

TELEMETRY OF TURKEY MOVEMENTS¹

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INTRODUCTION AND LITERATURE REVIEW

A knowledge of the habitat or range requirements must be determined before habitat manipulation can be prescribed for any species of wildlife. Too little is known concerning the mountainous range of the eastern wild turkey, or why turkeys may suddenly move from one area to take up residence in another. The secretive nature of the wild turkey and the complexity of the characteristics of its habitat often present difficult problems in obtaining adequate management information. Therefore, devices or techniques which permit study of an individual turkey or flock of turkeys are extremely useful.

Studies prior to the advent of radio-telemetry demonstrated a variation in the size of the home range of the several races of the wild turkey throughout its geographic distribution. Flocks in Virginia have a reported cruising radius of 2 miles; this encompasses 12 square miles, or about 8,000 acres, according to Mosby and Handley (1943). Dalke et al (1946) found in Missouri that movements may vary from a broadly elliptical area of 4 to 5 square miles to a long, narrow area embracing one or two ridges. Walker (1949) reported the home range of the Rio Grande turkey in Texas to be less than 400 acres when food was abundant. Lewis (1963), working in Michigan, found that the home range used throughout the winter averaged 683 acres for 8 flocks or gobblers only, 435 acres for 7 flocks on hens only, and 492 acres for 6 flocks of mixed sexes.

These reports indicate that the wild turkey is an extremely mobile species on an annual or year-to-year basis. This conclusion is further substantiated by the band returns of Wheeler (1948) in Alabama, Bailey (1959) in West Virginia, and Powell (1965) in Florida. With the above authors, however, the majority of band returns indicated movements of 2 to 4 miles.

Investigators, also, are of differing opinions concerning the principal feeding periods of turkeys. Mosby and Handley (1943) report two peaks of feeding activity; one in early morning and another in the latter part of the afternoon, but state that some feeding may be done throughout the daylight hours. Davis (1949) also describes two distinct periods of heavy feeding, mid-morning and mid-afternoon, separated by midday leisure. Wheeler (1948), however, states that the major portion of the day is spent in securing food.

Much of the early literature concerning movements of the wild turkey, while based on sound observations, is not supported by quantitative data. Radio-telemetry, developed for wildlife studies within the past decade, may help to relieve this problem by enabling the biologist (1) to obtain information previously inaccessible, and (2) to obtain more precise data.

The study was conducted on the Broad Run Management Area, Craig County, Virginia. The area is situated in the New Castle Ranger District of the Jefferson National Forest in southwestern Virginia approximately 25 air miles north of Roanoke, Virginia.

The primary objective of the study was to determine if radio-telemetry could be employed to monitor wild turkey movements in mountainous terrain, and if so, to determine the autumnal size, shape, and location of the wild turkey's range within

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the study area. Additional objectives were (1) to evaluate the effect of certain forestry practices, such as clear cutting on turkey movements; (2) to determine the effect of hunting pressure on movements; (3) to determine the turkey's autumnal habitat preferences; and (4) to evaluate the effect of weather on wild turkey movements.

TECHNIQUES AND PROCEDURES

Cannon-Projected Net Trap

The cannon-projected net trap was chosen for this study because of its availability, ease of handling, and demonstrated efficiency in capturing wild turkeys. It was similar in construction to the one described by Dill and Thornsberry (1950).

Transmitter and Receiver

The electronic equipment used in this study was custom-built by Mr. O. Lee Wilkins, Deerfield, Virginia. Each transmitter was designed to operate continuously on a separate frequency in the 26 megacycle range so that each bird could be monitored individually. The entire unit carried by each bird including transmitter batteries, and harness weighed approximately 8 ounces.

The custom-built portable receiver was small (6x6x5 inches), light weight (7½ pounds), and easily transported. It was equipped with a detachable 18-inch loop antenna incorporating a variable capacitor for tuning.

