

Tennessee Cooperative Wild Turkey Project : Summary of Key Results and Recommendations

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A decline in turkey harvest has been a concern in some areas of Tennessee.

The Tennessee Cooperative Wild Turkey Project started in 2017 in response to concerns over declining harvest in several counties of south-middle Tennessee. The objectives of the project outlined in the scope of work were:

1. Monitor turkey reproduction, survival, and habitat use.
2. Monitor turkey harvest.
3. Monitor hunter numbers, effort, and satisfaction.
4. Conduct disease surveillance.
5. Develop alternative management strategies for habitat and for hunting season structure.

Background

There has been considerable concern that the wild turkey population in Tennessee is declining, at least in some regions. The most reliable long-term data to assess population trends on any breeding bird is the North American Breeding Bird Survey (BBS), which started in 1996. Based on BBS data from Tennessee, the wild turkey population appears to be declining statewide since 2013 ($n=40$ routes, North American Breeding Bird Survey Dataset 1966-2022: U.S. Geological Survey data release; Figure 1). Concern of a declining turkey population in Tennessee has been greatest in several counties of south-middle Tennessee.

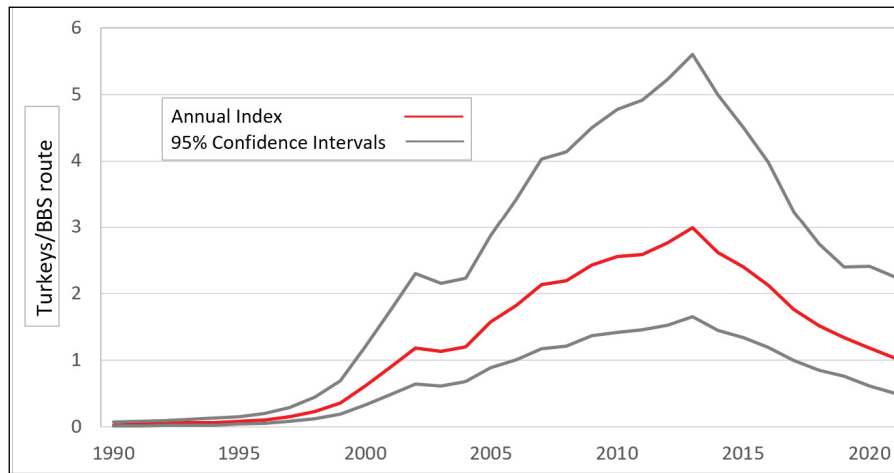


Figure 1: Wild turkey population trend—North American Breeding Bird Survey (BBS) data for Tennessee, 1990-2022.

Turkey harvest data also can be used to assess population change, though changes in harvest may lag population change as hunters adapt to declining opportunities to harvest a turkey and as regulations change. Turkey harvest declined by ~60 percent from 2005-2015 in three counties of south-middle Tennessee (Giles, Lawrence, Wayne; Figure 2), whereas harvest in two adjacent northern counties remained stable (Bedford) or increased (Maury; Figure 3). Since 2015, harvest in all five focal counties has remained stable.

As a result of declining turkey harvest in south-middle Tennessee, the Tennessee Wildlife Resources Agency contracted the University of Tennessee to monitor the turkey population in five counties of the region from 2017-2023. This project has been one of the longest running telemetry projects ever conducted on wild turkeys, and the only one to include a manipulative experiment monitoring the effects of a delay in the spring hunting season.

We monitored the effects of an experimental two-week delay on wild turkey vital rates, harvest, and hunter response and satisfaction, which was implemented in 2021 and 2022. In 2023, the Tennessee Fish and Wildlife Commission adopted the two-week delay statewide, which ended our manipulative experiment, but we continued to monitor the turkey population with radio-tagged birds. We also implemented experimental habitat management treatments at Yanahli Wildlife Management Area and evaluated those treatments as well as management efforts of private landowners involved in the project to aid in the development of alternative habitat management strategies. As of July 2024, our project is not yet complete, but we give summary results below to provide a science-based foundation for adaptive regulatory and habitat management decisions.

