# SEASONAL MOVEMENTS OF RESTOCKED WILD TURKEYS IN NORTH CAROLINA

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*Abstract:* Nineteen wild turkeys (*Meleagris gallopavo silvestris*) were restocked in a North Carolina mountain habitat in February and March, 1978. Each turkey was equipped with a solar-powered radio transmitter package. Seasonal home ranges and maximum seasonal distances from the release site were determined from the date of release through winter 1979. Turkeys were tracked from 29 days to 406 days following release. Dispersal from the release site continued through fall 1978 before stabilizing. The average maximum distance from the release site at that time for 9 hens and 1 gobbler was 7.0 km (4.3 mi). Seasonal home ranges were largest during spring and smallest during winter. The average spring 1978 range for 9 hens and 6 gobblers was 1,335 ha. The average winter 1979 range for 7 hens and 1 gobbler was 178 ha.

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The release of wild-trapped turkeys into suitable unstocked range has proven to be a very successful procedure for restoring the species to much of its former range. However, little research has been conducted to determine movement behavior of restocked turkeys which may affect the results of restoration efforts. Eichholz and Marchinton (1975) reported on the dispersal of restocked wild turkeys in a Georgia piedmont habitat, and Prestwich (1977) reported on a survival study of restocked wild turkeys in Tennessee. Other investigations of restocked turkeys immediately following liberation have not been reported. This paper includes information on the movements of 19 wild turkeys restocked in a southern Appalachian habitat of western North Carolina.

We are grateful to the North Carolina Division of Parks and Recreation and to Champion International, Incorporated for allowing the use of their lands for this study. We are also grateful to Wildlife Management Technicians C. Alexander and C. Deyton for their contributions to the field work and to J. James, Wildlife Enforcement Pilot, for providing aircraft support when needed during the study. This research was supported by Pittman-Robertson Federal Aid to Wildlife Restoration Project W-57.

## MATERIALS AND METHODS

### Study Area

The study area includes South Mountains State Park (2,145 ha) and South Mountains Game Land (1,578 ha leased from Champion International, Inc. by the Wildlife Resources Commission for a public hunting area). Other surrounding private lands are also included as required by the movements of the radio-equipped turkeys. The study area lies in the foothills of the southern Appalachian Mountains region of western North Carolina in Burke County. Elevations range from about 335 m to 884 m above mean sea level. The terrain is primarily steep with deep and narrow stream bottoms, although the periphery of the study area exhibits more moderate slopes with wider stream bottoms. The soils are well drained and somewhat excessively drained on the steep mountain slopes.

The study area is forested, with less than 1% in permanent forest clearings. Scattered cropland and pastureland adjoin the South Mountains region to the north, east, and south. Forest types which occur include upland hardwoods, mixed pine-hardwoods, and

upland pine. Major forest overstory species include oaks (*Quercus alba*; *Q. prinus*; *Q. coccinea*), hickories (*Carya tomentosa*; *C. glabra*), yellow poplar (*Liriodendron tulipifera*) and pine (*Pinus strobus*; *P. rigida*; *P. echinata*; *P. virginiana*). Major understory species include flowering dogwood (*Cornus florida*), mountain laurel (*Kalmia latifolia*),rhododendron (*Rhododendron* spp.), and huckleberry and blueberry (*Gaylussacia* spp.; *Vaccinium* spp.).

South Mountains State Park remains primarily undeveloped with visitor access restricted to foot travel. South Mountains Game Land adjoins the park and is managed by Champion International, Inc. for pulpwood production. An extensive system of unimproved roads exists on the study area; roads lying within the boundaries of the state park are closed to public vehicular access. Approximately 14 ha of permanent forest openings exist within the study area with most being 0.8 ha or less in size. The largest is about 3.2 ha.

At least a small number of wild turkeys was known to exist in the vicinity of the study area prior to the initiation of this project in 1978. The presence of those turkeys was the result of the release of 20 wild turkeys in 1956 on the current study area which, at that time, was a Wildlife Resources Commission management area. Those turkeys apparently reproduced and flourished into the 1960's but drastically declined later in that decade. The cause of the decline was undetermined, though it was likely associated with increased human disturbance including trailbike riding, camping, picnicking, horseback riding, and poaching.

### Field Procedures

From January to March, 1978, the drug tribromoethanol applied to whole-grain corn (Williams et al. 1973) was used to capture 10 wild turkeys from Caswell County in north-central North Carolina and 9 wild turkeys from Madison County in western North Carolina. Each turkey was then marked with a numbered, aluminum leg band and placed in a cardboard box for recovery and transportation to the Burke County release site (Table 1).

