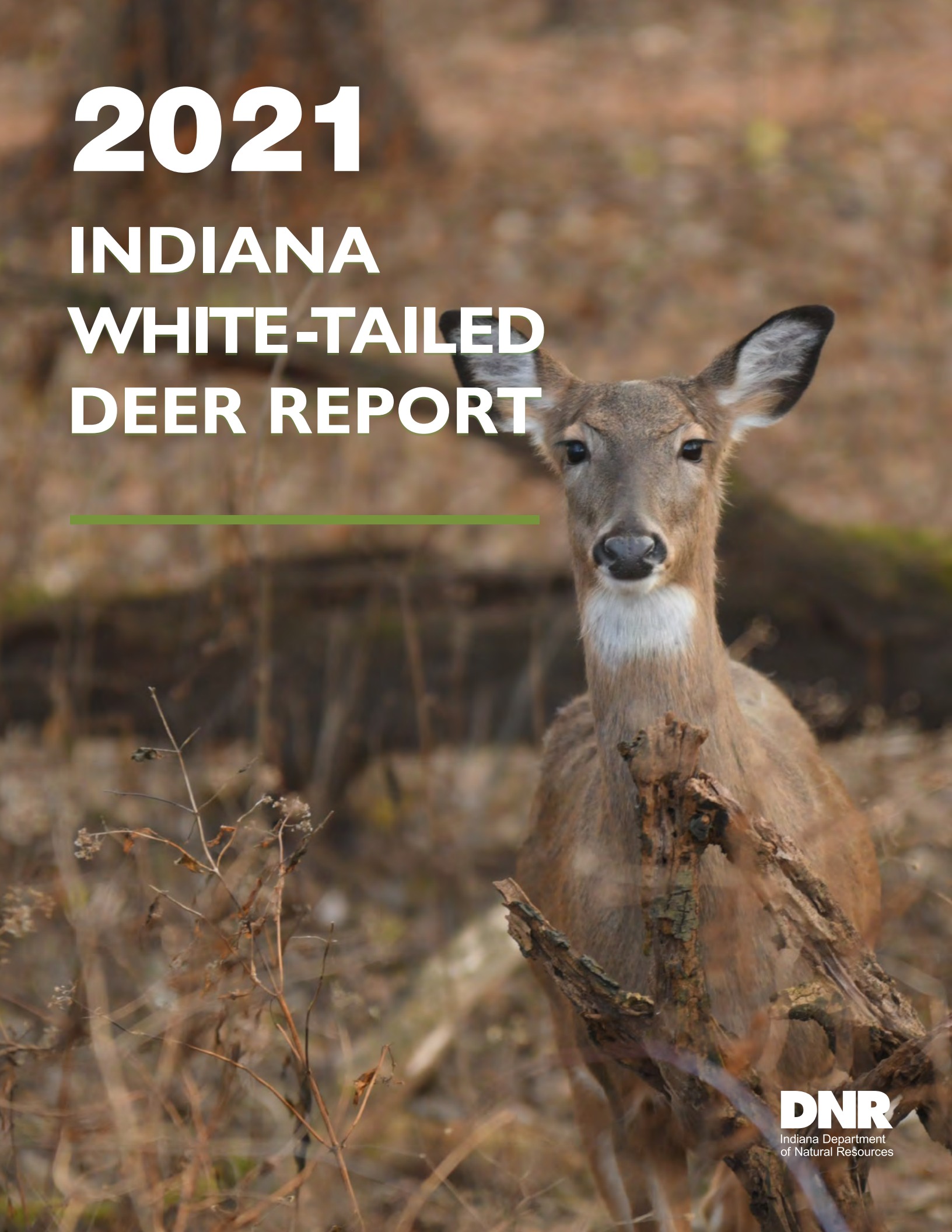
2021

INDIANA WHITE-TAILED DEER REPORT



DNR
Indiana Department
of Natural Resources

Federal Aid in Wildlife Restoration Program

This program supports state fish and wildlife agencies to conserve, protect, and enhance fish, wildlife, their habitats, and the hunting, sport fishing and recreational boating opportunities they provide. This program was initiated in 1937 as the Federal Aid in Wildlife Act and created a system where by taxes are paid on firearms, ammunition and archery equipment by the public who hunts. Today this excise tax generates over a hundred million dollars each year that are dedicated to state wildlife restoration and management projects across the United States.

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Cover Photo: A white-tailed deer browses for food in the understory at Celery Bog Nature Area. DNR File.

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DNR File Photo

Chapter 1. OVERVIEW

Welcome to the 2021 Indiana White-tailed Deer Report. Every year, Indiana DNR publishes a comprehensive report of the state's deer herd. The report includes deer hunting season results, use of depredation permits, deer-vehicle collision reports, disease monitoring efforts, survey results, and internal and external deer research projects. Past reports are available at on.IN.gov/INdeerreport.

2021-2022 Deer Hunting Season

The 2021 deer hunting season was composed of four statewide seasons: Youth (Sept. 25 and 26), Archery (Oct. 1 to Jan. 2), Firearms (Nov. 13 to Nov. 28), and Muzzleloader (Dec. 4-19). Special Antlerless Firearms season was closed for the 2021-2022 deer hunting season. Most resident deer licenses could be purchased for $24, nonresident licenses for $150. A deer license bundle was available at $65 for residents and $295 for nonresidents. The deer license bundle, which is valid in all deer seasons except Deer Reduction Zone season, allows hunters to take up to three deer while attempting to satisfy statewide bag limits for Archery, Firearms, Muzzleloader, and Special Antlerless Firearms (when open) seasons. The three deer may be either two antlerless and one antlered, or three antlerless deer. A hunter may take only one antlered deer during all statewide seasons combined (Archery, Firearms, Muzzleloader, and Youth seasons). Resident landowners and lessees who own and/or work Indiana farmland are exempt from needing deer licenses when hunting on their land. Hunters were required to register all harvested deer through the online CheckIN Game system within 48 hours of the kill of their deer.

Licensed youth, age 17 or younger, were eligible to participate in a youth-only season if accompanied by an adult at least 18 years old. Youth could take multiple deer (one antlered deer and the number of bonus antlerless deer per county quota) during this special season.

The statewide archery bag limit was two deer. Hunters could take one deer per license, for a total of either two antlerless or one antlered and one antlerless deer. Hunters were allowed to use crossbows throughout the

entire Archery season when in possession of a crossbow license. Any deer taken with a crossbow counted toward the hunter's two-deer archery bag limit.

The bag limit during Firearms season was one antlered deer. The bag limit for Muzzleloader season was one deer of either sex (antlered deer were only allowed for hunters who had yet to satisfy their one antlered bag limit across all statewide seasons). A single firearms license was required to hunt with any combination of shotgun, muzzleloader, rifle, or handgun during Firearms season. A muzzleloader license (separate from the firearms license) was required to hunt during Muzzleloader season.

Hunters could harvest additional deer beyond the statewide bag limits in designated Deer Reduction Zones. Beginning with an antlerless deer, hunters were allowed to harvest up to 10 additional deer under the Deer Reduction Zone bag limit, for a total of either 10 antlerless or one antlered ("earn-a-buck") and nine antlerless deer. Harvest of these additional deer required the possession of a Deer Reduction Zone license for each deer harvested. An antlered deer harvested under the Deer Reduction Zone license did not count toward a hunter's statewide bag limit of one antlered deer. However, deer harvested in designated Deer Reduction Zones with other license types (e.g., archery, bonus antlerless, and license bundle) counted toward statewide bag limits. The Deer Reduction Zone season opened Sept. 15, two weeks prior to the beginning of Archery season, and continued through Jan. 31.

There were multiple reserve draw hunts open to hunters with a valid deer hunting license. Reserve draw locations change annually. In 2021, reserve draw locations included, Muscatatuck National Wildlife Refuge, Big Oaks National Wildlife Refuge, and Camp Atterbury Joint Maneuver Training Center, among others. A complete list of reserve draw deer hunts is at on.IN.gov/reservedhunt.

Deer Control Permits and Deer-Vehicle Collisions

Deer control permits were issued to Indiana residents experiencing an economic loss of $500 or more as a result of property damage caused by deer or where there was an identified disease risk to humans or domestic livestock. Each depredation permit specified the number of deer a landowner was authorized to take under the permit. Permits were only valid on the permit holder's property, and the permit holder was allowed to designate assistants to remove deer in place of themselves. Depredation permits for deer are typically only issued outside of deer hunting season.

Vehicle collisions involving deer and resulting in property damage of at least $750 or injury to any person were reported to the Indiana State Police and Indiana Department of Transportation by local and state law enforcement agencies. Information collected included location of collision (e.g., county, coordinates, intersection, etc.) and road type (e.g., county road, state road, interstate, etc.). The number of deer-vehicle collisions and the number of deer taken with depredation permits are factors that influence the bonus antlerless quotas for hunting season. Numerous deer-vehicle collisions and abundant damage due to deer in a county may indicate too many deer in that county. Thus, the bonus antlerless quotas may be adjusted to minimize the impacts deer have on roadways and properties.

Deer Health

Indiana DNR monitors deer health for major outbreaks of diseases such as epizootic hemorrhagic disease (EHD), bovine tuberculosis (bTB), and chronic wasting disease (CWD). In 2021, Indiana experienced minimal EHD occurrences across the state, which was a change from the widespread 2019 EHD outbreak. Hunters and other residents reported 71 deer potentially infected with EHD. Indiana DNR confirmed EHD in two counties. Indiana DNR did not conduct bTB surveillance in Franklin County in 2021 because the level of bTB in the area was likely low to nonexistent. A total of 664 hunter-harvested deer, four road-killed deer, and 124 targeted deer were tested for CWD statewide in 2021. The CWD detectability rates were calculated for all 92 counties based on sampling intensity (Table 6-2). To date, no wild deer from Indiana have tested positive for CWD.

Surveys and Volunteer Monitoring

Surveys of hunters, landowners, and other people are tools Indiana DNR uses to manage the state's deer herd. Before 2017, paper surveys were mailed to a

subset of Indiana hunters and landowners every three or four years to ask questions about harvest, deer damage, and opinions on the size and management of deer in Indiana. In 2021, hunters had the opportunity to complete an online survey immediately after checking in their deer and to participate in the Deer Management Survey to share their opinions of Indiana deer management. These surveys gather specific information about the deer that were harvested (e.g., sex, age, approximate size, etc.), the hunting experience associated with those deer (e.g., number of does or bucks seen, and happiness with the hunt), how hunters feel about the state's deer population, and how they would like deer to be managed. Indiana DNR also solicits hunter and public participation in volunteer monitoring projects to collect valuable data on fawn:doe and buck:doe ratios to better understand the recruitment rates of populations at the county and regional levels.

Chapter 2. IMPROVEMENTS IN DEER MANAGEMENT

Joe N. Caudell, *Indiana Department of Natural Resources*

Introducing the State Deer Biologist

In September 2021, Joe Caudell returned to lead the Deer Program in Indiana after Moriah Boggess returned to his home state of North Carolina to become the state wildlife agency's Deer Biologist. In Fall 2019, Joe left the Deer Program to become the Assistant Director of Science and Research for the Division of Fish and Wildlife, but stepped down from that role and back into the lead position in the Deer Program upon the departure of Moriah. Although the Assistant Director position was a great opportunity Joe's passion in wildlife management has always been working with deer and people who interact with deer.

Joe grew up in northeast Georgia on a farm hunting for deer and squirrels. He attended the University of Georgia's Warnell School of Forestry and Natural Resources to earn a B.S. in Forest Resource Management. Joe later earned his M.S. and Ph.D. degrees in Wildlife Biology from Utah State University in 2001. Prior to working for Indiana Department of Natural Resources (IN DNR), Joe was a professor of Wildlife Management at Murray State University from 2013 to 2016. He also worked for USDA APHIS Wildlife Services as a wildlife biologist for 10 years in Indiana, Nevada, and Maine working with a variety of wildlife disease and wildlife damage issues. Prior to working for USDA, Joe worked in the environmental education field for 10 years in Texas and Georgia.

Five-Year Deer Review: 2017-2022

In May 2017, DNR and stakeholders reviewed the 2012-2017 deer management goal analyses. As a result, DNR adopted a new five-year management goal to "**focus deer herd management in a strategically targeted manner to more adequately balance ecological, recreational, and economic needs of the citizens of Indiana.**" This would allow DNR the ability to examine each county, or similar areas, independently to determine the desired direction of the size of the deer herd.

Figure 2-1. Indiana's returning state deer biologist, Dr. Joe Caudell.

With this goal in mind, IN DNR seeks to develop indices that are more sensitive to changes in the deer population, obtain data on the opinions of more groups that have an interest in deer management, and develop an objective model to set harvest quotas. Specifically, DNR will better incorporate the desires of all Indiana residents by expanding surveys beyond farming landowners and hunters. All stakeholders present in May 2017 agreed to the adoption of this plan.

Since 2017, DNR began working with faculty at Purdue University on the Integrated Deer Management Project to identify population indices that could be applied on larger scales throughout Indiana to better monitor trends in deer populations in a cost-effective manner. These indices must also provide an accurate representation of the population for the given cost. In addition to measuring the biological aspects of the deer population, this comprehensive research effort also examines sociological factors, such as if/how stakeholder opinions change relative to known deer density and ecological factors such as habitat quality response to density. The goal of this collaboration is to develop an integrated model that will incorporate the biological, ecological, and sociological factors to improve Indiana's deer management program.

Philosophy of Deer Management for Indiana

The primary challenge for any deer biologist is to balance the needs of hunters, people who are expe-

riencing deer-associated damage, and/or have other interactions with deer. IN DNR manages deer for everyone in the state. Since 2016, it has incorporated the governance principles for wildlife conservation (Decker et al. 2016) into the fabric of wildlife management throughout the state, including in its deer management program. The overall goal of the deer program is to be adaptive to the social and ecological conditions while also stretching limited resources of a small state agency to improve deer management. In general, we have worked to become more transparent with our data and decision-making processes, involve citizens more directly in wildlife management in a cost-effective manner, and have maximized the utility (i.e., overall good) of this public trust resource to increase the trust of Indiana citizens in our agency (Stinchcomb et al. 2022a).

A **public trust resource**, such as deer, are "an endowment of natural wealth to be stewarded as an integrational inheritance, not suitable for exclusive private ownership" (Decker et al. 2016: p291), whereby each beneficiary is entitled to the benefits of the resource. Not all citizens may desire the benefits provided by a specific natural resource. For example, most citizens will appreciate and desire clean air and water, but many may not appreciate the benefit provided by the presence of snakes. But the choice is there for all citizens to decide if they want to partake in the available benefit.

Trustees are "Elected or appointed officials who hold certain natural resources in trust in the interests of all current and future citizens…." who are responsible for "overseeing trust resources in a manner that ensures long-term viability and does not privilege any individuals, groups, or uses" (Hare and Blossey 2014: p397). For Indiana, the trustees are the Natural Resources Commission (NRC). The wildlife **trust managers** are trained conservation officials in government service who manage wildlife populations so that the trust is maintained, and benefits are available for both current and future generations. These individuals must understand the needs and desires of the various beneficiaries and make recommendations and provide information to the trustees that allow them to fulfill their responsibility. **Trust administrators** are a combination of trustees and upper-level management of the trust managers, such as the Director of the Division of Fish and Wildlife (DFW) and the Director of the Department of Natural Resources (DNR).

Beneficiaries are all current and future citizens who receive some benefit from the trust. This benefit can be tangible, such as a hunter who harvests a deer, or intangible, such as a homeowner who enjoys feeding and observing deer. The 'benefit' of deer can also have some negative effects (which is called a negative externality) which affects some beneficiaries in a negative fashion. For example, a homeowner may enjoy feeding deer that later go to the neighbor's house and eat their landscaping. Or a deer that a hunter passed on harvesting is then hit on the highway by a vehicle. An individual may experience both positive and negative interactions with the same wildlife resource (i.e., a hunter driving home after a successful hunt hits a deer on the highway). Beneficiaries have the responsibility of holding the trustees and trust managers accountable if they are not meeting their obligation (Hare and Blossey 2014).

The Governance Principles for Wildlife Conservation consist of 10 practices:

1. Wildlife governance will be adaptable and responsive to citizens' current needs and interests, while also being forward-looking to conserve options of future generations.
2. Wildlife governance will seek and incorporate multiple and diverse perspectives.
3. Wildlife governance will apply social and ecological science, citizens' knowledge, and trust administrators' judgment.
4. Wildlife governance will produce multiple, sustainable benefits for all beneficiaries.
5. Wildlife governance will ensure that trust administrators are responsible for maintaining trust resources and allocating benefits from the trust.
6. Wildlife governance will be publicly accessible and transparent.
7. Wildlife governance will ensure that trust administrators are publicly accountable.
8. Wildlife governance will include means for citizens to become informed and engaged in decision making.
9. Wildlife governance will include opportunities for trust administrators to meet their obligations in partnerships with nongovernmental entities.
10. Wildlife governance will facilitate collaboration and coordination across ecological, jurisdictional, and ownership boundaries.

To evaluate the past five years of deer management in Indiana, we will describe how we have implemented practices to address each of these recommended principles that the Deer Program can directly affect. Principles #7 *(Wildlife governance will ensure that trust administrators are publicly accountable)* and # 9 *(Wildlife governance will include opportunities for trust administrators to meet their obligations in partnerships with nongovernmental entities)* are for trust administrators, and therefore not addressed in this document. Additionally, we will describe additional refinements to the Deer Program for the next five-year period (2023-2027).

Five-Year Review of Applying the Wildlife Governance Model

Wildlife governance will be adaptable and responsive to citizens' current needs and interests, while also being forward-looking to conserve options of future generations.

The Deer Program uses a number of techniques to be responsive to the public. The first is to understand the needs and desires of the public. The primary tool to meet this obligation is the annual Deer Management Survey, which is an electronic survey sent via email. The Deer Management Survey is sent to hunters and non-hunters in Indiana for which DFW has a valid email address. Typically, this survey is sent to any hunter who has checked in a deer in the past five years and those who have purchased any type of hunting or fishing license in the past five years. During the past five years, we have experimented with sending it to anyone who has ever purchased a license, but the response rate was similar to the years where only a five-year dataset was used (i.e., sending it to people who have not purchased a license more than 5 years ago did not make much difference). It is also sent to anyone who is signed up for the DFW newsletter Wild Bulletin who did not purchase a hunting or fishing license and to individuals who specifically request they receive the survey. This, along with the angler-only license holders, (i.e., purchasing a fishing license but does not purchase a hunting license) produces a group of non-hunters who respond to the survey. The questions asked in this survey allow DFW to understand Indiana's citizens opinions and desires on a number of topics. Because it is sent to everyone (as opposed to a sample; as recommended by the last five-year review), everyone has a chance to participate and have their voice added to the other respondents. Examples of questions that are asked can be found in this and previous annual deer reports. Survey results are part of the input to determine the annual County Bonus Antlerless Quotas (CBAQs) and used to address desires to change hunting and deer management regulations.

Recently, hunters did not feel that DFW was being responsive to their needs following major epizootic hemorrhagic disease (EHD) outbreaks. To address this concern, the Deer Program began collecting better data on occurrence of EHD by establishing an online report form. Every August, the deer program reviews the data from the reports and makes a recommendation to the Director of the DFW for emergency changes to the quotas. In 2019 and 2022, CBAQs were lowered to address extensive occurrences of EHD. Reports collected after September 1 are evaluated the following April when discussing next year's CBAQs.

Several programs are used to help address localized deer damage incidents. Because some individuals experience deer-related damage to crops and other personal property, Indiana DNR continues to issue depredation permits as needed to address localized problems. Indiana DNR also continues to establish deer reduction zones in urbanized and surrounding areas where complaints about deer and deer-vehicle collisions (DVCs) appear elevated. Deer-vehicle collisions are another type of damage that commonly occur in localized areas, but are difficult to address because they occur statewide. However, we have identified areas throughout the state that have a higher-than-normal rate (called hotspots) of deer-vehicle collisions. A test program called linear deer reduction zones was implemented to determine if additional hunting pressure along roads with deer collision hotspots can reduce the number of collisions in those areas. This program was started in 2017 and was initially set to be analyzed after five years of use. However, during the infancy of the program, many people were had difficulty understanding how the program worked. In addition, the changes in driving habits during the COVID-19 pandemic may have also affected the outcomes due to stay-at-home orders. Therefore, to ensure unbiased data is being gathered, we will continue the program until 2024 before the final assessment is conducted.

Wildlife governance will seek and incorporate multiple and diverse perspectives

The Deer Program's annual Deer Management Survey is sent out to both hunters and non-hunters in Indiana. During the past five years, we have worked to ensure that the survey is sent out to additional non-hunting beneficiaries by using the mailing list for the DFW newsletter *Wild Bulletin*.

In 2017, the Deer Program contracted with Purdue University for the Integrated Deer Management Project (IDMP). A significant portion of the project was to learn how to hear from a representative sample of beneficiaries to ensure a balanced view on deer management in Indiana. The results of this can be found in the publication Expanding and Evaluating Public Satisfaction with Wildlife Governance: Insights from Deer Management in Indiana, USA by Stinchcomb et al. 2022b (https://link.springer.com/article/10.1007/s00267-022-01698-5). Additionally, we found that the Wild Bulletin mailing list reached a similar demographic as the physical mailing that was used in the research. Therefore, sending the electronic survey to all recipients would likely be just as effective as sending out the more expensive, random paper survey.

Indiana DNR continues to update its CWD implementation plan. In 2018, DNR started updating its general CWD response plan and began work on a more detailed implementation plan that covers response procedures. This included meetings with government and non-governmental partners, holding listening sessions from interested stakeholders in 2019, and presenting drafts of the proposed plan in 2021 for feedback from those same groups. Currently, the Deer Program is working on the final draft of the CWD plan. Once finalized, the plan will be posted at https://www.in.gov/dnr/fish-and-wildlife/wildlife-resources/wildlife-diseases-in-indiana/chronic-wasting-disease-cwd/ for public viewing.

Wildlife governance will apply social and ecological science, citizens' knowledge, and trust administrators' judgment

The Deer Program's annual Deer Management Survey, After Hunt Survey, Firearm Survey, Archer's Index, and the Sick and Dead Wildlife Report Form are all tools that leverage the localized knowledge of Indiana residents about the deer herd. Each survey has hunters (and non-hunters in the case of the Deer Management Survey and Sick and Dead Wildlife Report Form) report their observations related to deer. The Deer Program has integrated each of these into the decision-making process for setting County Bonus Antlerless Quotas, responding to disease events, and overall herd management.

Several external research projects were implemented to develop new science-based social and ecological knowledge for the management of deer in Indiana. The Integrated Deer Management Project was designed to create new scientific information for the management of deer including developing a new, cost-effective method of estimating the population density of deer throughout the state, methods to estimate damage caused by deer to woodland areas, and methods to understand the desires of the current beneficiaries of the benefit provided by deer. The Economics of Deer and Furbearer Project was designed to understand the economic benefits and negative externalities of deer. The Effects of License Prices on Harvest was intended to understand how increasing license prices would ultimately affect harvest of deer populations.

Several internal research projects were implemented to develop new scientific-based social and ecological knowledge for the management of deer in Indiana. Each year, the Deer Program identifies a suite of questions to include in the annual Deer Management Survey to better understand Indiana citizen's opinions on specific management questions, such as opinions on various approaches to CWD management, understand how people interact with deer, opinions toward specific regulations (proposed and existing), ability to access areas for hunting, and opinions toward management programs. We also conduct research on topics such as the effect of EHD on localized deer populations, effectiveness of deer reduction zones, how to target CWD surveillance, economic costs of CWD management, and how the Special Antlerless Firearm Season affects antlerless harvest.

Wildlife governance will produce multiple, sustainable benefits for all beneficiaries.

During the past five years, the Deer Program has worked to understand the nature of Indiana's citizens relationship with deer through its annual Deer Manage-

ment Survey, the human dimensions portion of the Integrated Deer Management Project, Economic Valuation of Furbearers and Deer, and the Effect of License Prices on Harvest projects with Purdue University. Positive benefits include deer for hunting, for viewing, and/or simply knowing they exist in Indiana. Negative externalities (which is the unintended effects of management decisions) from deer include deer eating crops and/or landscaping, collisions with vehicles, reservoirs for disease (i.e., COVID), and fear from co-existence with a large animal. The goal of Indiana's deer management program is to increase the overall utility (i.e., economic good) of deer by maximizing the benefits and minimizing the negative externalities. We continue to assess what Indiana citizens desire for the size of the deer herd by asking that question in the annual Deer Management Survey. Those desires are taken into account when the County Bonus Antlerless Quotas are set.

Wildlife governance will ensure that trust administrators are responsible for maintaining trust resources and allocating benefits from the trust.

