

**GOBBLER
BANDING
PROJECT**



Annual Report **2024**





About the Project

In 2021, the Tennessee Wildlife Resources Agency (TWRA), the Kentucky Department of Fish and Wildlife Resources (KDFWR), and Tennessee Technological University (TTU) launched the Gobbler Banding Project, a collaborative effort dedicated to conservation of wild turkey populations in Kentucky and Tennessee. This initiative seeks to enhance wild turkey populations in Kentucky and Tennessee by investigating the factors contributing to their decline, with a particular focus on male harvest rates across both states.

From 2021-2024, state agency staff, graduate students, and other stakeholders worked between January - March to capture male wild turkeys in both states. Captured individuals were uniquely marked with an aluminum rivet-leg band. The recovery of this band can give valuable insight into yearly survival and harvest of the population. Insights gained from this project will help inform hunting regulations that ensure well managed turkey populations and quality hunting for future generations.



MAIN OBJECTIVES:

- Estimate **harvest, reporting, and survival** rates for male eastern wild turkey in Kentucky and Tennessee.
- Examine the effects of regulatory, biological, and landscape factors on these rates.

CAPTURE RESULTS:

- Captured and tagged **1719** individuals, **742** juvenile (jakes) and **977** adult (gobblers) male wild turkeys.
- **299** successful trapping sites (≥ 1 bird caught) throughout the two states on both **private** and **public** land.

Opening Note

This year seemed to be an exceptionally tough trapping season. Whether due to the especially warm season or the abundance of food on the ground, it was challenging to attract turkeys to the bait. Early January started off promising, giving us a couple of cold days to start the season off. For my team, myself and a technician, we had good early season shoots dropping on multiple large flocks of >10 individuals in Kentucky. Unfortunately, the weather changed for the worst in February. A mix of rainy days, wet conditions, and heat kept us from being able to trap or trap successfully. I remember a stretch of days in February (of all months!) where the average temperature for the day was at least 70 degrees, forcing us out of the blind around noon. Luckily, March presented us slightly better weather and we finished the season strong.

Despite the challenges of the season, this year was marked by exceptional collaboration. On numerous occasions, my team and I were able to host volunteers, landowners, and other wildlife professionals, offering them firsthand experience with trapping. For the volunteers, primarily undergraduates aspiring to enter the wildlife field, we were able to provide valuable educational opportunities. For our landowners, it provided a fantastic chance to foster greater involvement with the project. Overall, the collaborative efforts this year were remarkable, significantly strengthening the project through this extensive network.

With all this in mind, I cannot express my gratitude enough to those who have assisted with this project. First, to my technicians, Connor and Brittany who helped me keep a level head through the trapping seasons. Second, to all my landowners, who graciously allowed me access to their property and turkeys. Your enthusiasm for this project and conservation of this species is truly contagious. I would not be able to do this project without your support. Finally, to all the biologist and other agency staff who have put in tremendous effort in support of this project. Catching turkeys is no easy feat but the critical data that has been collected (and is being collected) from this effort is providing valuable insight into the effects of harvest on wild turkey populations.

Looking ahead, I was thrilled that both KDFWR and TWRA have extended their trapping efforts for an additional year. With the cicada boom this year, providing extra food and presumably more turkeys, I'm eager to see the insights this additional year of data will provide.