Prior to release each turkey was equipped with a solar-powered radio transmitter consisting of 2 complete units to measure activity-location and mortality. The transmitter was held in position on the back of the turkey with braided nylon over 5 mm rubber tubing secured under the wings. The transmitters operated in the 150.850-151.450 Mhz frequency range, weighed approximately 90 g each, and had an estimated battery recharge life of 4 years. The transmitters utilized in this study have demonstrated individual recharge and operation capabilities ranging from 96 days through the time of this report (406 days).

The 150 Mhz, 24-channel portable receivers weighed about 1.35 kg. Handheld 3-element yagi antennas were used to determine signal direction, and whip-type antennas were mounted on vehicles to aid initial location of individual turkeys. Locations of instrumented turkeys were determined by triangulation (Cochran and Lord 1963). All visual observations and telemetry locations were plotted on topographic maps of the study area, and seasonal home ranges were determined by connecting the outermost locations (Ellis and Lewis 1967).

Maximum seasonal dispersal was calculated as the straight-line distance between the release site and the farthest known location of instrumented turkeys from the release site during each seasonal period.

## RESULTS AND DISCUSSION

### Seasonal Dispersal

The average maximum distance from the release site recorded for 8 hens and 4

TABLE 1. Summary of release and telemetry data for 19 restocked turkeys at South Mountains study area, North Carolina, winter 1978 through winter 1979.

| Turkey number | Age/ sex | County source | Date of release | Tracking period (days) | Number of Times monitored |
|---|---|---|---|---|---|
| 239 | AF | Caswell | 2/2/78 | 406 | 101 |
| 241[a] | IF | Caswell | 2/11/78 | 125 | 16 |
| 242[a] | IF | Caswell | 2/11/78 | 255 | 46 |
| 243[a] | IF | Caswell | 2/11/78 | 96 | 13 |
| 240[a] | IF | Caswell | 2/11/78 | 55 | 11 |
| 244 | AF | Caswell | 2/15/78 | 393 | 92 |
| 245 | IF | Caswell | 2/15/78 | 393 | 93 |
| 38 | IF | Madison | 2/22/78 | 386 | 96 |
| 39[a] | IF | Madison | 2/22/78 | 290 | 76 |
| 42[a] | IF | Madison | 2/22/78 | 334 | 66 |
| 43 | IF | Madison | 2/22/78 | 386 | 105 |
| 45 | IF | Madison | 2/22/78 | 310 | 102 |
| 47[a] | IF | Madison | 3/24/78 | 29 | 4 |
| 238[a] | IM | Caswell | 2/2/78 | 169 | 30 |
| 31[a] | AM | Madison | 2/9/78 | 166 | 23 |
| 32[a] | IM | Madison | 2/16/78 | 238 | 46 |
| 36 | IM | Madison | 2/22/78 | 390 | 82 |
| 246[a] | AM | Caswell | 2/24/78 | 80 | 12 |
| 247[a] | IM | Caswell | 2/24/78 | 174 | 17 |

[a]Tracked through date of mortality or date of last successful reading.

gobblers (Table 2) during winter 1978 was 2.6 km. During the period following liberation, most of the turkeys remained in fairly close proximity to the release site; however, Hen 43 was recorded about 5.8 km northeast of the release site. Those weeks following initial release probably served as a period of adjustment to the new environment as most of the turkeys remained closer to the release site than during any other period. Hens 245, 39, 42, 43, and 45 traveled together at least part of the time during winter following release. All of these except Hen 245 had been trapped and transported from a single flock. Eichholz and Marchinton (1975) suggested that minimal dispersal into a new environment is likey due in part to social communication among the wild turkeys. This social contact is one of several factors which have an important influence on reproduction among restocked turkeys following liberation.

The period of greatest dispersal for both hens and gobblers was during the spring months. The average maximum distance from the release site for 6 nesting hens was 7.9 km, while the average maximum distance for 7 non-nesting hens was 4.2 km. Three of the nesting hens (244, 38, and 42) moved more than 9.0 km from the release site during that period. A hen was considered to be nesting only if the nest was located by the investigator, although some nests may have been undetected due to early disruption. The average maximum dispersal for 6 gobblers during that same period was 5.5 km. Gobbler 246 moved 13.8 km from the release site during spring.

TABLE 2. Distance traveled by 19 restocked turkeys from winter release site to most distant point in seasonal range at South Mountains study area, North Carolina, winter 1978 to winter 1979.

