

COMPATIBILITY OF THE EASTERN WILD TURKEY WITH RECREATIONAL ACTIVITIES AT LAND BETWEEN THE LAKES, KENTUCKY¹

by

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ABSTRACT

A telemetric study of the effects of recreational activities on the eastern wild turkey was conducted during the summer of 1972 and the spring and summer of 1973 and 1974. One hundred and three turkeys were captured and patagium tagged. Fifty-five were released with 164 MHz radio transmitters attached. Turkeys did not frequent a heavily used off-road vehicle area. Foot trail traffic had an adverse effect on the use of an area by turkeys. Turkeys were not known to inhabit any area closer than 1.0 km to campgrounds in the summer. Some loss of turkeys to poaching was noted. Management implications are discussed.

INTRODUCTION

It has often been stated in the literature that wild turkeys are relatively intolerant of man and his activities. Bailey and Rinell (1968) found that as a rule the turkey populations in West Virginia were inversely proportional to the human populations. Stoddard (1963) stated that the great birds shun areas where frequently disturbed and recommended the quieter wild turkey range can be kept the better. Wheeler (1948) reported that persistent human intrusion and disturbance will cause turkeys to completely abandon an area. English and Bramble (1950) attributed constant molestation and noise around the edges of an area occupied by turkeys as the factor causing turkeys to leave that area. Raybourne (1968) believed that an increase in the minimum home range and daily movements of turkeys in Virginia was the result of increased vehicular disturbance during hunting season. Fleming (1975) thought the disturbance associated with deer hunting season was primarily responsible for an increase in the degree of turkey movements in Alabama.

A small flock of turkeys on Presque Isle State Park in Pennsylvania confined their range to an 81 ha area of the park containing the densest understory vegetation, apparently to avoid harassment from people (Wunz 1971). After initial stocking of this area in 1966, additional birds were released in 1967, 1968, and 1969 to bolster the declining population. It was not known if human disturbance was the only cause for poor survival in this area of intense human activity.

On the other hand, turkeys are known to tolerate normal farming operations and other human activities such as observations by biologists as long as the turkeys are unmolested (Speake et al. 1969, Williams et al. 1971). If given complete protection and regular feeding they have been known to become relatively tame (authors' observations).

Williams et al. (1971) indicated that in view of increasing demands for outdoor recreation more knowledge is needed concerning the possible effects of human disturbance on populations of the wild turkey.

In June 1972, the Tennessee Valley Authority contracted with the Alabama Cooperative Wildlife Research Unit to conduct a radio telemetry study of the eastern wild turkey (*Meleagris gallopavo silvestris* Vieillot) at Land Between The Lakes, a national recreation area in Tennessee and Kentucky. One of the major objectives of this study was to determine the influence of recreational use of Land Between The Lakes on wild turkey distribution. This paper presents data obtained during that study.

We are indebted to many whose assistance and cooperation made this study possible. Special appreciation is extended to Mr. Mike Wright, Mr. Charles Sharp, Mr. Jerry Allen, and Mr. David Nelson, who worked as research technicians on this project.

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Mr. Gene Wirwahn, Legislative Director of the American Motorcycle Association, provided the sound level measuring equipment and motorcycles for this research. We thank him for this assistance.

MATERIALS AND METHODS

Study Area

Land Between The Lakes is a national recreation area located in Lyon and Trigg Counties, Kentucky and Stewart County, Tennessee. This is known by geographers as the Two Rivers Break Area (Elam 1968). This 68,850 ha peninsula lies between TVA's Kentucky Lake on the Tennessee River, impounded in 1944, and the Corps of Engineers' Lake Barkley on the Cumberland River, impounded in 1965-66. Barkley Canal connects the two lakes on the north, giving the area a water boundary on three sides and 483 km of continuous shoreline. The 64 km long by 13 to 16 km wide area is transversed by U. S. Highway 68 and the Trace (former Kentucky Highway 453). A network of paved, graveled, and dirt roads is present, allowing access to most of the area.

Three subimpoundments of Lake Barkley, one small interior lake, and about 300 ponds and wildlife waterholes comprise the water resource within the interior of Land Between The Lakes. Year-round free-flowing streams are rare (TVA 1973).