Harness Construction and Transmitter Attachment

The transmitter was attached to the birds by a harness modified by writer from a design by Dr. James S. Lindsey, Leader, Pennsylvania Cooperative Wildlife Research Unit, University Park, Pennsylvania (pers. comm.). The harness consists of a dorsal saddle, a yoke, and lateral straps (Figure 1). The saddle was made from 2-inch wide cotton webbing reinforced by interwoven nylon strands. Two pieces of webbing (10¼ and 4 inches long) were sewn with nylon thread so that the smaller piece was perpendicular to and at the midpoint of the longer piece. Frayed ends were covered with nylon webbing and sewn. The two lateral straps were each 15 inches long of nylon webbing one-inch wide. The two yoke straps were each 15 inches long of nylon webbing, one-half inch wide. Both lateral straps and yoke straps were fastened to the saddle by 1/8 inch aluminum "speedy" rivets. The transmitter was attached to the harness by drilling holes in the transmitter base plate and inserting ½-inch copper split rivets through the webbing and base plate and spreading them on the baseplate surface. Finally the transmitter was covered with plastic electrical tape to help waterproof the unit and to reduce the possibility that other members of the flock might peck the shiny object.

Harness Attachment to the Bird

The harness was placed on the bird's back posterior to the wings with the yoke facing in the direction of the head. The lateral straps were passed under the wings and the entire unit was placed forward as far as possible. The lateral straps were loosely fastened together with "speedy" rivets at a point near the bird's breast. The yoke straps were passed downward on each side of the neck, crossed, and secured to the lateral straps.

Treatment of Data

The following means were used to analyze movement, home range, and behavior of the birds under study:

Minimum Home Range — The area formed by the outermost points obtained during a tracking period was considered the minimum home range for that period. Since some of the daily ranges were irregularly shaped, an attempt was made to connect points that would best describe the home range acreage. This technique, the modified minimum home range method, was described by Harvey and Barbour (1965:399). A compensating polar planimeter was used for measuring enclosed area.

Home Range Major Axis — A line connecting the two radio locations the greatest distance apart was considered the home range major axis.

