2025 Kentucky Wild Turkey Brood Survey Report

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Photo credit: Rachel Cummings

INTRODUCTION

This report presents results of the 2025 Kentucky Wild Turkey Brood Survey, which has been conducted by the Kentucky Department of Fish and Wildlife Resources (KDFWR) each summer since 1984. Turkey observations reported by volunteers and KDFWR staff are summarized to provide an annual indication of the summer "hatch," a commonly used term referring to the reproductive success or productivity of the turkey population. Monitoring reproductive success helps KDFWR manage the population through regulations, outreach, and technical assistance to landowners.

Turkey reproductive success is difficult to measure, as it varies from year to year in response to weather conditions, food and cover availability, land management, predator abundance, and disease prevalence. KDFWR is working with researchers at Tennessee Tech University on a 3-year study in Muhlenberg County to better understand turkey reproductive parameters, such as nesting success (the percentage of nests that hatch) and poult survival (the number of young turkeys that survive their first month of life). As important as the eventual results will be, they are a snapshot from one corner of the state. Intensive research is too costly to conduct every year in multiple areas.

In contrast, the Brood Survey provides KDFWR with a useful assessment of turkey reproductive success each year across the state, serving as a long-term monitoring tool that compliments formal estimates from research projects. The Brood Survey would not be nearly as effective without the high level of public involvement seen in recent years. For more information, such as instructions on how to participate or past-year reports, visit the KDFWR website and enter "brood survey" in the search box, or type or click *https://fw.ky.gov/Hunt/Pages/TurkeyBroodSurvey.aspx*.

METHODS

Survey participants submit details about turkeys observed during routine travels across the state in July and August. For each observation, participants report the number of turkeys seen, including the number of hens (adult females), poults (young turkeys), gobblers (adult males), and turkeys of unknown sex or age, along with the location (county or more precise GPS coordinates from a mobile phone) and whether the observer previously saw and reported the turkeys. Participants can report observation using a Survey 123 website or mobile phone app (ESRI 2025) or on a paper form submitted by mail or e-mail. For more information, such as instructions or past-year reports, search the KDFWR website (fw.ky.gov) for "turkey brood survey".

The primary objective for data collected through this survey is to calculate a poult-per-hen (PPH) ratio as a primary indicator of reproductive success. Historically, we calculated PPH as a single value across all observations: the total number of poults observed divided by the total number of hens observed (Figure 1). In 2017, we adjusted how hens without poults were recorded on the survey reporting form, which allowed us to calculate a PPH value for each individual hen observation. We then average the individual PPH values to get statewide and regional PPH values.