The trust managers within the Deer Program provides information as needed about the deer population and the beneficiaries to aid trust administrators in fulfilling their responsibilities. This is provided in regular meetings, such as those to discuss the County Bonus Antlerless Quotas, emergencies to discuss pressing or urgent events such as EHD outbreaks, and special topics, such as how hunters feel about the Special Antlerless Firearm Season. The Deer Program anticipates issues and collects data in advance of needs so that requests to trust managers from beneficiaries can be addressed in a timely manner.

Wildlife governance will be publicly accessible and transparent.

The Deer Program is readily accessible to the public through phone and email. The Deer Program routinely spends ~25%of its time in direct communication to the public and an additional ~25% of its time working on mass communications, such as the annual deer report, website updates, social media information, and data dashboards.

An objective of the Deer Program during the past five years has been to increase transparency in our data and decision-making processes. This has been achieved by the creation of an exhaustive deer management report consisting of data, research, activity, and processes used by the deer program in the past year. To further facilitate transparency, the Deer Program has utilized data dashboards that make data available to the public almost as quickly as it is available to the Deer Program. This includes 1) a dashboard for harvest that is updated daily; 2) a dashboard for EHD mortality that is updated daily; 3) a dashboard for biological deer management data that is updated yearly after the Deer Management Survey and After Hunt Survey have been compiled; and 4) a dashboard for public opinion data that is updated yearly after the Deer Management Survey has been compiled. These four dashboards represent and present all information used to make deer management decisions in Indiana.

Decision making processes are also published. The decision-making process for establishing County Bonus Antlerless Quotas, how Deer Reduction Zones are established, the number of hunters afield, data error, and how decisions are made about EHD is described on websites and in the annual deer report. Clarification is often provided to interested beneficiaries who call or email and ask how decisions were reached. The Deer Program has also been working with researchers at Purdue University to create an integrated deer management model that incorporates public input, data about the ecological status of deer and their habitat in Indiana, and population estimates from throughout the state. This model will use information regarding the data that is used, how the model functions, and how DNR is using the information in their decision making process. Upon completion of the model, it will be made publicly available.

Public trust in the Deer Program has been measured in the Annual Deer Survey (starting in 2022) and published in Section 9 (Internal Research) of this deer report by the Deer Program, and by external partners at Purdue and other researchers. Two recent publications from Purdue that examine the relationship between Indiana DNR and the public are Complex Human-Deer Interactions Challenge Conventional Management Approaches: The Need to Consider Power, Trust, and Emotion by Stinchcomb et al. (2022) and Expanding and Evaluating Public Satisfaction with Wildlife Governance: Insights from Deer Management in Indiana, USA by Stinchcomb et al. (2022).

Wildlife governance will include means for citizens to become informed and engaged in decision making.

The Deer Program uses the online annual Deer Management Survey as the primary tool for citizens to provide input into deer management. This tool was selected after a review of other methods, such as emulating the County Deer Advisory Groups (CDACs) in Wisconsin; or regular in-person meeting around the state similar to what other states, including Indiana, have used in the past. Caudell and Vaught (2019) found that an online survey where everyone in Indiana is given the opportunity to participate would result in the most representation, have the potential for a representative sample of opinions on topics, and be cost effective. They found various CDAC models would range in price from $921,266 annually for Indiana to implement the Wisconsin model, $349,150 for a modified regional approach, and $279,100 for a county-based grass roots model. This was compared with approximately $30,000 for an annual online survey. The online survey has more than 20,000 individuals responding annually and consists of both hunters and non-hunters. Survey results are posted online and in the annual deer management report.

The Natural Resources Commission provides direct access for the citizens of Indiana to affect change in natural resource administration and management. Rules are also proposed by the Deer Program to change deer management in Indiana. While citizens have the opportunity to provide input to proposed rules here after potential rules are presented to the NRC, the Division of Fish & Wildlife provides the opportunity for citizens to comment on proposed rules in the Got INput process where rules are listed on the Indiana DNR website and a comment form is provided. Comments are tallied and a response is written. The responses to the deer-related rules are presented in this report in Chapter 9. Additionally, the Deer Program includes any proposed rules for changes to deer management in the deer management survey and that feedback is taken into consideration when making decisions on which proposed rule changes should be taken to the NRC.

Wildlife governance will facilitate collaboration and coordination across ecological, jurisdictional, and ownership boundaries.

The Deer Program in Indiana works closely with biologists in Indiana, Michigan, Kentucky, Illinois, and other midwestern states on CWD, EHD, and other deer management issues. We meet annually at both the Midwest Deer and Turkey Study Group Meeting and at the Southeastern Deer Study Group Meeting, and monthly for a Midwest CWD working group. These deer biologists also keep in regular contact with each other on issues as they arise. The Deer Program also publishes its work in international journals and keeps up-to-date on the most recent science regarding deer management.

Proposal for 2023-2027

We feel that the Deer Program for Indiana is currently on-track for applying the Governance Principles of Wildlife Conservation. We recommend that we continue the initiatives started during this previous 5-year period including all of the human-dimensions surveys currently, the outreach methods, and the deer population indices currently being used. Additionally, we propose the following enhancements to deer management for the next five years.

- The Purdue Integrated Deer Management Project (IDMP) has identified that conducting aerial flights to assess deer density is a cost-effective method for Indiana DNR. When paired with a modeling software that takes into account differences in deer habitat in a given area, deer densities become further refined. We proposed starting a program to measure deer density across the state using a combination of the aerial methods and modeling to create a deer density map for Indiana. This will likely take five years to complete because flights must be conducted during the day when snow is on the ground. Over time, this should lead to the ability to monitor changes in population over time and assess the effectiveness of population indices, such as the Archer's index and other observation methods.
- Complete the CWD implementation plan.
- Work to simplify hunting regulations.
- Develop better decision models for assessing deer damage.
- Work to extend reach of human-dimension efforts.
- Complete the integrated deer management model and incorporate that model into DNR's decision making process.

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Chapter 3.
2021-2022 DEER HUNTING SEASON

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Errors in Reporting

The online check-in system, CheckIN Game, was initiated in 2012 as an option for hunters and was made the primary game-checking system in 2015. Hunters who check in their game online occasionally make errors in reporting their harvest. Errors include checking in deer with the wrong sex indicated, incorrect licenses, or multiple entries of the same deer. Indiana DNR is constantly working throughout deer season to correct these errors so that harvest numbers are as accurate as possible. In many cases, this involves contacting hunters by telephone or email to determine what type of error has been made before a correction can be issued.

For this reason, these data in this document should be considered to have a certain amount of reporting error. Hunters or others who use these data should expect that the numbers reported in future Indiana White-tailed Deer Reports may change slightly based on corrections of errors. This is also true for the Deer Counter on the DNR Deer webpage (deer.dnr.IN.gov). Some hunters have observed the reported total harvest decreasing as the corrections to the data were made and have contacted the DNR to ask why.

Two error rates were calculated for this issue: an unreconciled error rate and a total error rate, which includes both reconciled errors and unreconciled errors (Table 3-1). Typically, the numbers reported in this document will only fluctuate by the unreconciled error rate as the reconciled errors have already been voided and are not included in the data. However, occasionally a statistic might have been calculated without removing the voided transactions. Because error rates are relatively low, they have no effect on management decisions.

Harvest totals for the 2021 deer hunting season are current as of April 21, 2022. Additionally, harvest totals for the 2016, 2017, 2018, 2019, and 2020 seasons have been updated since previously reported. In this report, the updated totals are used in analyses and comparisons between years.

Table 3-1. Error rates of hunter-reported deer harvests, 2016-2022. Total error includes reconciled and unreconciled errors. Reconciled errors have already been removed from the dataset.

	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022
% total error	0.67	1.3	0.57	0.23	0.26	0.23
% unreconciled error	0.2	0.17	0.13	0.13	0.16	0.13

Harvest by Season

Harvest summary reports prior to 2016 did not include harvest numbers from Indiana State Park Reduction Hunts because those deer were checked in at the properties and reported separately by the Division of State Parks. Now that the deer check-in process is online for all hunters and hunts, deer harvested during State Park Reduction Hunts are included in the check-in database and can be reported with the statewide totals.

Shed bucks are checked in as antlerless deer in the CheckIN Game system and do not count against a hunter's buck limit. However, for the purpose of analyzing the harvest data, antlered bucks and shed bucks are grouped as antlered deer, while does and button bucks are grouped as antlerless deer, unless specified.

A total of 112,482 harvested deer were reported in Indiana during the 2021 season (Figures 3-1 and 3-2). This harvest was 9.4% lower than the 124,180 deer taken during the 2020 season. The antlered deer harvest of 53,752 was 3.1% lower than the 55,446 reported in 2020. The antlerless harvest of 58,730 was 14.9% lower than the 68,734 harvested in 2020. In 2021, the reported harvest for total deer ranks 19th highest all-time, while the total antlerless deer harvest ranks as the 22nd highest all-time in Indiana history. The antlered harvest ranks the 3rd highest since reporting began in 1951. Approximately 4.2 million deer have been reported harvested during the past 70 deer-hunting seasons in Indiana.

The hunting season began with the Deer Reduction Zone on Sept. 15, followed by a youth-only weekend (Sept. 25-26). The number of deer harvested with archery equipment during the Deer Reduction Zone season was incorporated into Archery season totals, while deer harvested with firearms during Deer Reduction Zone season were incorporated into Firearms season totals.

Youth season was created in 2006 and allowed youth 15 years old and younger to harvest one antlerless deer. It was changed in 2009 to include all youth 17 years old and younger. Youth hunters may harvest an antlered deer, which counts toward the statewide bag limit of one antlered deer and the number of antlerless deer determined by bonus antlerless quotas in each county. A total of 2,751 deer were reportedly harvested in 2021 during this season, an increase of 21.9% from the 2,256 deer harvested in 2020. This season resulted in 2.4% of the total harvest (Table 3-2). Approximately 38.6% of the Youth season harvest was antlered bucks (Figure 3-3).

There were 31,082 deer harvested during Archery season, which represented 27.6% of the overall harvest and was lower (10.1%) than the 34,581 deer harvested in 2020 (Table 3-2). Antlered deer (n=13,987) made up 45.0% of the total Archery season harvest (Figure 3-3).

The Firearms season harvest of 70,837 was 3.0% lower than the 72,998 deer harvested in 2020 and represented 63.0% of the total harvest (Table 3-2). The antlerless harvest of 35,969 was 4.7% lower than the 2020 antlerless harvest. The 2021 antlered harvest of 36,552 was 1.3% lower than the number of antlered deer harvested in 2020. The antlered harvest exceeded the antlerless harvest on the first seven days of the season. The antlerless deer harvest outnumbered antlered deer harvested during the other nine days of the season (Table 3-3). Opening weekend contributed 22.8% of the statewide total harvest for all 2021 seasons, compared to 20.2% in 2020. Antlered deer accounted for 52.2% of the total Firearms season harvest. (Figure 3-3).

At 7,812 deer, the Muzzleloader season harvest accounted for 6.9% of the total 2021 harvest, a 15.8% decrease from the Muzzleloader season harvest of 2020 (Table 3-2). As in years past, a large percentage of the deer harvested during Muzzleloader season were antlerless (72.5%, Figure 3-3).

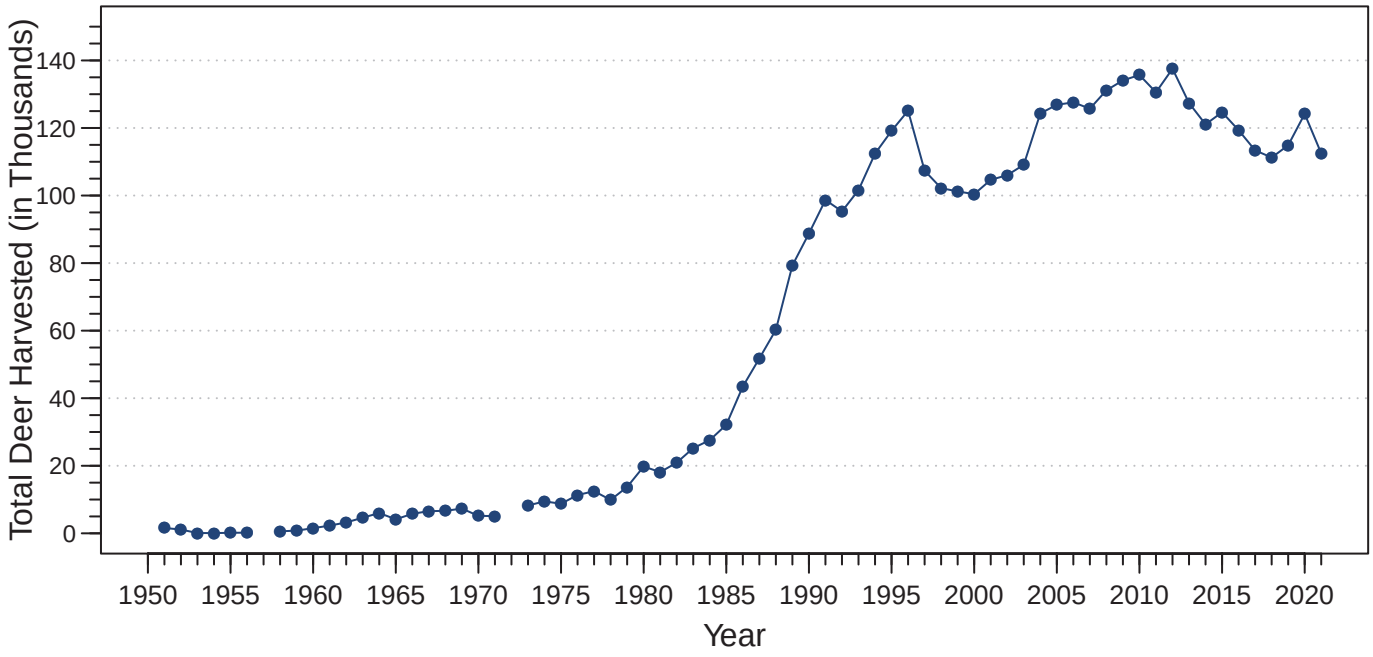

Figure 3-1. The total number of deer harvested in each Indiana deer season, 1951-2021. Totals include deer harvested in State Park Reduction Hunts, 1993-2021. Reporting error rates: ±0.23 (2021), ±0.26% (2020), ±0.23% (2019), ±0.57% (2018), ±1.30% (2017), and ±0.67% (2016).

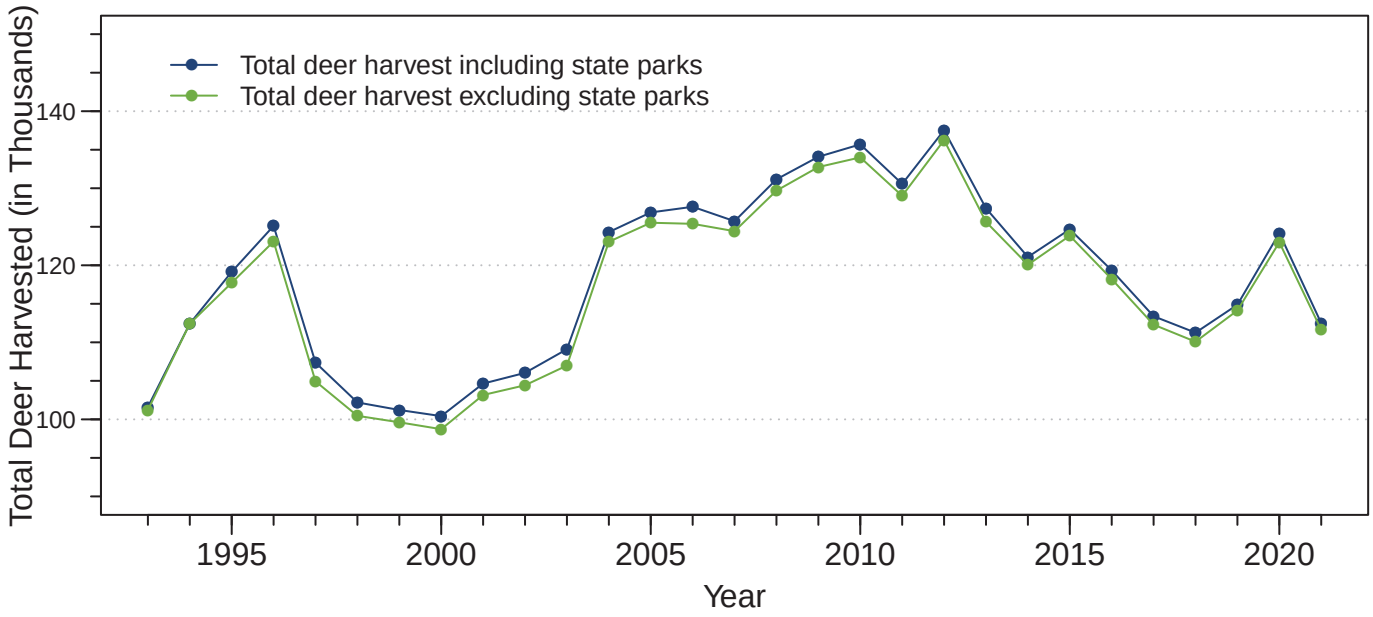

Figure 3-2. A comparison of the total number of deer harvested in each Indiana deer season, including and excluding deer harvested during State Park Reduction Hunts, 1993–2021. Reporting error rates: ±0.23% (2021), ±0.26% (2020), ±0.23% (2019), ±0.57% (2018), ±1.3 (2017), ±0.67 (2016).

Table 3-2. Number of deer harvested by season during the 2021 Indiana deer hunting season. Total harvest and percent of total harvest are labeled by each season. Values may not total 100 due to rounding. Reporting error rate: ±0.23% (2021).

Season	Antlered	Antlerless	Total
Youth Deer (25 - 26 Sept)	1,063 (0.9%)	1,688 (1.5%)	2,751 (2.4%)
Archery (1 Oct - 2 Jan)	13,987 (12.4%)	17,095 (15.2%)	31,082 (27.6%)
Firearms (13 - 28 Nov)	36,552 (32.5%)	34,285 (30.5%)	70,837 (63%)
Muzzleloader (4 - 19 Dec)	2,150 (1.9%)	5,662 (5%)	7,812 (6.9%)
Totals	53,752 (47.8%)	58,730 (52.2%)	112,482 (100%)

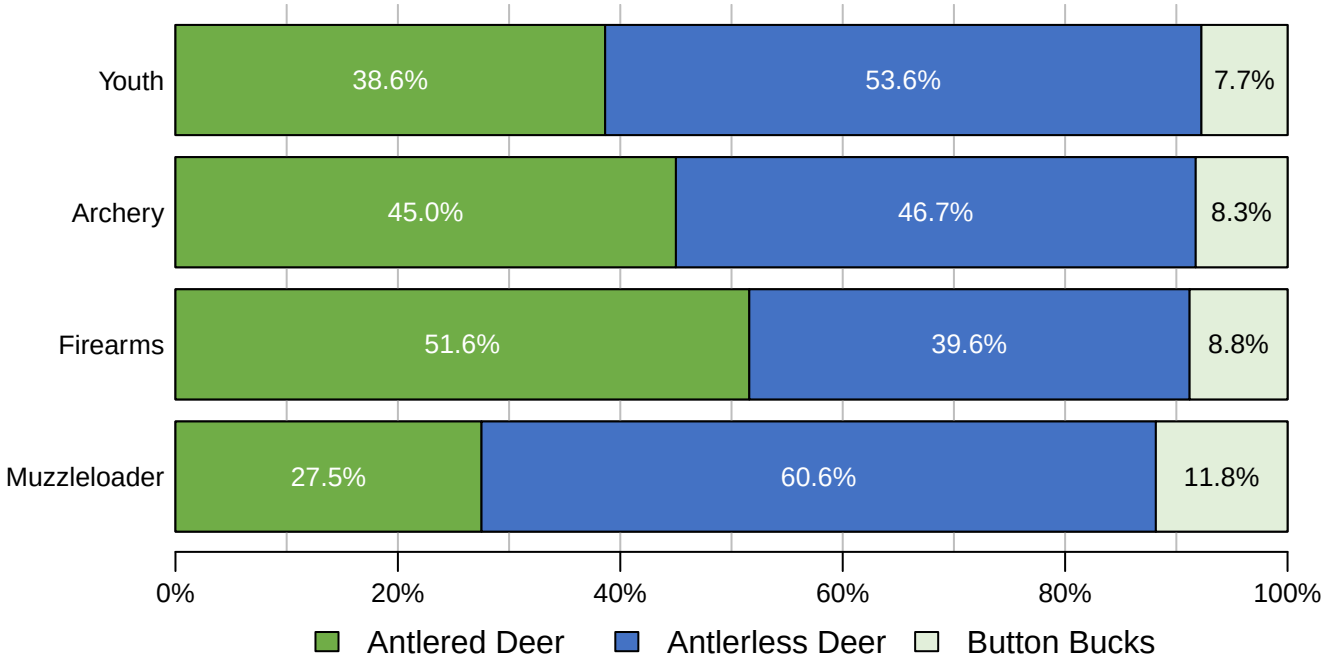

Figure 3-3. Composition of individual season harvests during the 2021 Indiana deer season. Reporting error rates: ±0.23% (2021).

Table 3-3. Antlered and antlerless daily harvest and percent of harvest by season and total harvest from the start of Firearms season through the end of Firearms season, Nov. 13-28. Reporting error rate: ±0.23% (2021).

Date	Day	Antlered Deer	Antlered % of Daily Total	Antlerless Deer	Antlerless % of Daily Total	Total Deer	% of Season Total	% of Total Harvest
13-Nov	Sat	11,760	62.827	6,958	37.173	18,718	27.005	16.641
14-Nov	Sun	4,189	60.649	2,718	39.351	6,907	9.965	6.141
15-Nov	Mon	2,826	54.065	2,401	45.935	5,227	7.541	4.647
16-Nov	Tue	2,045	56.352	1,584	43.648	3,629	5.236	3.226
17-Nov	Wed	908	59.115	628	40.885	1,536	2.216	1.366
18-Nov	Thu	1,348	56.902	1,021	43.098	2,369	3.418	2.106
19-Nov	Fri	1,953	52.303	1,781	47.697	3,734	5.387	3.320
20-Nov	Sat	3,254	48.322	3,480	51.678	6,734	9.715	5.987
21-Nov	Sun	1,045	45.514	1,251	54.486	2,296	3.313	2.041
22-Nov	Mon	897	45.812	1,061	54.188	1,958	2.825	1.741
23-Nov	Tue	849	40.896	1,227	59.104	2,076	2.995	1.846
24-Nov	Wed	813	41.564	1,143	58.436	1,956	2.822	1.739
25-Nov	Thu	486	39.803	735	60.197	1,221	1.762	1.086
26-Nov	Fri	1,327	36.456	2,313	63.544	3,640	5.252	3.236
27-Nov	Sat	1,365	34.296	2,615	65.704	3,980	5.742	3.538
28-Nov	Sun	1,093	32.813	2,238	67.187	3,331	4.806	2.961
Total	NA	36,158	NA	33,154	NA	69,312	100	61.621

Harvest by County

The number of deer harvested in individual counties ranged from 125 in Benton County to 2,710 in Steuben County (Table 3-4). Harvest exceeded 1,000 deer in 55 counties and 2,000 deer in 10 counties. Antlered buck harvest exceeded 1,000 in 10 counties in 2020 and 2021, while antlerless harvest exceeded 1,000 deer in 11 counties, compared with 23 the previous year..

Antlerless deer accounted for at least 50% of the total harvest in 61 of the state's 92 counties in 2021. The 10 counties with the highest harvests were, in descending order, Steuben, Franklin, Noble, LaGrange, Harrison, Kosciusko, Dearborn, Lawrence, Parke, and Orange. The 10 counties with the lowest harvests, beginning with the lowest, were Benton, Tipton, Hancock, Rush, Clinton, Blackford, Howard, Marion, Shelby, and Boone.

Table 3-4. Deer harvest by county during the 2021 Indiana deer hunting season. Reporting error rate: ±0.23% (2020).