| Maximum Distance from Release Site | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Turkey number | Sex | Winter '78 km | Winter '78 mi | Spring '78 km | Spring '78 mi | Summer'78 km | Summer'78 mi | Fall '78 km | Fall '78 mi | Winter'79 km | Winter'79 mi |
| 239 | F | 2.6 | 1.6 | 5.2 | 3.2 | 4.2 | 2.6 | 5.5 | 3.4 | 4.8 | 2.9 |
| 241[a] | F | 2.4 | 1.5 | 6.0 | 3.7 | - | - | - | - | - | - |
| 242[ab] | F | - | - | 5.8 | 3.6 | 3.1 | 1.9 | 6.4 | 4.0 | - | - |
| 243[a] | F | 2.1 | 1.3 | 2.3 | 1.4 | - | - | - | - | - | - |
| 240[ab] | F | 3.1 | 1.9 | 3.9 | 2.4 | - | - | - | - | - | - |
| 244 | F | 1.5 | 0.9 | 9.2 | 5.7 | 6.3 | 3.9 | 9.7 | 6.0 | 9.8 | 6.1 |
| 245 | F | 2.3 | 1.4 | 6.1 | 3.8 | 4.0 | 2.5 | 4.5 | 2.8 | 4.8 | 3.0 |
| 38[b] | F | - | - | 12.6 | 7.8 | 13.8 | 8.6 | 13.8 | 8.6 | 13.8 | 8.6 |
| 39[a] | F | 1.6 | 1.0 | 4.7 | 2.9 | 4.4 | 2.7 | 4.7 | 2.9 | - | - |
| 42[b] | F | - | - | 10.5 | 6.5 | 10.9 | 6.8 | 11.3 | 7.0 | 4.8 | 3.0 |
| 43 | F | 5.8 | 3.6 | 5.0 | 3.1 | 3.2 | 2.0 | 4.7 | 2.9 | 4.8 | 3.0 |
| 45[b] | F | - | - | 4.8 | 3.0 | 3.1 | 1.9 | 4.5 | 2.8 | 4.7 | 2.9 |
| 47[a] | F | - | - | 1.8 | 1.1 | - | - | - | - | - | - |
| Average | | 2.7 | 1.7 | 6.0 | 3.7 | 6.0 | 3.7 | 7.3 | 4.5 | 6.8 | 4.2 |
| 238[a] | M | 2.6 | 1.6 | 3.1 | 1.9 | 3.2 | 2.0 | - | - | - | - |
| 31[a] | M | 2.3 | 1.4 | 2.1 | 1.3 | 1.9 | 1.2 | - | - | - | - |
| 32[a] | M | 2.4 | 1.5 | 4.2 | 2.6 | 4.4 | 2.7 | - | - | - | - |
| 36 | M | 2.6 | 1.6 | 4.7 | 2.9 | 4.7 | 2.9 | 4.8 | 3.0 | 5.3 | 3.3 |
| 246[ab] | M | - | - | 13.8 | 8.6 | - | - | - | - | - | - |
| 247[ab] | M | - | - | 5.3 | 3.3 | 2.7 | 1.7 | - | - | - | - |
| Average | | 2.5 | 1.5 | 5.5 | 3.4 | 3.3 | 2.1 | 4.8 | 3.0 | 5.3 | 3.3 |
| Total Average | | 2.6 | 1.6 | 5.8 | 3.6 | 4.9 | 3.1 | 7.0 | 4.3 | 6.6 | 4.1 |

[a]Dispersal determined through date of mortality or date of last reading.
[b]Winter and spring 1978 data were combined due to insufficient winter data.

Average spring dispersal was found to be greater in this study than reported by Eichholz and Marchinton (1975) for restocked wild turkeys in a Georgia piedmont habitat where 4 gobblers moved an average of 3.25 km and 8 hens moved an average of 2.61 km from the release site during spring following release. Spring dispersal was also greater in this study than reported for resident turkeys in Alabama (Hillestad 1973, Davis 1973).

Maximum distances from the release site recorded during summer 1978 averaged less than spring maximum distances for both hens and gobblers. By fall 1978, the maximum seasonal distance from the release site for 9 hens averaged 7.3 km, while the single radioed gobbler on the study area during that period moved 4.8 km away from the release site. By mid-fall 1978 most of the turkeys had restricted their movements to the vicinity of the area that would comprise their winter 1979 range.

During the fall season, 2 hens made extensive movements for unknown reasons, although circumstances suggested that the moves may have been the result of disturbance by hunters. Hen 38 temporarily moved about 6.4 km from her established fall range during December, but returned after 7 days. Hen 42 traveled 6.1 km in early December and joined a flock containing Hens 245, 239, 39, 43, and 45. Both hens moved from locations which were subject to substantial deer hunting activity.

Hen 244 moved 10 km from her summer range to the most distant point in her fall range which bordered several pastures. This hen consistently exhibited wide movement patterns throughout the study; her spring 1978 nest site was about 17.2 km from her most distant winter 1979 location.

During winter 1979, 7 hens were an average of 6.8 km from the release site, while the single remaining gobbler moved out 5.3 km. All turkeys remained in the general vicinity of their fall 1978 range, and little dispersal into new territory was recorded during that period.