The soils on the study area are of two main associations: Baxter-Mountvied-Brandon and Brandon-Lax-Guin. These are well-drained soils in cherty limestone residuum or thin loess over cherty limestone residuum or Coastal Plain materials. The soils are gravelly, infertile, and generally not well suited to annual crops.

The area has rolling topography with most of the land consisting of a series of narrow ridges with moderate to steep slopes and narrow valleys. Elevation ranges from about 107 m to 183 m. Average summer lake elevation is 109 m.

Forests occupy 80 percent of Land Between The Lakes. Most of the forest is hardwood; oak-hickory stands make up about 90 percent of the inventory. Bottom-land hardwoods and blackjack oak occupy 4 percent; the remainder consists of small areas of pine and cedar.

The area was first settled about 1800 and by 1840 had become a center of iron furnace operations (Smith 1971). Only a few of the furnaces were in operation between the Civil War and World War I. Very little if any of the original hardwood forest remains, since the production of charcoal to feed the furnaces required large amounts of timber.

Kentucky Woodlands Wildlife Refuge was established in 1938 as part of the National Wildlife Refuge System. The 24,300 ha refuge centered around what now is the Environmental Education Center. In 1963 Congress approved the appropriation for the Tennessee Valley Authority to start the project now known as Land Between The Lakes. Residents of the area were relocated, and today there are no commercial establishments and only one permanent resident within its boundaries.

Most of the land is being managed as a wildlife area. Included among normal practices is the use of agricultural plantings, woods openings, waterholes, controlled burning of fields, bush-hogging, and selective timber harvest. The area has become a heavily used recreational and environmental education area. Camping, hiking, fishing, and hunting are among the many activities enjoyed. Over two million visitors use the area each year.

Land Between The Lakes boasts the only remaining native flock of wild turkeys in Kentucky. By 1900 they had been reduced by hunting, poaching, and perhaps adverse land use until only a remnant flock of eight birds remained on a 324 ha farm where they were protected (Smith 1971). After establishment of the Kentucky Woodlands Wildlife Refuge the population increased to the point that turkey hunting and some trapping of turkeys for restocking was permitted. Today, the population density on Land Between The Lakes is about one turkey per 91 ha (Wright 1975).

Capture and Marking Techniques

One hundred and three turkeys were captured between August 1972 and April 1974. Two capturing techniques were used, chemically treated baits (alpha-chloralose or tribromoethanol) and projected netting. Both methods involved daily baiting of turkeys near their roosting site.

The treated bait technique was described by Williams (1966) and employed the use of drugs on cracked corn. The projected netting method was described by Dill (1969).

All captured birds were leg-banded with numbered National Band and Tag Company² No. 213 aluminum bands, using size 11 for hens and poults and size 13 for gobblers. Each turkey was marked with wing tags in a manner similar to that described by Knowlton et al. (1964). The markers were medium-size plastic Ritchey Ear Tags (Nasco, Fort Atkinson, Wisconsin 53538) with 6-cm numerals of a contrasting color.

After processing, the turkeys were released at their capture sites. Netted birds were released the same day captured and drugged birds were released after recovering from the drug.

Telemetry Equipment

The tracking receivers were manufactured by Sidney L. Markusen (92 West Harvey Road, Esko, Minnesota 55733). Receivers were crystal-controlled, powered by dry-cell flashlight batteries, with beat frequency oscillator, vernier tuning, volume control, sensitivity control, microammeter, and meter gain. The receiving antennas were one-quarter wave-whips, hand-held two-element yagi beams, and 4.3-m eight-element truck-mounted yagi beams. The 24 frequencies used were spaced .0125 MHz apart, between 164.4375 MHz and 164.7250 MHz.

Transmitters were powered by one or two 1.4-volt mercury batteries weighing about 40 grams each. The transmitting units with one battery weighed about 60 grams and 100 grams with two batteries. Pulsed transmitters and batteries were connected and sealed in Carboline series "K" self-priming vinyl (Specialty Products Division, 328 Hanley Industrial Ct., St. Louis, Missouri 63144). The units were then wrapped with strong plastic fiber tape, and covered with Perm, a dental repair acrylic (Hygienic Dental Mfg. Co., Akron, Ohio 44310). Two 30.5-cm pieces of 0.3-cm outside diameter surgical tubing were added to this and the package was wrapped with more tape. The packaged units were attached to the backs of turkeys with the surgical tubing tied under each wing. The tubing was tied with one square knot and the excess ends were cut 1.5-cm from the knots. Birds were not noticeably hindered by this harness and no appreciable chafing was evident in several recaptures.