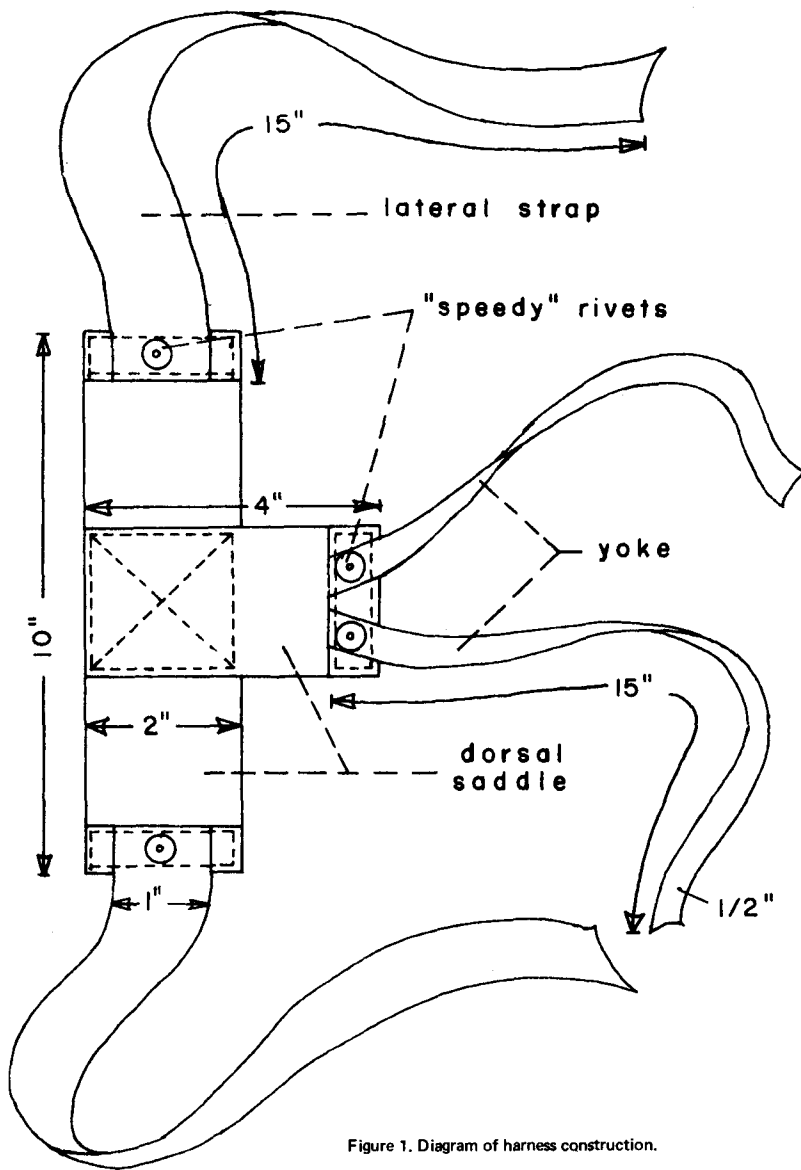


Figure 1. Diagram of harness construction.

Home Range Minor Axis – The line segment perpendicular to the major axis and connecting the minimum home range boundaries at the widest point was considered the home range minor axis.

Distance Between Extreme Diel Locations (DBE) – The greatest distance between any two radio locations of the turkeys during a 24 hour tracking period was their DBE for that period.

Average DBE – The arithmetic mean of all DBE's was the average DBE.

Minimum Total Distance Moved in Diel Period (MTD) – The arithmetic sum of the distances between locations of the birds in a 24-hour tracking period was the MTD for that period.

Average MTD – The arithmetic mean of all telemetrically obtained MTD's was the average MTD.

RESULTS

Transmitter and Receiver

The radio transmitters operated without mechanical failure. Battery life ranged from 78 to 84 days. Maximum range with a portable receiver through moderately dense timber and under line-of-sight conditions was approximately 1½ miles. Maximum range through dense timber and in mountainous terrain was approximately 1 mile. The optimum working range under field conditions was ½ to ¾ mile. Location error was 25 feet at ¼ mile.

Effect of the Harness on Turkeys

Since none of the marked birds was recovered, it is not known whether the harness caused abrasions or irritation. It is assumed that the harness did not restrict the bird's normal movements, however, because they were able to fly to treetops when released. Also, in the only instance, in which the birds were sighted after radio marking, the transmitter harness did not seem to affect the bird's movements adversely.

Radio-Tracking

Tracking was done by obtaining successive radio fixes as described by Cochran and Lord (1963). Locations were determined by the intersection method, using directional readings or "fixes" obtained from two fixed stations (wildlife clearings and/or waterholes). Readings were ordinarily taken at hourly intervals throughout each day. The daily tracking period usually involved 10 to 12 daylight hours since turkey normally remain on the roost during the night unless disturbed. Occasionally three readings were taken to check accuracy, but since the birds were usually moving, three readings were often impractical.

Home Range and Movements

The time of capture of the birds and operation life of the transmitter batteries made it convenient to divide the study into two tracking periods. The birds were captured on October 5, 1967, 4 weeks prior to beginning of the November 6 turkey hunting season. The last transmitter ceased to function on December 6, 1967, 4 weeks and 3 days after the beginning of the hunting season. During these two tracking periods, 80 locations prior to the fall hunting season and 83 locations during the hunting season were recorded.

Four immature wild turkeys, 3 hens and 1 gobbler, were trapped, banded, and equipped with 8-ounce radio-transmitters. Knoder's (1959) method of aging by primary feather replacement and growth indicated that these birds were approximately 133 days of age when captured. The four marked birds remained together throughout the study; therefore, the data, in each case, apply to four birds and not to an individual. Furthermore, since the marked birds were immature, it was assumed that the data apply to the entire flock of 11 poults and 1 hen.