By 1 year following liberation, 7 restocked hens and 1 restocked gobbler had dispersed an average of 6.6 km from their point of release. These wide movements were likely not the result of any human-related disturbances because very little human activity occurred on the study area during that time, especially within the state park where the turkeys were released. To the contrary, the fall 1978 and winter 1979 ranges of Hens 239, 245, 39, 42, 43, and 45 were in close proximity to a road utilized heavily by trailbike riders and off-road vehicles. It is much more likely that the relatively long distance from the release site realized by these turkeys 1 year following release was at least partially associated with habitat selection. In general, the vicinity of the release site consisted of steeper terrain and a larger percentage of dense forest understories than did the vicinity selected for fall 1978 and winter 1979 range.

Seasonal Ranges

The average winter 1978 range (Table 3) for 8 hens was 219 ha while the average range of 4 gobblers for that period was somewhat smaller at 195 ha. Seasonal ranges of 4 hens and 1 gobbler are illustrated in Figs. 1 through 5. The ranges of the hens in this study were similar in size to those of 2 restocked hens in Tennessee where Prestwich (1977) reported the winter ranges to be 120 ha and 193 ha. Winter ranges of the gobblers were also similar to those reported by Barwick and Speake (1973) for telemetered gobblers in Alabama.

In this study the average spring range for both hens and gobblers was larger than during any other season. The average spring range for 6 nesting hens was 1,869 ha, while the average spring range for 3 non-nesting hens was 1,735 ha. The spring range of 6 gobblers averaged 601 ha.

The range of Hen 244 was 5,661 ha during the spring months, and she continued to move widely through fall 1978. The spring 1978 nest of Hen 244 was located 9.2 km northeast of the release site, and she was required to cross at least 2 paved secondary roads to reach the nest site.

The average spring ranges of both hens and gobblers were considerably larger than previously reported for restocked turkeys in Georgia (Eichholz and Marchinton 1975) and Tennessee (Prestwich 1977), and for resident turkeys in the Southeast (Barwick and Speake 1973, Speake et al. 1973, Hillestad 1973). On the other hand, Proud (1969) reported that the spring movements of 3 restocked juvenile gobblers in New York approximated "a rectangular area 3.8 miles [6.1 km] northeast-southwest by 6.5 miles [ 10.5 km] northwest-southeast."

Six nesting hens had average summer ranges of 311 ha, and 3 non-nesting hens had average summer ranges of 933 ha. Four gobblers had summer ranges which averaged 597 ha. The non-nesting hens tended to travel extensively during this period, though

