 | 85 | 55 | 129 | 322 | 1.92 | 1.20 | 1.66 | 1.04 |
| HA8 | 2-19-71 | 62 | 62 | 54 | 129 | 322 | 1.92 | 1.20 | 1.66 | 1.04 |
| HS11 | 3-12-71 | 85 | 85 | 50 | 120 | 300 | 1.66 | 1.04 | 1.82 | 1.14 |
| HA10 | 3-14-71 | 458 | 93 | 32 | 415 | 1038 | 3.31 | 2.07 | 2.18 | 1.36 |
| HA3 | 3-24-71 | 376 | 21 | 32 | 391 | 977 | 3.78 | 2.36 | 3.94 | 2.46 |
| HA6 | 3-12-71 | 86 | 86 | 25 | 90 | 226 | 1.23 | 0.77 | 1.17 | 0.73 |
| HS2[b] | 3-12-71 | 46 | 19 | 12 | 38 | 96 | 1.31 | 0.82 | 1.42 | 0.89 |
| HS1[b] | 2-19-71 | 71 | 13 | 9 | — | — | 3.57 | 2.23 | 2.19 | 1.37 |
| HA4[b] | 2-19-71 | 15 | 15 | 6 | — | — | 1.78 | 1.11 | 1.60 | 1.00 |
| HA7[c] | 3-12-71 | — | — | — | — | — | — | — | — | — |
| | Average | 134 | 61 | 135 | 372 | 929 | 3.09 | 1.93 | 2.61 | 1.63 |
| Total | Average | 121 | 64 | 150 | 376 | 940 | 3.22 | 2.01 | 2.82 | 1.76 |

[a] Includes visual observations.

[b] Not included in averages because of insufficient data.

[c] No radio contact after release.

H = Hen; G = Gobbler; A = Adult; S = Subadult

*Dispersal and Adjustment to Habitat*

During the first three weeks, dispersal increased at the average rate of 0.64km (0.40 mi) per week, before slowing. Thirteen turkeys dispersed an average of 1.28km (0.80 mi) the first week after release. The average for the second week was 1.79km (1.12 mi) and for the third week 1.95km (1.22 mi). The trend changed during the fourth week with the maximum distance from the release site averaging only 1.44km (0.90 mi). This reflected a more established pattern of travel and appeared to be the result of adjustment to the new habitat. By the fifth week, the travel patterns were similar to those prevailing for the remainder of the study. Repeated sallies into new habitat outside of established areas gradually increased range thereafter.

Dispersal by individual turkeys for the entire study period varied from 1.17km (0.73 mi), 86 days tracked; to 4.62km (2.89 mi), 114 days tracked; with an average of 2.82km (1.76 mi). Four gobblers averaged 3.25km (2.03 mi) and eight hens averaged 2.61km (1.63 mi) (Table 1).

Minimal dispersal in a new environment is probably due in part to social communication among wild turkeys. Gobbling males during the spring can be heard as far as a mile away with favorable conditions. Other vocalizations were often heard up to 0.25 mile. Such communication enhanced group cohesion and eliminated indiscriminate wandering in search of other turkeys.

Spring dispersal was similar to that determined by radio tracking established populations in an Alabama Piedmont habitat. Barwick and Speake (1973:125) noted that spring dispersal from preceding winter locations averaged 1.3 miles [2.1km] for 16 gobblers in Alabama. Hillestad (1973) reported straight-line distances from capture sites to nest areas for eight hens in Alabama averaged 0.8 mile [1.28km] while four non-nesting hens dispersed an average of 1.44 miles [2.30km] from the capture site. Fleming and Webb (1974) found spring dispersal from capture sites averaged 2.63km [1.63 miles] for eight gobblers in South Carolina Piedmont habitat.

*Range Variation and Social Interactions*

Minimum range of 13 turkeys averaged 376 ha (940 acres) over a mean tracking time of 78 days. Three subadult gobblers had minimum ranges averaging 419.6 ha (1,049 acres) over a period of 100 days and an adult gobbler's minimum range was 280 ha (700 acres) during 30 days of tracking. Ranges for eight hens varied from 90 ha (226 acres) to 892 ha (2,231 acres) and averaged 372 ha (929 acres) during a mean tracking time of 61 days. Turkeys continuously used some new range, and range size increased directly with study time. The number of tracking days varied from 13 to 115 with an average of 64 (Table 1). Typical minimum ranges are illustrated in Fig. 1.

Telemetry studies of established turkey populations in similar habitats indicated slightly smaller ranges than we found. In Alabama, Barwick and Speake (1973:128) reported spring ranges from 222 acres [89 ha] to 1,069 acres [428 ha] for five gobblers. Hillestad (1973:119) noted an average range of 194 acres [78 ha] for five non-nesting hens and 370 acres [148 ha] for eight nesting hens. Fleming and Webb (1974) stated that the mean range during the breeding season was 94.6 ha [236.6 acres] for eight gobblers in South Carolina. Established populations may not be as exploratory as introduced birds and consequently may have smaller ranges, but range size is also determined by many other factors; hence, the difficulty of explaining differences in our findings with those of other researchers.