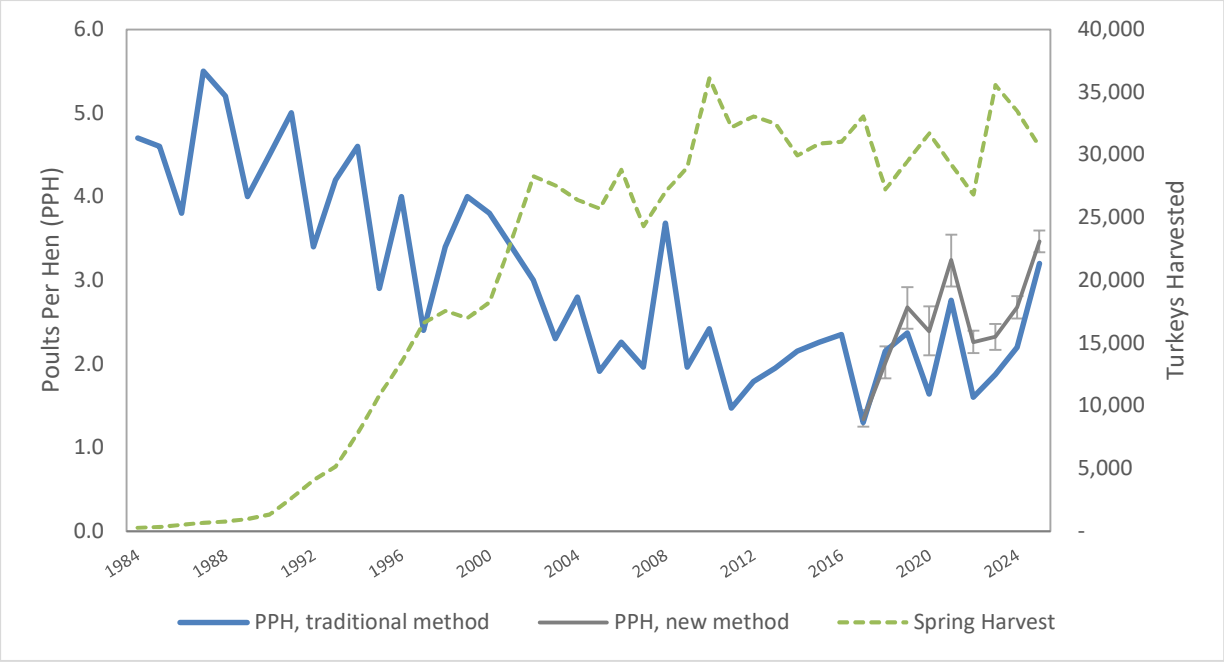

Figure 1. Long-term trends in wild turkey reproductive success (solid lines) and population growth (dashed line) statewide in Kentucky from 1984 to 2025. The poult-per-hen ratio (PPH) indexes reproductive success and spring hunter harvest indexes population growth. The overlay of population and reproduction trends shows rapid change during restocking in the 1980s to early 2000s followed thereafter by a leveling out with annual fluctuations. A new PPH calculation method used since 2017 (thick gray line with points; see text for details) provides similar inference about trends in turkey reproductive success as the traditional calculation method.

The PPH values from the new calculation method are slightly higher than the old method (Figure 1). Yet the two measures are highly correlated, meaning that while their exact values may differ slightly, they tell the same basic story about turkey reproductive trends through time. The advantage of the new method comes from the measures of statistical uncertainty it provides – the confidence intervals surrounding PPH estimates. Every study will involve some level of uncertainty, which is important to recognize and embrace right along with the estimated quantity of interest. We use a nonparametric statistical technique called bootstrapping to calculate confidence intervals, which follows a standardized protocol adopted by several states in recent years. Figure 1 shows PPH calculated with both methods since 2017.

In addition to PPH, we calculate a poults-per-brood ratio (PPB) to indicate poult survival, the proportion of hens observed with a brood to indicate nesting success (PHWB), and the ratio of male to female turkeys (MF) to indicate gobbler carryover after the spring hunting season or population sex ratio after the reproductive period. These measures receive less attention than PPH, mainly because they are highly correlated with PPH and provide similar information.

The protocol we use also specifies quality control criteria to foster consistency and comparability of results, which means that some observations get filtered out before analysis. This includes observations for which: sex or age were not recorded for 25% or more of the turkeys seen, eight or more hens but no poults were seen, poults but no hens were seen, more than 16 poults per hen were seen, or turkeys were seen before. More information about the analysis protocol can be found in Danks et al. (2025).

RESULTS

Survey cooperators recorded a statewide total of 2,556 turkey observations. Most observations were reported using the Survey 123 phone app and website (94%) and most were of turkeys not previously seen by cooperators (85%). Most observations were reported from the Central Region (61%), followed by the Eastern Region (24%) and the Western Region (14%). Of the observations not included in the analysis because they did not meet quality control criteria, most were of turkeys believed to have been recorded before (47%) or had 25% of turkeys marked as unidentified (45%). After filtering, we included 1,797 observations in the analysis (Table 1).

Based on reported observations, we estimated a statewide PPH index of approximately 3.5 in 2025, which was up from 2.7 PPH in 2024 (Table 1, Figure 3). At the regional scale, PPH improved in eastern counties (3.8 in 2025 vs 2.3 in 2024) and in central counties (3.6 in 2025 vs 2.6 in 2024) but declined in western counties (2.4 in 2025 vs. 3.1 in 2024). PPB improved considerably in eastern counties (4.5 vs. 3.5 in 2024) and in central counties (4.2 vs. 3.8 in 2024) but declined slightly in western counties (3.4 vs. 3.9 in 2024). Similarly, PHWB improved considerably in eastern counties (84% vs. 60% in 2024) and in central counties (84% vs. 64% in 2024) but dipped in western counties (74% vs. 81%). The MF ratio was lower in eastern and central regions but higher in the west.