County	Antlered	Antlerless	Total	County	Antlered	Antlerless	Total
Adams	317	320	637	Lawrence	1035	1124	2159
Allen	701	933	1634	Madison	260	279	539
Bartholomew	437	484	921	Marion	146	282	428
Benton	86	39	125	Marshall	849	993	1842
Blackford	181	218	399	Martin	738	814	1552
Boone	245	219	464	Miami	601	619	1220
Brown	567	753	1320	Monroe	723	700	1423
Carroll	413	468	881	Montgomery	468	446	914
Cass	589	576	1165	Morgan	656	780	1436
Clark	617	575	1192	Newton	463	432	895
Clay	587	614	1201	Noble	1070	1290	2360
Clinton	185	206	391	Ohio	316	316	632
Crawford	832	801	1633	Orange	964	1054	2018
Daviess	490	618	1108	Owen	813	702	1515
Dearborn	1002	1171	2173	Parke	1029	1108	2137
Decatur	358	470	828	Perry	744	769	1513
Dekalb	920	976	1896	Pike	775	888	1663
Delaware	351	382	733	Porter	577	937	1514
Dubois	812	1014	1826	Posey	471	548	1019
Elkhart	677	821	1498	Pulaski	795	949	1744
Fayette	403	489	892	Putnam	1055	929	1984
Floyd	266	308	574	Randolph	313	295	608
Fountain	669	654	1323	Ripley	806	878	1684
Franklin	1135	1341	2476	Rush	187	189	376
Fulton	630	699	1329	Scott	332	406	738
Gibson	541	613	1154	Shelby	224	235	459
Grant	389	373	762	Spencer	566	605	1171
Greene	1007	973	1980	St. joseph	493	696	1189
Hamilton	212	276	488	Starke	592	703	1295
Hancock	155	100	255	Steuben	1293	1417	2710
Harrison	1186	1121	2307	Sullivan	899	884	1783
Hendricks	324	283	607	Switzerland	828	819	1647
Henry	275	316	591	Tippecanoe	491	518	1009
Howard	205	200	405	Tipton	88	47	135
Huntington	467	443	910	Union	302	408	710
Jackson	734	778	1512	Vanderburgh	244	428	672
Jasper	655	579	1234	Vermillion	597	499	1096
Jay	452	521	973	Vigo	731	662	1393
Jefferson	838	814	1652	Wabash	637	685	1322
Jennings	783	896	1679	Warren	518	459	977
Johnson	250	265	515	Warrick	674	643	1317
Knox	457	400	857	Washington	1000	998	1998
Kosciusko	1016	1245	2261	Wayne	553	668	1221
Lagrange	935	1383	2318	Wells	319	324	643
Lake	495	746	1241	White	432	450	882
Laporte	758	952	1710	Whitley	481	429	910

Harvest per Hunter

The majority of hunters (73.1%, n=60,488) in Indiana harvested one deer during the 2021 deer season (Table 3-5). Only 0.48% (n=395) of hunters statewide harvested more than four deer in 2021, which is 36% less than the number (n=620) that harvested more than four deer in 2020.

Table 3-5. Number of deer harvested and percentage harvested by individual successful hunters during the 2020 and 2021 Indiana deer seasons. Reporting error rates: ±0.23% (2021) and ±0.26% (2020).

Number of Deer	2020 Hunters	2020 Percent of Total	2021 Hunters	2021 Percent of Total
1	61439	70.046	60488	73.134
2	18919	21.569	16531	19.987
3	5536	6.312	4469	5.403
4	1198	1.366	825	0.997
5	388	0.442	252	0.305
6	136	0.155	85	0.103
7	59	0.067	34	0.041
8	21	0.024	13	0.016
9	8	0.009	6	0.007
10	5	0.006	2	0.002
11	1	0.001	2	0.002
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	1	0.001	0	0
16	0	0	0	0
17	0	0	1	0.001
18	1	0.001	0	0

Harvest by Equipment Type

Six types of equipment were legal for hunting deer during 2021 (Figure 3-4): archery (traditional and compound bows), crossbows, handguns, muzzleloaders, rifles, and shotguns. Harvest decreased relative to 2020 for all equipment types including bow and arrow (-12.4%), crossbow (-7.9%), handgun (-21.6%), muzzleloader (-18.4%), rifle (-5.2%), and shotgun (-16.3%) (Table 3-6). The percent of total harvest relative to 2020 decreased for bow and arrow (-0.4%), muzzleloader (-1.1%), and shotgun (-1.0%). It stayed the same for handgun (-0.04%), and it increased for crossbow (0.2%) and rifle (2.3%).

DNR File Photo

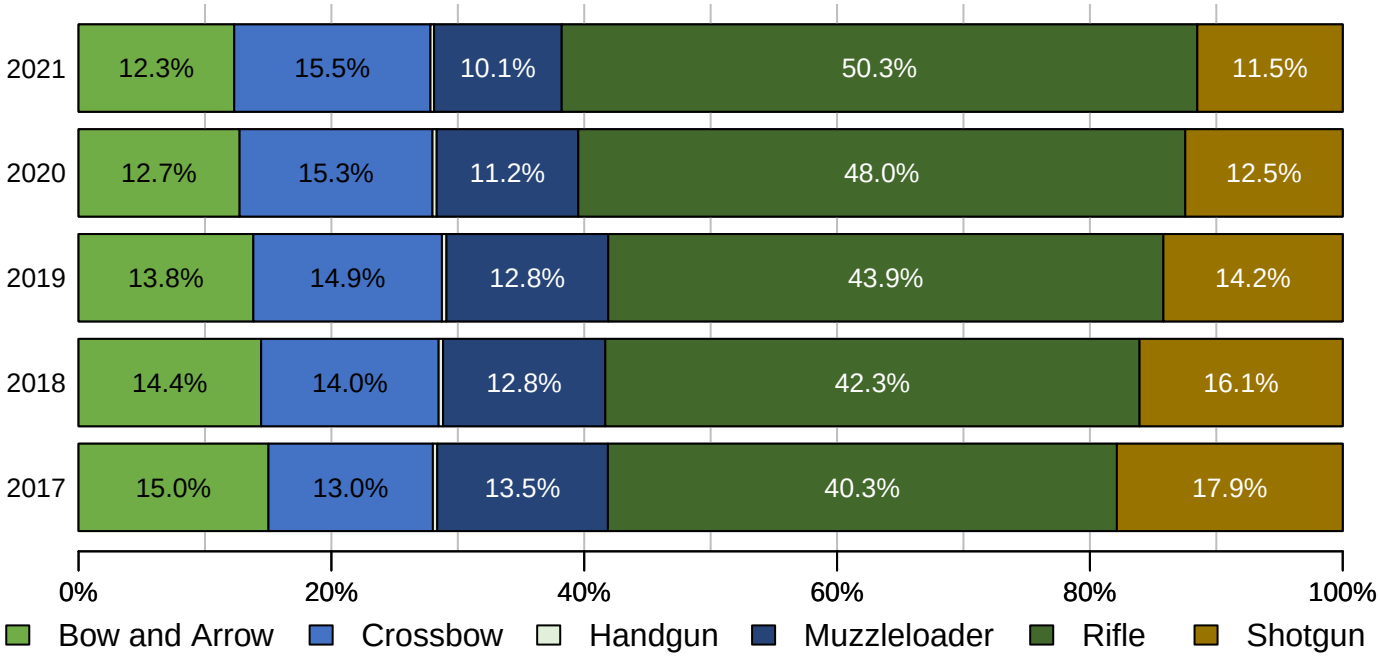

Figure 3-4. Percent harvest by equipment type, 2017-2021. Reporting error rates: ±0.23% (2021), ±0.26% (2020), ±0.23% (2019), and ±0.57% (2018), ±1.3% (2017).

Table 3-6. Number of deer harvested by type of legal hunting equipment across seasons, 2015-2021. Values within this table do not exactly equal those tallied by season (Figure 3-4) because multiple equipment types can be used during the Firearms season. Reporting error rates: ±0.23% (2021), ±0.26% (2020), ±0.23% (2019), ±0.57% (2018), ±1.3% (2017), and ±0.67% (2016), ±0.95% (2015).

Equipment	2015	2016	2017	2018	2019	2020	2021
Bow and Arrow	20,309 (16.3%)	16,996 (14.2%)	17,034 (15.0%)	16,069 (14.4%)	15,884 (13.8%)	15,819 (12.7%)	13,851 (12.3%)
Crossbow	11,837 (9.5%)	11,260 (9.4%)	14,747 (13.0%)	15,623 (14.0%)	17,136 (14.9%)	18,950 (15.3%)	17,462 (15.5%)
Handgun	917 (0.7%)	604 (0.5%)	392 (0.3%)	388 (0.3%)	415 (0.4%)	412 (0.3%)	323 (0.3%)
Muzzleloader	24,746 (19.8%)	16,676 (14.0%)	15,304 (13.5%)	14,279 (12.8%)	14,706 (12.8%)	13,906 (11.2%)	11,354 (10.1%)
Rifle	23,296 (18.7%)	44,628 (37.4%)	45,653 (40.3%)	47,015 (42.3%)	50,449 (43.9%)	59,630 (48.0%)	56,557 (50.3%)
Shotgun	43,563 (34.9%)	29,178 (24.4%)	20,256 (17.9%)	17,878 (16.1%)	16,292 (14.2%)	15,463 (12.5%)	12,935 (11.5%)
Total	124,668	119,342	113,386	111,252	114,882	124,180	112,482

Harvest Age and Sex Structure

The age and sex structure of the 2021 deer harvest was 47.8% adult males, 43.4% adult females, and 8.8% male fawns (button bucks) (Table 3-7). Antlerless deer (does and button bucks) represent the highest proportion of the total deer harvest at 52.2% but dropped from an all-time high of 66% in 2012.

During opening weekend of Firearms season, DNR biologists have traditionally manned check stations throughout the state to collect age-structure data and tissue samples for disease testing. Before the 2012 deer season, all deer had to be brought to a check station; therefore, age data collected during the opening weekend of Firearms season provided an unbiased method for determining the age structure of the harvest. All hunters had to check in deer online during the 2021 season; therefore, age estimates of adult deer, such as the proportion of yearling bucks in the harvest, became unreliable. Evaluation of the online check-in data for the opening weekend of Firearms season historically showed that hunters were more likely to report antlered bucks at check stations than online but were more likely to report button bucks online than at check stations, thus biasing estimates toward an older age structure than the actual harvest. Therefore, age class estimates of adult deer are unavailable until a valid, scientific method for correcting this bias is obtained.

DNR File Photo

Table 3-7. Number of deer harvested and percentage of total harvested by age and sex during the Indiana deer seasons from 1987-2021. Reporting error rate: ±0.23% (2021). As of 2015, female fawns were not recorded during the check-in process.

Year	Adult Males (%)	Adult Females (%)	Fawn Males (%)	Fawn Females (%)	Total
1987	29,530 (57%)	11,139 (21%)	6,164 (12%)	4,945 (10%)	51,778
1988	34,358 (57%)	13,170 (22%)	7,050 (12%)	5,656 (10%)	60,234
1989	40,503 (51%)	19,464 (24%)	10,737 (14%)	8,614 (11%)	79,318
1990	43,080 (48%)	23,680 (27%)	12,373 (14%)	9,630 (11%)	88,763
1991	41,593 (42%)	31,211 (32%)	14,626 (15%)	11,253 (11%)	98,683
1992	43,508 (46%)	25,387 (27%)	14,262 (15%)	12,157 (13%)	95,314
1993	44,424 (44%)	27,704 (27%)	14,751 (15%)	14,335 (14%)	101,214
1994	50,812 (45%)	32,466 (29%)	15,487 (14%)	13,651 (12%)	112,416
1995	47,098 (40%)	40,946 (35%)	16,398 (14%)	13,287 (11%)	117,729
1996	47,315 (38%)	39,913 (32%)	17,307 (14%)	18,551 (15%)	123,086
1997	42,537 (41%)	35,163 (34%)	14,039 (13%)	13,198 (12%)	104,937
1998	44,955 (45%)	30,711 (31%)	12,257 (12%)	12,538 (12%)	100,461
1999	46,371 (46%)	30,474 (31%)	11,645 (12%)	11,129 (11%)	99,618
2000	44,621 (45%)	31,986 (32%)	11,072 (11%)	11,046 (11%)	98,725
2001	48,357 (47%)	31,806 (31%)	11,230 (11%)	11,770 (11%)	103,163
2002	47,177 (45%)	35,357 (34%)	11,291 (11%)	10,603 (10%)	104,428
2003	49,533 (46%)	36,303 (34%)	10,262 (10%)	10,887 (10%)	106,986
2004	54,743 (44%)	41,749 (34%)	12,501 (10%)	14,065 (11%)	123,058
2005	52,488 (42%)	44,286 (35%)	13,030 (10%)	15,722 (13%)	125,526
2006	49,097 (39%)	45,257 (36%)	13,688 (11%)	17,339 (14%)	125,381
2007	49,375 (40%)	44,514 (36%)	13,313 (11%)	17,225 (14%)	124,427
2008	50,845 (39%)	46,666 (36%)	13,083 (11%)	19,154 (15%)	129,748
2009	52,878 (40%)	48,222 (36%)	13,040 (10%)	18,291 (14%)	132,431
2010	53,007 (40%)	49,911 (37%)	13,367 (10%)	17,719 (13%)	134,004
2011	50,717 (39%)	45,931 (36%)	13,058 (10%)	19,312 (15%)	129,018
2012	45,936 (34%)	54,983 (40%)	15,911 (12%)	19,418 (14%)	136,248
2013	46,240 (37%)	46,229 (37%)	14,100 (11%)	19,066 (15%)	125,635
2014	45,686 (38%)	46,760 (39%)	12,694 (11%)	14,933 (12%)	120,073
2015	51,075 (41%)	60,828 (49%)	12,765 (10%)	0	124,668
2016	51,646 (43%)	55,922 (47%)	11,774 (10%)	0	119,342
2017	44,884 (40%)	56,335 (50%)	12,167 (11%)	0	113,386
2018	47,256 (42%)	52,513 (47%)	11,483 (10%)	0	111,252
2019	51,646 (45%)	52,128 (45%)	11,108 (10%)	0	114,882
2020	55,446 (45%)	57,073 (46%)	11,661 (9%)	0	124,180
2021	53,752 (48%)	48,789 (43%)	9,941 (9%)	0	112,482

Public Lands Harvest

A total of 8,063 (a 9.8% decrease from 2020) deer were harvested on 119 public lands in Indiana during the 2021-2022 season, which resulted in 7.2% of the total deer harvest. Public lands included state fish & wildlife areas (FWAs), state nature preserves, state parks, state forests, national wildlife refuges, national forests, conservation areas, and military lands (Tables 3-8, 3-9, 3-10, and 3-11). Approximately 20% of the deer harvested on public lands were taken from across 25 FWAs. Pigeon River FWA had the largest harvest of 317 deer. Hoosier National Forest accounted for 12.5% of the public lands harvest, while Crane NSA accounted for 2.7%. Together, state park (10.6%) and state forest (12.8%) lands contributed to 23.4% of the public lands harvest. A total of 1,533 (19.0%) deer were harvested on public lands, but the specific property was not reported. The percent of antlered (46.3%) and antlerless (53.6 %) deer harvested on public lands was similar to the composition of the total harvest (47.8% antlered, 52.2% antlerless).

DNR File Photo

Table 3-8. Deer harvested during the 2021-2022 deer hunting season on public lands managed by Indiana DNR Division of Fish & Wildlife. Reporting error rate: ±0.23% (2021).

Property	Antlered	Button Buck	Antlerless	Total
FISH & WILDLIFE AREA	**765**	**169**	**626**	**1560**
Atterbury	19	5	15	39
Blue Grass	6	0	3	9
Chinook	9	0	9	18
Crosley	26	4	10	40
Deer Creek	13	1	8	22
Fairbanks Landing	44	2	19	65
Glendale	22	19	50	91
Goose Pond	18	3	11	32
Hillenbrand	20	3	17	40
Hovey Lake	21	2	23	46
J.E. Roush Lake	55	11	27	93
Jasper Pulaski	47	5	34	86
Kankakee	10	1	9	20
Kankakee Sands (TNC)	16	3	2	21
Kingsbury	46	12	43	101
Lasalle	27	7	16	50
Pigeon River	125	46	146	317
Splinter Ridge	13	2	10	25
Stucker Fork	1	0	1	2
Sugar Ridge	38	9	30	77
Tri-County	27	11	37	75
Wabashiki	24	1	9	34
Wilbur Wright	6	3	7	16
Willow Slough	75	10	54	139
Winamac	57	9	36	102
CONSERVATION AREA	**25**	**2**	**10**	**37**
Sugar Creek	14	1	5	20
Wabash River	11	1	5	17
GAMEBIRD HABITAT AREA	**7**	**2**	**4**	**13**
Hufford	4	2	1	7
Reynolds Creek	3	0	3	6
PUBLIC FISHING AREA	**2**	**0**	**1**	**3**
Driftwood	1	0	0	1

Property	Antlered	Button Buck	Antlerless	Total
WETLAND CONSERVATION AREA	**172**	**31**	**96**	**299**
Aukiki	4	2	2	8
Austin Bottoms	27	3	6	36
Barnes Seng	6	0	2	8
Cedar Swamp	32	2	18	52
Dick Blythe	0	0	2	2
Durham Lake	8	4	8	20
Eagle Lake	0	0	2	2
Fish Lake	6	0	2	8
Goose Lake	2	0	0	2
Lake Maxinkuckee	0	0	2	2
Little Pigeon Creek	14	2	2	18
Lost Hill	6	2	0	8
Mallard Roost	14	2	10	26
Manitou Lake Islands	2	2	4	8
Marsh Lake	20	2	14	36
Maxincukee	6	0	2	8
Menominee	14	8	8	30
Province Pond	4	0	2	6
Swamper Bend	2	0	2	4
Tern Bar Slough	3	0	8	11
Turkey Foot	2	0	0	2
Whirledge	0	2	0	2
WILDLIFE MANAGEMENT AREA	**27**	**7**	**16**	**50**
Ashcraft	1	1	0	2
Elk Creek	4	2	2	8
Green Valley	1	0	1	2
Modoc	0	0	1	1
Morgan Bluff	8	1	1	10
Oak Grove	1	0	0	1
Pisgah Marsh	1	0	0	1
Randolph County	5	2	4	11
Westerkamp	0	0	1	1
White River Bend	6	1	6	13
RESOURCE AREA	**3**	**1**	**2**	**6**
Deniston	3	1	2	6

Table 3-9. Deer harvested during the 2021-2022 deer hunting season on public lands managed by Indiana DNR Division of State Parks. Deer harvested in state parks were taken during special state park reduction draw hunts. Reporting error rate: ±0.23% (2021).

Property	Antlered	Button Buck	Antlerless	Total
STATE PARKS	**300**	**139**	**418**	**857**
Chain O'Lakes	27	16	35	78
Clifty Falls	4	5	10	19
Fort Harrison	16	2	21	39
Indiana Dunes	11	2	14	27
Lincoln	18	3	17	38
Ouabache	5	16	28	49
Pokagon	16	7	23	46
Potato Creek	39	18	69	126
Shakamak	14	6	8	28
Spring Mill	8	0	9	17
Summit Lake	14	8	22	44
Tippecanoe River	48	25	69	142
Turkey Run	16	5	25	46
Versailles	48	14	43	105
Whitewater Memorial	16	12	25	53
NATURAL AREA	**4**	**1**	**7**	**12**
Cave River Valley	4	1	7	12
STATE RECREATION AREA	**48**	**5**	**45**	**98**
Deam Lake	4	1	6	11
Interlake	22	3	20	45
Lieber (Cagles Mill Lake)	10	1	6	17
Raccoon Lake	8	0	9	17
Starve Hollow	2	0	0	2
Trine	2	0	4	6
STATE RESERVOIRS	**331**	**112**	**393**	**836**
Brookville Lake	79	30	109	218
Hardy Lake	4	3	9	16
Mississinewa Lake	89	26	81	196
Monroe Lake	33	15	50	98
Patoka Lake	85	28	107	220
Salamonie Lake	41	10	37	88

Table 3-10. Deer harvested during the 2021-2022 deer hunting season on public lands managed by Indiana DNR divisions of Forestry and Nature Preserves. Reporting error rate: ±0.23% (2021).

Property	Antlered	Button Buck	Antlerless	Total
STATE FORESTS	**480**	**122**	**433**	**1035**
Clark	53	15	30	98
Ferdinand	11	3	12	26
Frances Slocum	4	2	2	8
Greene-Sullivan	37	4	28	69
Harrison-Crawford	105	22	76	203
Jackson-Washington	48	5	47	100
Martin	41	14	54	109
Morgan-Monroe	76	15	74	165
Owen-Putnam	13	5	10	28
Pike	13	5	12	30
Salamonie River	5	2	11	18
Selmier	4	4	4	12
Yellowwood	70	26	73	169
NATURE PRESERVES	**29**	**2**	**20**	**51**
Beaver Lake	7	1	2	10
Bob Kern	1	0	2	3
Conrad Savanna	10	0	6	16
Judy Burton	0	0	3	3
Round Lake Wetland	2	0	0	2
Section Six Southern Flatwoods	5	1	6	12
Shrader Weaver	0	0	1	1
Wabash Lowlands	4	0	0	4

Table 3-11. Deer harvested during the 2021-2022 deer hunting season on public lands managed by federal agencies. Special draw hunts were held on the military lands and national wildlife refuge properties. Reporting error rate: ±0.23% (2021).

Property	Antlered	Button Buck	Antlerless	Total
MILITARY LANDS	196	32	161	389
Atterbury JMTC	74	18	79	171
Crane NSA	122	14	82	218
NATIONAL FORESTS	527	87	395	1009
Hoosier	527	87	395	1009
NATIONAL WILDLIFE REFUGE	220	35	144	399
Big Oaks	163	25	101	289
Muscatatuck	14	6	15	35
Patoka River	43	4	28	75

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Deer Reduction Zones Harvest

Indiana Deer Reduction Zones (DRZs) are designated to target areas within the state that have high deer populations coupled with high human density, where the cultural carrying capacity has been exceeded due to concerns over local ecology, deer-vehicle collisions, or the amount of damage to personal property. DRZs aim to reduce deer-human conflict in these areas rather than to eliminate the deer population. Hunters may harvest up to 10 deer in the DRZs, 10 antlerless deer or nine antlerless deer, and one antlered deer after first harvesting an antlerless deer (earn-a-buck). An interactive map of the current DRZs along with information and a video about how DRZs are developed can be found online at wildlife.IN.gov/wildlife-resources/animals/white-tailed-deer/deer-reduction-zones/.

Approximately 4,694 deer were harvested in DRZs in 2021 (Table 3-12), an 11.5% decrease from 2020. These deer were harvested within a DRZ county using a valid license type for DRZs (DRZ license, lifetime license, youth license, or landowner or military exemptions) and were marked that they applied to the "zone bag limit" in the CheckIN Game system. Deer harvested on any other license type within the boundaries of a DRZ counted toward the statewide bag limit.

In 2021, antlerless deer made up 82.5% of the DRZ harvest. The percentage of the statewide antlerless harvest that was taken in a DRZ decreased by 0.1% in 2021 (4.2%) compared to 2020 (4.3%). A total of 822 antlered deer were taken in DRZs in 2021, which accounted for 1.5% of the statewide antlered harvest. Deer taken within a DRZ accounted for between 3.0% and 64.0% of each DRZ county's total harvest (Table 3-13).

Table 3-12. Number of antlered, antlerless, and total deer harvested within Deer Reduction Zones in 2019, 2020, and 2021. Reporting error rates: ±0.23% (2021), ±0.26% (2020), and ±0.23% (2019).

County	2019 Antlered	2019 Antlerless	2019 Total	2020 Antlered	2020 Antlerless	2020 Total	2020 Antlered	2021 Antlerless	2021 Total
Allen	91	346	437	93	413	506	85	387	472
Boone	7	25	32	7	23	30	4	14	18
Brown	14	68	82	11	71	82	14	73	87
Dearborn	35	136	171	40	155	195	45	171	216
Dekalb	20	67	87	23	94	117	17	72	89
Delaware	6	32	38	14	42	56	8	38	46
Elkhart	19	78	97	21	108	129	20	91	111
Fulton	6	32	38	5	29	34	7	37	44
Hamilton	32	113	145	41	135	176	38	137	175
Hendricks	8	50	58	13	49	62	10	43	53
Johnson	7	23	30	5	27	32	3	23	26
Kosciusko	16	108	124	29	180	209	28	171	199
Lagrange	24	163	187	42	179	221	29	153	182
Lake	102	461	563	146	622	768	106	495	601
Laporte	45	197	242	52	211	263	49	201	250
Madison	3	15	18	1	14	15	3	15	18
Marion	53	225	278	55	260	315	60	214	274
Monroe	6	36	42	17	72	89	19	45	64
Morgan	19	88	107	31	125	156	29	147	176
Porter	109	532	641	126	633	759	109	576	685
St Joseph	19	92	111	29	142	171	21	142	163
Steuben	31	194	225	40	248	288	41	203	244
Tippecanoe	11	43	54	15	82	97	8	65	73
Vanderburgh	77	295	372	76	322	398	49	282	331
Wabash	7	24	31	9	51	60	6	34	40
Warrick	8	51	59	18	56	74	14	43	57
Total	775	3494	4269	959	4343	5302	822	3872	4694
Percent Of Statewide Harvest Totals	1.501	5.525	3.716	1.730	6.319	4.270	1.529	6.593	4.173

Table 3-13. Proportion of each Deer Reduction Zone (DRZ) county's total deer harvest that was counted as deer harvested in the DRZ in 2021. DRZ deer were defined as deer harvested within a DRZ county using a valid license type (DRZ license, lifetime license, youth license, or landowner or military exemptions) and indicated as counting toward the zone bag limit in the CheckIN Game system. Reporting error rate: ±0.23% (2021).

