2024 MINNESOTA DEER HUNTER OBSERVATION STUDY REPORT

Adam C. Landon[1], Tyler R. Obermoller[2], Shanell Lovelace[1]

INTRODUCTION

The Minnesota Department of Natural Resources (MNDNR) sets annual harvest regulations (bag limits) and season lengths for white-tailed deer (*Odocoileus virginianus*; hereafter, deer) within Deer Permit Areas (DPAs) across the state. Annual decisions regarding deer hunting seasons can influence deer populations by controlling harvest opportunities. It is necessary to obtain reliable and current information about the status of white-tailed deer populations (e.g., density and population trend estimates) to set annual hunting season regulations that move populations (e.g., increase or decrease) toward desired goal densities.

To inform these annual decisions, MNDNR incorporates mandatory hunter-reported harvest, hunter effort, winter severity, and vital rate parameter estimates (e.g., survival, fecundity) into a population model to make population trend inferences (lambda [λ]; Michel and Giudice 2022). Modeled trends are sensitive to varying hunting season regulations and changes in the relationship between winter severity and deer survival. Confidence in the population model can be improved by collecting annually recurrent information to independently estimate the population trend. In 2016, the State of Minnesota's Office of Legislative Auditors (OLA) conducted an independent evaluation of the MNDNR deer population management program and recommended collection of additional data to improve deer population estimates (see OLA 2016).

Existing survey methods such as aerial surveys and road-based distance sampling are viable methods for deer population estimation; however, they are costly and logistically difficult to implement, especially at the geographic (i.e., farmland, transition zone, forest) and temporal scales needed to inform annual deer season recommendations. Additionally, these survey methods are unreliable in northern Minnesota where coniferous cover dominates, leaving trend estimation in this geographic region difficult. Conversely, hunter observation surveys are a cost-effective alternative to obtain data that can validate modeled trends, estimate sex ratios, and monitor annual changes to compare with existing harvest indices.

Several Midwestern states had already begun using deer hunters' observations of deer seen while hunting to monitor population trends of deer (Rolley et al. 2016) and other species (Bauder et al. 2021) as a successful alternative to aerial surveys and/or distance sampling methods. In Minnesota, we began using hunter observations in 2017. With the help of hunter observations collected annually, we can establish trends and provide managers with multiple independent indices to help set harvest regulations. This report details the results of our efforts to track deer populations using hunter observations over the period 2017-2024.

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[1]Conservation Social Scientist, Wildlife Research Unit; [2]Ungulate Research Scientist, Farmland Wildlife Populations and Research Group.

METHODS

We began collecting deer hunters' observations of deer and other species in 2017, with the intent of developing additional indices to monitor deer populations and to serve as an independent check on trends estimated by the deer population model. Three distinct periods exist in the methods used to solicit observations from hunters.

First Period. From 2017 to 2019, we invited archery hunters to submit records of the location of their hunts, their duration, and the numbers of deer they observed by age and sex, among other variables, using survey methods. A random selection of archery hunters stratified by ecoregion (farmland, transition zone, forest) received either a letter or an email describing the study and inviting their participation. Hunters contacted through postal mail received a log on which to record their hunts, and a postage-paid envelope to return the log.

Second Period. Although we gained valuable information from this bowhunter survey (2017-2019), it yielded a low response rate and was costly to implement. Therefore, in 2020, we converted the survey to a community science format and invited all deer hunters, regardless of weapon type or the season they hunted, to provide observational data in an online format. The agency made this transition to increase opportunity for hunters to participate in deer management, obtain more responses, and reduce the costs of implementing the study. The first two years of this format (2020 and 2021) were not successful, in part due to capacity issues surrounding the COVID-19 pandemic.

Third Period. Beginning in 2022, and remaining in the community science format, we began sending direct emails to all deer hunters with an email on file inviting them to submit observations, in addition to making social media posts and covering the study in other deer-related communications from the agency. In 2024, we sent two direct emails to all hunters with an email address on file, made social media posts inviting hunters to log their hunts, covered the study in GovDelivery emails regarding deer and deer hunting, and issued a press release inviting media coverage.