Statewide and regionally, trends in turkey productivity metrics generally indicate improvement since 2017, the historic low point in productivity (Figure 1, Figure 3). PPH and PHWB have increased while PPB has remained stable. MF has declined over time, possibly reflecting how observers inadvertently misclassify older poults as adult hens in better-production years.

Estimated timing of hatching based on size of poults reported by survey participants (Figure 5) was consistent with past years' survey data and field date from our ongoing research projects.

Table 1. Summary statistics for the 2024 Kentucky Wild Turkey Brood Survey. Poults per hen = PPH, poults per brood = PPB. Calculations based on NWTF Technical Committee standardized protocol.

Region	PPH (95% CIs, n)[a]	PPB (95% CIs, n)	PHWB % (95% CIs, n)[b]	Male:Female (95% CIs, n)[c]
Western	2.4 (2.2–2.7, 242)	3.4 (3–3.7, 177)	74 (67–80, 242)	0.42 (0.3–0.55, 264)
Central	3.6 (3.4–3.7, 1,006)	4.2 (4.1–4.4, 842)	84 (81–87, 1,006)	0.22 (0.18–0.26, 1,060)
Eastern	3.8 (3.6–4.1, 424)	4.5 (4.3–4.8, 359)	84 (80–88, 424)	0.27 (0.21–0.33, 473)
Statewide	3.5 (3.3–3.6, 1,672)	4.2 (4.1–4.3, 1,378)	82 (80–85, 1,672)	0.26 (0.23–0.3, 1,797)

[a] 95% bootstrap confidence intervals; n = number of observations used in calculation

[b] Percentage of hens observed with at least 1 poult (95% bootstrap CIs)

[c] Total number of males observed divided by total number of hens observed (95% bootstrap CIs)

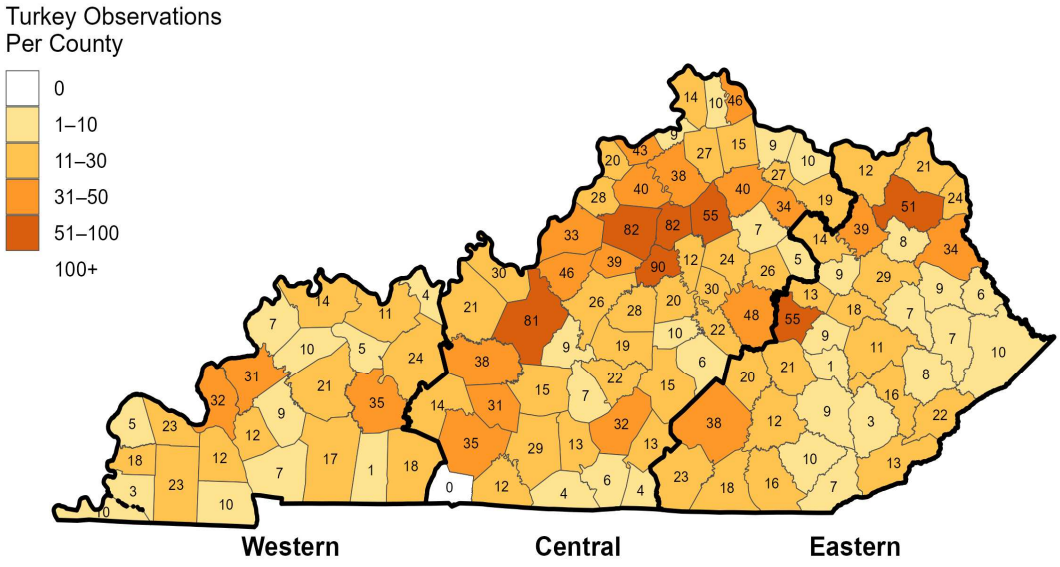

Figure 2. Turkey observations per county for the 2025 Kentucky Wild Turkey Brood Survey. Counties are grouped into 3 survey regions reflecting general landscape differences.

