Gobbling of male eastern wild turkeys has been used to index population size and set hunting seasons. It is assumed that the number of gobblers heard reflects population abundance. Additionally, several researchers have noted that 2 gobbling peaks occur. We examined factors



affecting gobbling activity and timing of gobbling on Tallahala Wildlife Management Area in central Mississippi. We observed only 1 gobbling peak and it did not coincide with peak incubation by hens. This challenges the assumption that hunting seasons can be designed to offer maximum opportunities to hear gobblers while protecting hens from illegal kill. Chronology ofgobbling activity may be affected by break-up of winter hen flocks, peak mating activity and initiation of laying behavior. A decrease in the gobbler population during the study may have influenced gobbling activity, but the relationship was weak. Within years, number of gobblers heard may have declined as gobblers were harvested, hens left to incubate nests (eggs) and vocal birds near roads were har-

Z

2

-

0

5

9

9

1

.

< 0

C

3

D

N

Z

0

vested. Proportion of 2 year-old males in the population influenced number of gobblers heard. Daily variations in weather, individual gobbler behavior, presence of hens and presence of hunters may influence gobbling patterns. Gobbling activity does not appear to effectively index wild turkey populations in central Mississippi.



Photo by Kovert Griffin

2

=

0

-

CTIO

By the early **1940's** the once abundant wild turkey was all but extirpated from the Magnolia state due to unregulated hunting and destruction of Mississippi's vast forests. Extensive restocking efforts, beginning in the 1950's, signaled the beginning of the return of wild turkeys to Mississippi. Today, an estimated 300,000 wild turkeys inhabit Mississippi.

Increasing interest in turkey hunting has been associated with recovering populations (Fig. I). To properly manage a game species, biologists must (I) design hunting seasons that maintain viable populations and (2) monitor population trends. Spring hunting seasons for male wild turkeys are often based on the belief that gobbling activity has 2 peaks with the hunting season encompassing the second peak. The first gobbling peak may be associated with break-up of winter hen flocks. The second peak, associated with peak nesting, may provide quality hunting opportunities while protecting hens from illegal or inadvertent kill. If hens are incubating, gobblers are alone and may call more frequently to attract hens. Additionally, the increased calling and decreased hen activity allows hunters to hear gobblers without exposing hens to poaching or being shot from mistaken identity

One proposed method to index gobbler populations is gobbling call counts. Wild turkey males gobble to attract hens. For call counts to index populations, one assumes that the more gobblers you have, the more you will hear. However, research throughout the U.S. has concluded that many factors probably influence gobbling activity, making a direct connection to population numbers difficult. No one previously has examined the many possible factors affecting gobbling activity simultaneously. We used I2 years of continuous data to examine factors affecting wild turkey activity and timing of gobbling relative to spring biological events (e.g., incubaFunding for this research was provided by the Mississippi Department of Wildlife, Fisheries and Parks through Federal Aid in Wildlife Restoration Funds, the National Wild Turkey Federation (NWTF), the Mississippi Chapter of NWTF. the Mississippi Forest and Wildlife Research Center and the U.S. Forest Service. We operated under the Mississippi State University Animal Care and Use Committee (IACUC) Protocol 93-030.



Our study was conducted on the 14,410 ha (35,500 ac) 2 Tallahala Wildlife Management Area (TWMA) located within the Bienville National Forest in central Mississippi. Most (95%) of TWMA was forested with 0 30% in mature bottomland hardwood forests, 37% in mature pine forests, 17% in mature mixed pine-hard-S wood forests (30-70% pine), and II% in I - I4 year old loblolly pine plantations. TWMA was open to the public for spring (approximately March 18 - May I) gobbler-only hunting during the entire study period. We conducted appbling call counts between IO March - 7 May, beginning 7 days before spring hunting season and ending 7 days after, from 1984-95. We conducted call counts 3 days/week from 2 routes composed of 8 and IO stations, respectively, from 30 minutes before sunrise to 30 minutes after. We located stations along roads throughout TWMA at 0.5 mile intervals. Observers listened 4 minutes/station and recorded number of individual gobblers and number of calls heard. Call counts were postponed until the next suitable day when wind exceeded 5 miles/hr or it was raining.

We captured wild turkeys at sites baited with corn using cannon nets or drugged bait from 7 January to 4 March and I July to August, 1984-95. Captured turkeys received numbered metal bands and wing tags for future identification. We fitted most hens with an 108 g radio-transmitter placed on the hen so that

it rested between her wings like a backpack. Using the radio signal, we located hens using a radioreceiver. Beginning 14 March of each year, we located hens > I time/day to determine when hens began to continuously incubate a nest.