County	DRZ Harvest	Total County Harvest	% DRZ
Allen	472	1634	28.886
Boone	18	464	3.879
Brown	87	1320	6.591
Dearborn	216	2173	9.940
Dekalb	89	1896	4.694
Delaware	46	733	6.276
Elkhart	111	1498	7.410
Fulton	44	1329	3.311
Hamilton	175	488	35.861
Hendricks	53	607	8.731
Johnson	26	515	5.049
Kosciusko	199	2261	8.801
Lagrange	182	2318	7.852
Lake	601	1241	48.429
Laporte	250	1710	14.620
Madison	18	539	3.340
Marion	274	428	64.019
Monroe	64	1423	4.498
Morgan	176	1436	12.256
Porter	685	1514	45.244
Steuben	244	2710	9.004
Tippecanoe	73	1009	7.235
Vanderburgh	331	672	49.256
Wabash	40	1322	3.026
Warrick	57	1317	4.328

Community Hunting Access Program (CHAP)

The Division of Fish & Wildlife created the Community Hunting Access Program (CHAP) in 2017 to assist communities with the use of hunting as an effective deer management tool. This innovative program provides community partners with financial assistance and a list of trained coordinators to manage and oversee recreational deer hunting. The program results in a practical and economical method for reducing deer numbers to balance ecological and societal needs. Benefits to citizens include reduced levels of deer damage, new hunting opportunities, decreased deer/vehicle collision risk, fewer potential sharpshooting permits, and stronger state government/private sector partnerships.

CHAP provides community partners oversight and flexibility to identify when and where managed hunts occur. In 2021, one-year agreements were offered, instead of the traditional two-year agreements. New also this year was the need for the successful applicant to provide a 25% acreage match for the total acres offered for deer hunting opportunities. CHAP then provided a dollar amount per acre up to 75% of the acres identified by the applicant as being hunted, up to a maximum of $25,000. Nine applicants applied, and seven were funded to conduct hunts during the 2021-2022 deer hunting season. One applicant submitted two different applications for two individual properties, and both properties were treated as one application. In total, seven applicants conducted CHAP hunts during the 2021-2022 deer hunting season on eight different properties. As outlined within each approved agreement, to receive the agreed-upon funding, each applicant with a CHAP agreement is required to submit a final report in writing within 30 days after the completion of the last hunt. The seven applicants who successfully conducted CHAP hunts in 2021-2022 were awarded $66,799.58 cumulatively. These seven applicants provided a match of $22,266.53, while making 3,173 acres available for hunter access, resulting in 976 actual hunting opportunities and harvesting 88 deer. The cost per acre for creating hunting opportunities during the 2021-2022 CHAP hunting timeframe was $21.05.

In summary, the CHAP committee made a substantial change to the eligibility criteria for communities applying during the 2021-2022 application period. For an application to qualify for funding, the applicant needed

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to provide funding for a 25% acreage match of the total acres offered for deer hunting opportunities. CHAP assisted by funding opportunities on the remaining 75% of the available acres open for deer hunting opportunities, as identified on the application, up to a maximum of $25,000. CHAP will not offer or accept agreements for the 2022-2023 deer hunting season. Currently, the committee is evaluating the success of the program and trying to determine how many participating communities have continued their hunting programs without CHAP financial assistance. Even though CHAP has been discontinued in its original format, communities experiencing human/deer conflicts are encouraged to review the information on the CHAP manage hunt website and seek the assistance and services of trained hunt coordinators. Information on CHAP is available at on.IN.gov/dnrchap.

Harvest by License Status

Resident hunters harvested 94.1% of the total deer harvested in Indiana in 2021, while nonresidents harvested 5.9% of the total (Table 3-14). Of resident Indiana hunters, annual license holders (license types purchased every year) harvested 71.9 % of the total deer. Lifetime license holders harvested 16.4%, and landowner-exempt hunters (landowners and lessees who hunted on their own land without a license) harvested 11.7% of deer in 2022. A large proportion of hunters harvested deer using a deer bundle license (46.2% resident hunters, 50.7% nonresident hunters).

Table 3-14. Number of deer harvested by resident and nonresident license types during the 2021 deer hunting season. Reporting error rate: ±0.23% (2021).

License Type	Resident Harvest	Non-Resident Harvest	Total	Percent Resident Harvest	Percent Non-Resident Harvest
Bonus Antlerless	2,804	116	2,920	2.49	0.1
Deer Archery	1,811	491	2,302	1.61	0.44
Deer Bundle	48,979	3,332	52,311	43.54	2.96
Deer Crossbow	1,655	306	1,961	1.47	0.27
Deer Firearm	5,693	1,443	7,136	5.06	1.28
Deer Military/Refuge	400	9	409	0.36	0.01
Deer Muzzleloader	452	98	550	0.4	0.09
Deer Reduction Zone	2,849	57	2,906	2.53	0.05
Early State Park Reduction	564	4	568	0.5	0
Landowner Exemption	12,361	278	12,639	10.99	0.25
Late State Park Reduction	190	0	190	0.17	0
Lifetime License	17,364	348	17,712	15.44	0.31
Military Exempt- IC 14-22-11-11	51	7	58	0.05	0.01
Youth Free Hunt Days	186	3	189	0.17	0
Youth Hunt/Trap	10,547	84	10,631	9.38	0.07
Total	105,906	6,576	112,482	94.15	5.85

Deer License Sales

The number of deer licenses sold in 2021 decreased by 4.2% from 2020 (Table 3-15). The number of privileges (number of deer legally allowed to be harvested, excluding those harvested by youth) was 1.2% less than in 2020. Each deer license bundle included three deer privileges.

Table 3-15. Deer license sales in Indiana by license type, 2015-2021. Total license sale numbers are subject to change slightly as refunds or voids are made.

License Type	2015	2016	2017	2018	2019	2020	2021
Resident Deer License Bundle	65,604	68,997	67,731	67,963	69,683	79,881	80,974
Resident Archery/Crossbow/Reduction Zone	29,258	24,796	25,044	24,794	24,512	25,380	22,801
Resident Firearm	43,991	40,577	37,254	34,575	29,627	26,671	24,265
Resident Muzzleloader	6,088	4,669	4,376	3,898	3,607	3,715	2,902
Resident Military/Refuge	1,277	1,343	1,355	1,611	1,613	1,081	1,504
Resident Bonus Antlerless	21,088	18,065	16,188	13,866	15,149	14,378	11,267
Nonresident	10,165	10,493	10,796	10,773	10,989	11,781	12,380
Youth	34,529	33,900	31,378	29,273	28,073	31,285	30,276
Total Licenses (Excluding Resident Youth)	177,471	168,940	162,744	157,480	155,180	162,887	156,093
Total Privileges (Excluding Resident Youth)	314,519	313,458	304,724	299,660	301,256	330,745	326,931

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County Bonus Antlerless Quotas and Deer Population Indices

County Bonus Antlerless Quotas 2021-2022. In 2021, Indiana DNR maintained county bonus antlerless quotas (CBAQ) of three or fewer in all counties in continued response to a widespread epizootic hemorrhagic disease (EHD) outbreak in southern and south-central Indiana in 2019 (Table 3-16). Two counties decreased from a three to a two, and two other counties increased from a two to a three from 2020 quotas. Because Special Antlerless Firearms season has traditionally only been open in counties with a CBAQ of four or more, Indiana DNR made a temporary rule change to open the season in all counties (except those with a CBAQ designation of "A") to continue providing late hunting opportunities. CBAQs still applied in each county during Special Antlerless Firearms season. In counties with an "A" designation, hunters could take only one antlerless deer from Nov. 26, 2020, through Jan. 3, 2021. The number of antlerless deer harvested in each county can be found at wildlife.IN.gov/wildlife-resources/animals/white-tailed-deer/deer-harvest-data/.

Deer Population Indices. Since 2012, CBAQs have been gradually lowered across the state as the deer-management goals of Indiana DNR have shifted from that of herd reduction to population maintenance (Figure 3-5). This approach integrated with strategic harvest in Deer Reduction Zones (DRZ) has been adopted to provide a healthy deer population across the state while addressing human safety concerns along roadways that have historically experienced high levels of deer-vehicle collisions (DVC). CBAQs should be maintained at current levels if harvest remains steady, unless population indices indicate that adjustments are necessary to increase or reduce local deer harvest in a county.

Every year the Indiana DNR deer program, private lands biologists, and conservation officers work collectively to analyze trends in deer population and public opinion indices to determine whether CBAQs should be adjusted. The following population and public opinion indices are gathered through the Deer Management Survey (see Chapter 7), harvest reports,

and public comment and are used in CBAQ evaluations: annual deer harvest, hunter success rate, hunter effort, Archer's Index deer observations, DVC rates, public opinion on deer population size, and public desire for changes in populations. Because these data sources are not true measurements but rather indices of the deer population, trends in these data over time are weighed and collectively inform the final decision of Indiana DNR when setting CBAQs for the fall deer season.

County Bonus Antlerless Quotas 2022-2023. After reviewing deer population and public opinion indices, the following changes will be made to CBAQs for the 2022-2023 deer hunting season (Figure 3-6):

- Brown, Jackson, Lawrence, Martin, Monroe, Morgan, and Orange counties: CBAQ dropped to 2
- Benton and Tipton counties: CBAQ raised to 1
- Hancock, Randolph, Rush, and Whitley counties: CBAQ raised to 2

DMU Summaries. Indiana DNR analyzes deer data on a regional scale based on Deer Management Units (DMUs; Figure 3-7). DMUs are defined groupings of counties based on similar characteristics such as habitat, hunter density, and urban development. Trends in a DMU's indices influence the CBAQs for the counties within it. DMU-specific data is available in Appendix A: DMU Deer Data Sheets 2021. County-specific data referenced below is available on the new Indiana DNR Deer Data Dashboard at www.in.gov/dnr/fish-and-wildlife/wildlife-resources/animals/white-tailed-deer/county-data/

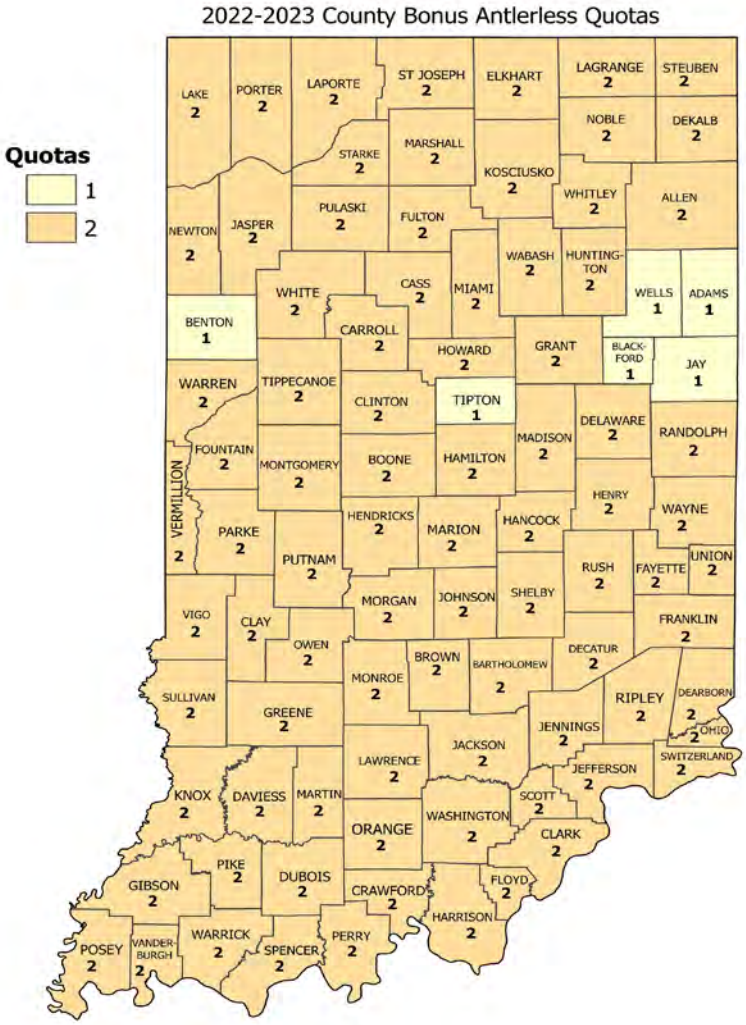

Table 3-16. Indiana County Bonus Antlerless Quotas (CBAQ), 2019-2022. In 2019, all quotas were lowered to a two or less in response to an epizootic hemorrhagic disease (EHD) outbreak in southern and south-central Indiana. Numbers in parentheses represent the original quotas for the 2019-2020 season before they were lowered due to EHD. In 2021, all counties, except those with a CBAQ of A, were open to the Special Antlerless Firearms season.

	Bonus Antlerless Quota				Bonus Antlerless Quota		
County	2019	2020	2021	County	2019	2020	2021
Adams	1	1	1	Lawrence	2 (4)	3	3
Allen	2	2	2	Madison	2	2	2
Bartholomew	2	2	2	Marion	2	2	2
Benton	A	A	A	Marshall	2	2	2
Blackford	1	1	1	Martin	2 (4)	3	3
Boone	2	2	2	Miami	2	2	2
Brown	2 (4)	3	3	Monroe	2 (4)	3	3
Carroll	2	2	2	Montgomery	2	2	2
Cass	2	2	2	Morgan	2 (3)	3	3
Clark	2 (4)	2	2	Newton	2	2	2
Clay	2 (3)	2	2	Noble	2	2	2
Clinton	2	2	2	Ohio	2	2	2
Crawford	2 (4)	2	2	Orange	2 (4)	3	3
Daviess	1	2	2	Owen	2 (4)	2	2
Dearborn	2 (3)	2	2	Parke	2 (3)	2	2
Decatur	2	2	2	Perry	2 (4)	3	3
Dekalb	2	2	2	Pike	2	2	2
Delaware	2	2	2	Porter	2	2	2
Dubois	2	2	2	Posey	1	2	2
Elkhart	2	2	2	Pulaski	2	2	2
Fayette	2	2	2	Putnam	2 (3)	2	2
Floyd	2 (4)	2	2	Randolph	1	1	1
Fountain	2	2	2	Ripley	2 (4)	3	2
Franklin	2 (4)	3	2	Rush	1	1	1
Fulton	2	2	2	Saint Joseph	2	3	3
Gibson	2	2	2	Scott	2 (4)	2	2
Grant	2	2	2	Shelby	2	2	2
Greene	2 (4)	2	2	Spencer	2	2	2
Hamilton	2	2	2	Starke	2	2	2
Hancock	1	1	1	Steuben	1	1	2
Harrison	2 (4)	2	2	Sullivan	2 (3)	2	2
Hendricks	2	2	2	Switzerland	2	2	2
Henry	2	2	2	Tippecanoe	2	2	2
Howard	2	2	2	Tipton	A	A	A
Huntington	2	2	2	Union	2	2	2
Jackson	2 (4)	3	3	Vanderburgh	2	2	2
Jasper	2	2	2	Vermillion	2 (3)	2	2
Jay	1	1	1	Vigo	2 (3)	2	2
Jefferson	2 (4)	3	3	Wabash	2	2	2
Jennings	2 (4)	3	3	Warren	2	2	2
Johnson	2	2	2	Warrick	2	2	2
Knox	2	2	2	Washington	2 (4)	3	3
Kosciusko	2	2	2	Wayne	2	2	2
Lagrange	1	1	2	Wells	A	1	1
Lake	2	2	2	White	2	2	2
LaPorte	2	2	2	Whitley	1	1	1

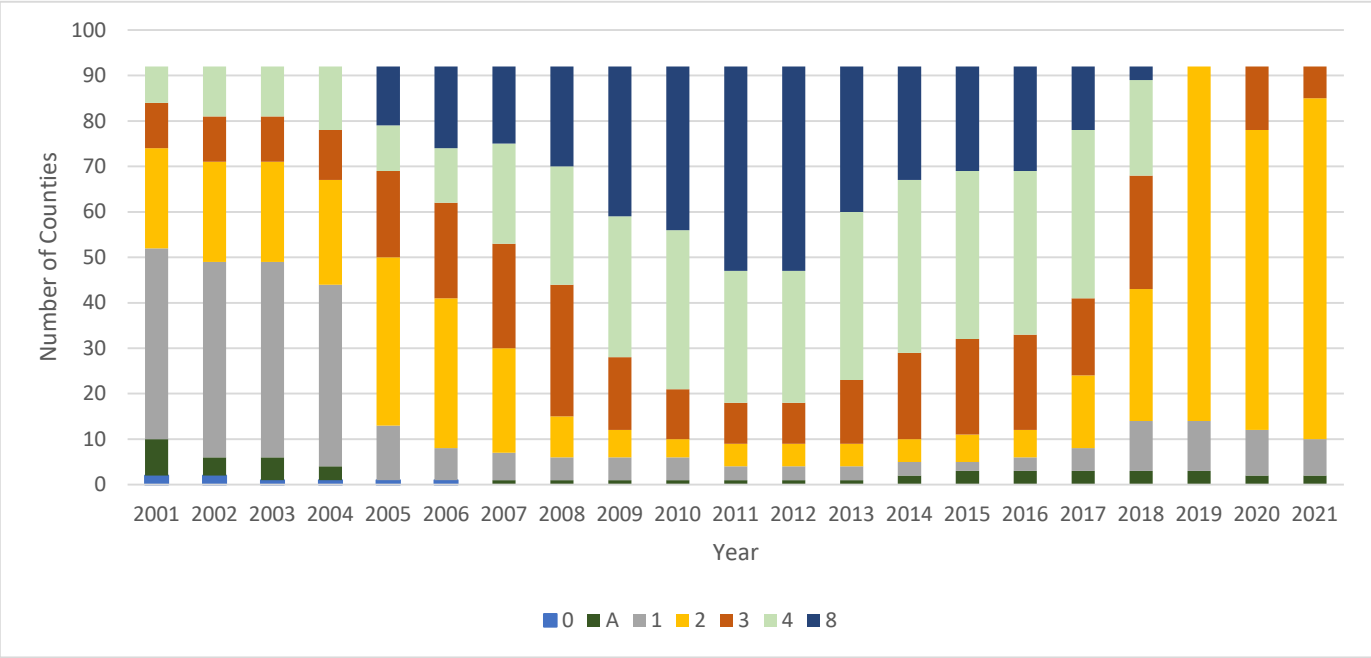

Figure 3-5. Number of counties with the corresponding county bonus antlerless quota during the Indiana deer hunting season from 2001 to 2021.

2021-2022 County Bonus Antlerless Quotas

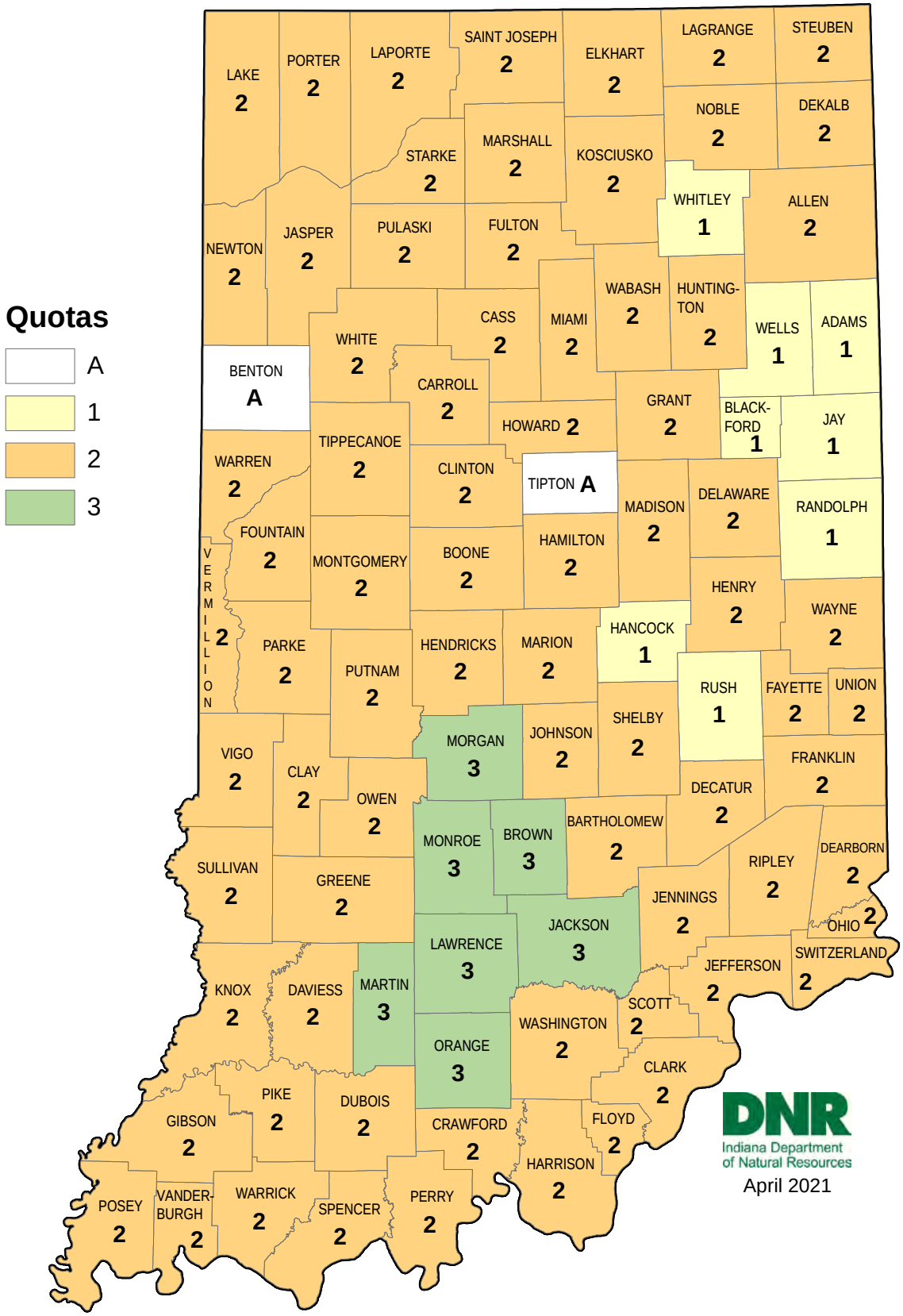

Figure 3-6. The County Bonus Antlerless Quotas for the 2021-2022 Indiana deer hunting season.