Prior to hunting, 80 radio locations were obtained for the four marked birds. The birds were approximately 133 days old when captured and were approximately 163 days old on the day preceding the hunting season. The minimum home range for this period was 424.8 acres (Figure 2). The home range major axis was 1.5 miles, and the home range minor axis was 0.68 miles. Distance between extreme diel locations (DBE) ranged from 0.23 to 1.48 miles and averaged 0.84 miles. The minimum total distance moved in a diel period (MTD) ranged from 0.24 to 2.60 miles and averaged 1.47 miles.

During the hunting season, 83 radio locations were recorded. The marked birds were approximately 164 days old at the beginning of the hunting season, and were approximately 195 days old when the last transmitter ceased to function 31 days

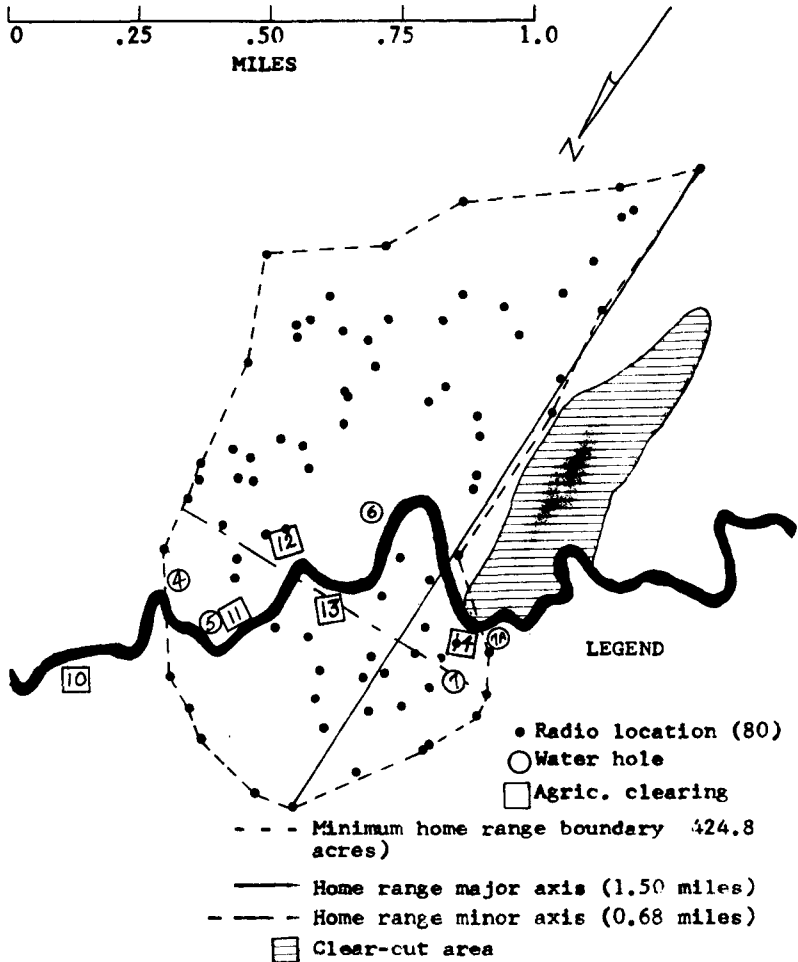


Figure 2. Minimum home range of 4 immature wild turkeys (3 hens and 1 gobbler), prior to the fall hunting season, Broad Run Management Area, Craig County, Virginia, 1967.

into the hunting season. The minimum home range during the hunting season was 552.0 acres (Figure 3). The home range major axis was 1.6 miles, and the home range minor axis was 0.95 miles. DBE ranged from 0.50 to 1.40 miles and averaged 0.98 miles. MTD for the period ranged from 0.75 to 2.68 miles and averaged 1.69 miles.

Activity Periods

The data disclosed two rather distinct periods of daily activity; late morning and late afternoon. Periods of lesser movement were early morning, midday, and early afternoon. The average distance traveled per day was 1.47 miles for the tracking period prior to hunting, and 1.69 miles during the hunting season. The average distances traveled during each of the daylight hours for the two tracking periods are presented graphically in Figure 4.