The performance of the radio equipment varied with the height of the transmitter above ground, terrain, time of day, and other factors. The normal maximum receiving range with transmitter and receiver both near the ground was about 2.4 km and exceeded 4.8 km for birds roosting in trees. A useful signal could normally be received from the ground during daytime at about 1.2 km. With the receiver in an airplane at 610 m, signals were received farther than 9.7 km. A total of 55 birds were instrumented during the study. Transmitter life varied from nearly zero to over 200 days.

Radio Tracking and Observations

Telemetered birds were tracked by the triangulation method described by Cochran and Lord (1963). Radio-tagged turkeys were normally located three times a day. Locations were plotted on maps prepared from topographic maps and aerial photographs. Visual observations of turkeys were made mainly during trips through the research area while systematically searching for turkeys or turkey sign. Usually two crews searched the area each morning and evening. Many sightings of turkeys were made by Land Between The Lakes staff. When observations of turkeys were made, field notations (i.e., location, distance to human activities, habitat type, number of turkeys, sex, age, and identity of marked birds) were recorded on prepared observation cards.

During late spring and summer, searches were made daily through at least part of the study area. Due to the vastness of the area, project personnel concentrated their efforts on the 26,325 ha portion north of U. S. Highway 68 and the 1,012 ha off-road vehicle (ORV) area.

During this study, the investigators were especially careful to cause as little disturbance as possible to turkeys. Fields would normally be approached on foot using available cover and searched with binoculars. Quite often it was possible to observe turkeys and obtain the required information without the birds being aware of our presence. Sometimes the birds were observed with a spotting scope from long distances (0.4 km and greater) without alarming them or causing them to leave the fields. Areas would be checked for radio-tagged birds before being entered.

In spite of all efforts, turkeys were sometimes disturbed. The authors do not feel that these disturbances biased the data presented here.

Estimating Human Activity

The numbers of people using campgrounds and the off-road (ORV) vehicle area were determined by Land Between The Lakes staff using vehicle traffic counters. Human activity on the 2.4-km foot

² Reference to commercial products does not imply an endorsement.

trail in the Environmental Education Center was measured by the investigators. A traffic trail counter, operating on a beam of pulsed infrared light (Scientific Dimensions, Inc., 309 McKnight N. E., Albuquerque, New Mexico 87107), was installed along the foot trail. The unit was well concealed to prevent detection by hikers.

Measuring Sound Levels

Sound levels of motorcycles used in the controlled disturbance of turkeys were determined with a sound level indicator (Model CS. 15B. Castle Associates, Scarborough, England) as prescribed by the noise abatement program of the American Motorcycle Association. Before each use the sound level indicator was calibrated using a PSQ101-A Falling Ball Calibrator (R-Deck, Inc., 12 Dale Street, Waltham, Massachusetts 02154). All measurements were taken at a distance of 15.3 m with the indicator held about 1.2 m above the ground. With the motorcycle in neutral, the motor was accelerated to the prescribed rpm, depending on engine displacement, and held there long enough for the reading to be taken.

Controlled Disturbances

Controlled disturbances were carried out on radio-tagged turkeys to determine some possible effects of occasional disturbances on turkeys. These harassments were made toward the end of summer after summer ranges had been established. A tracking receiver was mounted on a motorcycle which was utilized to "chase" the birds. The turkeys were also tracked from known points with a truck-mounted 4.3-m yagi beam during the disturbances.

RESULTS AND DISCUSSION

Off-Road Vehicles

In order to determine some of the effects of consistently intense vehicular activity on turkeys, TVA and project personnel visited the 1,012 ha "off-road vehicle" (ORV) area weekly during the spring and summer of each year of the study. This area is heavily used by motorcyclists, who enjoy unrestricted use within its boundaries. Monthly use of the area in 1974 varied from about 150 motorcycles in January to over 500 in August. There was some use of the area by jeeps and dune buggies. Most of this activity occurred on weekends. Unlicensed vehicles are restricted to this area and, elsewhere, licensed ORV's are restricted to roads open to normal vehicular traffic. A heavily used ORV campground is provided on the edge of the area for visitors. Several observations were made of turkeys using fields near the ORV area, indicating that turkeys were in the general vicinity. In early May 1973, a period of much turkey movement, four turkeys were seen flying out of the area ahead of two motorcycles. Excluding the previously mentioned sighting, there were no observations of turkeys nor was any "turkey sign" found there during weekly searches of the area. This area had fields and waterholes and, except for the disturbance factor, appeared to be suitable for turkeys.