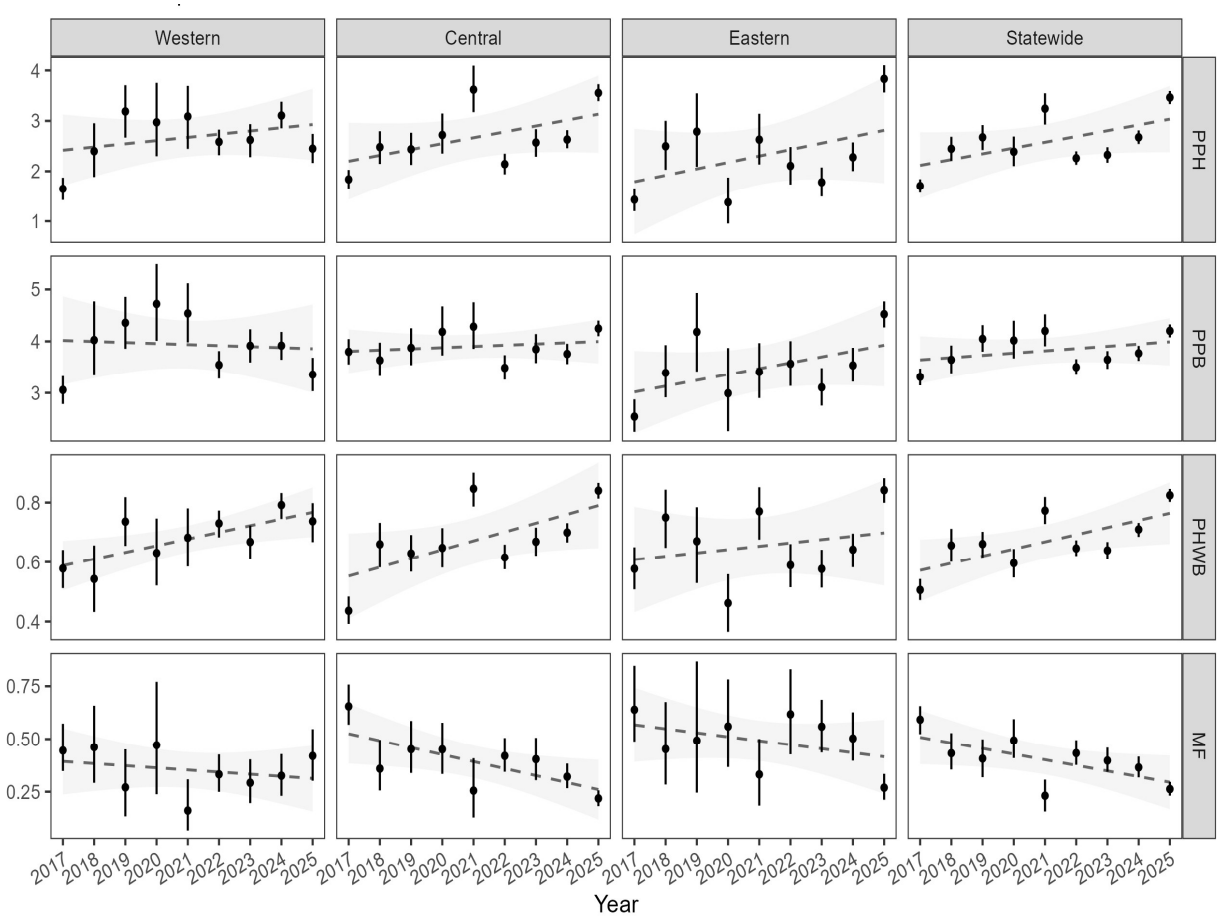

Figure 3. Trends in metrics of wild turkey reproductive success from the Kentucky Wild Turkey Brood Survey, 2017-2025. For each subplot, horizontal x-axes shows years and vertical y-axes show values for survey metrics, each within a row. Regions are oriented vertically in columns. Points show annual averages for each metric and vertical error bars (95% confidence intervals) indicate estimation uncertainty. Dashed lines show smoothed trend lines across years and gray ribbons (95% confidence intervals) indicate estimation uncertainty.