-Abigail Riggs, Graduate Research Assistant

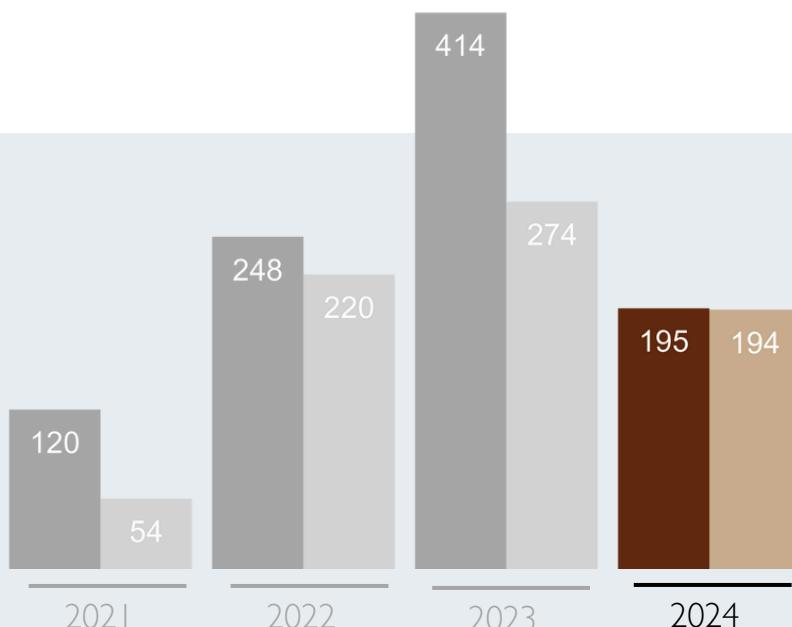
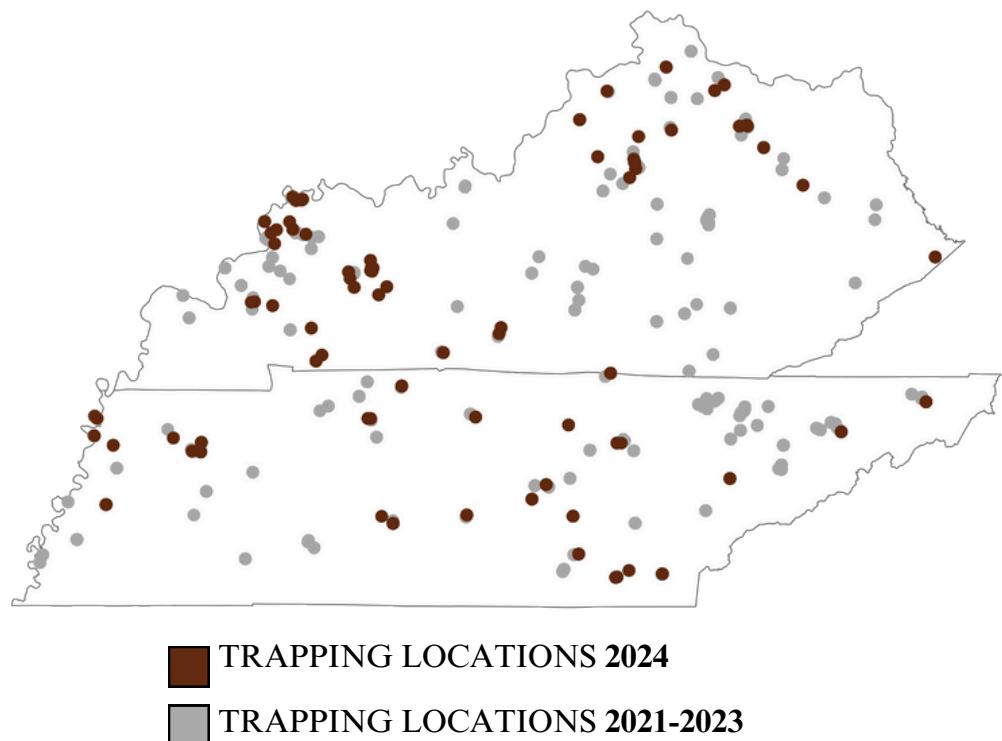




Updates For 2024 and Preliminary Project Results

Trapping Locations

We added 99 new locations for 2024, successfully catching at over 299 sites across the two states. The random distribution of sites throughout Kentucky and Tennessee allow us to capture the east-to-west environmental variation occurring within these states.



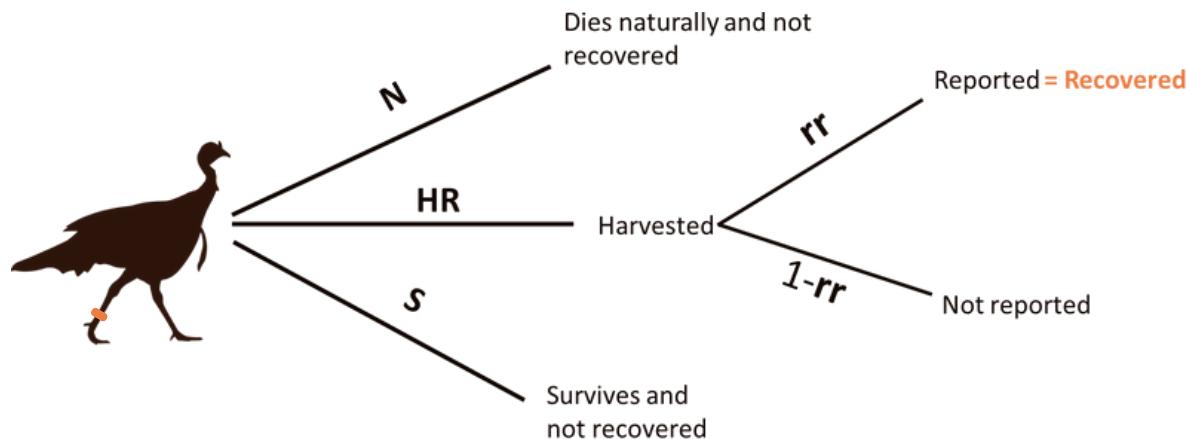
Scan for raw numbers of annual captures and recoveries

Birds Caught and Tagged

In 2024, we captured 389 birds, 195 gobblers and 194 jakes. Throughout the four years, both age classes are well represented.