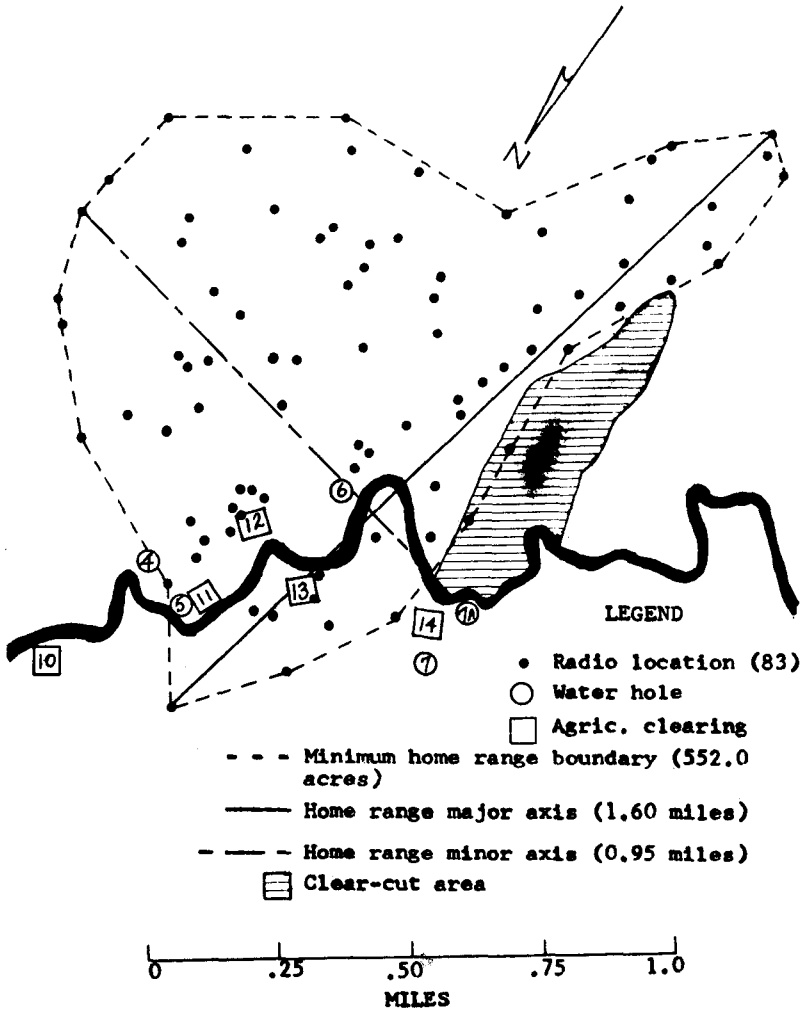


Figure 3. Minimum home range of 4 immature wild turkeys (3 hens and 1 gobbler), during the fall hunting season, Broad Run Management Area, Craig County, Virginia, 1967.

Rate of Travel

The average daily rate of travel varied little between the two tracking periods. The birds averaged 0.160 mi./hr. prior to the hunting season and 0.169 mi./hr. during hunting. These rates compare favorably with the rate of travel of one-quarter of a mile in 80 minutes reported by Dalke et al (1946), but are somewhat less than the one to two miles per hour described by Mosby and Handley (1943).

Habitat Preference

The data was insufficient to show conclusively the effect of habitat on movements of the marked birds. However, during the study period the turkeys were not observed in the interior of an adjoining 60-acre clearcut area even though the periphery of the area was utilized. This was especially apparent during the fall hunting season.