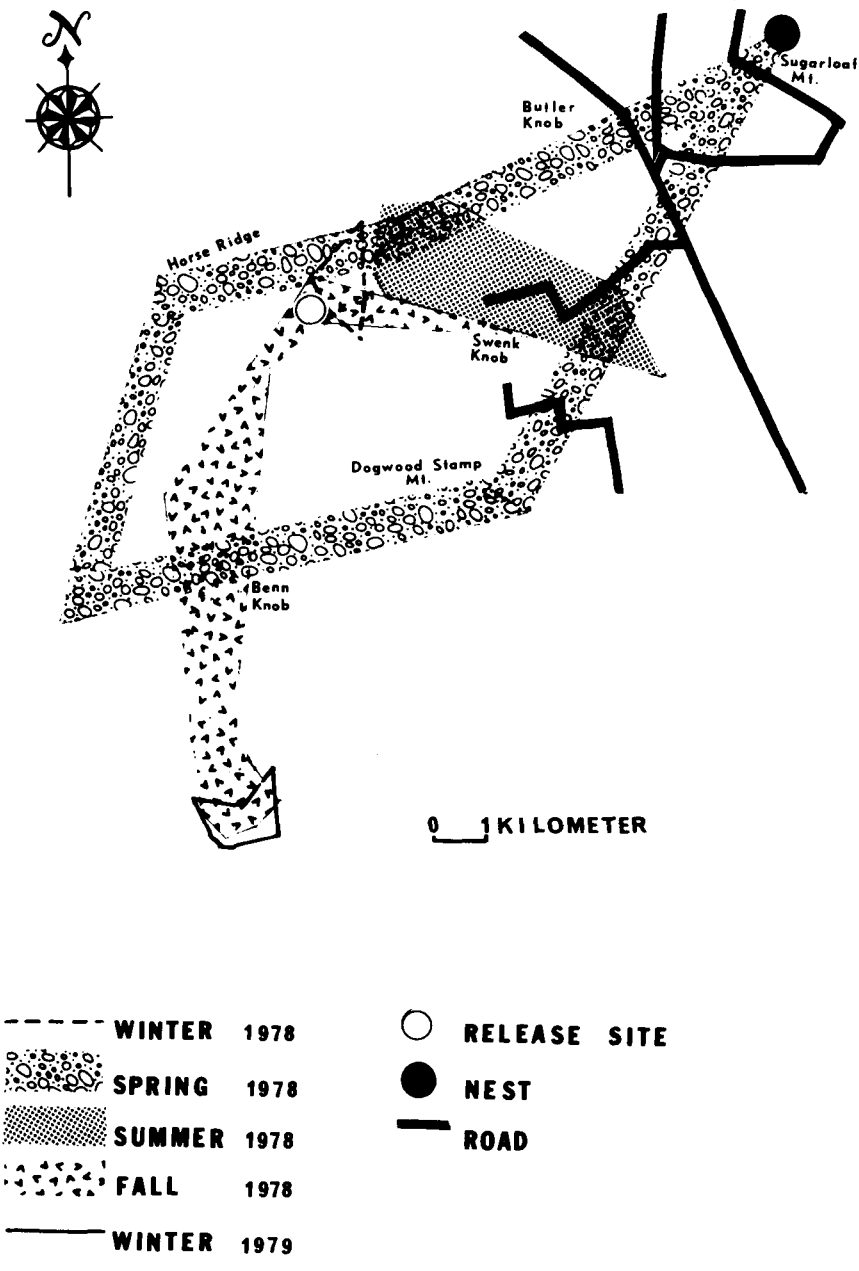


Fig. 1. Seasonal ranges of adult Hen 244 at the South Mountains study area, North Carolina, winter 1978 through winter 1979.

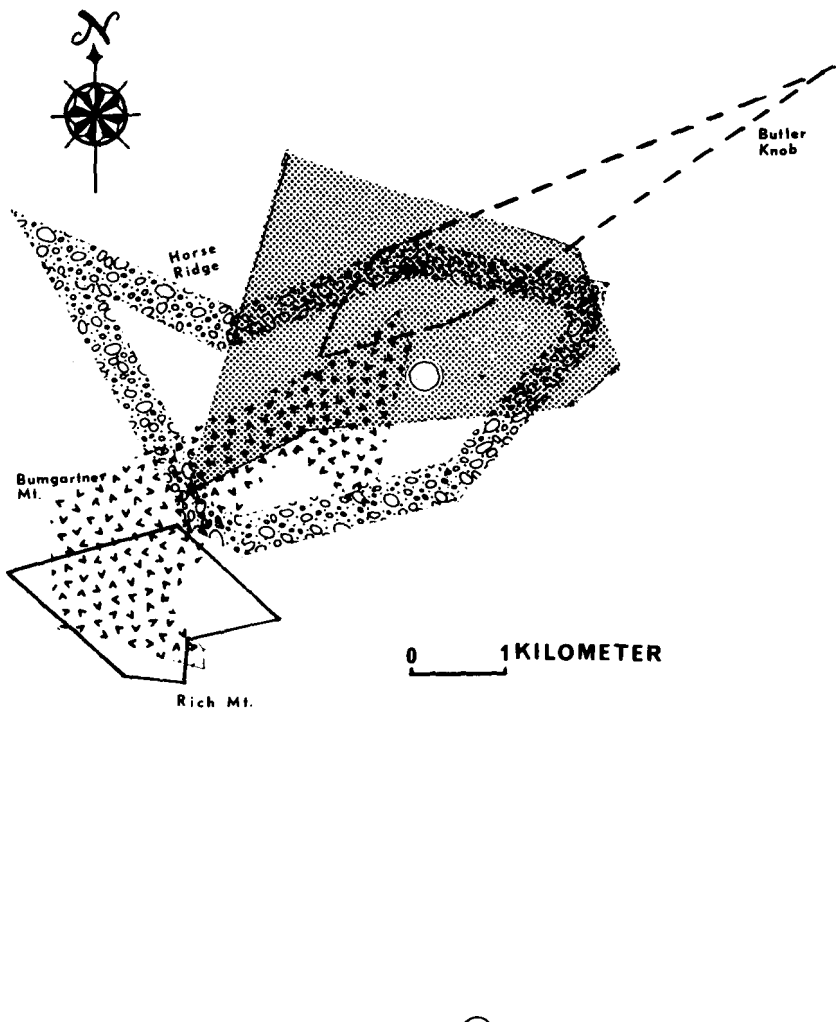


Fig. 2. Seasonal ranges of juvenile Hen 43 at the South Mountains study area, North Carolina, winter 1978 through winter 1979.