Another possible reason for larger ranges in our study was the absence of baiting. Research has often been conducted on areas where turkeys have become conditioned to baited areas and tend to have smaller ranges. The intensity of the radio-tracking has also been a factor in estimating range size. We noted that ranges increased directly with the number of radio locations and the length of time studied.

We found turkey ranges to be irregular in shape, tending to follow hardwood plant associations. Man-made topographic features such as improved pastures, roads, and large agricultural clearings acted as range barriers, as turkeys were never radio-located beyond a wooded area bordered by a 240-ha (600 acre) pasture and a highway. Natural barriers such as dense briars or saplings were avoided. Areas of clean groundcover and good eye-level visibility were favored for travel. Use of openings was generally restricted to edges and was usually during early and late hours when human presence was minimal.

All ranges overlapped spacially but not always temporally. Fig. 1 illustrates the overlapping ranges of four turkeys that were most frequently radio-located. This was probably due to food sources, social grouping, and a preference for similar habitat. Evaluation of travel patterns of the four most frequently radio-located turkeys revealed no consistent social associations throughout the tracking period (Fig. 2). Each turkey that was continuously monitored traveled with other turkeys at some time during the study. The time any two turkeys were together varied considerably with no discernible pattern, except two young males that were together for 30 days near the beginning of the

study. No siblings were known to be included among radio-equipped turkeys, hence this type of social relationship was not studied.

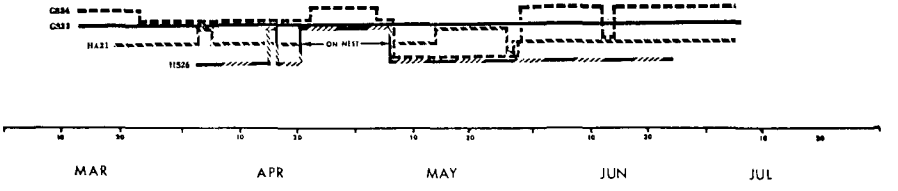


Figure 2. Flow graph of social interactions of four radio-tagged turkeys. Contiguous parallel lines indicate turkeys traveling together.

## MANAGEMENT IMPLICATIONS

Although it is difficult to compare behavioral patterns of turkeys in our study with those in established populations, it is significant that birds introduced into unfamiliar habitat had movement parameters similar to that reported for established populations. Turkeys have been reported to wander great distances (Powell 1965:17) but our data indicate that most will stay within predictable boundaries if habitat requirements are favorable.

Although turkey movement is primarily controlled by food sources, brood rearing areas, roosting sites, human influence, etc., the innate drive to wander or disperse must be considered when evaluating a potential release site. We hypothesized that the turkeys would orient around the release site if habitat was of good quality. Radio telemetry, visual observations, and field sign confirmed that the turkeys used the release site and adjacent areas frequently as much as five years after the initial release. Offspring of the original stocking also used the same habitat.

Difficulties in trapping turkeys have necessitated the release of relatively small numbers of birds on many restocking efforts. Although wildlife managers take credit for the many successful restockings of wild turkeys, many of these attempts have been due to trial and error. Until the advent of radio telemetry, the success or failure of restocking efforts could only be evaluated after the fact. Many failures are undoubtedly due to insufficient knowledge of turkey behavior and/or poor judgment of habitat requirements.

Our findings suggest that social communication may help account for a minimum of wandering and exploration when turkeys are introduced into new habitat. A relatively small number of birds are able to maintain contact increasing their chances of survival and reproduction within a limited area. Accurate appraisals of the quality and quantity of available habitat will greatly increase the chances of success of turkey releases and save time and money. With an ever expanding human population and the incessant encroachment of highways and other developments, habitat selection and knowledge of turkey behavior become even more important to future restocking efforts.

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# A COMPUTER SIMULATION OF DIETARY COMPETITION AMONG SEVEN CONSUMERS IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK

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## ABSTRACT

Interactive feeding among a group of vertebrates in the Great Smoky Mountains National Park was simulated. Consumer density, biomass production, consumer consumption rates, and seasonal food habits of adults of each species were calculated using field or literature values.

The consumers included the European wild hog, black bear, raccoon, wild turkey, white-tailed deer, three sciurid species, and several rodents. The sciurids and rodents were considered as two respective canonical groups making a total of seven consumer groups. Values of requisite parameters were allowed to vary randomly.

Simulations were run for five years at one-half month intervals with a four-year comparison period. The European wild hog did not compete with the other consumers even when their population was doubled. The sciurids were the major competitors. The black bear was the consumer best able to cope with the vicissitudes of life in the Park; however, all consumers gave evidence of being able to usually find enough to eat by relying on alternate foods.

## INTRODUCTION

The European wild hog *(Sus scrofa)* was introduced into the Southern Appalachians in the early 1900's and it was established in the Great Smoky Mountains National Park (GSMNP or Park) by the 1950's (Tennessee Game and Fish Commission 1972). The success of this exotic species has raised fears that it might out-compete the native species in the Park for food, possibly extirpating some.

A simulation model was developed to determine the flow of plant and animal biomass through, and the dietary interaction of, selected vertebrates in the Park. It was hoped that this model would yield insight into the impact of the wild hog on native species. Such models are rare in published literature.

Walters and Bunnell (1971) developed a computer model designed to facilitate land use and big game population management decisions. Their model simulated interactions involving plant produc-

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