DISCUSSION

Kentucky's 2025 brood survey data suggest that turkey reproductive success improved significantly compared to 2024. The overall trend has been positive since 2017, the lowest production level on record. Depressed turkey abundance in the next few years likely led to the increasing number of calls to the Turkey Program in subsequent years from hunters and landowners who reported seeing fewer turkeys. It stands to reason that in low production years, fewer turkeys get recruited into the population, meaning fewer hens available to nest and rear broods, and fewer poults produced per hen, both of which are vital to maintaining and growing turkey populations (Londe et al. 2023). Our male-to-female ratios show a population skewed toward males in 2017 but a shift toward females since then.

The effect of reproductive success in any given year, good or bad, is reflected in the spring harvest 2 years later (Figures 1 and 5). Two-year-old male turkeys display behaviors (gobbling, strutting) and

physical characteristics (longer beard and spurs, full tail fan) that hunters desire, which leads to the much greater rates at which hunters harvest them (about 30% of adult males in the population) compared to 1-year-old jakes (about 6%), as estimated from turkey banding data (Riggs 2024).

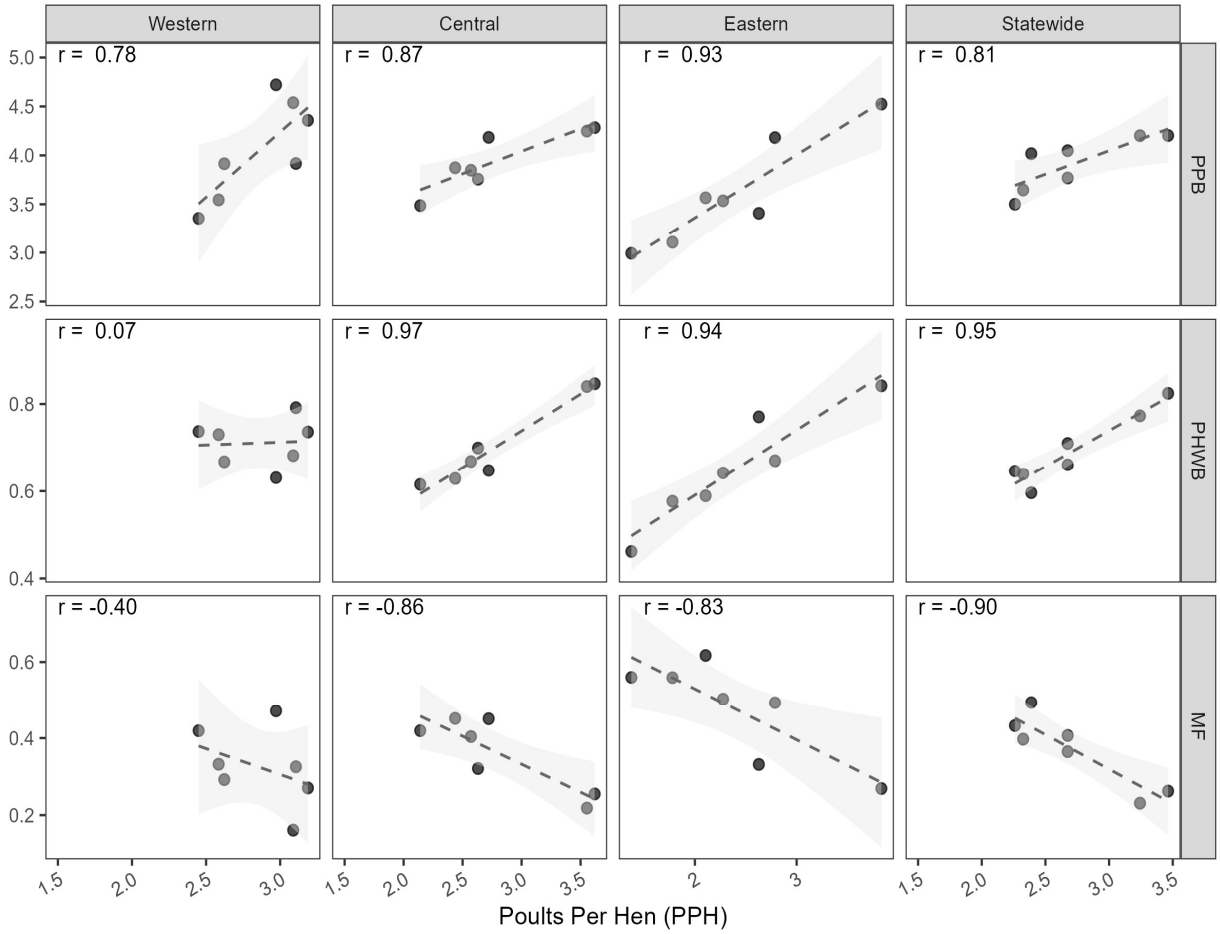

Figure 4. Relationships (statistical correlations) between poults per hen (PPH) and the 3 other metrics of turkey reproductive success from the Kentucky Wild Turkey Brood Survey, 2017-2025. PPB = poults per brood, PHWB = proportion of hens with a brood, MF = male:female ratio of observations. For each subplot, horizontal x-axis shows the PPH value and vertical y-axes show values for the other metric in each row. Regions are oriented vertically in columns. Points show yearly values for PPH and the other metric. Dashed lines and r values show Pearson's correlation coefficients. Gray ribbons show 95% confidence intervals for correlations.

When KDFWR began tracking the PPH index in the 1980s, PPH values were high, reflecting high population growth rates following the restocking of over 6,000 turkeys across the Commonwealth between 1978 and 1997. However, as the turkey population expanded across the state, growth rates, as measured by PPH, declined until the mid-2000s, then leveled off, generally around 2.0 PPH, which has since been considered a "break-even" level of production for population sustainability. The decline in productivity during a period of population growth may seem

counterintuitive but is well documented in wildlife population biology. It may indicate that the turkey population grew until it reached the landscape's capacity to support it (Byrne et al. 2015).