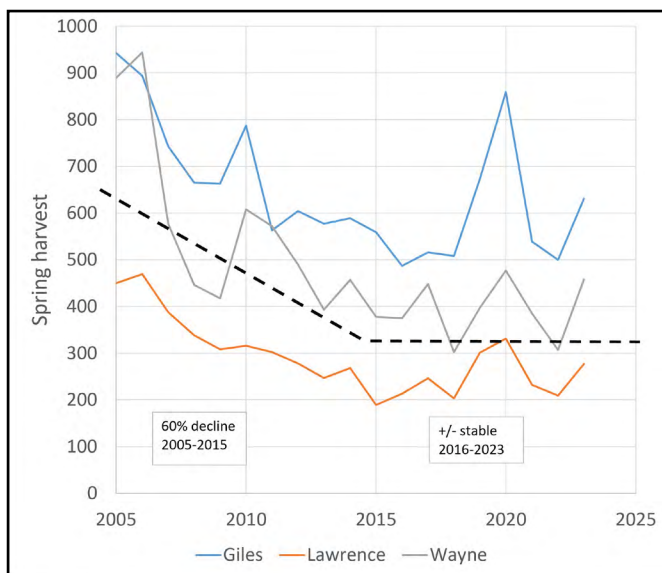


Figure 2: Spring wild turkey harvest in Giles, Lawrence, and Wayne counties, 2005-2023.

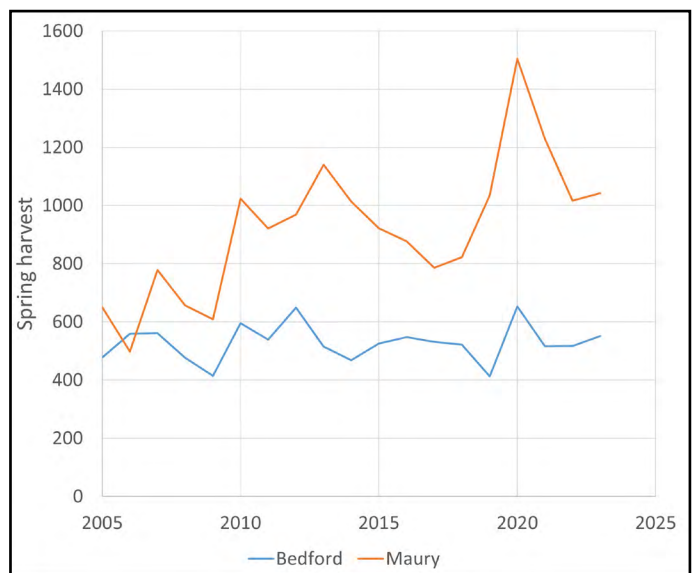


Figure 3: Spring wild turkey harvest in Bedford and Maury counties from 2005-2023.



Two-day-old wild turkey poult with radio transmitter.

Key Project Findings to Date

1. We trapped and radio-tagged 432 hens and monitored their reproduction and survival rates for 623 hen-years from 2017-2022. Based on vital rate data inputs in preliminary population models (final results pending completion of Lindsey Phillips' dissertation), population growth rate (λ) has been <1.0 (declining) in six of seven years monitored (except 2018) with average declines of 10-20 percent per year.
2. Based on monitoring vital rates, the turkey population in the five focal counties appears to be declining because of the cumulative effects of **poor average annual nest success (<30 percent)**, **poor average 28-day poult survival (<30 percent)**, and **poor average annual hen survival (<50 percent)**. During the six years of monitoring, only in 2018 did all three parameters simultaneously approach or surpass the levels outlined above, which likely are necessary to sustain the turkey population (Figure 4).