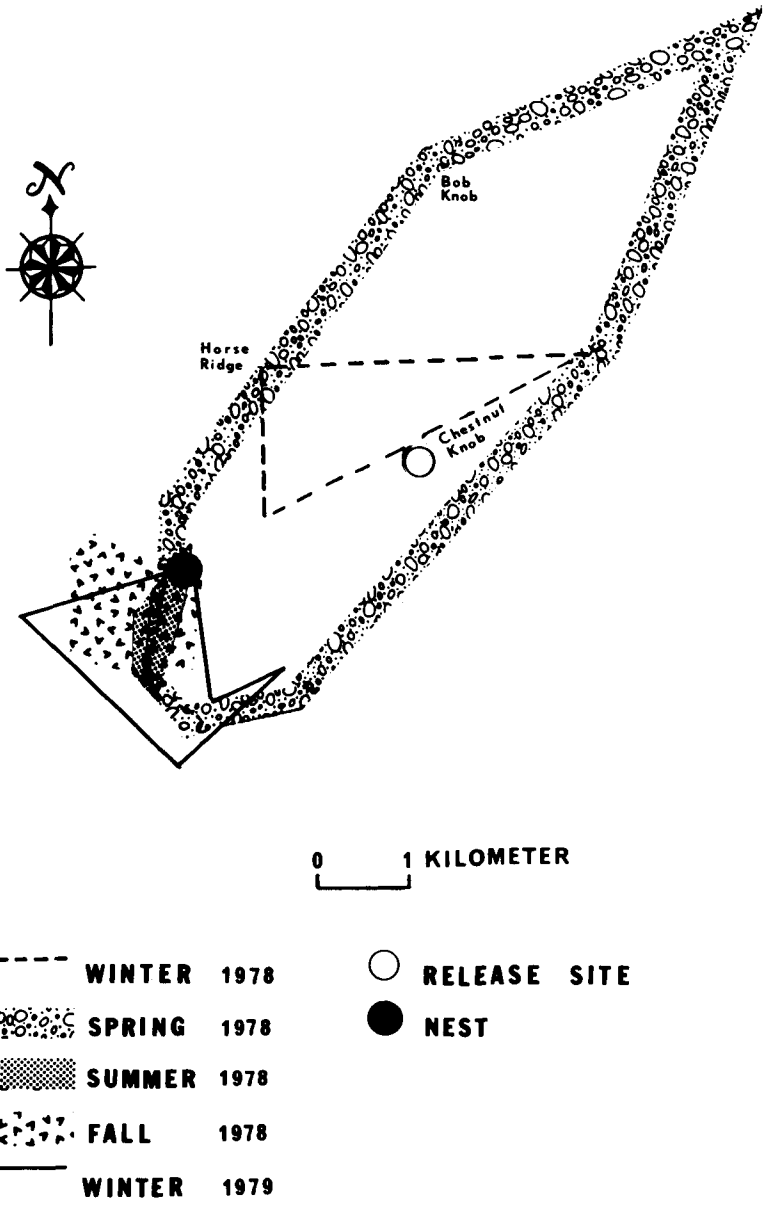


Fig. 3. Seasonal ranges of juvenile Hen 245 at the South Mountains study area, winter 1978 through winter 1979.