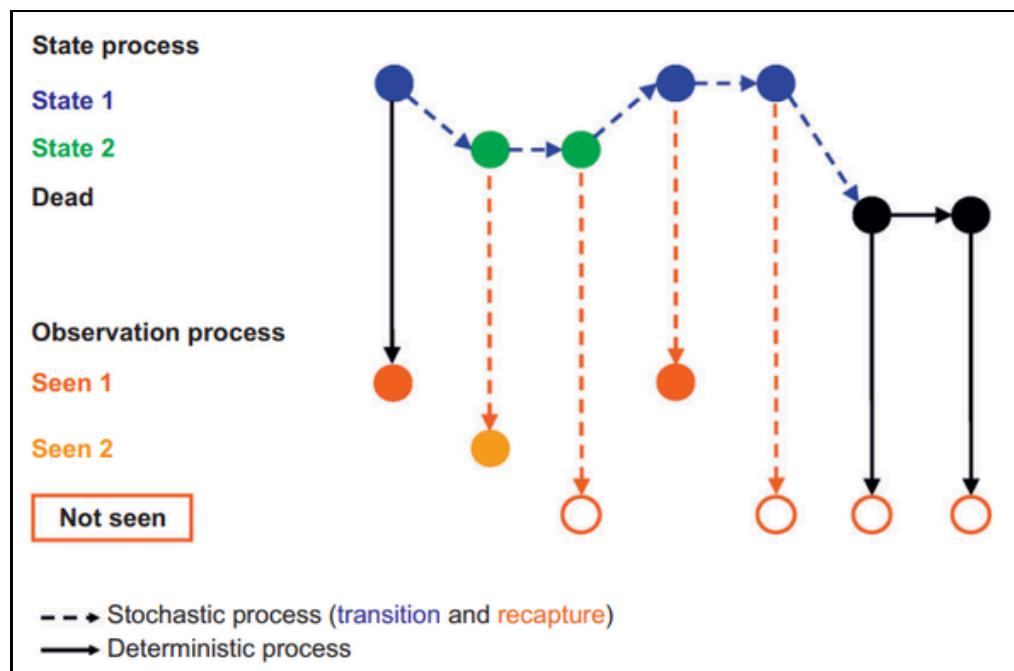
Recovery of a Band

Recovering a band is a complex process. After a turkey is marked and released, there are three possible outcomes for that banded bird: survival, natural death, or harvest. Of these, only a harvested turkey offers the possibility of band recovery. However, recovery of that band isn't assured. For managers to recover the band, the harvested turkey must also be reported to the state agency.



Modeling Vital Rates

Given the complexities of band recovery, relying solely on raw band recoveries may not yield accurate estimates. By modeling rates, we can better account for these complexities and produce more accurate estimates. To address this, we developed a Bayesian multistate model to estimate harvest, survival, and reporting rates for tagged male eastern wild turkeys in two states. The strength of the multistate model lies in its flexibility: it allows us to assign characteristics to individuals and account for transitions over time. This flexibility enables us to model transition of jakes to gobblers for age-specific estimates. Additionally, we can incorporate regulatory and landscape characteristics for individuals to assess their effects on various parameters.



Example of a multistate model from Kéry and Schaub et al. 2011. This describes the possible state and observed processes a single individual (i) can enter.

Main Parameters Estimated:

- | | |
|-------------------|----------------------|
| 1. Harvest Rate | 3. Survival |
| 2. Reporting Rate | 4. Natural Mortality |

Reporting Rates

The Gobbler Banding Project depends on the public to accurately report their bands through online surveys available on the respective state agency's website. While most hunters are likely to report their harvested bands, there may be circumstances where they are unable to. Consequently, actual harvest rates are higher than percent recovery of bands,

as not all harvested birds are necessarily reported. Having reward bands helps to encourage hunters to report their band and allows us to establish reporting rate. One out of every four of our birds received a reward band and we can use the recovery of reward bands to help establish a reporting rate



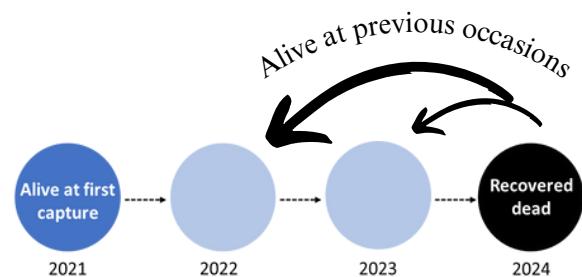
Reward Bands

Both jakes and gobblers were banded with either a reward (green) or non-reward (silver) band. Previous literature suggests a monetary value of $\geq \$75$ would be sufficient enough to encourage a 100% reporting rate. Thus, upon reporting a reward band, hunters from either state can receive a monetary value of \$75 in the form of a Academy Sports or Bass Pro Shops gift card.

Survival and Natural Mortality

When an individual is tagged and released into the wild, there's no guarantee that animal will ever be seen again. Thus, survival is more difficult to estimate than recovery, but not impossible. Upon recovery of a band, we can definitively say that an individual was alive in previous years and incorporate this knowledge in the survival estimate. Additionally, while we will never recover an individual that dies naturally,

the Bayesian framework allows us to use prior information regarding natural mortality that helps more accurately estimate annual survival.