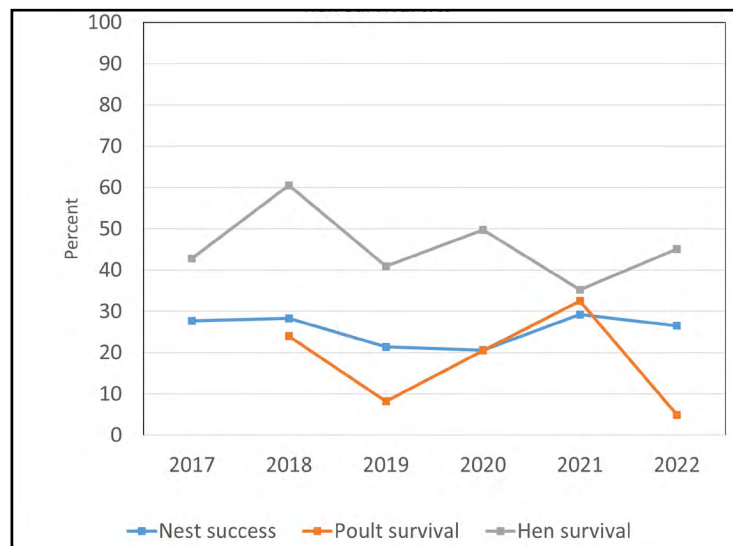


Figure 4: Adult hen nest success (percent), 28-day poult survival (percent), and adult hen annual survival (percent) in the five-county area studied.

3. Annual estimates of fecundity (defined as female poults per hen (PPH) that live >28 days post-hatch) were very low (<1.0 PPH), and recruitment (defined as female poults per hen that survive until the next breeding season) was very low (<1.0 ; Figure 5). Our fecundity estimates have been much lower than TWRA statewide or region-specific PPH indices based on roadside counts during summer, even after doubling our estimates to account for male and female poults counted in the TWRA estimate.

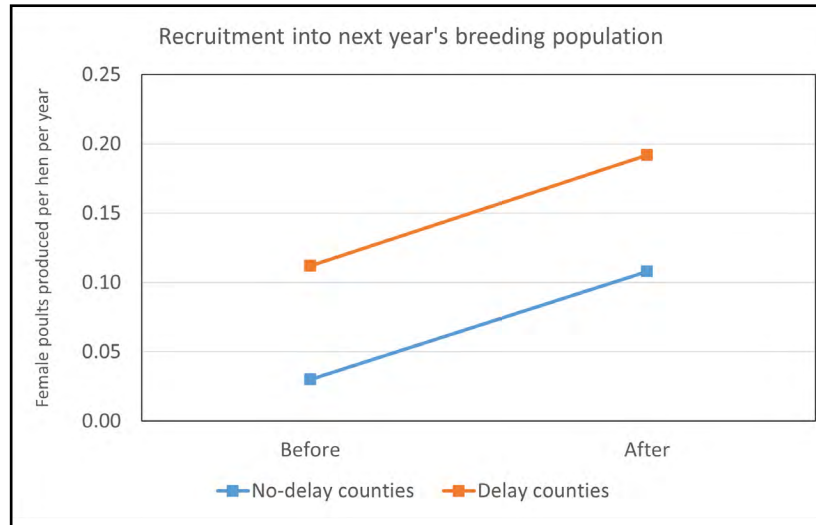


Figure 5: Recruitment into next year's breeding population before and after a two-week delay in the opening date of the spring wild turkey hunting season.

4. Land-use patterns likely are contributing to the population decline. For example, only 7 percent of the study area was represented by early successional and young regenerating forest plant communities, but 46 percent of the nests occurred in these plant communities. Nest success in early successional plant communities (36 percent) was greater than in any other plant community, demonstrating that nest-site selection can lead to greater fecundity. Nest success would have been even greater, but mowing destroyed 12 percent of all nests in any vegetation type that could be mowed.



Clutch size, hatchability, and nest success did not change after the two-week delay in the opening date of the spring hunting season.