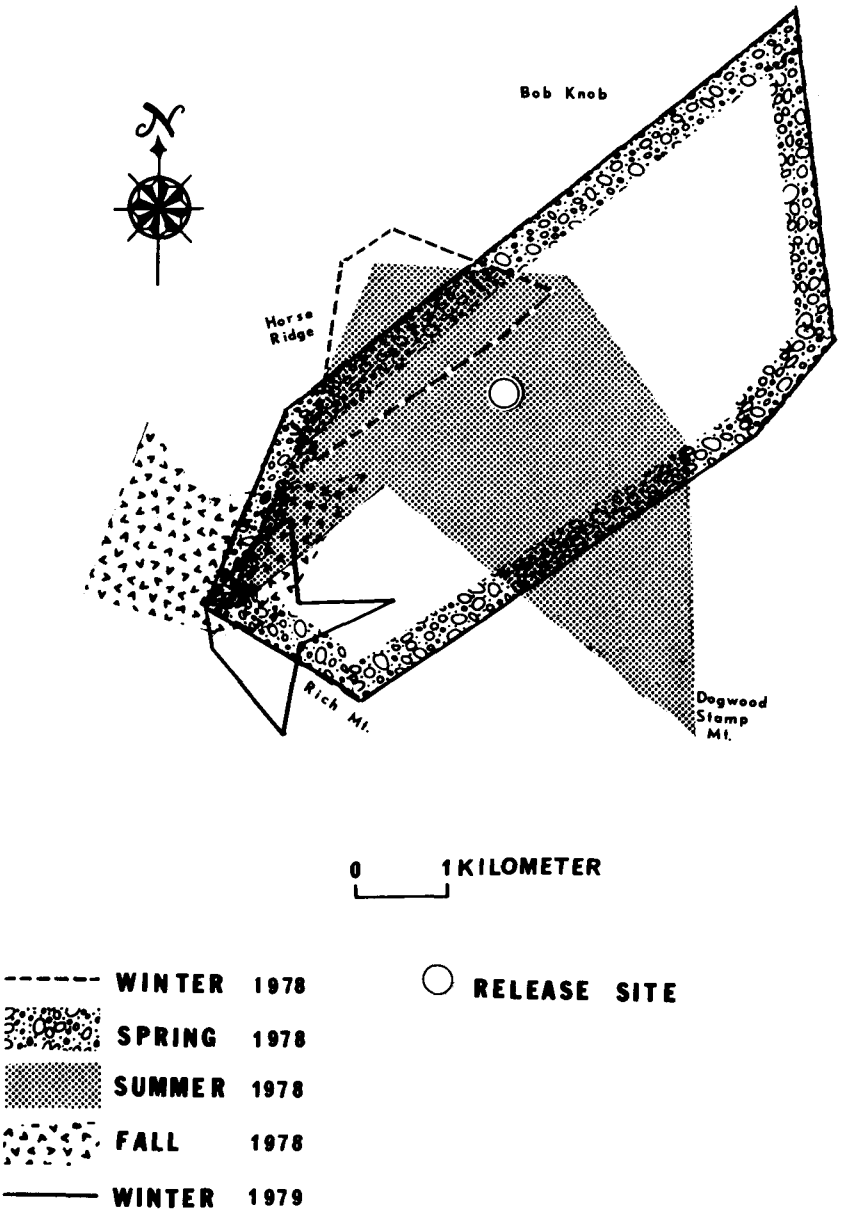


Fig. 4. Seasonal ranges of adult Hen 239 at the South Mountains study area, North Carolina, winter 1978 through winter 1979.

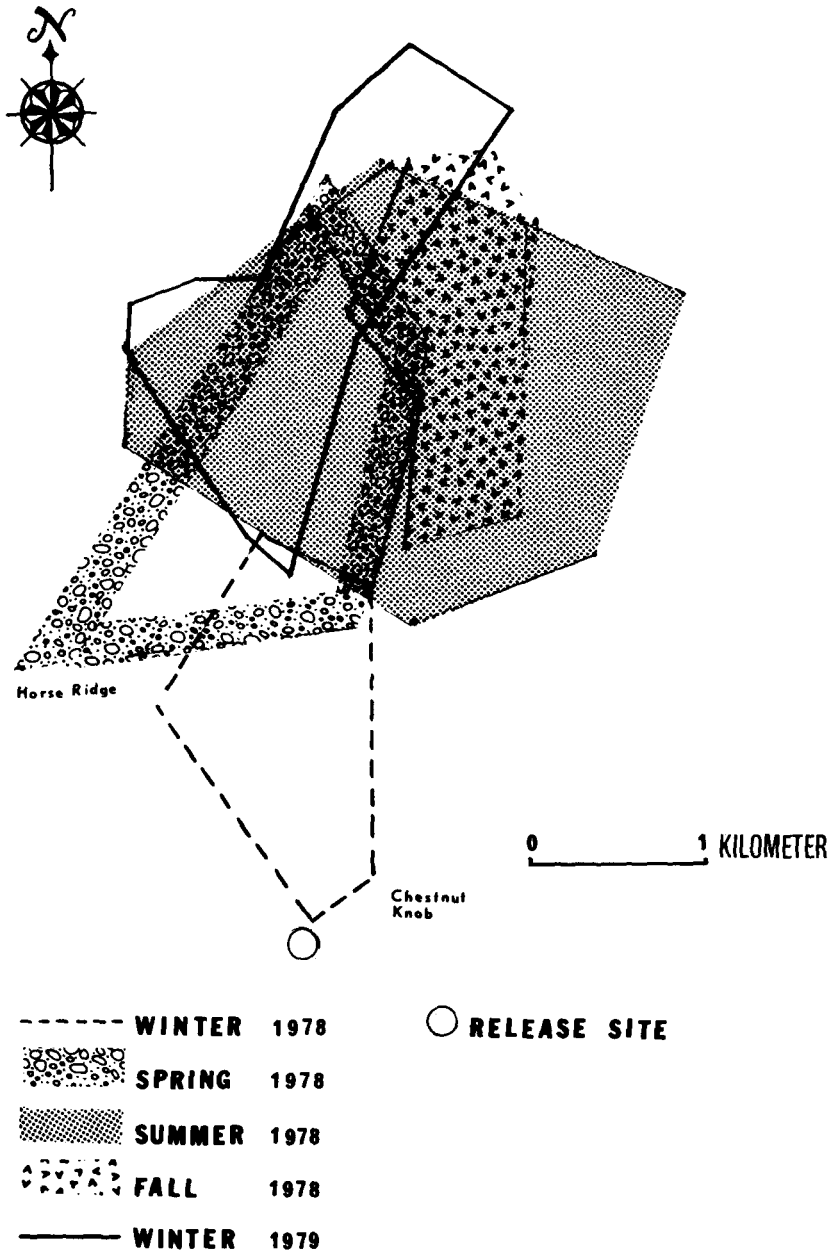


Fig. 5. Seasonal ranges of juvenile Gobbler 36 at the South Mountains study area, North Carolina, winter 1978 through winter 1979.