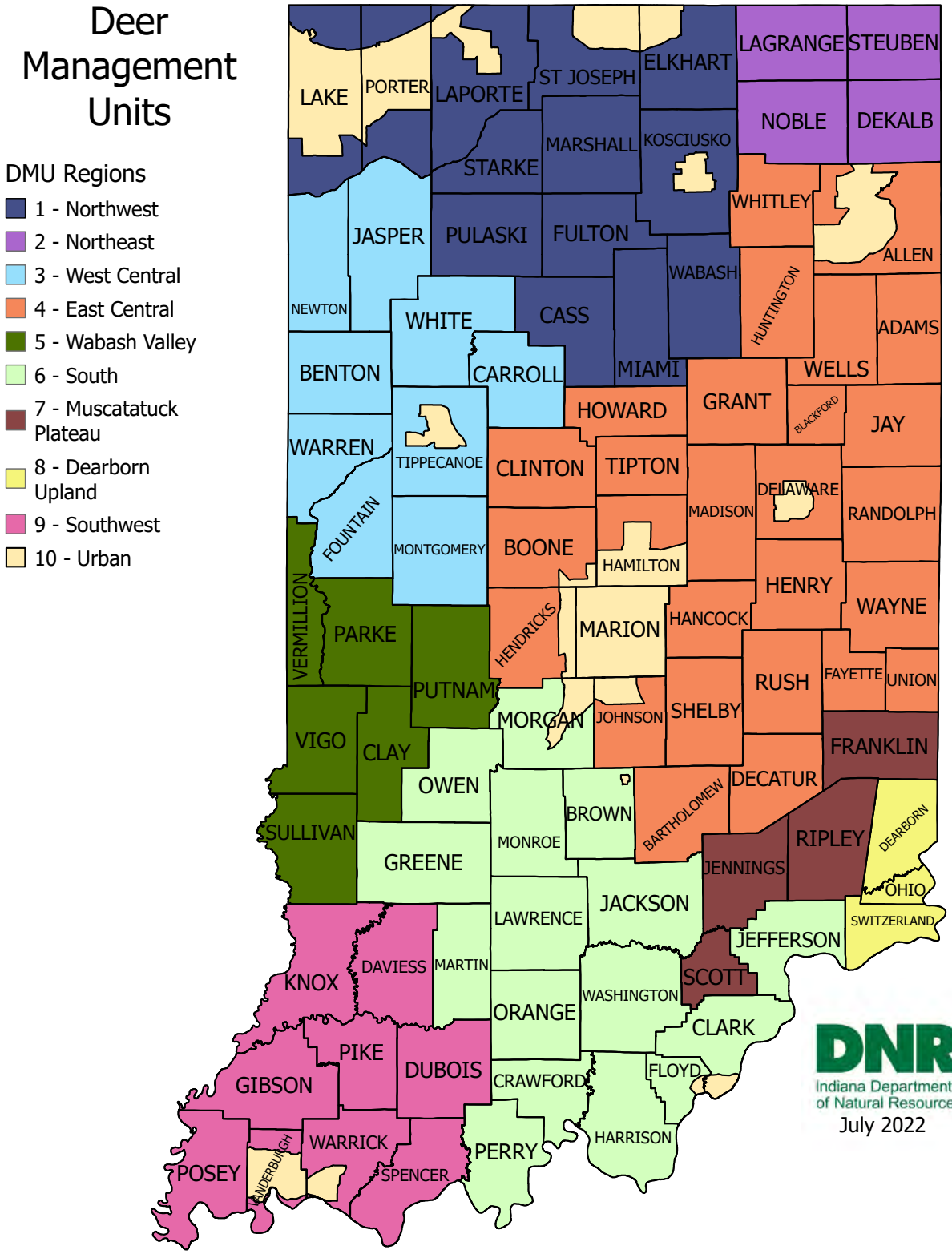

Figure 3-7. Indiana deer management units (DMUs) created by Indiana DNR and Purdue University to better understand survey data trends regionally.

Hunter Success and Hunters Afield

The number of Indiana deer hunting licenses sold each year represents the number of licensed hunters afield during the hunting season, but that number does not include all hunters attempting to harvest a deer in a given year. A portion of Indiana hunters have a lifetime license, which requires no annual purchase. These hunters are not tracked in yearly license sales data, and a hunter with a lifetime license is not necessarily still an active hunter. Indiana also allows for license exemptions for landowners and active military members who are not tracked in the license sales data. Lifetime license holders accounted for 16% of the deer harvest in 2021. More than 11% of deer were harvested by landowners or military-exempt hunters in 2021. Estimating the total number of hunters afield sheds light on how many hunters are using the resource and how they are using it (i.e., license or exemption type).

Indiana DNR defines a successful hunter as an individual who harvests at least one deer during hunting season, regardless of how many deer the hunter attempted to harvest. Hunter success can be calculated using license sales and harvest data: hunters who attempted to harvest a deer (i.e., hunters who purchased a license) compared to hunters who actually harvested a deer (i.e., hunters who bought a license and checked in a deer on that license). However, not every hunter is required to purchase an annual hunting license (e.g., lifetime license holders and landowner and military-exempt hunters), so with this method, success rates for lifetime and exempt license holders is assumed to be the same as those for annual licensed hunters. This calculation is not applicable at the county level because deer are not always harvested in the same county where a license was purchased.

Hunter success can also be calculated from hunter survey responses. During multiple years of the annual Deer Management Survey (DMS), hunters were asked to report the number of deer they wanted to harvest, the number of deer they harvested, and the license or exemption used to harvest the deer. This information allows us to calculate hunter success in a similar way to using the license sales and harvest data: the number of hunters who attempted to harvest a deer compared to the number of those hunters who harvested a deer. Since the DMS was available for all hunters with a valid email address in the Indiana DNR system, this calculation captures all hunters regardless of license type or exemption, providing an accounting of success rates for lifetime license holders, landowners, and military-exempt hunters.

Hunter success rates themselves are an index that may indicate the relative herd size in an area (Roseberry and Woolf 1991). For example, a comparably high hunter success rate over time may mean it is becoming easier to harvest a deer because the deer population is increasing, while a low hunter success rate over time may mean it is becoming more difficult to harvest a deer because the deer population is decreasing in that area. These comparisons are useful for determining how the deer population is fluctuating over time in an area, which then helps set hunting quotas and regulations.

Methods

For the 2021-2022 hunting season, license sales, the deer management survey, and harvest data were used to estimate hunter success. We estimated success rates for all non-youth resident and nonresident annual license holders in our database for each deer season from 2015 to 2021. It was not possible to calculate youth success rates using the same methodology because youth licenses are not specific to deer. Success was defined as harvesting and checking in at least one deer during the 2021-2022 deer season using the same customer ID number that was used to purchase an annual deer license. To calculate success rate, we divided the number of successful hunters in each category by the total number of hunters in that category.

Resident License Success Rate (SRLR)=The number of non-youth hunters who purchased a resident annual deer license and checked in a deer using the same CID number/the total number of non-youth hunters who purchased a resident annual deer license

Nonresident License Success Rate (SRLNR)= The number of non-youth hunters who purchased a nonresident annual deer license and checked in a deer using the same CID number/The total number of non-youth hunters who purchased a nonresident annual deer license

Using the deer management survey, we estimated success rates for all non-youth resident and nonresident annual license holders, lifetime license holders, and license-exempt hunters who participated in the annual deer management survey for each deer season from 2017 to 2021. Although hunters can hunt using multiple license types per season, we categorized them into a single category to avoid double counting. Any hunter who purchased an annual license was categorized as an annual license holder. Any hunter who hunted using a lifetime license and did not buy an annual license was categorized as a lifetime license holder. Any hunter who hunted using a license exemption and did not purchase an annual license or hunt on a lifetime license was categorized as license exempt. Like the license success rate, the survey success rate was calculated as the number of successful hunters in each category divided by the total number of hunters in that category.

Resident Survey Success Rate (SRSR)= The number of non-youth hunters who reported purchasing a resident annual deer license and checked in a deer under the resident annual license category/the total number of non-youth hunters who reported purchasing a resident annual deer license

Nonresident Survey Success Rate (SRS_N)= The number of non-youth hunters who reported purchasing a nonresident annual deer license and checked in a deer under the nonresident annual license category/the total number of non-youth hunters who reported purchasing a nonresident annual deer license

Lifetime Survey Success Rate (SRS_L)= The number of non-youth hunters who reported hunting using a lifetime license and checked in a deer under the lifetime license category/the total number of non-youth hunters who reported hunting using a lifetime license

Exemption Survey Success Rate (SRS_E)= The number of non-youth hunters who reported hunting using a license exemption and checked in a deer under a license exemption category/the total number of non-youth hunters who reported hunting using a license exemption

We used harvest data and license success rates to calculate the number of hunters afield for each deer season from 2015 to 2021. For each year we queried the number of unique hunters who checked in a deer under the following categories: resident annual license, nonresident annual license, lifetime license, landowner exemption, and military exemption. As with the deer management survey success rate calculation, hunters were exclusively assigned to a single category to avoid overestimating the number of hunters afield. To calculate the number of hunters afield, we divided the number of unique hunters in each category by the license success rate and summed the category estimates. We used the license success rates to estimate hunters afield, because survey responses appear to be biased toward successful hunters.

$$\textit{Hunters Afield} = (HCD_{RAL}/SRL_R) + (HCD_{NAL}/SRL_N) + (HCD_{LL}/SRL_R) + (HCD_{LO}/SRL_R) + (HCD_{LO}/SRL_R) + (HCD_{ME}/SRL_R) + (HCD_Y/SRL_R)$$

Where,

HCD_{RAL} = Adult hunters who checked in a deer and purchased a resident annual deer hunting license

HCD_{NAL} = Adult hunters who checked in a deer and purchased a nonresident annual deer hunting license

HCD_{LL} = Hunters who checked in a deer using a lifetime license

HCD_{LO} = Hunters who checked in a deer using a landowner exemption

HCD_{ME} = Hunters who checked in a deer using a military exemption

HCD_{Y} = Youth hunters who checked in a deer and purchased a youth license

Results

The resident license success rate was similar from 2015 through 2017, at ~0.35, and increased significantly in 2018 and 2019 (Figure 3-8). The 2020 success rate was similar to 2019 at 0.40 (CI_{95}=0.003), but it decreased slightly in 2021 to 0.39 (CI_{95}=0.003). The nonresident license success rate was similar to the resident license success rate in 2015 and 2017 but was higher in 2016 (Figure 3-8). From 2018 -2021, the nonresident license success rate followed a similar pattern as the resident license success rate but was consistently lower with an annual success rate of 0.37 (CI_{95} 0.009) in 2021.

As with license success rates, survey success rates fell in 2021 relative to 2020 (Figure 3-9). This was true for resident annual license holders (0.57 ± 0.008 CI_{95} in 2020 to 0.54 ± 0.010 CI_{95} in 2021), lifetime license holders (0.52 ± 0.016 CI_{95} in 2020 to 0.49 ± 0.016 CI_{95} in 2021), and license-exempt hunters (0.50 ± 0.024 CI_{95} in 2020 to 0.44 ± 0.025 CI_{95} in 2021). The only license category to maintain a steady success rate was nonresident annual license holders (0.54 ± 0.030 CI_{95} in 2020 to 0.54 ± 0.035 CI_{95} in 2021). Survey success rates were consistently higher than license success rates, with a mean difference of 0.14 (CI_{95} 0.02) for resident annual hunters and 0.13 (CI_{95} 0.03) for nonresident annual hunters, but they displayed similar trends. Both resident and nonresident license and survey success rates were lowest in 2017, increased until 2020, and decreased slightly in 2021. Generally, nonresident success rates have been equal to or lower than resident success rates.

Many of the license categories saw an increase in the number of hunters afield in 2020 including resident and nonresident annual hunters, landowner exempt hunters and youth annual hunters (Figure 3-10). The number of resident annual hunters and landowner exempt hunters decreased in 2021 relative to 2020, whereas the number of youth annual hunters stayed steady, and the number of nonresident annual hunters increased (Figure 3-10). The number of lifetime license hunters and military-exempt hunters has fallen since 2017 (Figure 3-10). The total estimated number of hunters afield was highest in 2015 at 233,748, fell to a low of 201,434 in 2019, and after a bump in 2020 to 213,357, readjusted to 209,189 in 2021 (Figure 3-11).

Discussion

An increase in hunter success rates was apparent in both the license success rate and the survey success rate. The lifetime license survey success rate was the only estimated success rate to decrease over time but is now more comparable to the other license categories. The large mean difference in success rates between the license data and the survey data is likely because of systematic biases in both data sets. The license data calculation is based on the success rate of only non-youth hunters who purchased a license and assumes that everyone who purchased a license took advantage of the hunting opportunity. Furthermore, a hunter is only counted as successful if they checked in a deer with the same CID they used to purchase an annual license. These underlying assumptions likely result in an underestimate of success rate and thus an underestimate in the number of hunters afield. However, we use the license success rate for the hunters-afield calculation, because we believe it is a more accurate estimate of success than the deer management survey estimates, which are calculated from a nonrandom sample of deer hunters.

Based on the survey success estimates, we know that the success rate of hunters who purchased an annual license may not be the same for other hunters. For example, lifetime license holder success rates were generally higher than other groups', and exempt success rates were generally lower. One of the goals of the DMS was to estimate success rates for different groups based on license category to help us more precisely estimate the num-

ber of hunters afield (Caudell and Vaught 2018); however, given the survey bias toward successful hunters, this is infeasible without a correction factor to adjust between hunter success based on license sales data and hunter success calculated from the DMS. In the future, our harvest-effort survey, which is sent to a random sample of firearms hunters may provide this correction factor.

There are several practical applications for estimating hunter success and hunters afield. Hunter success may act as an index of deer populations (Roseberry and Woolf 1991) and a predictor of hunter satisfaction (Gigliotti 2000). Estimating the number of hunters afield using a standardized method of calculation provides a repeatable index for hunter trends in Indiana. Because the proportion of the population actively participating in hunting has been declining over time (U. S. Fish & Wildlife Service 2018), it is important to have an accurate index of these trends. As Indiana DNR puts forth efforts to recruit new hunters, retain current hunters, and reactivate hunters who have stopped hunting, having an estimate of the number of hunters participating in the hunting season will aid in evaluation of the success of these programs. Ultimately, the most accurate measure of hunter success and hunters afield requires documenting every hunter who attempts to harvest a deer through license sales, registration, or some other record.

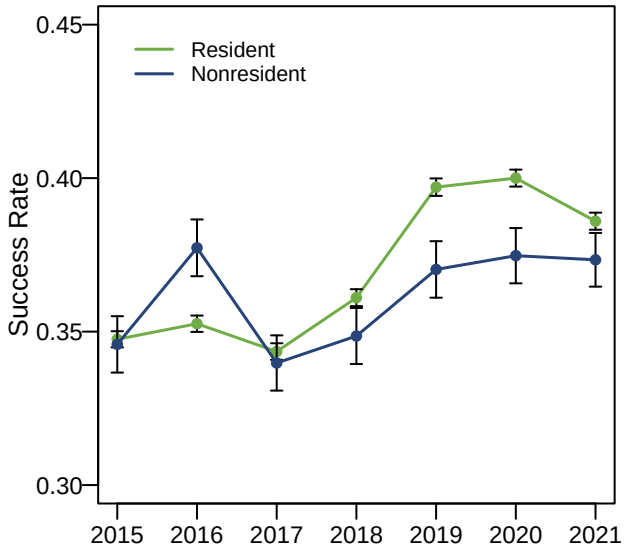

Figure 3-8. Calculated annual success rates of non-youth licensed resident and nonresident deer hunters who purchased an annual deer license and checked in at least one deer using the same Customer ID number.

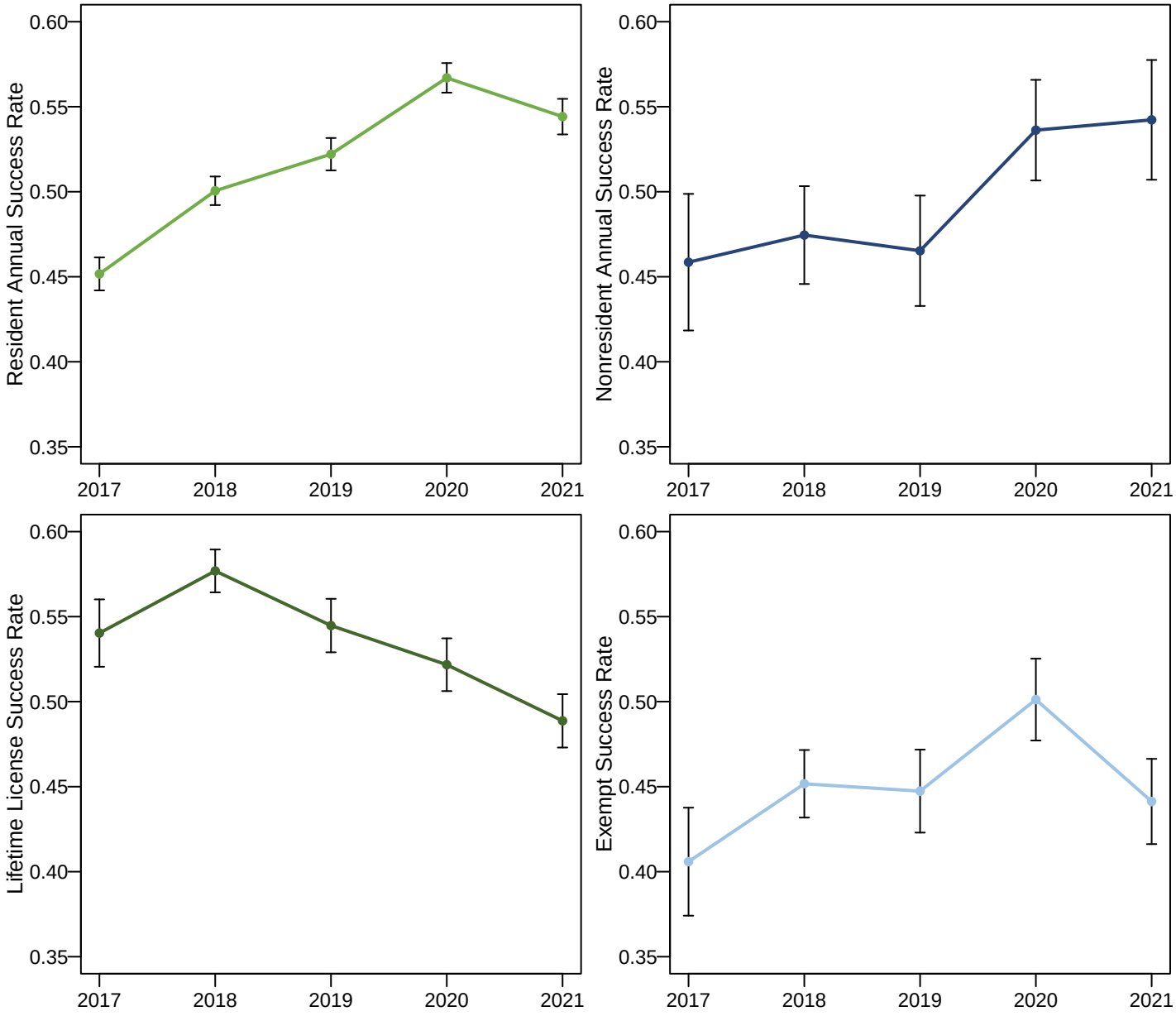

Figure 3-9. Calculated annual success rates of non-youth deer hunters who hunted using resident and nonresident annual licenses, lifetime licenses, and military and landowner exemptions, and participated in the annual Deer Management Survey.

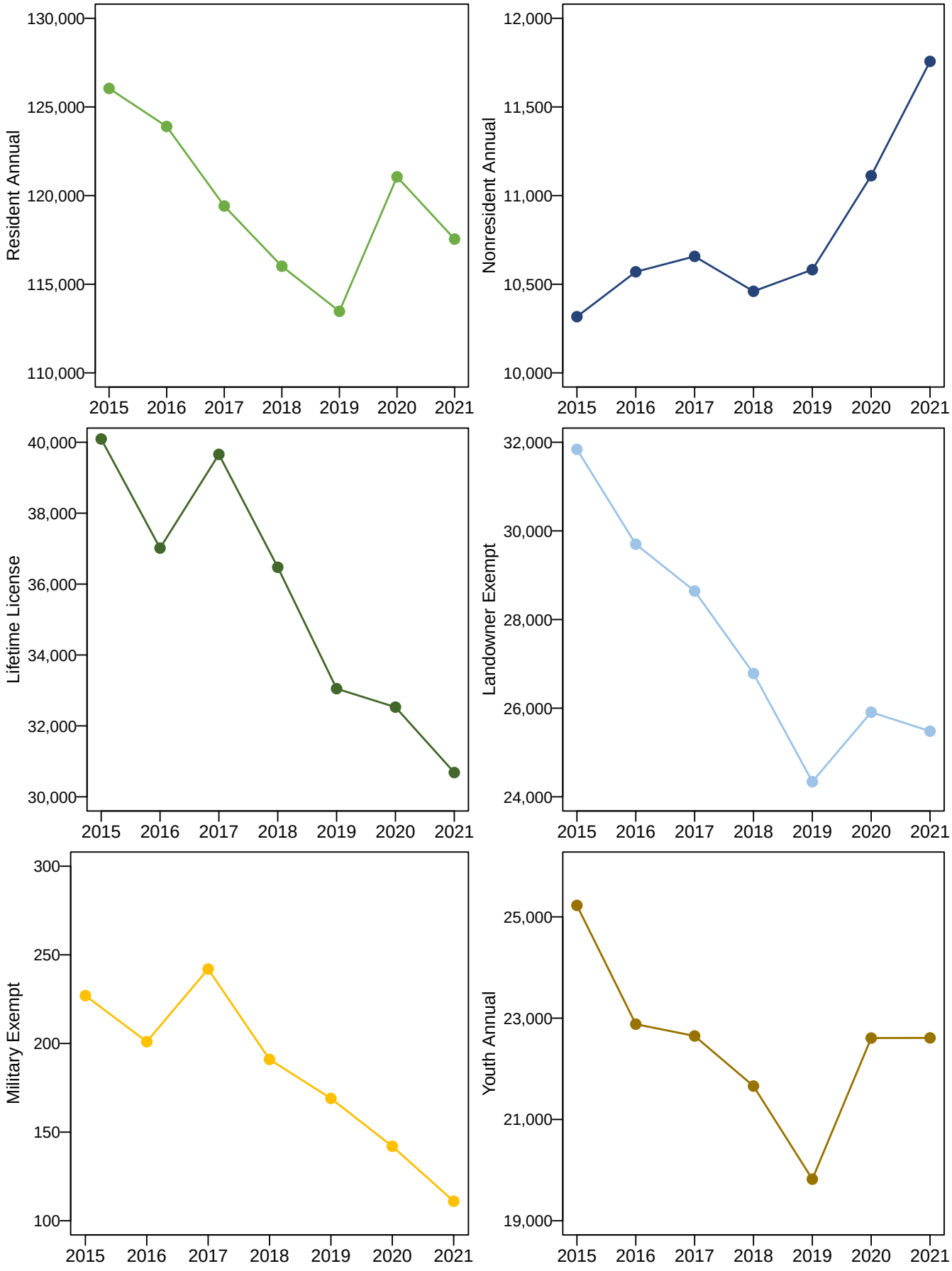

Figure 3-10. Estimated hunters afield in each license category, including resident annual license holders, nonresident annual license holders, lifetime license holders, landowner exemptions, military exemptions, and youth annual license holders.

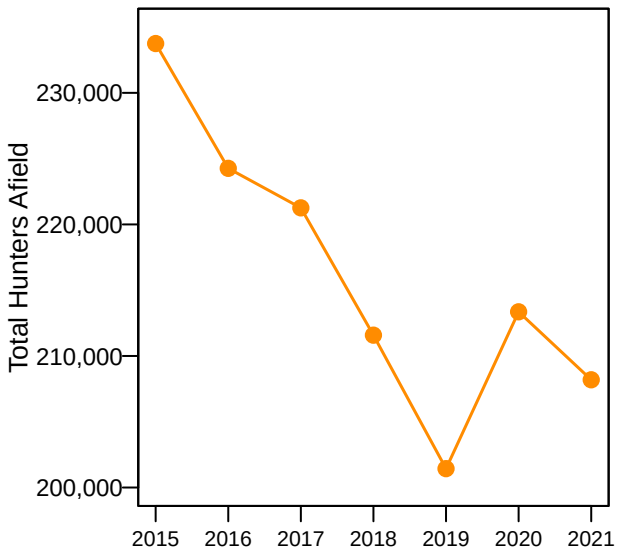

Figure 3-11. Total estimated hunters afield during Indiana deer hunting seasons, 2015-2016 through 2021-2022.

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Chapter 4.
DEER CONTROL PERMITS

Joe Caudell, Julia Buchanan-Schwanke, and Linnea Petercheff, *Indiana Department of Natural Resources*

Deer control permits grant special permission to take deer outside of the deer hunting season and are issued when farmers and other landowners experience problems with deer. These permits reduce damage and other conflict with landowners and help alleviate future property damage from deer in localized areas. Deer control permits are not issued for population control, and the number of deer taken on control permits is lower than the number of deer harvested during hunting season in each county (Table 4-1). An exception is Marion County, where few deer were harvested by hunters because of limited access, and a comparatively large number of deer were removed using control permits. Typical problems in Indiana resulting from deer include browsing damage to crops, orchards, nurseries, vineyards, and plants used for landscaping (Table 4-2). Deer control permits are issued to landowners who demonstrate damage in excess of $500, to address disease concerns (e.g., Franklin and Fayette counties to address issues with bovine tuberculosis), to protect endangered species (e.g., Porter County), or for the safety of the public.

When permits expire, permit holders are required to report to the Indiana DNR the number of deer taken on the permit, the sexes of the deer, the equipment used, and the disposal method for each deer taken. Indiana DNR received reports from 266 of the 282 deer control permits issued statewide. Reports were not received from the remaining 16 permits. An average of 13.3 (n=280; CI_{95}=11.8, 14.8) deer were authorized per permit, and an average of 5.1 (n=265; CI_{95}=4.0, 6.2) deer were taken per permit (Table 4-1). Damages reported at the time of the application ranged from $500 to $108,000. Permit recipients reported an average of 18.5% (n=109; CI_{95}=14.3%, 22.9%) of soybean crops damaged and an average of 20.1% (n=140; CI_{95}=17.0%, 24.8%) of corn crops damaged.