Turkey hunters on TWMA were required to pick-up, fill out, and deposit daily visitor permits in selfservice check stations. We estimated hunter numbers (number of hunters/day) from these permit cards. beginning I March and ending 28 May (Fig. 2). The ending date was the last nest initiation which represented the last daily event recorded. This time period encompassed the spring gobblersonly hunting season. We wanted to determine if events (e.g.. turkey harvested, hen initiated incubation, etc.) were similarly distributed. In other words, were turkeys gobbling the most when hens were on the nest? Or, were hunters in the woods when hens were incubating! To answer these questions, we compared the distribution of events to see if they coincided. We also wanted to determine what factors affected gobbling. We tested a number of environmental (e.g., weather) and biological (e.g., population size) factors to examine within year and

son

from I March that each event (e.g., a gobbler harvested, a hen

began incubation, a sportsperson hunted) occurred. From this,

we obtained a daily frequency of occurrence for each variable

Successful hunters were required to

headquarters. From these gobblers,

we determined dates when gobblers

were harvested. We recorded mortal-

ity dates of radio-ragged hens illegally

killed during spring gobbler-only sea-

Chronology for variables associated

gobblers/day, number of hens incubat-

ing/day, number of hunters/day. etc.)

was standardized as number of days

gobbling (number of

check-in harvested gobblers at TWMA

We tested a number of environmental (e.g., weather) and biological (e.g., population size) factors to examine within year and among year gobbling variation. We used an index of gobbler age structure (proportion of I-, 2-, and 3- year-olds in the population) to examine effect of age structure on gobbling activity. Because gobblers have high survival rates on TWMA. it is reasonable to assume that higher nest success from 2 years previous, for example, would increase relative number of 2-year-olds

in the population.

During the I2 years we monitored gobbling activity. we heard I,93I gobbles from 627 gobblers. The most gob-

blers heard was I25 in 1986: this year also had the most gobbles recorded (399). Average number of gobblers heard/day declined from 5.7 during I984 to I..2 during I990 to 0.23 during 1995. Gobbling activity peaked during I986 and 1994: despite these peaks, a downward trend was evident in gobbling activity. -

5

20

S

 \frown

SS10

-



On TWMA, peaks of gobbling and initiation of incubation did not coincide except during 1995, making it impossible to design a hunting season framework to both optimize opportunities to hear gobblers and protect hens by opening the season during peak incubation (Fig. 2). Current regulations in Mississippi dictate spring gobbler season to open the Saturday nearest March 20. Moving opening day until mid-April would severely limit opportunities to harvest vocal birds on TWMA.



Additionally, contrary to results from other studies, we observed only I peak of gobbling on TWMA. Accepting the assumption of 2 gobbling peaks and structuring spring gobbler season around this assumption may be erroneous. Many researchers/resource managers may assume they can simultaneously protect wild turkey hens and afford hunters maximum harvest opportunity. A reexamination of this assumption is warranted to determine occurrence and chronology of gobbling peaks and their relationship to nesting hens. This work is important to best manage wild turkeys, especially on public hunting areas.

Within the Southeast, the first peak of gobbling has been associated with break-up of winter hen flocks. On TWMA. winter hen flocks gradually broke up during mid-late March. In all years except 1988-89, 1993, and 1994, the observed peak of gobbling occurred during this time, suggesting that the gobbling peak on TWMA may coincide with break-up of winter hen flocks. However, inconsistency among years indicates additional factors may be involved.

We hypothesize that 2 additional factors may influence the observed peak of gobbling on TWMA. In Ohio, peak of mating was 2 - 3 weeks after onset of gobbling activity. This possible peak of mating also may influence observed gobbling patterns on TWMA. We propose that increased mating activity may stimu-

late gobblers to attract as many mates as possible during hens' peak receptivity to displaying males and subsequent copulation. Secondly, peak gobbling may be influenced by initiation of laying behavior, not incubation behavior. Hens require approximately 2 weeks to lay a clutch of eggs. Based on our data, hens began laying close to the time of peak gobbling. Movement of hens away from gobblers during this period may stimulate males to gobble more frequently.