Measures. Hunters were asked to record several measures related to their hunts, including:

1) The date their hunt occurred
2) The duration of the hunt in 0.5-hour increments
3) The DPA where their hunt occurred
4) The number of deer they observed of the following age and sex categories:
    a. Antlered deer
    b. Antlerless deer (doe)
    c. Fawns
    d. Unknown – if unable to discern age and sex
5) The number of the following species that they observed
    a. Badger *(Taxidea taxus)*
    b. Bear *(Ursus americanus)*
    c. Bobcat *(Lynx rufus)*
    d. Coyote *(Canis latrans)*
    e. Fisher *(Martes pennanti)*
    f. Gray fox *(Urocyon cinereoargenteus)*
    g. Gray wolf *(Canis lupus)*
    h. Wild turkey *(Meleagris gallopavo)*

We produced summary statistics describing the total number of observations for all species, and for each age and sex category of deer. We calculated two indices (total deer observed per hour

and antlered deer observed per hour) and calculated the fawn-to-adult antlerless (doe) ratio as a representation of recruitment. A higher number of fawns observed per doe observed reflects a higher recruitment rate.

RESULTS

Hunters logged 2,715 observations in 2024. Hunters submitted logs from all Deer Management Units (DMUs) and ecoregions. Hunters recorded 1,076 observations in the forest region, 1,399 observations in the transition zone, and 240 observations farmland region (Table 1). Statewide observations for each species ranged from 5 observations of badgers to 6,841 observations of deer (Table 2). Most hunters recorded observations while hunting out of a tree stand (2,032) or a ground blind (452; Table 3).

Hunters observed 859, 257, and 216 antlered deer for the transition zone, forest region, and farmland region, respectively, in 2024 (Table 4). They observed 4,178, 1,580, and 1,133 total deer (bucks, adult females, antlerless, and unidentified combined; Table 1) for the transition zone, forest region, and farmland region, respectively in 2024. Fawn-to-doe ratio was 0.54, 0.46, and 0.79 in the farmland region, forest region, and transition zone, respectively (Table 4, Figure 1). Antlered bucks observed per hour were 0.51, 0.29, and 0.11 in the farmland region, transition zone, and forest region, respectively (Figure 2). Total deer observed per hour was 1.06, 0.76, and 0.22 in the farmland region, transition zone, and forest region (Figure 3).

Although comparing indices across years is difficult due to differences in methodology and low sample sizes in 2020 and 2021, there appears to be consistent variation among the ecozones for fawn-to-doe ratio (Figure 1), number of antlered deer observed per hour (Figure 2), and total deer observed per hour (Figure 3). However, it will take 3-5 years of collecting data under this new methodology to establish trends. Until then, annual comparisons should be made with caution.

DISCUSSION

Using a combination of direct emails and advertising via social media and radio interviews resulted in a nearly 24-fold increase in observations compared to 2021, but this total is still a 75% decrease from 2019, which was the final year of the bowhunter survey. Regardless, this increase indicates our modified methodology has been successful thus far. The total number of observations could also increase in subsequent years of data collection. For example, the total number of observations from the bowhunter survey increased throughout the 3-year study period. We will continue to improve our outreach by directly working with conservation groups (e.g., National Deer Association, Backcountry Hunters and Anglers, etc.) to promote this project and increase participation.

Observation data collected by our hunters across these 3 geographic ecozones will allow us to estimate independent indices that can be compared to deer population model outputs and harvest data. Ultimately, this approach will allow us to increase confidence in modeled population trends and better inform our decision-making process for setting harvest regulations used to help manage deer in Minnesota.

ACKNOWLEDGMENTS

We thank all deer hunters who have participated in this survey to date, and the MNDNR Farmland Wildlife Populations and Research Group staff who provided feedback on earlier versions of the survey and this report. We also thank Pete Takash, Barb Keller, Morgan Sussman, and David Schueller for their help coordinating outreach and communication to solicit hunter participation.

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TABLES AND FIGURES

Table 1. Deer hunter observations by year for each ecoregion from 2017 to 2024 in Minnesota, USA.

	Ecoregion		
Year	Farmland	Transition	Forest
2017[a]	1,654	6,992	3,066
2018[a]	4,215	6,548	4,260
2019[a]	4,986	8,568	4,936
2020[b]	67	433	266
2021[b]	37	107	42
2022[c]	542	1,807	2,295
2023[c]	223	1,194	1,152
2024[c]	240	1,399	1,076

[a]Bowhunter observation survey with direct mailings to hunters.

[b]Community science approach without direct emails.

[c]Community science approach with direct emails.

Table 2. Total number of 9 species observed by deer hunters in 2024 for each ecoregion in Minnesota, USA.