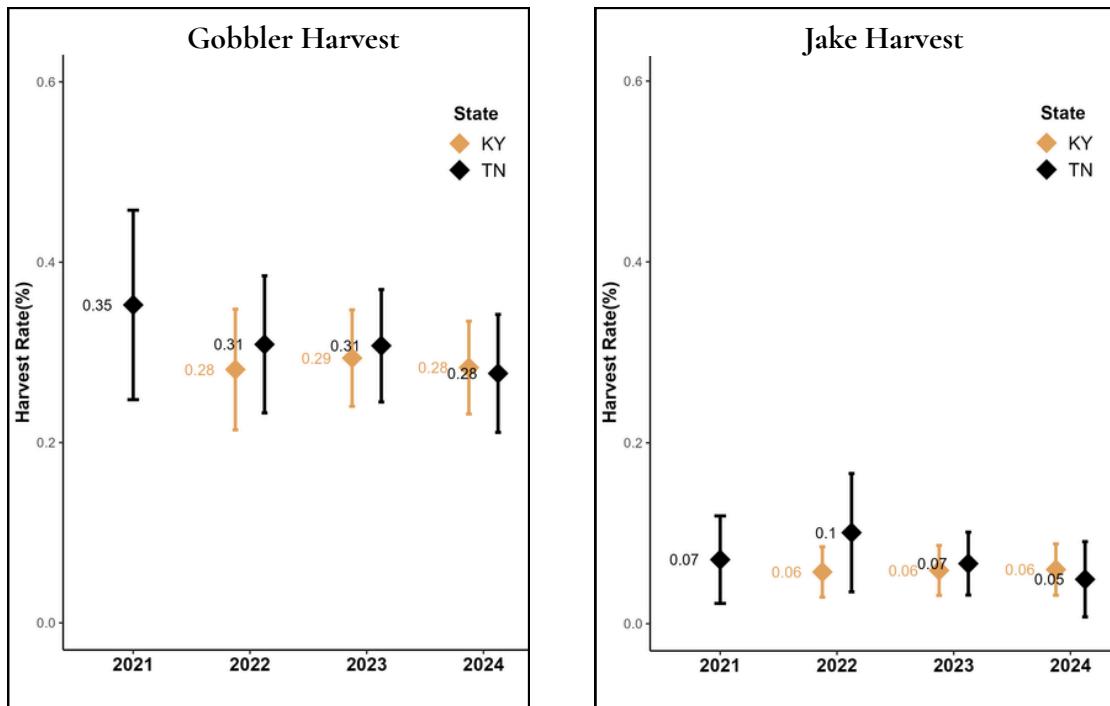
Vital rate estimates

Estimated rates derived from our Bayesian multistate model. CI represents the 95% Confidence Interval. Tennessee and Kentucky rates are very similar.

All Birds 30% CI 0.24-0.35	Tennessee 30% CI 0.21-0.39	Kentucky 28% CI 0.21-0.34	gobbler harvest
All Birds 6% CI 0.05-0.09	Tennessee 7% CI 0.05-0.11	Kentucky 6% CI 0.04-0.09	jake harvest
All Birds 51% CI 0.45-0.58	Tennessee 51% CI 0.41-0.62	Kentucky 57% CI 0.48-0.69	gobbler survival
All Birds 75% CI 0.72-0.78	Tennessee 74% CI 0.70-0.78	Kentucky 78% CI 0.73-0.84	jake survival
All Birds 82% CI 0.69-0.91	Tennessee 80% CI 0.68-0.91	Kentucky 80% CI 0.67-0.91	reporting
All Birds 18% CI 0.16-0.20	Tennessee 18% CI 0.15-0.20	Kentucky 15% CI 0.06-0.20	natural mortality

Annual Harvest Rates

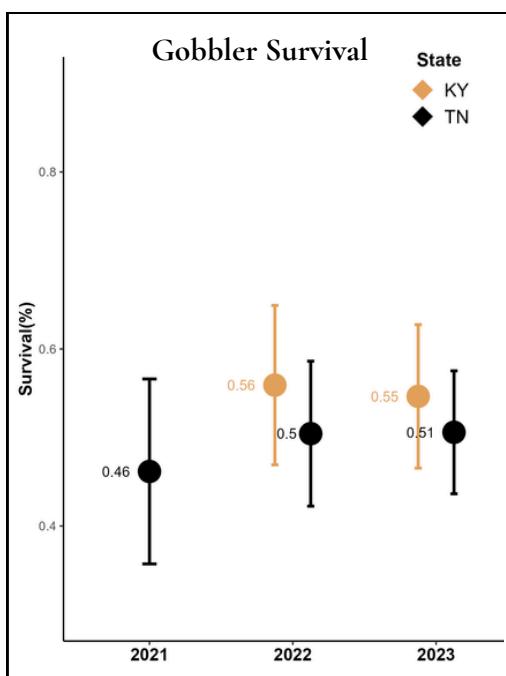
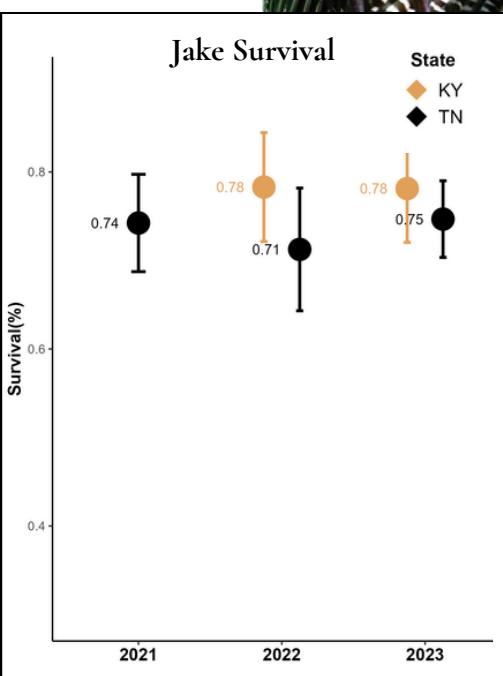
For both states, jakes had lower harvest than adults. This is unsurprising and is consistent with findings from other studies (Norman et. al. 2022, Table 10). The highest gobbler harvest occurred in Tennessee in 2021. However, this may be due to the lower sample sizes in the first year causing greater uncertainty in the estimate.