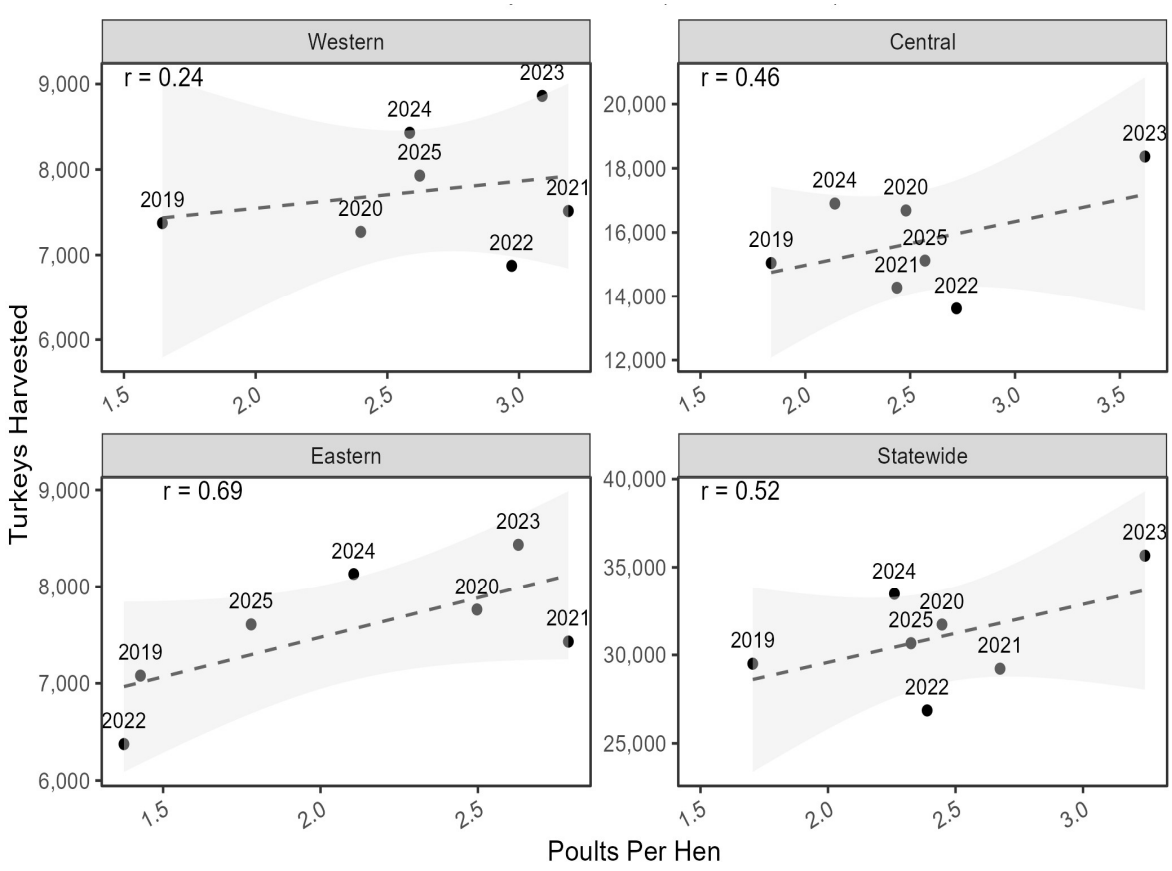

Figure 5. Relationships (statistical correlations) between poults per hen (PPH) from the Kentucky Wild Turkey Brood Survey 2017-2023 with spring turkey hunter harvest from the KDFWR Telecheck database, 2019-2025. For each subplot, horizontal x-axis shows the PPH value and vertical y-axis shows the number of turkeys harvested 2 years later. Points are labeled with the year of harvest. Dashed lines and r values show Pearson correlation coefficients. Gray ribbons show 95% confidence intervals for correlations.

In recent years, state wildlife agency biologists have standardized brood survey data collection and analysis to improve monitoring for long-term sustainability of turkey populations; this has included refinements in how PPH is calculated (Danks et al 2025). An artifact of the calculation change has been that PPH estimates are systematically higher (by about 0.4 PPH) under the new method. For wildlife population monitoring, an exact figure can be less important than a trend across years. Also, sound inference should involve measures of statistical uncertainty to help gauge the reliability of our estimates (confidence intervals under the new approach), a more rigorous and transparent approach.

Regardless of how you figure it, the story is the same: over the past 20 to 25 years, turkey abundance and harvest have depended on reproductive success. Turkey populations are dynamic,

sometimes fluctuating considerably from year to year (Healy and Powell 1999). This should not be surprising considering the hurdles turkeys face: high predator densities, ill-timed spring rains and flooding during nesting and brood-rearing periods, poor nesting and brood-rearing habitat throughout the state, and counter-productive land management practices ranging from recreational mowing to intensive agriculture and poor forest management. Diseases and pathogens may play a role as well.