	Species								
Ecoregion	Deer	Wild Turkey	Badger	Gray Fox	Black Bear	Fisher	Bobcat	Coyote	Wolf
Farmland	1,133	213	1	0	0	2	1	34	0
Transition	4,178	2,945	3	10	9	14	12	131	35
Forest	1,530	1,034	1	16	36	18	20	63	330
Statewide Total	6,841	4.192	5	26	45	34	33	228	365

Table 3. Hunting methods used by deer hunters submitting observations in 2024 in Minnesota, USA.

	Ecoregion			
Hunting Method	Farmland	Transition	Forest	Total
Treestand	152	1,069	811	2,032
Ground Blind	76	205	171	452
Stalking	5	31	49	85
Deer Drive	3	7	2	12
Other	4	87	43	134

Table 4. Total deer hunter observations of antlered deer, adult females, fawns, and unknown, and fawn-to-adult antlerless (doe) doe ratio by ecoregion for 2024 in Minnesota, USA.

Ecoregion	Antlered Deer	Adult Antlerless (Doe)	Fawns	Unknown	Fawn:Doe	Hours
Farmland	216	544	295	78	0.54	1,067.0
Transition	859	1,611	1,265	443	0.79	5,522.5
Forest	257	777	357	139	0.46	6,833.5

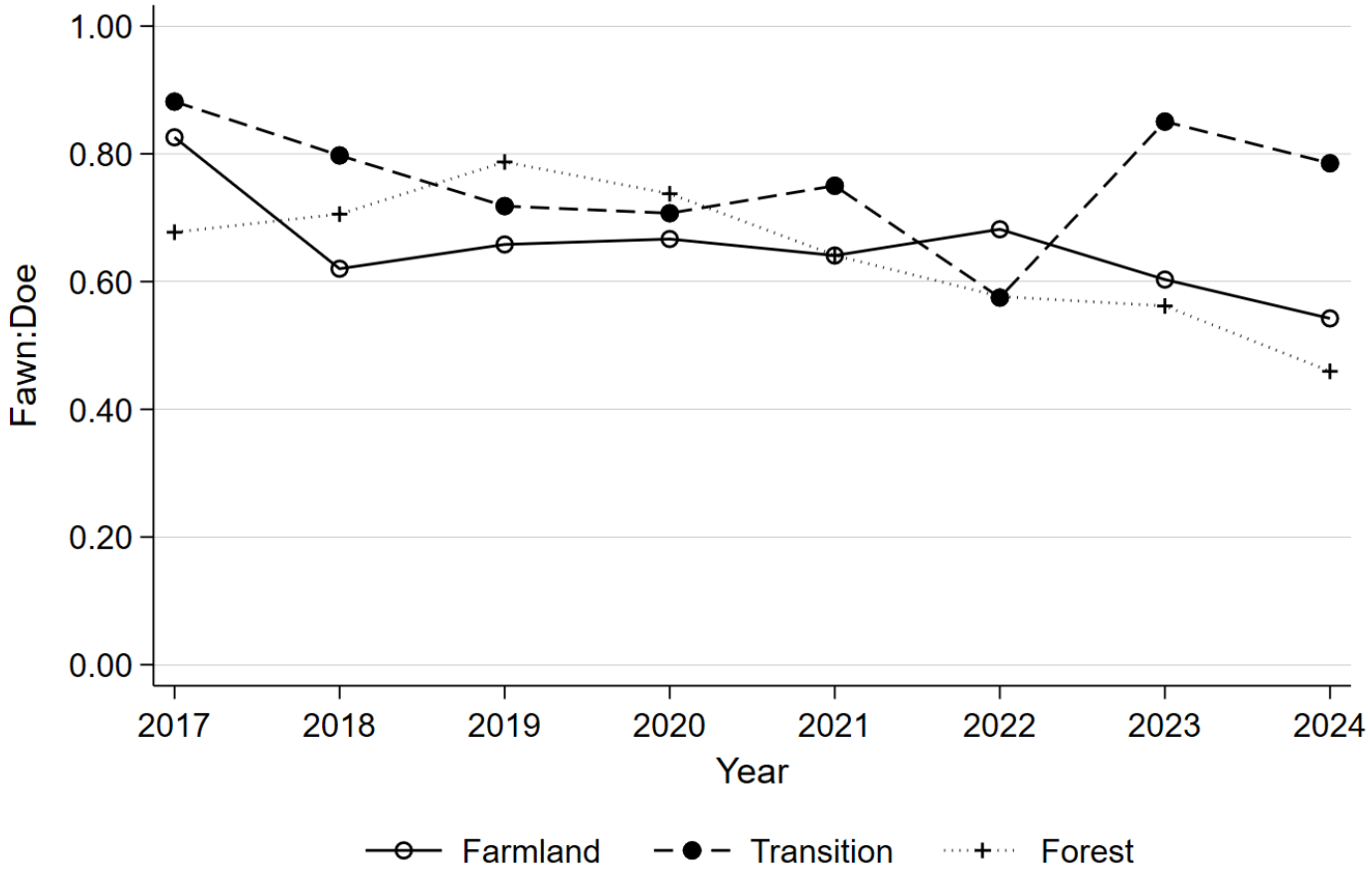

Figure 1. Index of the number of fawn-to-adult antlerless (doe) deer for the farmland, transition zone, and forest ecoregions from 2017 to 2024 in Minnesota, USA.

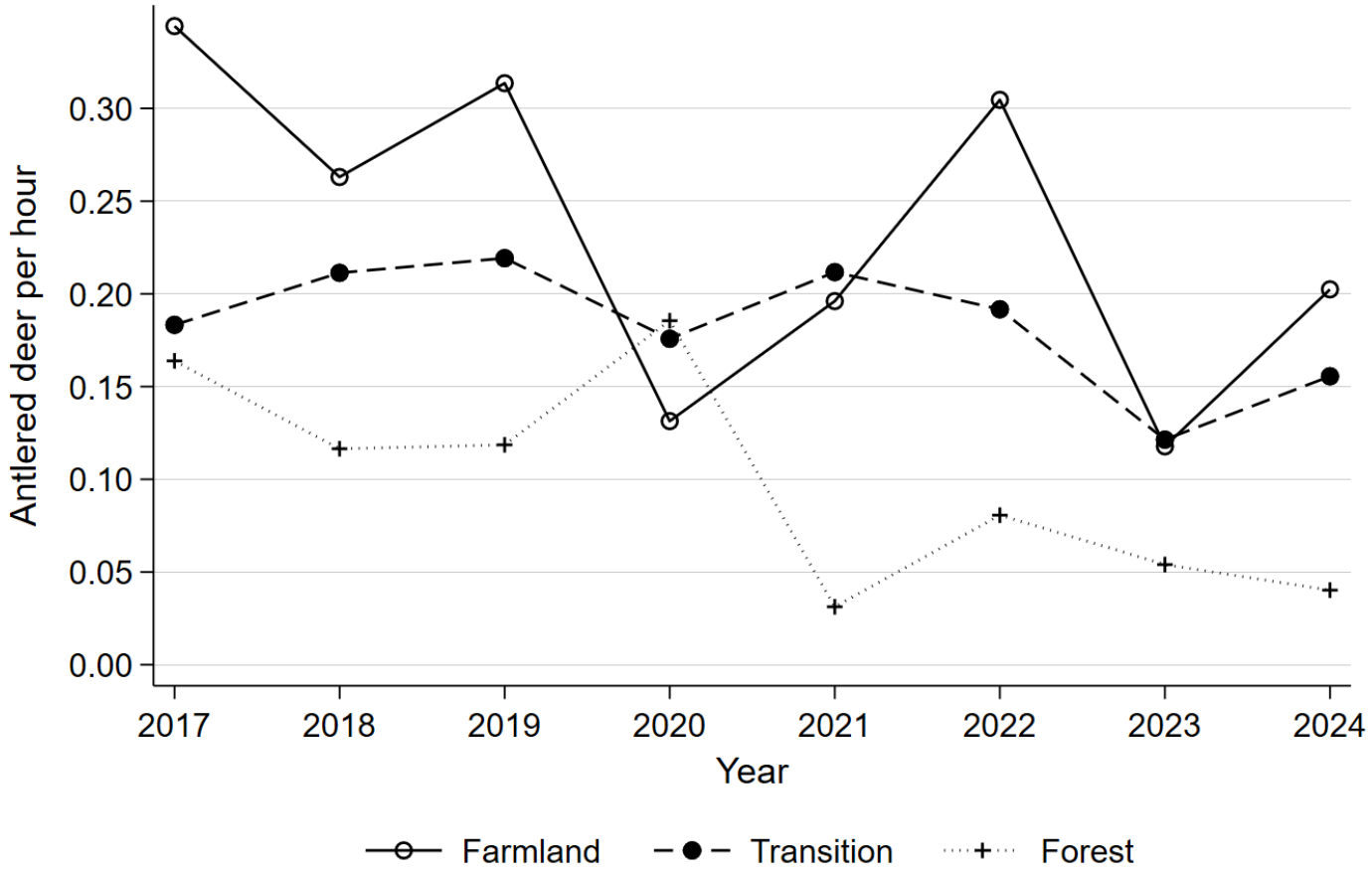

Figure 2. Total number of antlered deer observed per hour for the farmland, transition zone, and forest ecoregions from 2017 to 2024 in Minnesota, USA.