Distribution of hunter numbers and harvest differed from distribution of initiation of incubation in all years. Hens were not incubating when the highest numbers of hunters were present on TWMA. possibly causing hens to be more vulnerable to illegal kill. Although most hens (3 of 5) known to be poached were killed within the first 2 weeks of the hunting season, this is based on a small sample. However, some general conclusions can be proposed. The highest density of hunters occurred on IWMA during

first 2 weeks of the hunting season (Fig. 2). In Missouri, hunter density, among other factors. may have governed occurrence of illegal hen kill more than timing of incubation. Illegal hen kill during spring gobbler season may be affected by a higher density of hunters during the first part of a turkey season. Additionally, many hunters during the first part of the season may be relatively inexperienced. This would contribute to mistaking hens for gobblers

Graphical examination of our data (Fig. 2) revealed a second peak of harvest during week 7. However, this peak was not associated with a similar peak in gobbling activity or hunter numbers. We believe that this peak may be a reflection of hens leaving gobblers to begin incubation. Half of all nest initiations occurred during weeks 7 and 8. We hypothesize that gobblers are more susceptible to calling when they are not with hens, potentially causing them to be more easily harvested without necessarily gobbling more. Additionally, by this late in the season, mostly experienced turkey hunters are in the woods. These hunters may be more proficient turkey hunters thus increasing harvest relative to the number of hunters.

Although nest success 2 years previous was correlated with probability of hearing a gobbler, it was not correlated with number of calls heard. This indicated that proportion of 2-year-old

> toms in the population may contribute to the likelihood of hearing an individual turkey gobble. However, withinyear factors, possibly on a daily basis, exerted enough influence on gobbling behavior that it could not be similarly predicted. Such daily factors may be weather conditions, individual gobbler behavior and hen presence. Another possible influence is gobbler condition. Gobblers in poor condition may not participate in breeding activities. Gobblers lose weight during the breeding season and rely on their

RESEARCH ADVANCES

Research conducted by **Darren** H. Miller, graduate research assistant George A. Hurst. professor and Bruce D. Leopold, professor Department of Wildlife and Fisheries



For more information contact: John E. Gunter, Director Forest &Wildlife Research Center Box 9680 Mississippi State. MS 39762

601-325-2952 Fax: 601--325-8726 jgunter@cfr.msstate.edu http://www.cfr.msstateedu

Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age, disability or veteran status. breast sponge for much of their energy requirements. Gobblers entering the breeding season with smaller energy reserves may not be able to invest as much effort for breeding. This may be affected by winter habitat conditions (e.g., available acorns), although it has never been investigated.

Based on our research, gobbling activity significantly decreased during the research project and also decreased within years as number of days into call count surveys progressed. The TWMA turkey population was declining and may have contributed to the decline in gobbling activity observed across years. It appears that gobbling activity declined throughout call count periods, partially due to decreases in the gobbler population and increases in number of hens incubating. However, it is important to note that the relationship to gobbler population size was not strong enough to predict population levels based on gobbling activity. Decreases in within-year gobble call counts also may be related to hunting activity. Hunting effort declined with call counts on TWMA. A possible relationship may be that hunters are harvesting vocal birds, especially those located close to roads. This would lead to observers and hunters being less likely to hear gobbling birds, resulting in less hunting effort and lower call counts. Disturbance of vocal birds also may contribute to declining gobbling within years.

Wind velocity also was negatively related to both number of calls and number of gobblers heard. This may have resulted from turkeys gobbling less or observers being less able to hear gobblers. Hunter numbers significantly increased as gobbling increased. Hunters were more likely to hunt when gobbling activity was higher and did not hunt when gobblers were silent.

Our results suggested that some unmeasured factors (i.e., gobbler condition, individual gobbler behavior, presence of







hens) significantly affected daily variations in gobbling call counts so that we were unable to account for a large proportion of variation in gobbling activity within years. Within central Mississippi, gobbling call counts have limited application for indexing wild turkey populations. Even

accounting for variations in weather, population levels, and reproductive parameters, we could not predict gobbling activity. Relationships between number of calls heard and number of gobblers heard with hunter numbers and hunter success only indicate that, in years when gobbling activity was high, more hunters were pursuing turkeys with higher success

Within-year gobbling activity was influenced by a complex interaction of population and environmental conditions that cannot be easily modeled. This resulted in a poor ability to predict gobbling activity. Additionally, variables representing population size were not strongly related to gobbling activity. Obviously, if there are no turkeys, there will be no gobbling However, just because gobblers are not heard doesn't mean there are none. Finally an index of age structure (i.e., number of 2-year-old gobblers in the population) was demonstrated to positively impact gobbling call counts between years.

Hunters need to be aware that a lack of gobbling activity doesn't necessarily indicate a lack of gobblers. Conversely, a lot of gobbling may not reflect an abundance of gobblers. Researchers and managers wishing to implement gobbling call counts to assess population trends should consider possible alternative methods, such as harvest information. Our work on TWMA has indicated that number of gobblers harvested is a good index of gobbler population levels. Gobbling activity appears to be affected by as yet unmeasured factors (e.g., presence of hens, individual





gobbler behavior, gobbler condition) in central Mississippi. As such, interpretation of results from such surveys should be viewed with caution.

1988 1981 1982 1983 1984 1985 1986 1987 1989 1998 1991 1992 1998 1994 1995