DNR File Photo

A total of 1,349 deer were reported taken statewide on deer control permits, representing 1.2% of the cumulative deer taken, which is the total number of hunter-harvested deer and deer taken on control permits in 2021. Most of the deer that were taken on control permits were does and button bucks (n=1,112), which represented 1.0% of the cumulative number of deer taken in 2021. Fewer adult bucks (n=234) were taken on control permits, which represented 0.2% of the cumulative number of deer taken in 2021. The majority of deer (82.6%) taken on control permits were either consumed or donated for human consumption. Some error exists in the total number and the individual numbers of bucks, does, and button bucks reported taken on deer control permits due to permit-holder reporting error or due to the total take being split between counties for permits that cover multiple counties.

Table 4-1. Deer control permits issued by county in 2021, including the number of deer actually taken. Cumulative deer is the number of hunter-harvested deer plus the number of deer taken on control permits. The sum of permits per county is greater than the total number of permits issued because some permits were issued for multiple counties and are counted for each county. The number of deer taken per permit was divided among multiple counties on a single permit.

County	Permits Issued	Deer Taken	Avg Deer Taken/Permit	% Cumulative Deer	County	Permits Issued	Deer Taken	Avg Deer Taken/Permit	% Cumulative Deer
Allen	6	5	0.8	0.3%	Lawrence	4	15	3.8	0.7%
Bartholomew	4	7	1.8	0.8%	Madison	1	0	0.0	0.0%
Benton	1	2	2.0	1.6%	Marion	3	94	31.3	18.0%
Boone	1	0	0.0	0.0%	Marshall	9	26	2.9	1.4%
Brown	9	103	11.4	7.2%	Monroe	7	60	8.6	4.0%
Cass	4	11	2.8	0.9%	Montgomery	4	16	4.0	1.7%
Clark	6	45	7.5	3.6%	Noble	8	32	4.0	1.3%
Clay	1	8	8.0	0.7%	Ohio	4	24	6.0	3.7%
Crawford	2	5	2.5	0.3%	Orange	3	3	1.0	0.1%
Daviess	3	7	2.3	0.6%	Owen	2	15	7.5	1.0%
Dearborn	14	59	4.2	2.6%	Parke	5	20	4.0	0.9%
Decatur	1	5	5.0	0.6%	Perry	3	28	9.3	1.8%
DeKalb	4	6	1.5	0.3%	Pike	1	0	0.0	0.0%
Delaware	1	0	0.0	0.0%	Porter	10	80	8.0	5.0%
Dubois	1	0	0.0	0.0%	Posey	2	28	14.0	2.7%
Elkhart	3	2	0.7	0.1%	Pulaski	5	34	6.8	1.9%
Fayette	3	25	8.3	2.7%	Ripley	5	21	4.2	1.2%
Floyd	4	9	2.3	1.5%	Saint Joseph	2	16	8.0	1.3%
Fountain	1	2	2.0	0.2%	Scott	1	2	2.0	0.3%
Franklin	10	21	2.1	0.8%	Spencer	5	37	7.4	3.1%
Fulton	1	20	20.0	1.5%	Starke	3	14	4.7	1.1%
Gibson	1	5	5.0	0.4%	Steuben	10	23	2.3	0.8%
Greene	1	0	0.0	0.0%	Sullivan	13	34	2.6	1.9%
Hamilton	1	0	0.0	0.0%	Switzerland	6	19	3.2	1.1%
Hancock	1	2	2.0	0.8%	Tippecanoe	2	0	0.0	0.0%
Harrison	8	55	6.9	2.3%	Tipton	2	1	0.5	0.7%
Hendricks	1	0	0.0	0.0%	Union	1	6	6.0	0.8%
Jackson	5	14	2.8	0.9%	Vanderburgh	3	2	0.7	0.3%
Jasper	5	15	3.0	1.2%	Vermillion	2	5	2.5	0.5%
Jefferson	4	15	3.8	0.9%	Vigo	1	0	0.0	0.0%
Jennings	4	21	5.3	1.2%	Wabash	2	4	2.0	0.3%
Johnson	4	6	1.5	1.2%	Warrick	4	17	4.3	1.3%
Kosciusko	1	0	0.0	0.0%	Washington	11	128	11.6	6.0%
Lagrange	6	16	2.7	0.7%	Wayne	1	1	1.0	0.1%
Lake	4	29	7.3	2.3%	White	3	2	0.7	0.2%
LaPorte	7	20	2.9	1.2%	Whitley	1	2	2.0	0.2%

Table 4-2. Number of damage reports for each crop type or other reason for 2021 deer control permits. Some individuals reported multiple crops or reasons.

Crop or Reason for Permit	Number of Reports
Alfalfa	11
Barley	1
Tree Farms	5
Clover	1
Corn	109
CRP	1
Grapes	7
Hay	25
Health and Safety	1
Landscaping	2
Nursery Stock	3
Orchard	16
Popcorn	1
Produce	13
Pumpkins	18
Rye	3
Soybeans	140
Timber Production	14
Vehicle Training Facility	1
Wheat	7
Wildflowers	5
Woodland	2

Chapter 5.
DEER-VEHICLE COLLISIONS

Joe Caudell, Emily McCallen, and Julia Buchanan-Schwanke, *Indiana Department of Natural Resources*

Deer-vehicle collisions are reported by state and local police to the Indiana Department of Transportation (INDOT) anytime an accident report is completed for insurance purposes. These reports include information on the direction the vehicle was moving, location of the accident, type of road (e.g., county road, state road, interstate), road conditions, estimated cost of damage, and other data used in road safety analyses. INDOT provides data on deer-vehicle collisions to DNR each year for this report and for deer population analysis. This data set is especially valuable for the DNR because it is an independent data set that has been collected in a consistent way during a long period of time. Deer-vehicle collisions are also standardized across years and counties by using INDOT's statistics on Daily Vehicle Miles Traveled. Analyzing collisions per billion miles traveled accounts for changes in traffic volume between counties and allows for unbiased comparison between counties and years.

The total number of deer-vehicle collisions reported across the state increased from 14,325 in 2020 to 15,276 in 2021 (Figure 5-1; Table 5-1). The number of deer-vehicle collisions per billion miles traveled (DVC/BMT) was 189 DVC/BMT in 2021, an increase of 6.2% from 2020.

Ohio (1,547 DVC/BMT), Pulaski (1,040 DVC/BMT), and Steuben (770 DVC/BMT) counties had the highest number of DVC/BMT (Figure 5-2). Marion (10 DVC/BMT) and Lake (41 DVC/BMT) counties had fewer than 50 DVC/BMT. Compared to 2020, DVC/BMT decreased in 32 counties and increased in 60 counties. Nine counties showed a decrease greater than 15% in DVC/BMT compared to 2020, while 28 counties showed an increase greater than 15%.

DNR file photo

Most deer-vehicle collisions in 2021 occurred on state roads (35.6%) and county roads (29.1%; Table 5-2). From 2016 to 2021, state roads had the highest average number of DVC/BMT by road type per year (451 DVC/BMT). U.S. routes had the highest average number of deer-vehicle collisions (85 DVC) per 100 miles of road from 2016 to 2021 (Table 5-2).

Nearly 50% of deer-vehicle collisions in 2021 occurred between September and December (Figure 5-3). Compared to 2020, the number of collisions during January and February decreased by 16.8% and 18.9%, respectively. Collisions in all other months increased, with April increasing by 56.3%. Additionally, deer-vehicle collisions occur most often during dawn and dusk, which varies by month as day length changes (Figure 5-4).

The estimated economic cost of deer-vehicle collisions from damage to vehicles in 2021 was $72.9 million, based on the average estimated cost per collision (Table 5-3). From 2016 to 2021, deer-vehicle collisions cost drivers a total of more than $387 million (Table 5-3).

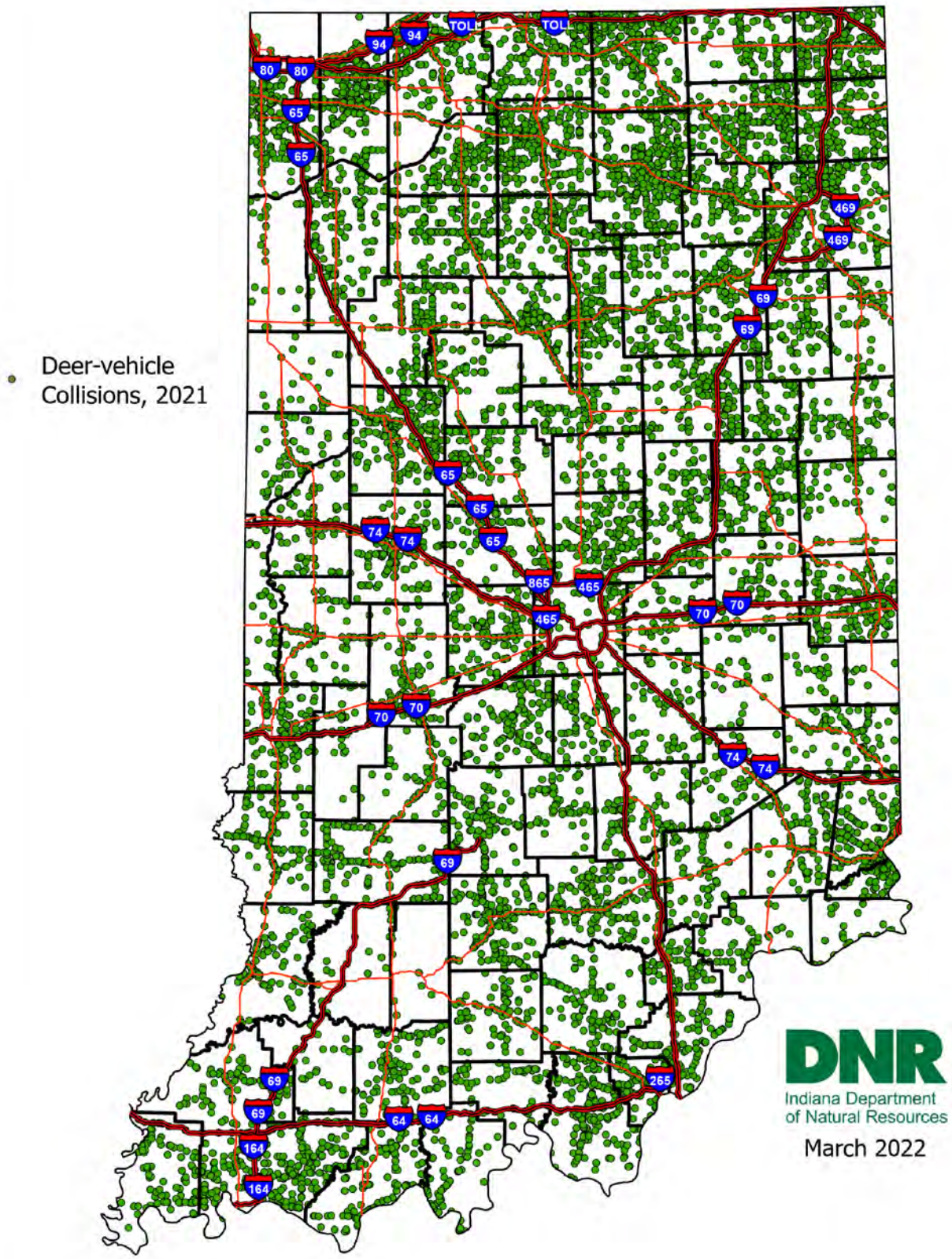

Figure 5-1. Locations of deer-vehicle collisions in Indiana in 2021. Only 13,029 (85.3%) of the 15,276 deer-vehicle collisions reported to INDOT included GPS location data to map.

Table 5-1. Number of deer-vehicle collisions by county in Indiana, 2020 and 2021.

	Deer-vehicle Collisions			Deer-vehicle Collisions	
County	2020	2021	County	2020	2021
Adams	104	99	Lawrence	203	256
Allen	442	438	Madison	147	172
Bartholomew	151	141	Marion	101	109
Benton	18	20	Marshall	326	358
Blackford	56	54	Martin	18	15
Boone	153	147	Miami	196	227
Brown	111	82	Monroe	143	165
Carroll	129	116	Montgomery	174	189
Cass	185	186	Morgan	147	149
Clark	170	156	Newton	113	101
Clay	68	79	Noble	317	311
Clinton	93	122	Ohio	49	70
Crawford	83	65	Orange	94	119
Daviess	22	25	Owen	67	75
Dearborn	242	225	Parke	137	155
Decatur	76	95	Perry	77	105
Dekalb	268	342	Pike	16	24
Delaware	165	184	Porter	375	396
Dubois	185	156	Posey	128	124
Elkhart	369	303	Pulaski	168	203
Fayette	65	33	Putnam	134	154
Floyd	100	123	Randolph	103	74
Fountain	97	94	Ripley	122	158
Franklin	117	148	Rush	61	52
Fulton	160	194	Saint Joseph	308	86
Gibson	119	143	Scott	89	94
Grant	171	191	Shelby	83	206
Greene	212	238	Spencer	209	347
Hamilton	202	259	Starke	145	174
Hancock	110	110	Steuben	442	507
Harrison	239	211	Sullivan	135	157
Hendricks	186	205	Switzerland	33	37
Henry	106	116	Tippecanoe	335	365
Howard	122	113	Tipton	36	51
Huntington	191	217	Union	5	5
Jackson	213	212	Vanderburgh	110	122
Jasper	201	227	Vermillion	90	75
Jay	145	136	Vigo	183	193
Jefferson	45	60	Wabash	169	190
Jennings	59	86	Warren	103	120
Johnson	112	125	Warrick	208	264
Knox	117	113	Washington	141	132
Kosciusko	450	493	Wayne	196	224
Lagrange	202	204	Wells	166	134
Lake	251	262	White	164	143
LaPorte	316	348	Whitley	161	193
			Totals	14325	15276

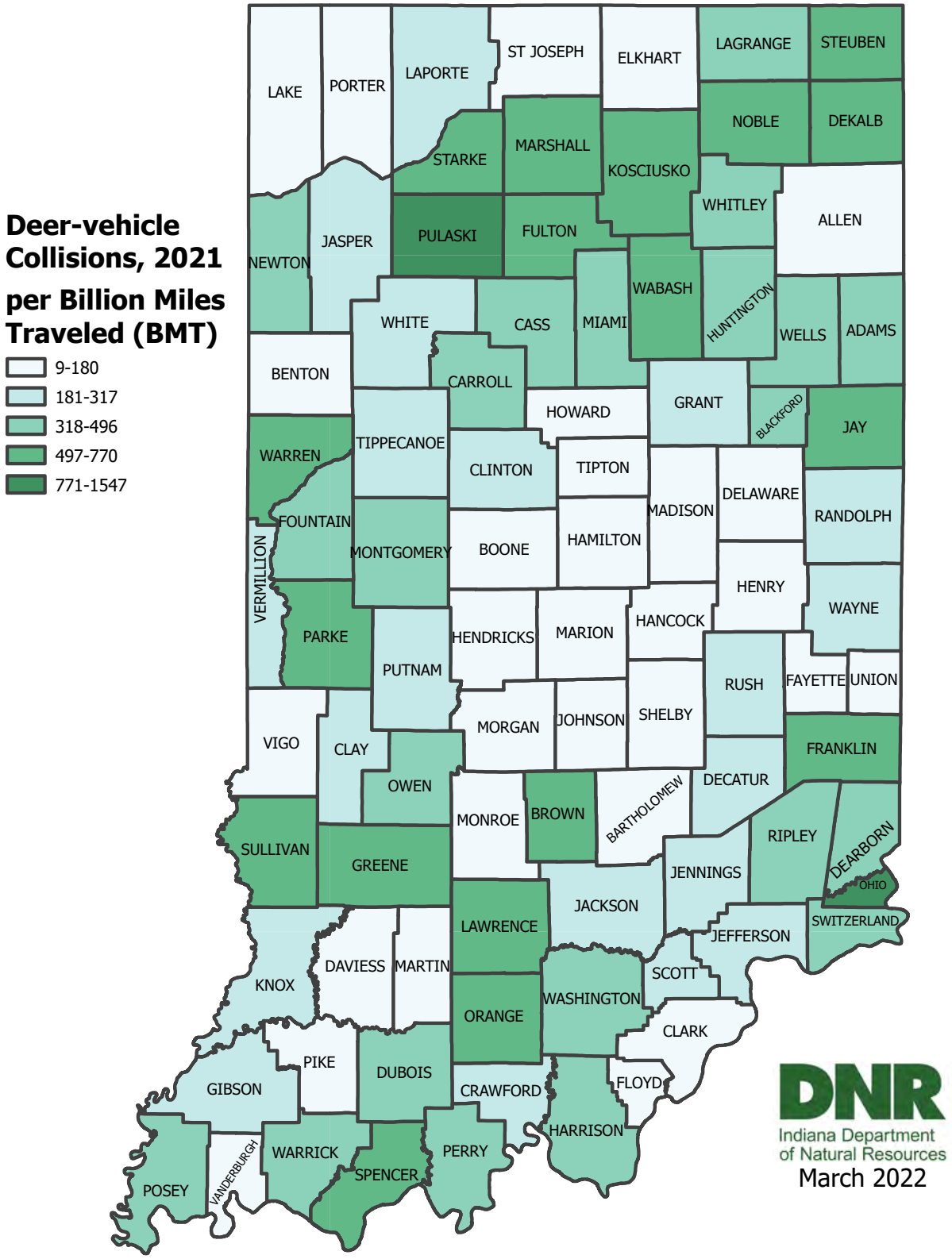

Figure 5-2. The number of deer-vehicle collisions per billion miles traveled (DVC/BMT) by county in Indiana in 2021. DVC/BMT provides a relative rate of deer-vehicle collisions given the number of miles driven in that county per year. Counties with high DVC/BMT have proportionally more deer-vehicle collisions per mile traveled than counties with lower DVC/BMT. Counties with low DVC/BMT may have a high number of deer-vehicle collisions that is offset by a high number of miles traveled (e.g., Lake County).

Table 5-2. The number of deer-vehicle collisions (DVC) in 2021 by road type, average number of deer-vehicle collisions per year from 2016-2021, miles of road, average deer-vehicle collisions per 100 miles, and average deer-vehicle collisions per billion miles traveled (DVC/BMT) from 2016-2021 by road type. Collision values were averaged from 2016-2021, and miles-traveled values were averaged from 2016-2020. Collisions on unknown road types (3.2%) were proportionally distributed among the other road types.

Road Type	2021	Avg DVCs 2016-2021	Road Length (mi)	Avg DVCs per 100mi of Road	Avg BMT per year	Avg DVC/ BMT per year
County Road	4,453 (29.1%)	4,250 (28.4%)	65,225	6.5	19.3	220.6
Interstate	1,129 (7.4%)	1,140 (7.6%)	1,645	69.3	18.5	61.8
Local/City Road	1,842 (12.1%)	1,698 (11.4%)	20,148	8.4	21.2	80.2
State Road	5,442 (35.6%)	5,433 (36.4%)	7,184	75.6	12.1	450.5
US Route	2,410 (15.8%)	2,424 (16.2%)	2,851	85.0	10.0	242.0

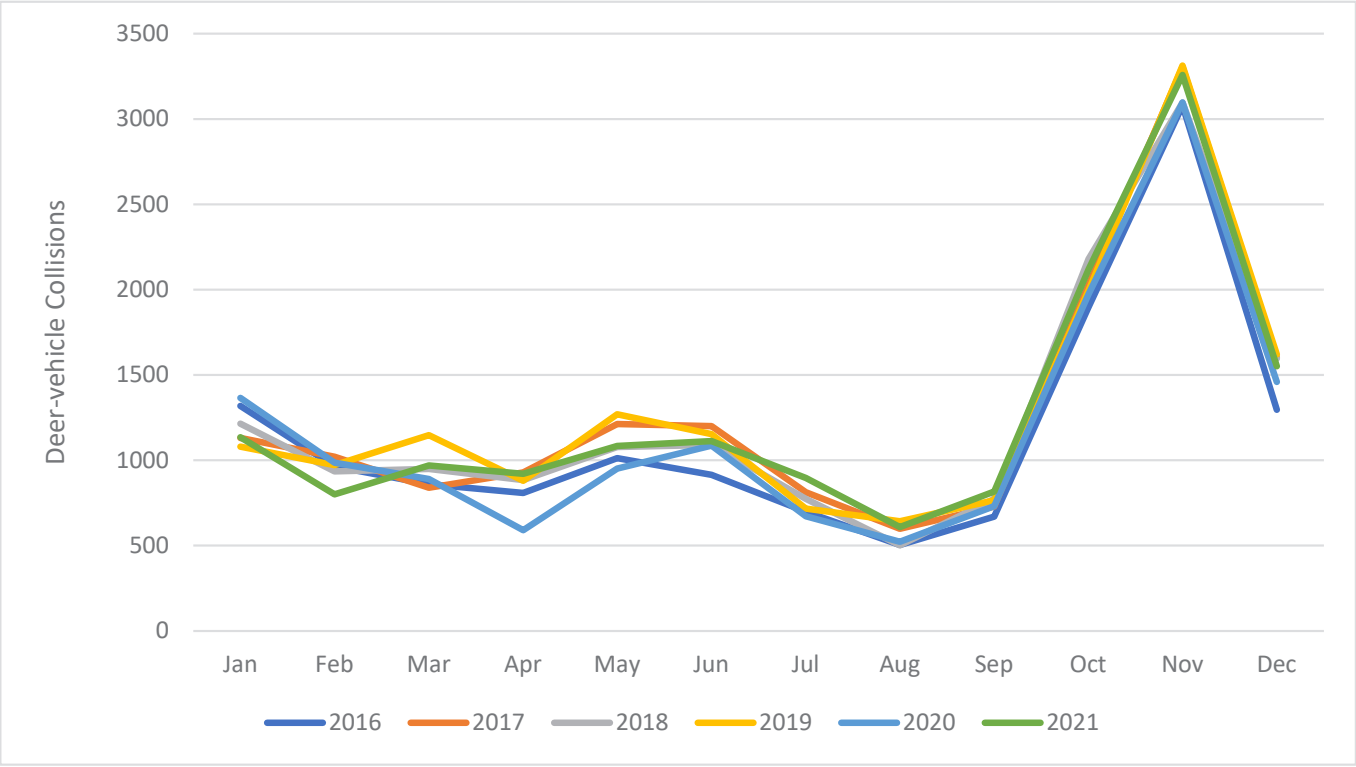

Figure 5-3. Number of deer-vehicle collisions by month in Indiana from 2016-2021. There was a noticeable decrease in collisions during March, April, and May 2020, most likely due to the stay-at-home orders during the beginning of the COVID-19 pandemic.

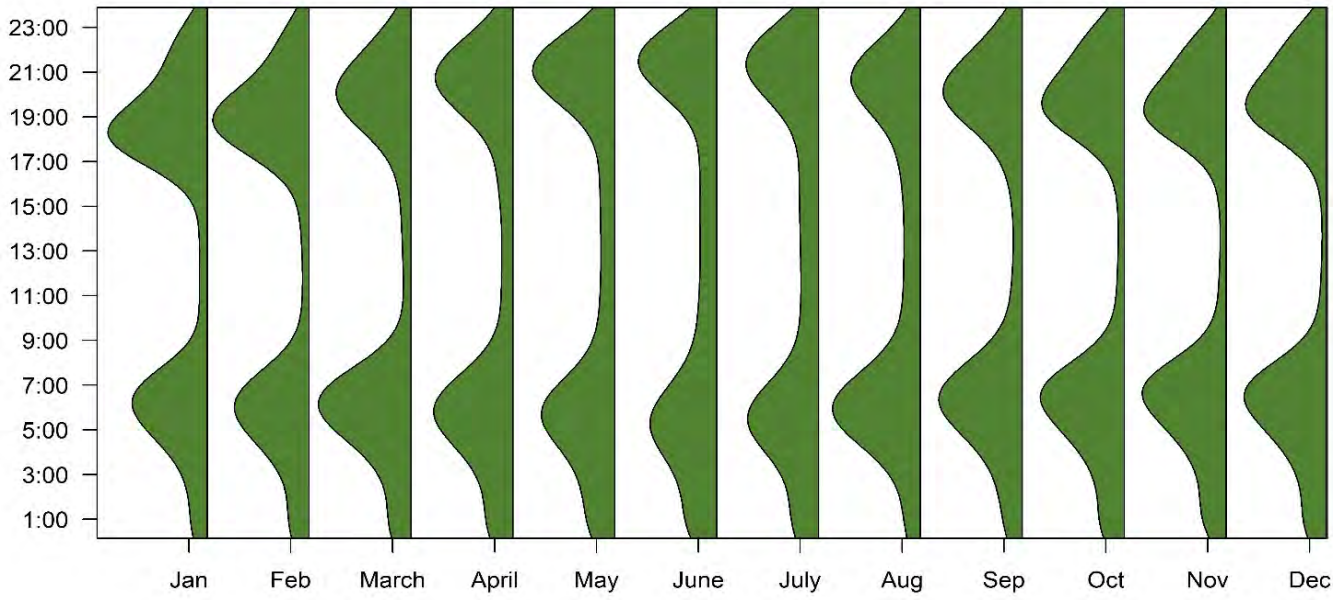

Figure 5-4. The proportion of deer-vehicle collisions by time of day in Indiana from 2016-2020.