TABLE 3. Seasonal ranges of 19 restocked turkeys at South Mountains study area, North Carolina, winter 1978 to winter 1979.

| Turkey number | Sex | Seasonal Home Range | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Winter '78 | | Spring '78 | | Summer '78 | | Fall '78 | | Winter '79 | |
| | | ha | ac | ha | ac | ha | ac | ha | ac | ha | ac |
| 239 | F | 323 | 798 | 2,360 | 5,832 | 1,397 | 3,452 | 374 | 925 | 171 | 422 |
| 241[b] | F | 152 | 376 | 363[a] | 897[a] | - | - | - | - | - | - |
| 242[b] | F | - | - | 1,588[d] | 3,923[d] | 444 | 1,098 | 351[a] | 868[a] | - | - |
| 243[b] | F | 157 | 389 | 128[a] | 316[a] | - | - | - | - | - | - |
| 240[b] | F | 191 | 473 | 102[a] | 253[a] | - | - | - | - | - | - |
| 244 | F | 119 | 294 | 5,661 | 13,988 | 682 | 1,686 | 923 | 2,281 | 103 | 255 |
| 245 | F | 282 | 697 | 2,055 | 5,077 | 51 | 125 | 172 | 426 | 259 | 640 |
| 38 | F | - | - | 993[d] | 2,453[d] | 163 | 402 | 465 | 1,149 | 72 | 177 |
| 39[b] | F | 166 | 409 | 454 | 1,123 | 438 | 1,083 | 199 | 492 | - | - |
| 42[b] | F | - | - | 1,107[d] | 2,736[d] | 117 | 290 | 729 | 1,801 | 116 | 287 |
| 43 | F | 361 | 891 | 1,257 | 3,106 | 958 | 2,366 | 551 | 1,362 | 257 | 636 |
| 45 | F | -[c] | -[c] | 994 | 2,333 | 413 | 1,020 | 304 | 752 | 208 | 514 |
| 47[b] | F | -[c] | -[c] | 37 | 91[a] | - | - | - | - | - | - |
| Average | | 219 | 541 | 1,824 | 4,508 | 518 | 1,280 | 465 | 1,149 | 178 | 441 |
| 238[b] | M | 161 | 399 | 255 | 631 | 760 | 1,877 | - | - | - | - |
| 31[b] | M | 244 | 603 | 119 | 293 | 79[a] | 195[a] | - | - | - | - |
| 32[b] | M | 197 | 488 | 283 | 700 | 650 | 1,607 | - | - | - | - |
| 36 | M | 179 | 442 | 370 | 914 | 550 | 1,360 | 165 | 407 | 240 | 594 |
| 246[b] | M | - | - | 1,430[d] | 3,534[d] | - | - | - | - | - | - |
| 247[b] | M | - | - | 1,150[d] | 2,842[d] | 425 | 1,050 | - | - | - | - |
| Average | | 195 | 483 | 601 | 1,486 | 597 | 1,474 | 165[f] | 407[f] | 240[f] | 594[f] |
| Total Average | | 211 | 522 | 1,335 | 3,299 | 542 | 1,340 | 431 | 1,066 | 187 | 463 |

[a]Not included in average because of insufficient data.
[b]Home range determined through date of mortality or date of last reading.
[c]Winter 1978 range determined from date of release through March 19.
[d]Winter and spring 1978 data were combined due to insufficient winter data.
[e]No winter 1978 data was available.
[f]Data for only one gobbler.

primarily within the bounds of their spring range and during early summer. During the latter half of the summer period, their movements were confined to smaller areas. The gobblers also exhibited significantly larger summer ranges than reported in the literature. The reasons for the large summer ranges among many of the turkeys in this study cannot be easily explained but may be related to the continued exploration of new habitat.

Prestwich (1977) reported that the summer range of 1 restocked hen in Tennessee was 248 ha. The average summer range of 6 radioed gobblers in Alabama was 133 ha (Barwick and Speake 1973).

The average fall range for hens in this study was quite large as a result of significant shifts in range by Hens 244, 42, and 43 during that period to areas that would also comprise their winter range. In addition, Hen 38 temporarily shifted her range possibly as a result of disturbance by hunters. Hens 239, 245, 39, 42, 43, and 45 traveled together at various times during late fall 1978 and winter 1979 and shared a common range which contained 6 wildlife clearings totalling about 3.2 ha. They were often monitored near a remote 0.6 ha clearing, but apparently only occasionally utilized the other clearings.

The average fall range of 8 hens was 465 ha, and the range of the single remaining gobbler was 165 ha. The winter 1979 ranges of 6 hens averaged 178 ha, the smallest average range since being released a year earlier. the single remaining telemetered gobbler had a range of 240 ha during the winter 1979 period. Fall and winter ranges determined for turkeys in this study were similar in size to those reported for resident turkeys in the Southeast (Davis 1973, Barwick and Speake 1973, Speake et al. 1975).

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