5. High-quality brood-rearing cover was extremely limited across our study area. Hens with broods often traveled >1 mile within a couple days after hatching seeking suitable brooding cover. Previous research has indicated poult mortality increases with distance moved from the nest to brooding cover. We are still analyzing brood data from across our study sites and evaluating field and woodland management treatments at Yanahli Wildlife Management Area to determine the best strategies to improve habitat for broods.
6. Predation of hens, nests, and poults was the dominant proximate cause limiting the wild turkey population and subsequent harvest in the study area. **Improved habitat management with some level of predator control likely is required to increase turkey numbers on most properties.**
7. Based on extensive disease surveillance, prevalence of all diseases and parasites was relatively low, and there is no evidence that disease has been a limiting factor on the wild turkey population in south-middle Tennessee. We collected blood and fecal samples from the live turkeys and organs and other tissues from dead turkeys from 2017-2022 to monitor prevalence of various diseases and parasites from approximately 800 birds. The disease surveillance detected infection or exposure to *Histomonas meleagridis* protozoan, *Taxoplasma gondii* protozoan, Newcastle's Disease viruses, *Mycoplasma* bacteria, as well as the parasites *Plasmodium*, *Haemoproteus*, and *Leucocytozoon*. Although *Histomonas* is fatal to infected turkeys, the four confirmed cases constituted an insignificant and small fraction of total birds tested (n=4). There is no test available to determine exposure (antibodies) to *H. meleagridis* in clinically normal birds. Exposure or infection to the other pathogens rarely resulted in clinical signs or lesions.

8. **We did not detect an effect of the two-week delay of the spring turkey hunting season opening date on any of eight reproductive parameters we evaluated.** We monitored 623 hen-years (we tracked many hens more than one year) and 402 initial nests to examine potential effects of the experimental two-week delay. Our analysis was based on a rigorous Before-After-Control-Impact (BACI) experimental design with two northern counties (Bedford, Maury) as control (no delay), and three southern counties (Wayne, Lawrence, Giles) as treatment (delayed). We tested eight vital rates (nesting rate, timing of nesting, clutch size, hatchability, nest success, poult survival, hen survival, and fecundity) and calculated recruitment (female poults that enter the breeding population the following year) for potential effects of the delay. None of the vital rates increased or improved with the two-week delay. Estimates of fecundity were <1.0 female poult produced per hen before and after the delay. Recruitment increased in 2021 and 2022 in both treatment and control counties at the same rate (Figure 5) unrelated to the two-week delay. In 2023, the Tennessee Fish and Wildlife Commission implemented a two-week delay statewide. Average nest success in the five focal counties following the two-week delay in 2023 was the poorest of the seven-year study (18 percent; n=49 initial nests). Thus, we documented no biological reason to delay the opening date of the spring wild turkey hunting season from just prior to peak nest initiation to early in the incubation stage to improve wild turkey fecundity and recruitment.
9. We evaluated hunter effort, success, and overall satisfaction related to the two-week delay. Hunters hunted 37 percent fewer hours after the delay, in part because the season was shortened from six to four weeks. Hunters in delay counties heard fewer gobblers (-39 percent) but harvested about the same number of birds (average=1 for successful hunters); thus, their efficiency (birds harvested per hour) increased after the delay. Hunter satisfaction was lower in delay counties compared to no-delay counties prior to the delay and did not change after the delay.
10. In 2023, we surveyed ~10,000 hunters in the five focal counties after the two-week delay was implemented statewide to assess effort, success, and satisfaction. A plurality of hunters was dissatisfied (47 percent dissatisfied, 21 percent neutral, 32 percent satisfied) with the two-week delay and preferred the spring hunting season to open near April 1. A majority of hunters (69 percent) were dissatisfied with the two-week delay if the delay did not benefit turkey production. Hunters were equally split in favor of a bag limit of two vs. three birds and between a five-week vs. six-week season.
11. We trapped and radio-tagged a total of 265 male wild turkeys during the study, including 124 juvenile males (jakes) and 141 adult males (gobblers). Harvest of radio-tagged gobblers ranged from 20–43 percent per year ($\bar{x}$ = 30 percent). The average harvest is at the upper limit of the range of harvest rates (25–30 percent) considered sustainable for wild turkey based on previous harvest and population modeling. The greatest harvest (43 percent) occurred in 2020 during COVID restrictions when statewide harvest also peaked as a result of an increase in the number of turkey hunters statewide. Harvest of radio-tagged jakes was very low (3/115 jakes; 2017–2022; 2.6 percent) compared to the county-wide jake harvest for the five focal counties ($\bar{x}$ = 13.4 percent of total male harvest for 2017–2022).
12. There was no relationship between bag limit and the harvest rate of radio-tagged gobblers (2017–2023; $r=0.024$). The bag limit changed from four birds (2017–2020) to three birds (2021–2022) to two birds (2023). Changes in bag limit and the two-week delay also did not influence hunter success, as only 50 percent of hunters harvested a bird before or after the delay, regardless of the bag limit. The statewide harvest remained relatively constant at 30,000–35,000 birds, regardless if the statewide bag limit was four, three, or two.
13. We deployed 11 acoustic recording units in hunted and non-hunted sites across the state in 2023 to document gobbling chronology. Based on preliminary analysis, gobbling peaked in late March and early April and declined significantly after May 1 with no apparent differences in gobbling peaks east to west or north to south across the state (Figure 6).