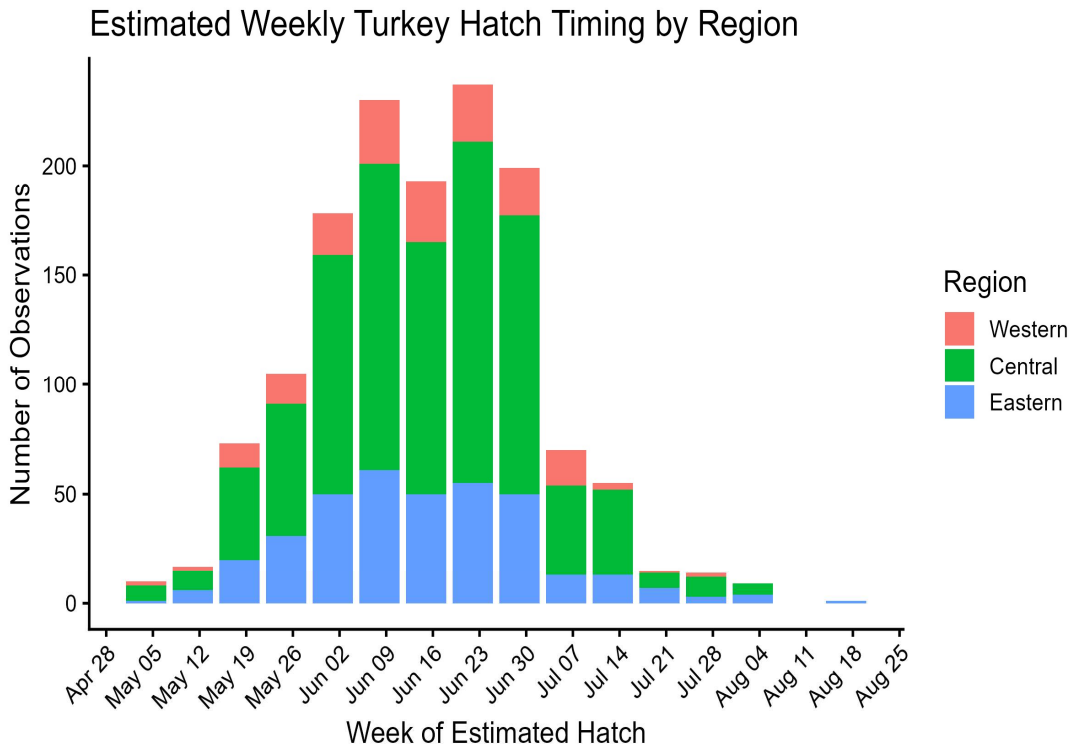

Figure 5. Estimated hatch dates of poults based on brood observations reported in the Kentucky Wild Turkey Brood Survey, 2025. Dates were derived from back-dating the date poults were observed based on the size of poults estimated by observers. Observers were provided the following poult size comparisons to other bird species: sparrow size (<2 weeks), robin size (2 weeks), quail size (3 weeks), pigeon size (4 weeks), grouse size (6 weeks), pheasant size or larger (8+ weeks).

Upticks in the turkey populations have been linked to the emergence of periodical cicadas. The 2025 uptick in turkey production in the eastern two-thirds of the Commonwealth rivaled the production observed in 2008 (Figure 1), which was the last time the Brood XIV “Bourbon Brood” 17-year periodical cicadas emerged. PPH in 2025 exceed 2021 when a different batch of 17-year periodical cicadas, the Brood X “Great Eastern Brood,” emerged in counties along the Ohio River and in north-central Kentucky. In 2024, the Brood XIX “Great Southern Brood” 13-year cicadas that emerged in several western counties contributed to improvements in regional turkey production; compared to 2023, Tennessee Tech University PhD student Sara Watkins documented improvements in nest success (+50%), renesting (+176%), and the percentage of nests that produced a successful brood (+113%). Although these results are not directly comparable with our statewide brood survey results, their general alignment shows the great value of the survey.

The cicada emergences are truly fascinating natural phenomena that Kentuckians – and our turkeys – are fortunate to have experienced. However, the response of turkey populations to the huge influx of insects across our landscape provides a cautionary tale: in non-cicada years, we are not producing enough bugs to provide alternative prey for turkey predators nor enough food for vulnerable turkey hens on the nest and tiny, defenseless poults. The cicadas also provide turkey hens with easy access to forage during nesting, reducing their travel needs, keeping them in good condition to protect nests and lay larger clutches in subsequent nests if first nests fail. Early-hatching poults certainly benefit from protein-packed cicadas, which fuel rapid growth.