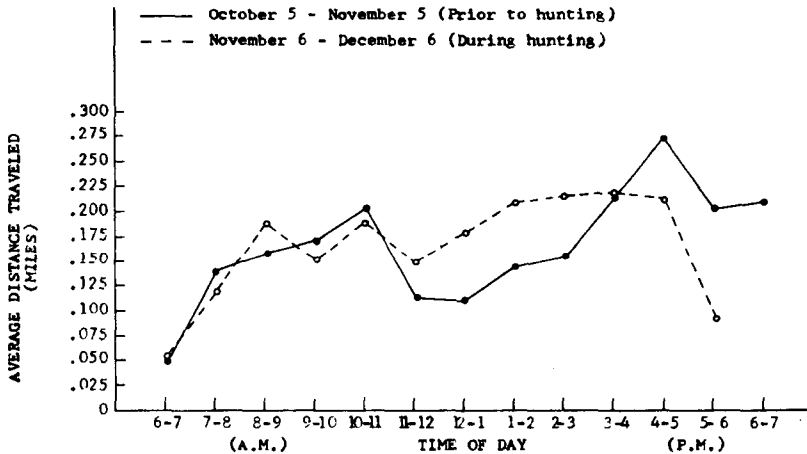


Figure 4. Average distance traveled per hour for 4 immature wild turkeys (3 hens and 1 gobbler), prior to, and during, the fall hunting season, Broad Run Management Area, Craig County, Virginia, 1967.

Effect of Weather on Movements

Weather conditions could not be related to the turkey's movements. A temperature range of 36 degrees F to 72 degrees F produced no noticeable effect upon the bird's activities. Precipitation did not seem to effect movement adversely.

DISCUSSION

The increase in the size of the minimum home range and the change in its location during the hunting season possibly resulted from one or more of the following four factors: food availability, increased maturation of the birds, hunting pressure, and vehicular disturbance. Food availability probably was least responsible because of the abnormally abundant mast crop in southwest Virginia during the fall of 1967. In fact, it is probable that both ranges would have been larger had there not been an abundant mast crop. Increased maturation of the birds could have been responsible for the increased range size during the two tracking periods, but this is speculation. Indeed, it would be difficult to explain the change in range shape based on increased maturation. Hunting pressure in the immediate vicinity of the marked bird's range, based on the investigator's familiarity with the area and work done during the hunting season, was low in comparison to pressure in other parts of the study area. It appeared that hunters were adverse to hunting an area bordering a clear-cut, and preferred to hunt "back in the woods". Even though hunting pressure was low, hunter vehicular traffic through the area was quite heavy. This factor of vehicles may have been primarily responsible for the change in the size and shape of the turkey's home range during the two tracking periods.

It is the investigator's opinion that the lack of use of the clearcut area by the birds under study was due to less available food (mast) than in the adjoining uncut area. Whether this would be true during other seasons of the year, especially the nesting and brooding period, and in lean mast years, remains questionable. Additionally, it appeared that the width of the clearcut area may also be a factor responsible for the lack of utilization.

In January, 1968, during a period of heavy snow, the investigator assisted personnel of the U. S. Forest Service, Southeastern Forest Experiment Station, Blacksburg, Virginia, in conducting snow-track counts for turkeys within the study area. From these counts it was observed that turkeys freely crossed clearcut areas not greater than 150-200 yards in width, but did not penetrate beyond 50-75 yards into clearcut areas in excess of 300 yards in width. This led the investigator to suspect that a "width-usage" ratio may exist for turkey movements in relation to clearcut

timber management areas. It appears to the writer that clearcut areas in excess of 200 yards in width may restrict turkey movements to fringe utilization of those areas, but this is an area that requires additional research. Length of the clearcut did not seem to affect turkey movements adversely.

SUMMARY

Four immature wild turkeys were trapped, banded, and equipped with 8-ounce radio transmitters during the fall of 1967. A total of 80 locations were obtained prior to the fall hunting season embracing a minimum home range of 424.8 acres. A total of 83 radio locations were recorded during the hunting season indicating a minimum home range of 552.0 acres. Vehicular disturbance by hunters appeared to be more responsible for the change in range size and shape than did hunting pressure. The average daily rate of travel varied little between the two tracking periods. Periods of greatest activity were late morning and late afternoon. Periods of lesser movement coincided with early morning, midday, and early afternoon. The data were insufficient to disclose any preferred habitat type; however, it was noted that during the study period the turkeys did not use the interior of an adjoining 60-acre clearcut area even though the periphery of the area was utilized. Weather conditions could not be related to the turkey's movements. Precipitation did not seem to effect the movement of the marked birds adversely.

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