Overall, annual harvest rates were relatively consistent between the two states, despite having varying harvest regulations.

	Bag Limit	Start Date	Season Length (Days)		Bag Limit	Start Date	Season Length (Days)
2021	3	April 3	44		2	April 17	23
2022	3	April 2	44		2	April 16	23
2023	2	April 15	44		2	April 15	23
2024	2	April 13	44		2	April 13	23
				TENNESSEE			KENTUCKY

*Tennessee had restrictions on jake harvest 2023-2024



Annual Survival Rates

Mean survival rates were similar between Kentucky and Tennessee, with jakes having higher percent survival. Tennessee has an additional year of data compared to Kentucky, so Kentucky's survival estimates may adjust slightly as more data is collected over the next years. Using prior information for natural mortality, we allowed annual natural mortality to deviate from 10-25% for both jakes and gobblers.



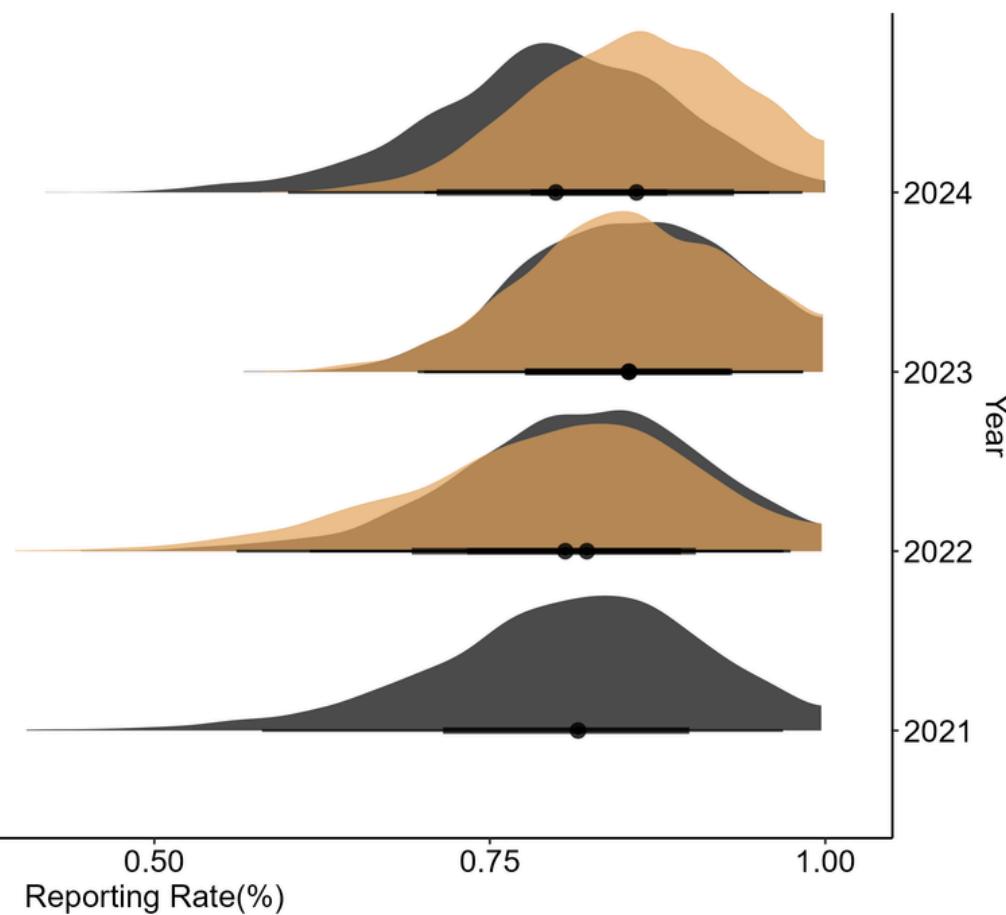
Reporting rates for Tennessee and Kentucky

The graph below depicts the posterior distribution of our estimates for reporting rates. We assumed that reward bands had a reporting rate of 100%. Overall, we estimate a reporting rate for both states around 82% (95% CI = 0.69 - 0.98).

We use the reporting rate to help determine true harvest rates, where $\text{recovery} = \text{harvest rate} * \text{reporting rate}$ (Brownie et al. 1985). Harvest rates are especially sensitive to changes in reporting rates. A slight decrease in reporting rates will result in a higher harvest rate.