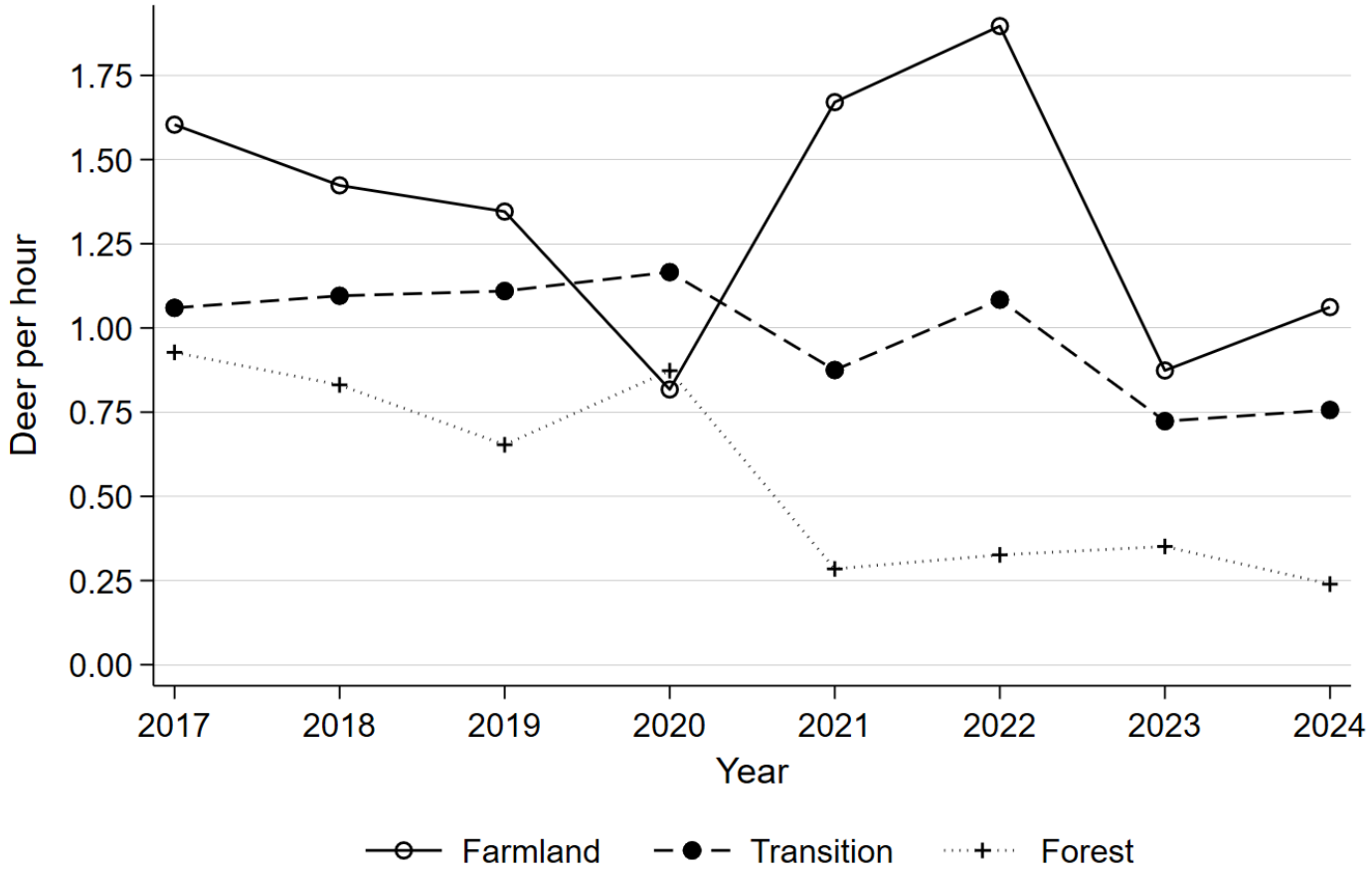

Figure 3. Total number of deer observed per hour in the farmland, transition zone, and forest ecoregions from 2017 to 2024 in Minnesota, USA.