Table 5-3. Reported economic loss due to deer-vehicle collisions in Indiana from 2016-2021. Collisions with an unknown estimate or an estimate of $1,000 or less were not included. Total Damage Estimate 2016-2021 is calculated by multiplying the total number of collisions for that damage estimate range by the average value of damage.

Damage Estimate Range	2021 DVCs	2020 DVCs	2019 DVCs	2018 DVCs	2017 DVCs	2016 DVCs	Total DVCs	Total Damage Estimate 2016-2021
$1,001 to $2,500	4,477 (30.4%)	4,503 (32.6%)	5,234 (35.1%)	5,365 (36.7%)	5,501 (37.3%)	5,157 (38.7%)	30270 (35.0%)	$52,914,750
$2,501 to $5,000	5,949 (40.4%)	5,615 (40.7%)	6,063 (40.6%)	5,851 (40.0%)	5,917 (40.1%)	5,397 (40.5%)	34864 (40.5%)	$130,470,000
$5,001 to $10,000	3,485 (23.6%)	3,015 (21.9%)	3,029 (20.3%)	2,826 (19.3%)	2,806 (19.0%)	2,366 (17.7%)	17594 (20.4%)	$131,452,500
$10,001 to $25,000	749 (5.1%)	606 (4.4%)	542 (3.6%)	520 (3.6%)	488 (3.3%)	373 (2.8%)	3315 (3.8%)	$57,365,000
$25,001 to $50,000	70 (0.5%)	47 (0.3%)	42 (0.3%)	40 (0.3%)	30 (0.2%)	37 (0.3%)	278 (0.3%)	$9,975,000
$50,001 to $100,000	11 (0.1%)	9 (0.1%)	10 (0.1%)	7 (0%)	11 (0.1%)	5 (0%)	56 (0.1%)	$3,975,000
Over $100,000	1 (0%)	0 (0%)	1 (0%)	2 (0%)	4 (0%)	1 (0%)	9 (0%)	$900,000
Total	14,742	13,795	14,921	14,611	14,757	13,336	86,386	$387,052,250

Chapter 6. DEER HEALTH

Joe Caudell, Mitch Marcus, Emily McCallen, Michelle Benavidez-Westrich, and Julia Buchanan-Schwanke, *Indiana Department of Natural Resources*

Epizootic Hemorrhagic Disease

Epizootic hemorrhagic disease (EHD) is a virus spread to white-tailed deer by a biting midge (*Culicoides variipennis)*. While it is often worse in severe drought years, EHD is reported in deer throughout Indiana every year. Deer can be reported as sick, dead, or in a group with a sick or dead animal via the Indiana DNR's online Sick or Dead Wildlife Report form (on.IN.gov/sickwildlife) and by calls directly to DNR offices.

In 2021, Indiana DNR received 41 reports of potential EHD cases involving 71 sick or dead deer from 28 counties. Testing for EHD requires fresh samples of the spleen, liver, kidney, or blood. Indiana DNR tests deer to confirm only the presence of EHD in a county, not its total number of infected animals. A total of five deer from five counties were tested, and only two (20%) deer from two counties tested positive for EHD. Reports of EHD were spread throughout the state, but 39 (55%) of the deer reported were located in the northeastern corner of the state (Figure 1).

The presence of EHD this year was less widespread than in the previous year and even less in comparison to the 2019 outbreak that occurred in more than half of the state's counties. Before 2019, the last major outbreak of EHD in Indiana occurred in 2012. A less widespread but significant outbreak occurred in 2013. Maps of deer reported, tested, and confirmed to have EHD are updated daily at on.IN.gov/EHD.

Indiana DNR monitors the locations and numbers of sick and dead deer reports to evaluate the effect of EHD. In many cases, EHD affects only a small area within a county, often along a creek or stream (Figure 6-2). But in some years, EHD can affect a larger-than-normal portion of the deer in each county and be widespread across a county (Figure 6-3). In those instances, the DNR recommends that the County Bonus Antlerless Quotas (CBAQ) in those counties be lowered to offset the effect of EHD. This determination is made by the end of August to allow the decision makers time to review the recommendations, make any changes to the CBAQ, and write an Emergency Rule to change the quota. If the number of reports of EHD continues to rise in counties after the August 31 deadline, the effects of EHD are considered when the next year's CBAQ are set.

As part of the 2021-2022 After Hunt Survey, participants were asked if the deer they harvested had evidence of chronic EHD apparent on the hooves. Of 3,198 survey responses, we could use only 2,074 (65%) to compare the presence or absence of EHD evidence on the hooves. Of the 2,074 usable responses, 2,044 (98.5%) answered "NO. The hooves on my deer did NOT show any evidence of EHD", and 30 (1.5%) answered "YES. At least one of the hooves on my deer showed evidence of EHD", based on photos provided to compare.

Chronic Wasting Disease

Chronic wasting disease (CWD) is a neurodegenerative disease that affects members of the cervid family, including white-tailed deer, mule deer (*O. hemionus*), elk (*Cervis elaphus*), moose (***Alces alces***), and reindeer (*Rangifer tarandus*). CWD is in a class of prion-caused diseases known as transmissible spongiform encephalopathies (TSEs) and is similar to Mad Cow Disease in cattle or Scrapie in sheep. Prions are misfolded proteins that cause lesions in the brains of infected animals. CWD is shed in the saliva, feces, and urine of infected deer and transmitted either by direct deer-to-deer contact or through contact with contaminated soil or other material.

Despite considerable ongoing research related to CWD, there is no effective cure or vaccine. CWD is fatal to infected cervids. CWD attacks the animal's brain and causes behavioral changes, excessive saliva production, and loss of appetite. It leads to progressive degradation of body condition and, eventually, death. CWD has a long incubation period that averages from 18 to 24 months between infection and clinical signs. Infected animals often appear healthy in the early stages of the disease. In advanced stages, however, deer with CWD become abnormally thin or weak, may lose fear of humans, stand with legs wide apart, and hold their head and ears low. Infected individuals rarely live more than 2.5 years from the time they are infected

until death (B. Richards, USGS National Wildlife Health Center, personal communication).

CWD was first detected as a clinical syndrome in 1967 in captive mule deer at a Colorado research facility. In 1978, CWD was determined to be a spongiform encephalopathy and was found in captive deer and elk in Wyoming. Three years later, the disease was observed in free-ranging elk in Colorado. By 2002, it had been detected in nine states (Colorado, Illinois, Kansas, Minnesota, Montana, Oklahoma, South Dakota, Wisconsin, and Wyoming) and two Canadian provinces. As of December 2021, CWD had been found in wild and/or captive cervid herds in 28 states, four Canadian provinces, Finland, Norway, South Korea, and Sweden (Richards 2021).

CWD has been detected in white-tailed deer in three states bordering Indiana: in wild and captive deer in Ohio, in wild and captive deer in Michigan, and in wild deer in Illinois (Richards 2021). Ohio confirmed its first case of CWD in a wild white-tailed deer in December 2020. The CWD-positive animal was found more than 60 miles from Indiana's eastern border (Ohio Department of Natural Resources 2020). In Michigan, the closest CWD-positive white-tailed deer was found approximately 30 miles from the Indiana border (Michigan Department of Natural Resources 2020). Illinois reported 176 new detections of CWD in wild deer during fiscal year 2020 (Dufford and McDonald 2020). The closest CWD cases in Illinois are approximately 25 miles from Indiana's western border.

Each year, Indiana DNR collects tissues from hunter-harvested and road-killed deer throughout the state for CWD testing. Samples are collected as part of the statewide CWD surveillance program to monitor for the presence of the disease in Indiana. Sick deer reported by the public are also tested through the statewide CWD surveillance program. Because prions accumulate in the lymph nodes, brain, and spinal cord, CWD is diagnosed by examination of brain or lymphoid tissue from a dead animal.

After reviewing state surveillance efforts from the past years, Indiana DNR staff re-evaluated how it would choose the counties where they would conduct surveillance. The DNR put together a risk assessment in late 2020 involving two surveys designed to focus on hazards thought to relate to CWD transmission as well as an expert elicitation survey. The first survey concerning hazard identification was distributed to 28 cervid biologists throughout North America. Twenty-one (75%) of the 28 individuals responded from all 13 geographic units of interest. Based on the survey, the top four hazards identified (and accompanying hypothetical values for them) were deer density/abundance (low, medium, high), captive cervid facilities (absent/present), taxidermists and processors (absent/present), and out-of-area hunters (low or high). The second survey concerned the likelihood of CWD occurring based on hypothetical situations with varying value combinations of the top four identified hazards. The second survey was sent to the 21 individuals who responded to the first survey and was completed by 13 (62%) of the 21 individuals from 11 of the 13 geographic units of interest. From the results of the second survey, Indiana DNR identified the importance of each risk factor out of the top four hazards from the first survey: 1) captive cervid facilities, 2) out-of-area hunters, 3) taxidermists/processors, and 4) wild cervid abundance.

After the CWD surveillance efforts in northwest and northeast Indiana during the 2020 season, Indiana DNR altered its focus to seven counties (Steuben, Allen, Clinton, Boone, Washington, Harrison, and Clark) based on the risk assessment. Indiana DNR staff were stationed at 10 different processors on the opening weekend of firearms season (November 13-14, 2021) in an effort to retrieve samples from target counties. Submission of samples for CWD testing was voluntary, and hunters received a metal tag reminiscent of historic confirmation tags for participating.

In an effort to collect more samples and effectively lower the cost per sample, Indiana DNR piloted a taxidermist program. Taxidermists in or around the surrounding counties of interest were contacted and asked if they would be willing to participate in a program in which the DNR would pay them to collect samples from hunters bringing in their deer for taxidermy services. Ten taxidermists agreed to participate across nine counties. Of the 663 samples collected this year, 228 (nearly 35%) came from this program. The final cost per sample taken in the taxidermist program came to $45.46, compared to $116.48 per sample when collected from a traditional sampling station.

In addition to targeted surveillance, hunters interested in having their deer tested for CWD were able to drop off deer heads at any participating Fish & Wildlife Area (FWA), State Fish Hatchery (SFH), or National Wildlife Refuge (NWR) throughout the season. The heads were later sampled by Indiana DNR. Wildlife biologists and property managers collected routine samples from road-killed and hunter-harvested deer, and biologists responded to calls and online reports of sick deer that were consistent with clinical signs of CWD. The public was able to report sick deer online through the Sick/Dead Wildlife Report form. Hunters could submit the heads or lymph nodes from their harvested deer directly to the Animal Disease Diagnostic Lab (ADDL) at Purdue University to be tested, for a fee.

Samples collected by DNR staff were submitted to approved laboratories and tested using immunohistochemical (IHC) staining procedures. Results were posted online for hunters to access using the confirmation number for their harvested deer. Any positive deer would have resulted in a phone call being made to the hunter before the results were posted.

Totals of 664 hunter-harvested deer, four road-killed deer, 24 targeted deer, and 32 opportunistic deer from Indiana were tested statewide in 2021 (Table 6-1). To date, no wild deer from Indiana have tested positive for CWD. The CWD detectability rates were calculated for all 92 counties based on sampling intensity (Figure 6-4). The detectability provides us with a calculated prevalence of CWD in free-ranging deer for which there is a 95% probability the true prevalence falls below. For example, if CWD is present in the deer population in Clark County, there is a 95% chance that it occurs in less than 3.1% of the population (Jennelle et al. 2018), based on our sampling efforts.

Bovine Tuberculosis Surveillance

Bovine tuberculosis (bTB) is a chronic disease caused by the bacterium *Mycobacterium bovis*. Indiana DNR and other state and federal partners test wild white-tailed deer for bTB because it was found in Franklin County cattle in 2008, 2009, and 2016, and in Dearborn County in 2011. The disease was also detected in captive deer from a farm in Franklin County in 2009. Between 2009 and early 2021, a total of 4,144 wild hunter-harvested white-tailed deer were sampled in the bTB surveillance zones, and none of those deer tested positive for the disease.

In addition to testing hunter-harvested deer, small mammals and other deer have been sampled for bTB on the affected 2016 cattle farm or from lands within a 1.5-mile radius of that farm since 2017. In 2020, the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (USDA APHIS WS) collected 117 raccoons, 13 opossums, three groundhogs, and one skunk from that area as targeted clean-up. As of early 2021, the total number of non-hunter-harvested deer and small mammals sampled in that area was 111 deer, 180 raccoons, 33 opossums, three groundhogs, and one skunk. One wild raccoon tested positive for bTB in 2017. Another wild raccoon tested positive for bTB in 2020.

To date, all wild deer sampled through hunter-harvest surveillance, disease permits, and USDA APHIS WS targeted clean-up have tested negative for bTB. Additionally, all sampled wild deer exhibiting signs of potential bTB infection have tested negative for bTB. These results suggest that the prevalence of bTB in wild deer in the Franklin County surveillance zone is at a level difficult to detect and is likely very low to nonexistent. As a result, the DNR did not conduct intensive bTB surveillance in Fayette and Franklin counties during the 2021-2022 deer hunting season.

Automated Animal Disease Report Form

The automated animal disease report form has remained active since its launch in mid-2020. The report form is used to track trends over time from reports of animals presenting with signs of disease or reports of animals that died under unusual circumstances. During the system's first year, deer were the No. 1 reported animal. In 2021, birds were the most reported animal because of a disease outbreak in in the summer of 2021, and deer were the second most reported animal. While reports of various animals come in year-round, a number of reports about deer present in late July, when EHD becomes most prominent, but the majority of reports come in during hunting season, from late September to late January the following year (Figure 6-5).

While the report form is a tool to assist biologists in locating sick or dead wildlife, it is the responsibility of the

biologists to use the information provided to investigate what has caused the animal's condition. Biologists use evidence to hypothesize what happened to the deer, and the deer are then classified into seven different categories; suspected EHD, suspected respiratory infection, other disease, injury, nontarget, tumor, or unknown death (Figure 6-6). The number of reports classified as suspected EHD was nearly 80 during September 2020, versus the maximum of around 20 in October 2021. During the hunting season of 2021, there was an increase in the number of reports classified as "other disease", and unknown death that can be attributed to the increase in number of brain abscesses traditionally seen during this time of year. Brain abscesses often occur due to sparring between males during breeding season, but injuries caused by other means can also cause brain abscesses. There is also a slight increase in 2021 of nontarget reports during the hunting season. That change can be attributed to roadkill deer, dead deer removal, and incidents involving law enforcement (i.e., poaching).

Anyone can report sick or dead deer directly to Indiana DNR through the online Sick or Dead Wildlife Report form (on.IN.gov/sickwildlife) This form is useful for tracking reports of sick deer with clinical signs consistent with diseases of interest, such as EHD and CWD. The person who reports a deer showing clinical signs of EHD, CWD, or other diseases of potential concern receives a phone call from a wildlife biologist or technician to verify the clinical signs and lack of obvious injury, assess if the animal's location is still known, and determine whether to collect a sample or submit the animal for testing.

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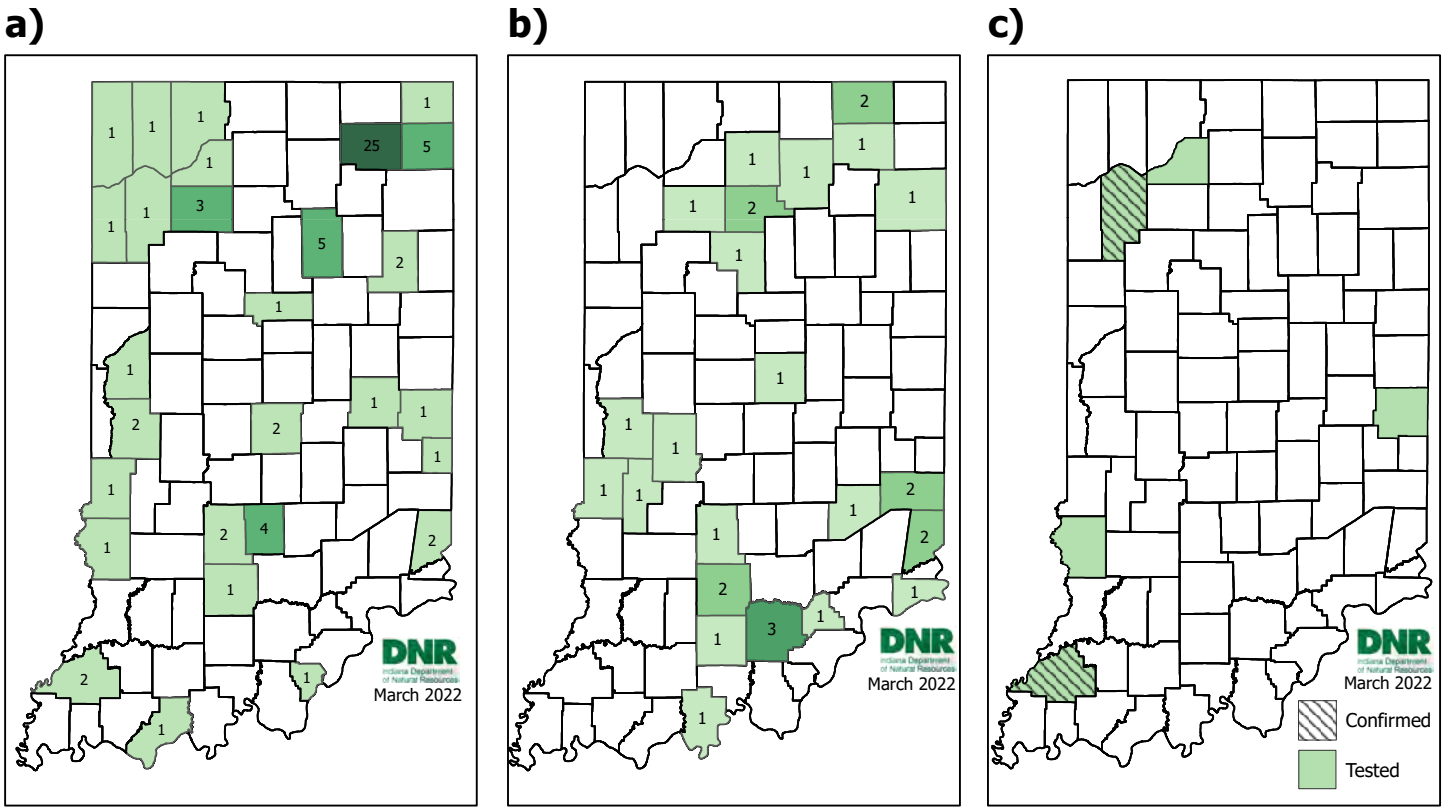

Figure 6-1. A) Number of deer reported as acute suspects of EHD in each county in 2021. B) Number of deer reported as chronic suspects of EHD. C) Counties where EHD was tested for in 2021 and counties where EHD was confirmed in 2021.

Table 6-1. Results of CWD surveillance by county during Indiana's 2021-2022 deer hunting season. *Denotes a combination of Opportunistic, Sick Animal, and Found Dead samples.

County	Hunter-Harvested Samples	Road Killed Samples	Targeted Deer	Opportunistic Samples	Total Samples	County	Hunter-Harvested Samples	Road Killed Samples	Targeted Deer	Opportunistic Samples	Total Samples
Adams	1	0	0	0	1	Lawrence	6	1	0	0	7
Allen	21	0	0	0	21	Madison	1	0	0	0	1
Bartholomew	3	0	1	0	4	Marion	3	0	0	0	3
Benton	2	0	0	0	2	Marshall	2	0	0	0	2
Blackford	0	0	0	0	0	Martin	27	0	1	0	28
Boone	13	0	0	0	13	Miami	1	0	0	0	1
Brown	1	0	0	0	1	Monroe	2	0	0	0	2
Carroll	1	0	0	0	1	Montgomery	23	0	0	1	24
Cass	0	0	0	0	0	Morgan	6	0	0	0	6
Clark	42	0	1	0	43	Newton	1	0	0	25	26
Clay	2	0	0	0	2	Noble	9	0	1	0	10
Clinton	5	0	0	0	5	Ohio	2	0	0	0	2
Crawford	6	0	0	0	6	Orange	6	0	0	0	6
Daviess	0	0	0	0	0	Owen	8	0	0	0	8
Dearborn	9	0	0	0	9	Parke	26	0	0	0	26
Decatur	12	0	0	0	12	Perry	6	0	0	0	6
Dekalb	20	0	1	0	21	Pike	1	0	0	0	1
Delaware	1	0	0	0	1	Porter	1	0	0	0	1
Dubois	1	0	0	0	1	Posey	5	0	0	0	5
Elkhart	1	0	0	0	1	Pulaski	5	0	0	0	5
Fayette	3	0	0	0	3	Putnam	8	0	0	0	8
Floyd	17	0	0	0	17	Randolph	0	0	0	1	1
Fountain	6	0	0	0	6	Ripley	8	0	0	0	8
Franklin	14	0	2	0	16	Rush	3	0	0	0	3
Fulton	4	0	1	0	5	Saint Joseph	0	0	0	0	0
Gibson	0	0	0	1	1	Scott	28	0	0	0	28
Grant	1	0	1	0	2	Shelby	1	0	0	0	1
Greene	4	0	0	0	4	Spencer	0	0	0	0	0
Hamilton	1	0	1	0	2	Starke	7	0	2	0	9
Hancock	4	0	0	0	4	Steuben	31	0	0	0	31
Harrison	24	0	3	0	27	Sullivan	3	0	1	0	4
Hendricks	5	0	0	0	5	Switzerland	0	0	0	0	0
Henry	0	0	0	0	0	Tippecanoe	21	0	0	0	21
Howard	1	0	0	0	1	Tipton	0	0	0	0	0
Huntington	4	0	0	0	4	Union	1	0	0	0	1
Jackson	10	0	0	0	10	Vanderburgh	0	1	0	0	1
Jasper	1	0	1	0	2	Vermillion	10	0	0	0	10
Jay	0	0	0	0	0	Vigo	11	0	0	0	11
Jefferson	25	0	0	0	25	Wabash	1	0	0	0	1
Jennings	14	0	0	0	14	Warren	6	0	0	0	6
Johnson	3	0	0	0	3	Warrick	0	0	0	0	0
Knox	0	0	0	0	0	Washington	23	0	0	0	23
Kosciusko	3	0	0	0	3	Wayne	0	0	0	1	1
Lagrange	8	1	0	0	9	Wells	2	0	0	0	2
Lake	0	0	1	0	1	White	2	0	0	0	2
LaPorte	1	0	0	1	2	Whitley	0	1	6	0	7

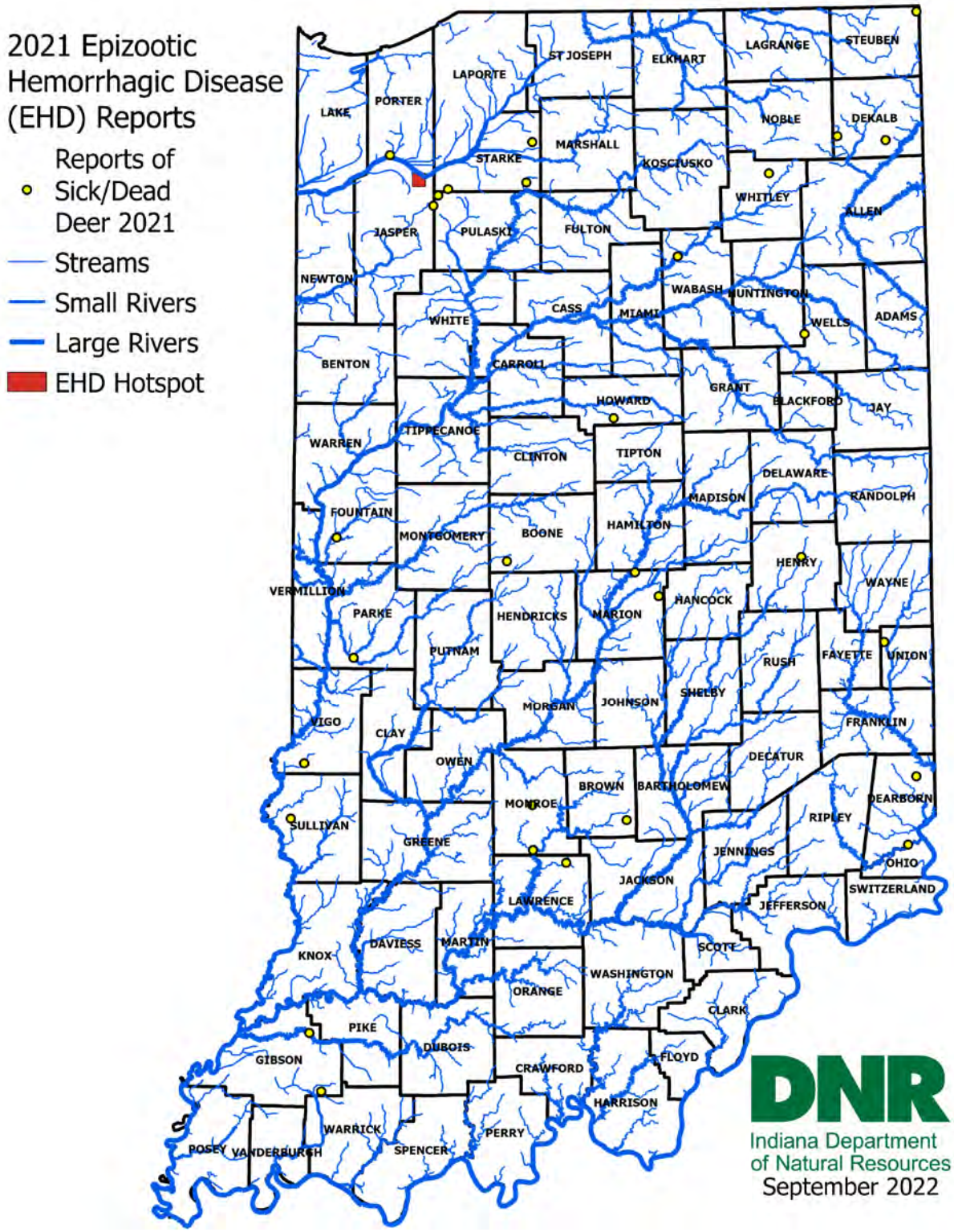

Figure 6-2. Confirmed locations of reported 2021 suspect EHD deer overlaying three types of water features (streams, small rivers, large rivers) with an Optimized Hot Spot Analysis conducted to determine local hotspots of the disease in four square-mile grids.