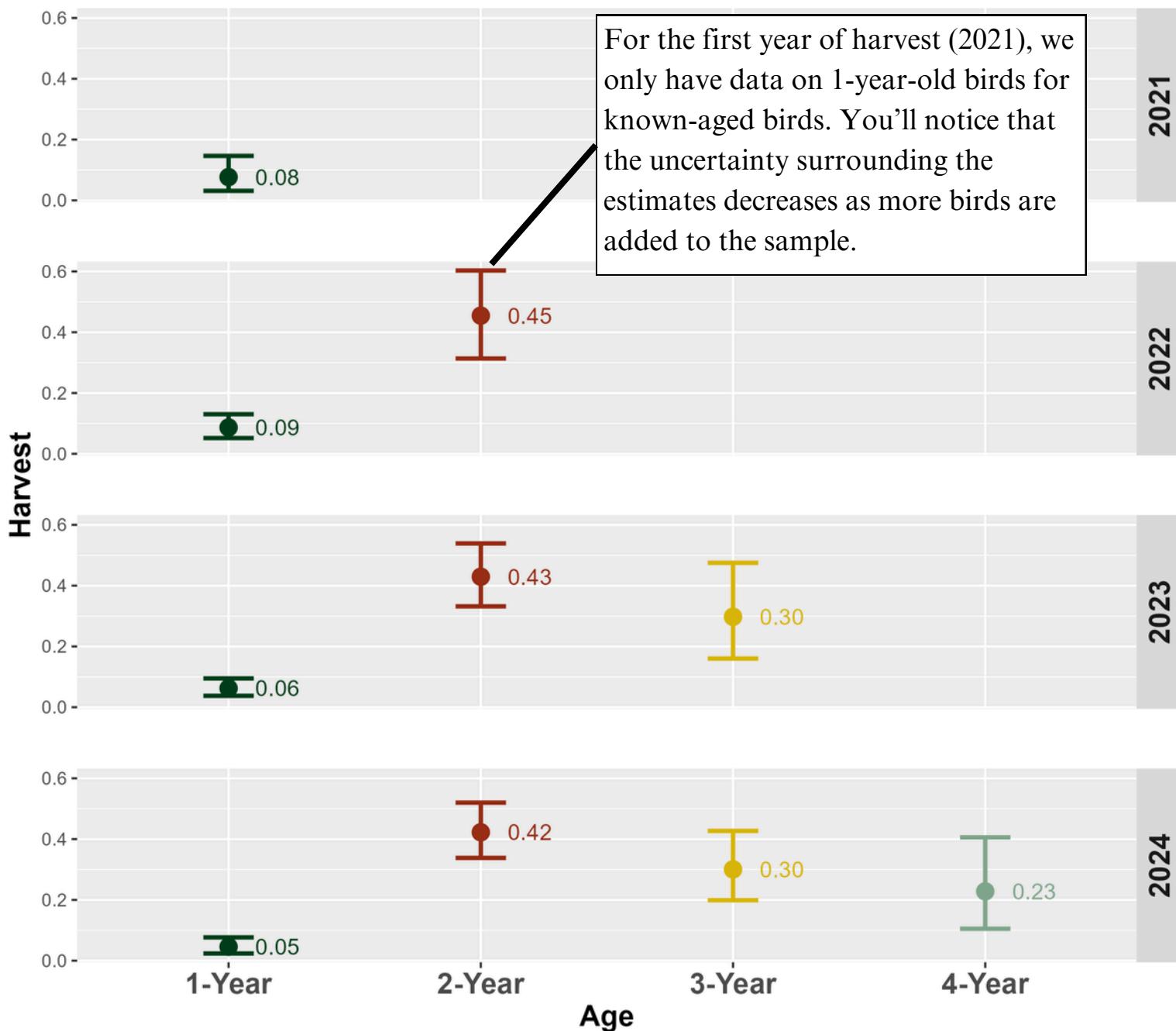
 **Kentucky**
 **Tennessee**

Reporting Rates for Tennessee and Kentucky



Harvest of Known-Age Birds

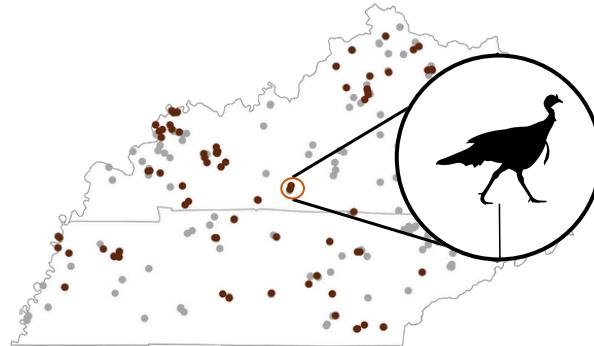
Birds marked as juveniles allow us to calculate age-specific harvest rates. Preliminary results suggest that two-year-old birds are harvested at a much higher rate than older birds. Two-year-old birds could be more susceptible to harvest due to behavioral naivety or animal abundance.



Looking Forward



We plan to continue to explore additional factors such as land ownership (public/private) and land cover attributes that might impact harvest rates. For landscape factors, we can assign a buffer around the capture location of individuals.