In closing, we hope hunters and landowners interested in helping wild turkeys will consider doing everything possible to help their local turkey populations. Fur-trapping of coyotes, bobcats, racoons, and other mammals may help and certainly provides great outdoor recreation. However, the best bang for the buck in terms of predator control is likely to be indirect – that is, by providing areas of lush herbaceous vegetation that support bugging areas for broods. Direct control of predators is difficult, even if mammals are controlled, because birds of prey and snakes that cannot be controlled take their place. Disease and weather are impossible to control, yet better habitat may buffer their effects. Quail, rabbits, deer, and songbirds will also benefit.

KDFWR biologists are available to help you improve your land for turkeys and other wildlife. They can provide free technical advice and link you to financial assistance opportunities. For more information on how to contact them, see the following web link: (*https://fw.ky.gov/More/Documents/privatelands_biologists.pdf*.

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ACKNOWLEDGMENTS

We thank the many survey participants who took the time to report turkey observations this year and in past years, which has helped us better understand population dynamics of Kentucky wild turkeys. We thank the KDFWR Wildlife Division GIS Program developing and maintaining the brood survey reporting app and webpage. We thank KDFWR Information and Education Division staff for promoting the survey through press releases and social media posts. Finally, we thank Kentucky hunters for funding this work through the sale of hunting licenses and the matching federal funds they generate from excise taxes on hunting equipment (the US Fish and Wildlife Service's Wildlife Restoration Program, first authorized by the Pittman-Robertson Act of 1937).

Photo credit: Joe Lacefield