In a related event during April 1974, six turkeys were observed feeding in an opening when they were apparently flushed by an extremely loud motorcycle on a road approximately 500 m away. The observer was well concealed in a blind and could find no other reason for this behavior; traffic on the road was not visible from the opening.

In August 1972, a flock of three hens and 24 poults abandoned their regular brood range after being disturbed at least twice within a week. On the first occasion the turkeys unhurriedly left a field when one of the investigators approached within 50 m in a jeep and stopped when he saw the birds. Five days later the birds were in the same field when they were harassed (uncontrolled) by four motorcyclists. The turkeys were apparently feeding when the motorcyclists drove through the flock and chased some of the birds for short distances. This field is located about 1,500 m from a campground and it is likely that they could have been disturbed in this field on other occasions. The flock moved about 3.2 km from its original range, where it was located five days after the last known disturbance. It remained in this new area until at least the end of September, when project personnel departed the area for the winter.

Subadult gobbler No. 916 was harassed on three occasions by project personnel using motorcycles. On the first occasion he was harassed by chasing with one motorcycle (noise level 62 decibels). On the second occasion, one week later, two motorcycles were employed (62 and 70 decibels) and on the last harassment, four days after the second, three motorcycles were used (62, 70 and 89 decibels). The gobbler was disturbed for about 30 minutes on each occasion. He was not seen by the cyclists, but it is believed that motorcycles were within 90 m of him several times.

Adult gobbler No. 344 was disturbed by one motorcycle (83 decibels) for 1.5 hours. He was seen once during the chase and was "pushed" as hard as possible. Adult gobbler No. 934 was harassed with

one motorcycle (83 decibels) for 1.0 hour. He too was seen once but could not be "pushed" because of topography.

Some difficulty was encountered with keeping up with the birds because of their movements, terrain, and thick vegetation. The turkeys did not leave their summer ranges during or after the harassments and they were effective in using dense vegetation in selective timber harvest areas to elude the motorcycles. Unfortunately, circumstances prevented the controlled harassments of hens and brood groups. More work is needed with these birds and nesting hens before the overall effects of occasional disturbances can be properly determined.

Foot Trail

A new foot trail through an area of previously high turkey use as determined by radio-tagged turkeys and observations in 1972 was opened during May 1973. In the summer of 1972, turkeys were observed by project personnel almost daily in this area. One instrumented gobbler spent the summer in the area. During the spring of 1973 and 1974, before the trail was open for the summer, turkeys were captured in the area on four occasions.

The trail traversed three fields maintained in crops used by turkeys. A traffic trail counter was installed to determine the number of people using it and the area was checked visually and by radio two to three times a week for turkeys. A control area with little disturbance but similarly situated and maintained was also checked for turkeys each time the foot trail was checked. The control area was checked either 15 minutes before or after the foot trail area.

In the summer of 1973 approximately 100 people per week used the trail; in 1974 about 125 visitors used the trail each week. Most of this traffic was in the coolness of the morning or evening, coinciding with maximum turkey usage of fields.

Only one hen was seen in this area in the summer of 1973 and no birds were observed there in the summer of 1974. No "sign" could be found in fields or around waterholes in either year. Although several instrumented turkeys were in this region, none were known to range within 1,000 m of the area associated with the trail. The control area was consistently utilized by turkeys throughout this study. Turkeys were normally seen at least once a week in the control area and fresh "sign" could always be found in fields and around waterholes. In 1973, five instrumented turkeys had summer ranges in the control area.

Campgrounds

During each summer of this project, turkeys were known to regularly feed in a field 1.0 km from a campground. This facility received an average of 12,000 visitors per month in the summer. Two hens and 18 poults routinely utilized a field that was 1.1 km from a small campground that averaged about 5,000 visitors per month. No instrumented turkeys were known to range closer than 1.6 km to campgrounds during the summer, even though campgrounds were widely distributed in the turkey range and instrumented turkeys were often in the general vicinity of them. Radio-tagged gobbler No. 907 was known to utilize the interior of a campground during the winter when it was closed to camping, indicating the mere presence of man-made facilities has little effect on turkey use of an area.