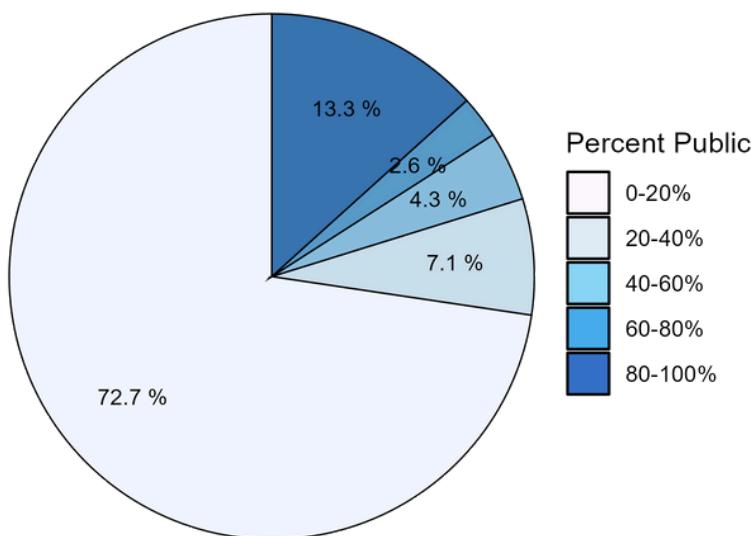


We will use prior information regarding the home-range of wild turkeys to determine buffer size. To produce our preliminary results below, we used a buffer size of ~900ha (~2220 acres), however this number is subject to change as we continue our analysis of landscape factors on rates. Using this buffer we can extract various landscape factors such as percent public, land cover, and road density.

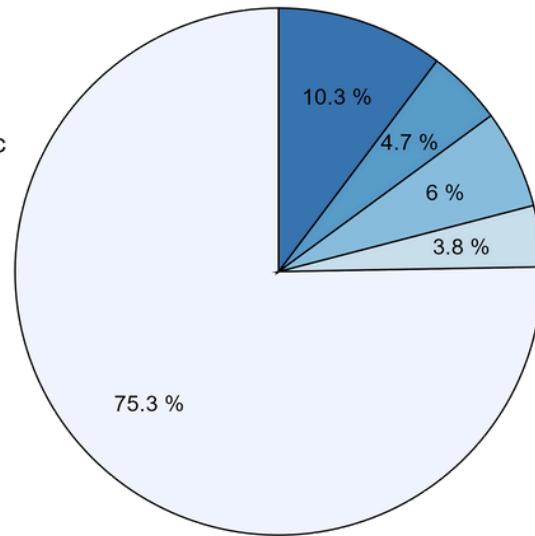
Public Land

In both states, the majority of birds were captured on private land, thus most birds had minimal percent of public land within their buffer.