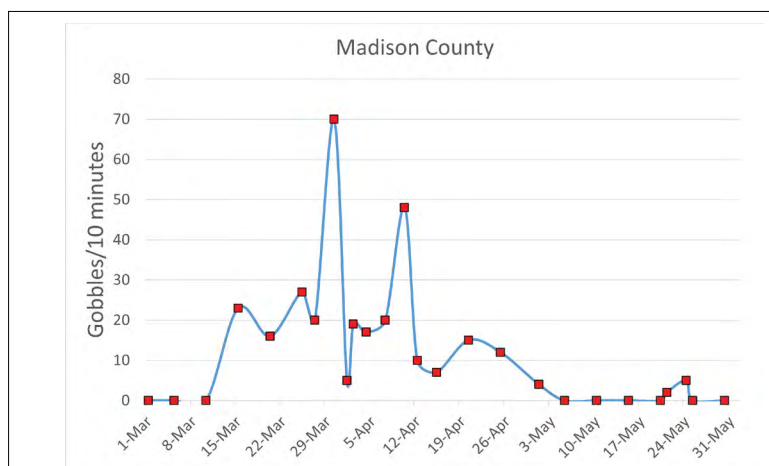


Figure 6: Seasonal peaks in gobbling based on an acoustic recording unit (ARU) deployed in a traditional turkey roost in Madison County, Tennessee. ARUs were deployed at 11 sites across Tennessee in 2023.

Regulatory Recommendations

We provide the following regulatory recommendations based on our project results, including the biological effects and hunter response to the two-week delay, and our professional experience conducting research and developing management strategies for wild turkeys over 30 years. Our recommendations were developed for consideration in Tennessee, but they may be relevant in other states that have similar regulatory frameworks.

1. Our biological and hunter survey data indicate the Tennessee spring wild turkey hunting season could start the first Saturday in April. This start date would allow a rotating opening date from April 1 – April 7, which aligns with the season-opening date when the experimental delay was implemented (April 2 and 3). Such a rotation would represent a delayed season-opening date of about four days compared to the traditional opening date of the Saturday closest to April 1, which could open as early as March 27. Our recommendation represents a conservative opening date and a reasonable compromise to hunters who would like an earlier opening date in late March with those who would like a later opening date.
2. Based on our hunter surveys, hunters were equally divided in preference for a two-bird vs. three-bird bag limit. Based on harvest rates of radio-tagged males and the lack of a relationship between bag limit and harvest rate, the current population could support a three-bird bag limit. However, if the bag limit was increased to three, we believe a conservative approach to include an annual bag limit is prudent, so any turkey harvested in the fall should be included in the annual three-bird limit. If the spring and fall bag limits are kept separate, we recommend a two-bird spring limit, which would help increase gobbler age structure.
3. Based on our hunter surveys, gobbling rate was the primary determinant of hunter satisfaction, and only 25 percent of surveyed hunters actually hunted after May 15 in 2023. Hunters were equally divided over preference for a season length of ≤ 5 weeks versus ≥ 6 weeks. Based on these data, we recommend a five-week season, which represents a conservative approach and ends the season after gobbling has declined substantially in May.
4. Given that the survival of radio-tagged jakes was >80 percent, a regulatory action prohibiting jake harvest would increase the adult male population for harvest the following spring. A no-jake rule would forego harvest of ~330 jakes per year in the five focal counties, which would increase the adult male population by ~250 gobblers per year in the five focal counties.
5. Given that hen survival is a crucial vital rate limiting population sustainability and given that hen survival was <50 percent most years in our study, management efforts are needed to increase hen survival. A simple regulatory action that could help address this problem is to make bearded hens illegal for harvest.

For More Information

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