Hunting

As pointed out by Bailey and Rinell (1968), poaching, by its very nature, makes data on this mortality source difficult to obtain. Powell (1967) stated that the illegal kill may be as high as 10 percent of the total population in some parts of Alabama. Mosby and Handley (1943) estimated that 10 percent of the population in Virginia is killed annually by illegal hunting. Gardner (1972) and Fleming (1975) reported substantial losses to poaching in recent studies in Alabama.

Several reports of illegal hunting were obtained during this research. One of five radio-equipped gobblers tracked through the deer season of 1973 was shot with a deer rifle, and a deer hunter was reported to have "opened-up" on a flock of birds in another area. During the squirrel season, in August 1974, the area conservation officer found two poult heads in his mailbox.

During the 1973 spring gobbler season, 2 of 13 instrumented hens were found illegally killed. In 1974 no illegal kills were found during the spring turkey season, but indications are that some occurred. Five of 8 instrumented hens in a heavily hunted area "disappeared" during the hunting season, while all of 10 instrumented hens in a "no hunting" area could be accounted for. The study area was searched from the air, but the five missing radio-tagged hens could not be located. Emigration was unlikely because of wide lakes on two sides of the area. Ten radio-equipped gobblers, five of which were in a "no hunting" area, were also tracked through the turkey season without any losses.

These observations suggest that illegal losses were more numerous than could be documented. The overall effect of illegal losses could not be determined due to the difficulty of obtaining reliable data, but we think that an annual loss as high as 20 percent may have occurred.

During the fall of 1973, three flocks of radio-tagged adult gobblers moved about 3.2 km from an area that was intensely hunted for deer by archers. These birds moved into a "no hunting" section, where they generally remained until the close of deer season. One of these birds was captured in April 1974, about 8.8 km from this winter range.

DISCUSSION

We have observed that different populations of turkeys may react to disturbances differently. In 1972 the senior author drove a truck within 20 m of a flock of turkeys on a protected area in Alabama without greatly alarming them. These birds had not been hunted; about the only human contacts with them were research personnel and one farmer. Today, after several years of hunting and a general increase in disturbance and poaching (Fleming 1975), the birds in this area head for cover if they are approached. At the Fred T. Stimpson Sanctuary in southwestern Alabama where wild turkeys have been under rigid protection for at least 30 years, they usually allow much closer approach by humans than on areas open to public hunting. It would seem logical that turkeys that are hunted and endure the harassment of deer season along with occasional disturbances would act "wilder" than birds that are rarely disturbed. No doubt there is a wide variation in wariness among populations of wild turkeys. This should be taken into account in management of these birds.

Turkeys at LBL tolerated routine agricultural operations. Turkeys were observed feeding in a large field while a tractor was working about 500 m away. The birds were aware of the tractor but paid little attention to it. Turkeys were also known to use fields the same day they were bush-hogged.

The findings of this study offer several implications for management. On large recreational areas such as LBL, it would be desirable to concentrate ORV's to special sites, which would reduce harassment and the possible flushing of nesting hens on the remainder of the area. It would be desirable on any turkey management area, or on any area where the eastern wild turkey is an important species, to keep the number of roads open to the public to a minimum. The use of state operated wildlife management areas by the public for general recreational uses such as camping, hiking and riding ORV's should be discouraged or these activities should be allowed only at designated locations. Each campground, foot trail, or other special use area of high human activity removes a certain area around it from regular use by turkeys. How much habitat can be eliminated without adversely affecting a population should be of utmost concern to those responsible for turkey management. On an area the size of LBL, a number of well-placed areas of high human activity would have little effect on the turkey population. However, too much activity on a small wildlife management area could "push" the birds into areas offering little or no protection from illegal hunting.

The use of thick vegetation by turkeys to escape harassment may indicate that barriers of thick vegetation along roads or around areas of high human activity may reduce the area of exclusion for wild turkeys. It is also likely that one of the benefits of well-distributed timber harvest sites may be the provision of escape cover as well as nesting and brood range for turkeys.

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