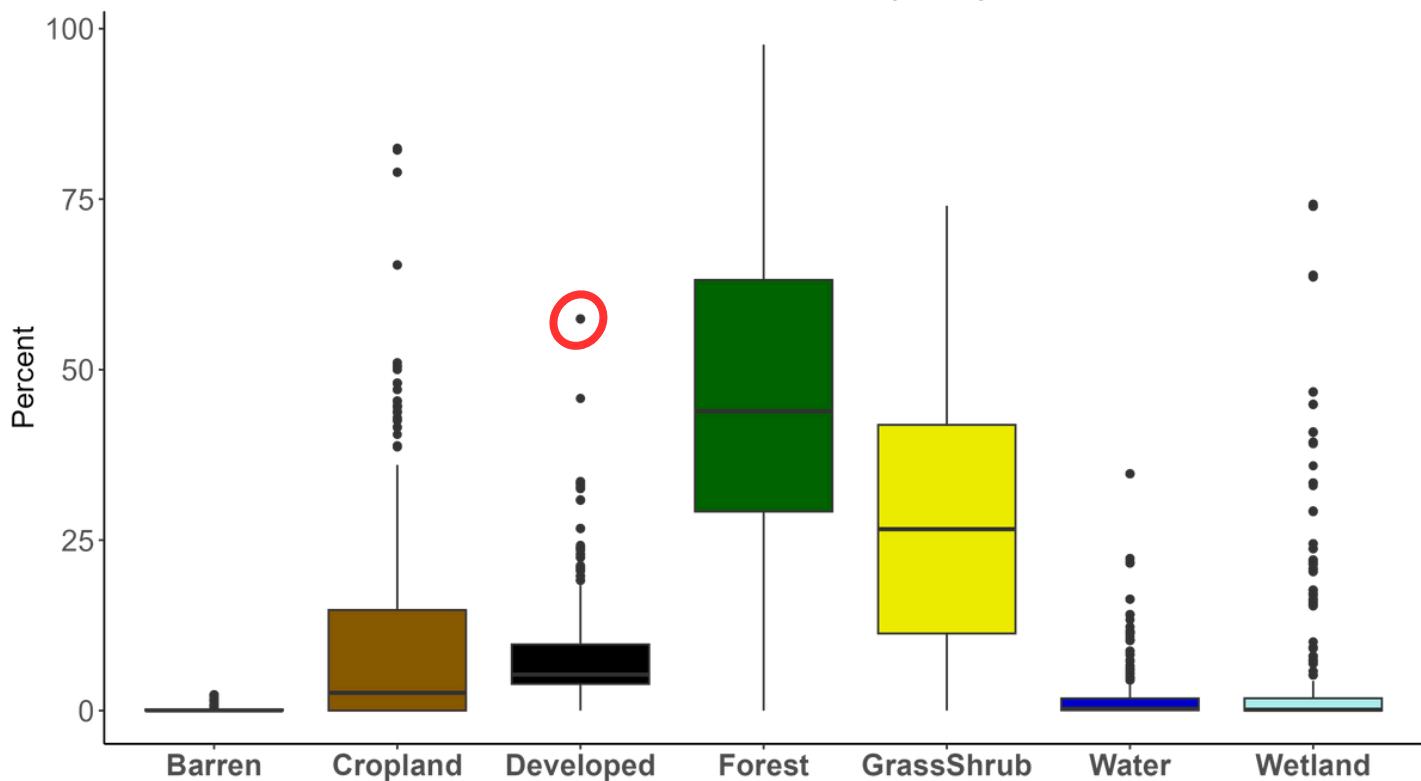
Tennessee



Kentucky



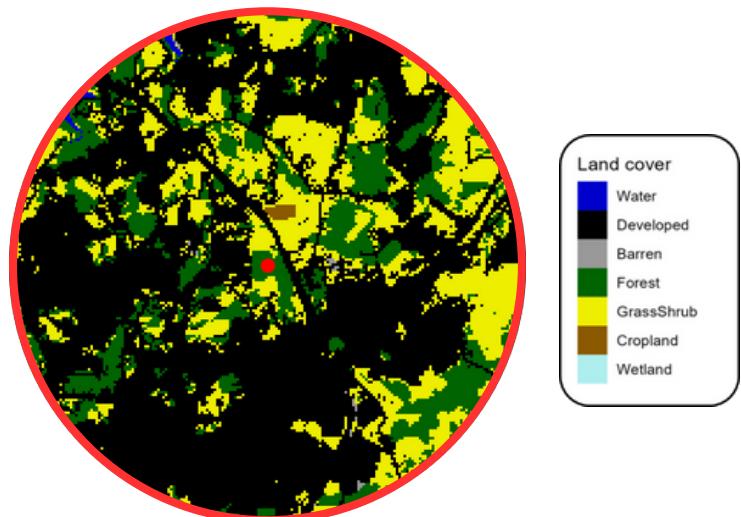
Land Cover Percent (2021)



Land Cover

Using the National Land Cover Database (NLCD) shapefile from the Multi-Resolution Land Characteristics Consortium, we extracted land cover types for our banded turkeys. We used this to find percentage of forest, grass/shrub, etc. within our banded turkeys buffer. Unsurprisingly, the majority of our birds are found in highly forested and grassy/shrubby areas. We plan to use this information to help determine the impact of landscape factors on harvest rate.

Notice the group of birds that were caught in over 50% of developed areas. Here is a close-up of their buffer home-range, they were caught just outside of town. The encroaching development could create future problems for this population of turkeys. Alternatively, hunting pressure often decreases in more developed areas which might allow these turkeys to benefit from the refuge that urbanization provides.



REPORT A TURKEY BAND

Did you harvest a banded turkey or find a band this year? If so, please consider reporting your band number. Reporting bands helps us generate more accurate estimates of harvest and survival rates. These improved estimates enable us to better protect and conserve wild turkeys, ensuring healthy populations for future sportsmen.

The first hexagonal callout shows the "Report a Turkey Leg Band" page on the Tennessee Wildlife Resources Agency website. It features a video player with two men in hunting gear, a "Report a TURKEY LEG BAND" button, and a "LEARN MORE ABOUT THE RESEARCH - CLICK HERE" link. The second hexagonal callout shows the "TURKEY BAND" page on the Kentucky Department of Fish & Wildlife Resources website, featuring a large image of a turkey and a "Turkey Leg Band Reporting" section with a question and two small images of turkeys with bands. The third hexagonal callout is a green hexagon containing the Survey123 for ArcGIS logo, which consists of a white checkmark inside a white square with a black border.

Publicly available surveys for band reporting can be found on the respective state websites. Specifically, you can access them at the following websites:

Tennessee:



<https://www.tnturkeyband.com>

Kentucky:



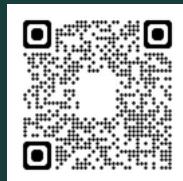
<https://fw.ky.gov/Hunt/Pages/TurkeyBand.aspx>



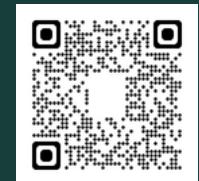
SUMMER BROOD SURVEYS

Please also consider participating in summer brood surveys. Brood surveys are currently the best form of estimating recruitment into the population. For more information visit the following websites:

TENNESSEE:



KENTUCKY:





FUNDING AND SUPPORT



The data presented in this report are the cumulation of 2021-2024 years of data. The project will continue collecting data through 2025 and following years.

Works Cited:

Brownie, C., D. R. Anderson, and K. P. Burnham. 1978. Statistical inference from band recovery data: a handbook. U.S. Department of the Interior, Fish and Wildlife Service.

Norman, G. W., D. Crawford, C. W. Ryan, W. K. Igo, and M. J. Cherry. 2022. Hunting and environmental influences on survival of male wild turkeys in Virginia and West Virginia. *Wildlife Society Bulletin* 46:e1284.

Kéry, M., and M. Schaub. 2011. Bayesian Population Analysis Using WinBUGS: A Hierarchical Perspective. Elsevier Science & Technology, San Diego, United States.

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