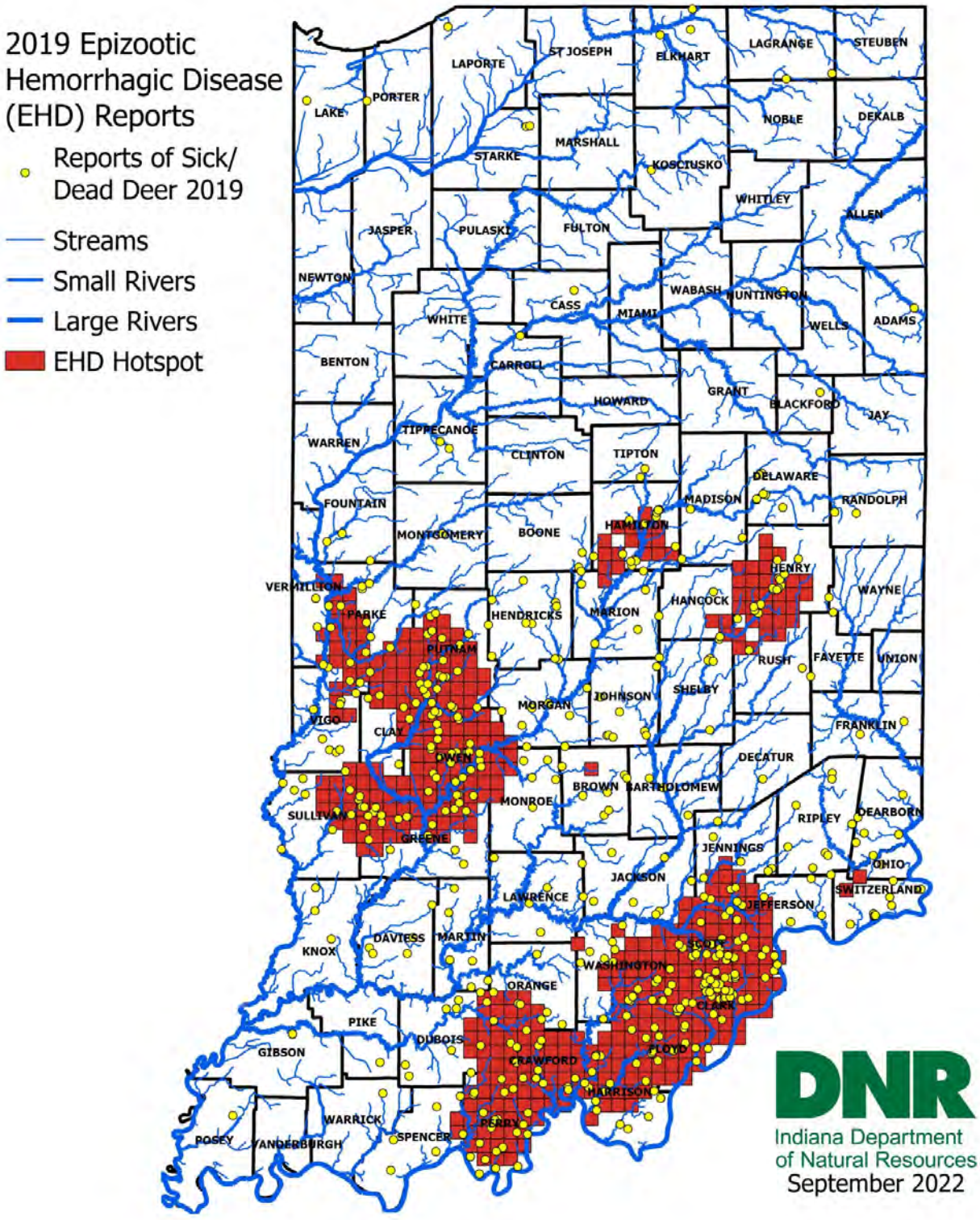

Figure 6-3. Confirmed locations of reported 2019 suspect EHD deer overlaying three types of water features (streams, small rivers, large rivers) with an Optimized Hot Spot Analysis conducted to determine local hotspots of the disease in four square-mile grids

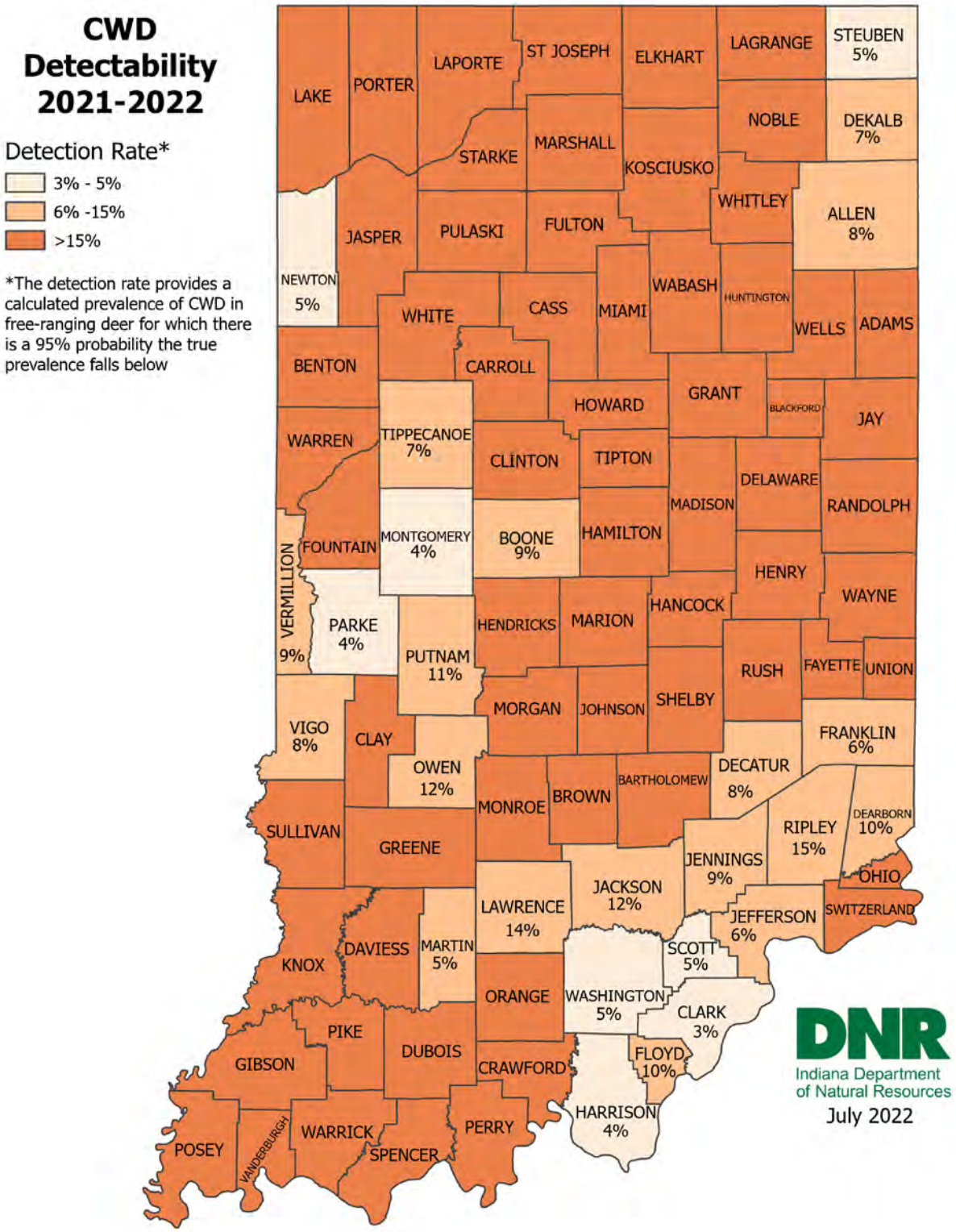

Figure 6-4. Statewide CWD detectability rates for the 2021-2022 deer hunting season. Based on sampling intensity, detectability provides the rate for which there is a 95% probability the true prevalence falls below the figure listed. For example, if CWD is present in the deer population in Clark County, there is a 95% chance that the disease occurs in less than 3.1% of the population (Jennelle et al. 2018) based on our sampling efforts.

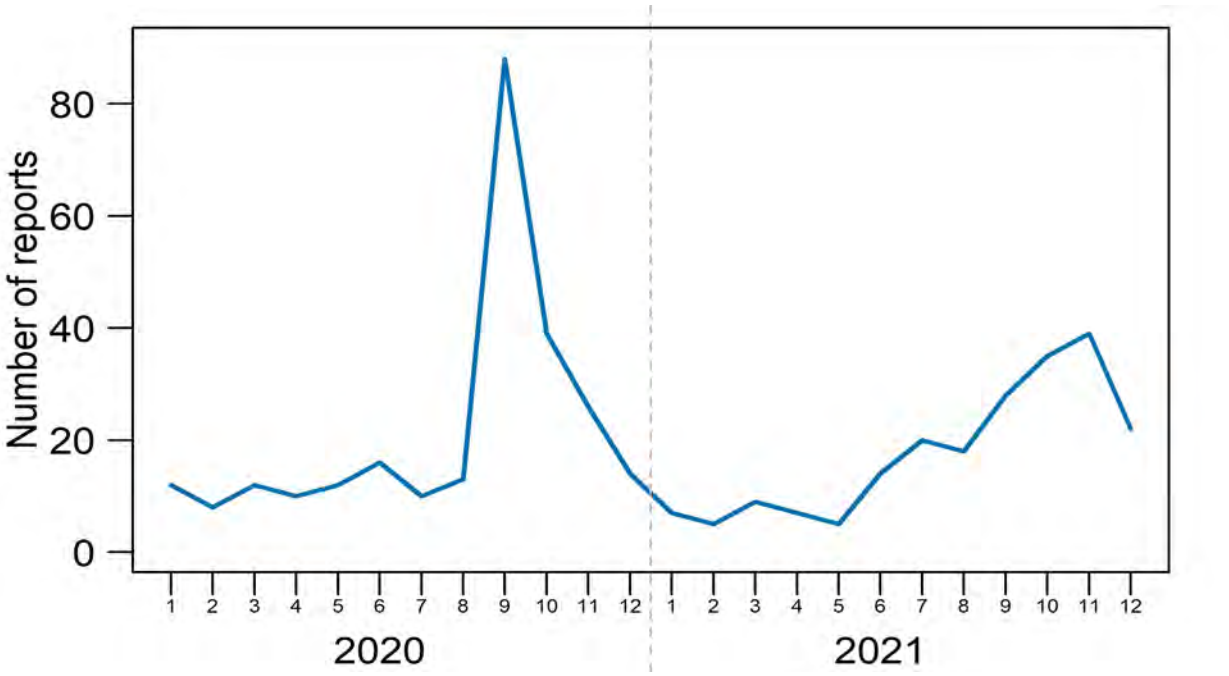

Figure 6-5. Number of reports on deer from the online Sick or Dead Wildlife Report form spread from January 2020 to December 2021. The majority of reports concerning deer are received during late July through the end of hunting season in January of the next year.

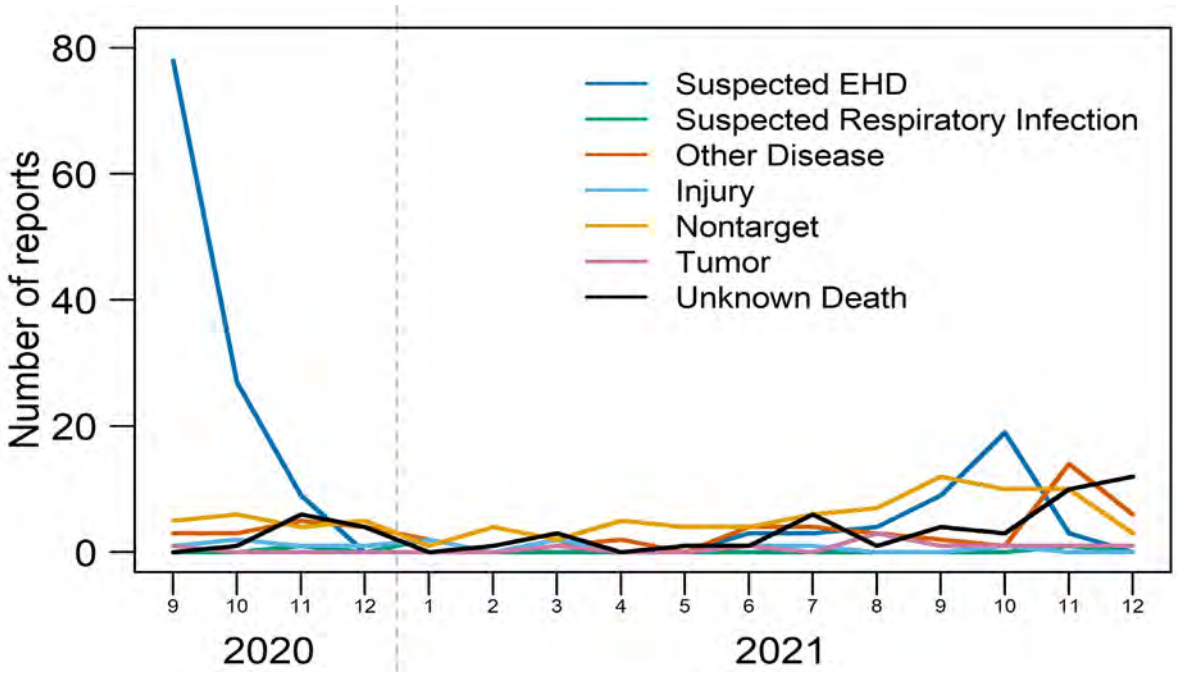

Figure 6-6. Number of sick or dead deer reported from September 2020 to December 2021, classified into seven different categories based on evaluation by a biologist: suspected EHD, suspected respiratory infection, other disease, injury, nontarget, tumor, or unknown death.

Chapter 7.
DEER MANAGEMENT SURVEY

Emily McCallen, Joe Caudell, and Julia Buchanan-Schwanke, *Indiana Department of Natural Resources*

Understanding public opinion on topics and policies that affect deer hunting and management is an important part of the decision-making process for Indiana DNR. These data are used to set harvest regulations and to examine the potential effect of proposed regulatory changes. Since 2018, Indiana DNR has administered the Deer Management Survey to provide a convenient method for interested hunters and nonhunters to share their opinions.

The Deer Management Survey consists of a core set of questions that remain the same every year to collect longitudinal data, with additional sets of unique questions that change each year to address emerging issues in state deer management. In the 2022 survey, the Indiana DNR asked several questions designed to assess opinions and behaviors related to DNR deer rule proposals, deer interactions, use of processors, and trophy deer management. The inclusion of specific questions should not be interpreted as a change or a desire for a particular regulation by Indiana DNR or the public.

The information gathered from these questions is often useful in answering questions from the public about Indiana DNR regulations, hunter behavior, and the need for programs designed to assist hunters (e.g., hunter access program). Here we report the results of the 2022 survey on these topics across the entire state. Questions regarding the desires of hunters and nonhunters about the direction of the size of the deer herd, number of deer desired and taken, and other questions related to the deer population status at the scale of counties or deer management units (DMUs) are reported on the online Deer Management Survey Dashboard and can be queried by county or DMU at https://www.in.gov/dnr/fish-and-wildlife/wildlife-resources/animals/white-tailed-deer/deer-management-survey-results/.

Methods

The 2022 survey was sent to individuals that the Division of Fish & Wildlife had prior contact with and had an email address for. Individuals included residents and nonresidents who had purchased any type of hunting, trapping, or fishing license since 2006; anyone who checked in a deer in the last five years; anyone who created an electronic account with Indiana DNR for other reasons (such as obtaining the survey); and anyone who signed up for the Indiana DNR Wild Bulletin e-newsletter. Because lifetime license holders and landowner hunters do not have to purchase a yearly license, they can only be surveyed if they harvest a deer, purchase another license type (e.g., fishing, deer reduction zone license, etc.), or sign up on Indiana DNR's electronic system specifically to receive the survey. Because of this, lifetime license holders and hunters who only use their landowner exemption and do not harvest a deer are likely underrepresented in the survey. Survey invitations were distributed by GovDelivery, a mailing subscription service, in February and March 2022. The survey was developed in the program Qualtrics, all survey results were downloaded in March 2021, and descriptive statistics were generated using Program R.

Results and Discussion

General Demographics of Respondents

The 2022 Deer Management Survey was sent to 1,012,126 individuals who purchased some type of license(s) (i.e., hunting, fishing, and trapping) through the Indiana DNR online system, had signed up for an Indiana DNR account or the Wild Bulletin e-newsletter, or had checked in a white-tailed deer within the past five years, all of which depended upon the individual providing a valid email. Out of the surveys successfully sent, 28,109 were started for a response rate of 2.8% (Table 7-1). Because much of the survey depends upon potential respondents being assigned to a county for reporting, survey respondents had to include a county they hunted in or lived in to be included in the final data.

When residents of Indiana were asked ***Do you consider yourself a deer hunter even if you did not hunt during the 2021-2022 deer hunting season***, 18,204 residents indicated they were deer hunters, while 4,458 residents indicated they were not deer hunters but wanted to provide input on deer management where they live (i.e., were resident nonhunters; Table 7-2). Of the Indiana hunters, 15,157 hunted during the 2021-

2022 deer season (i.e., were active resident hunters). An additional 3,047 did not hunt in the past season but still wanted to provide input on deer around where they live in Indiana (i.e., were inactive resident hunters). Of the nonresidents who responded to the survey, 921 reported they hunted during the 2021-2022 deer hunting season (i.e., were active nonresident hunters; Table 7-2).

Indiana hunters were asked about where they lived and hunted. Of the 14,463 hunters who responded, the most common responses were: "I hunt only in the county that I live in" (30.1%) and "I hunt mostly in the county that I live in, but I also occasionally hunt in other counties" (29.7%). These were followed by "I never hunt in the county that I live in, I only hunt deer in a different county" (22.7%). The remaining 17.5% "occasionally hunt in the county that I live in, but mostly hunt in other counties".

We asked hunters ***How many total years have you been a deer hunter*** and ***How many total years have you hunted deer in Indiana***. A total of 15,662 hunters reported the total number of years they had been a deer hunter. Most (67.5%) reported they had been a hunter for more than 20 years total, followed by 16.2% who reported 10-20 years deer hunting experience, 8.0% who reported 6-10 years hunting, 6.3% who reported 2-5 years hunting, and just 2.0% who reported that this was their first year hunting deer. A total of 15,636 hunters reported the number of years they had hunted in Indiana. Most (58.8%) reported they had hunted deer in Indiana for more than 20 years, followed by 17.9% who reported 10-20 years of deer hunting in Indiana, 9.8% who reported 6-10 years hunting deer in Indiana, 9.6% who reported 2-5 years hunting deer in Indiana, and 3.9% who reported that this was their first year hunting deer in Indiana.

Respondents were asked to report all types of equipment they used during the 2021-2022 deer season. A total of 16,004 hunters reported which type of equipment they used to hunt deer. The most common responses were high-powered rifles (55.1% of hunters), crossbows (42.7%), compound bows (37.7%), modern in-line muzzleloaders (33.5%), and shotguns (26.8%). Few respondents indicated that they used pistol-caliber rifles or other low-powered rifles (13.0%). Hunters used traditional muzzleloaders (8.1%), handguns (4.6%), traditional bows (2.7%), or modern recurve bows (1.0%) less often. Breech-loading muzzleloaders (0.9%), air rifles (0.1%), and arrow guns (0.1%) were used by less than 1% of hunters. Most deer hunters (32.0%) reported hunting with two types of equipment, while 29.8% hunted with one, and 25.6% hunted with three equipment types. Only 12.6% of Indiana deer hunters used four or more types of equipment.

We asked hunters to select which license(s) they used in the 2021-2022 deer hunting season. A total of 15,885 hunters responded. The most commonly reported answer was the license bundle (45.0% of hunters), followed by the lifetime license (26.8%), landowner exemption (14.4%), and firearms (11.2%). Few hunters used archery (6.6%), bonus antlerless (4.6%), deer reduction zone (3.8%), crossbow (3.3%), muzzleloader (2.2%), youth (1.2%), or military exemption (0.4%) licenses.

We asked hunters to report how many deer they wanted to harvest in the 2021-2022 deer hunting season by selecting from harvest combinations that included both bucks and does. A total of 15,788 hunters responded. Most respondents (77.4%) wanted to harvest a buck. The most common combination was one buck and one doe (30.7%), followed by one buck and two does (21.8%), and just a single buck (19.3%). Few individuals wanted to harvest one buck and three does (3.6%) or one buck and more than three does (2.1%). Only 1.3% reported wanting to harvest only a single doe. In total, under a quarter of hunters wanted to hunt a number of deer regardless of its sex (one deer 6.2%, two deer 8.1%, three deer 4.7%, four deer 1.1%, and more than four deer 1.3%).

Perceptions about Deer Populations and Management

Both hunters and nonhunters responded to a series of questions about deer population sizes and how harvest should change. Hunters were asked ***How would you like to see the County Bonus Antlerless Quota change next year in [County] for the 2021-2022 deer hunting season?*** To avoid using terminology they may be unfamiliar with, nonhunters were asked *How would you like to see the number of does that can be harvested by hunters change in the next year in [County]?* (Figure 7-1). Hunters and nonhunters were asked,

Please describe the size of the deer population in [County] during the 2021-2022 deer hunting season (Figure 7-2), ***How does the number of deer you saw in [County] during the 2021-2022 deer hunting season compare to the number you saw five years ago?*** (Figure 7-3), and ***How would you like to see the number of deer change in the next five years in [County]?*** (Figure 7-4).

In the 2022 survey, when asked about how quotas should change, most hunters and nonhunters thought quotas should be maintained (51.4% and 49.9%, respectively). During the past five years, the proportion of hunters who want to see quotas decrease has fallen over time while the opinion of nonhunters has stayed relatively stable (Figure 7-1). Most hunters (58.3%) perceived the size of the deer population as low or too low while only 24.2% of nonhunters felt the same. Conversely, 29.0% of nonhunters perceived the size of the deer population as high or too high while only 6.6% of hunters felt the same. In both hunters and nonhunters, opinions about the size of the deer population have changed little over time (Figure 7-2).

Asked about how the deer population had changed over the last five years, most hunters thought it was substantially, moderately, or slightly decreasing (27.03%, 18.9%, and 19.1%, respectively) or being maintained (17.3%). Most nonhunters thought it was being maintained (26.1%), and the rest were equally divided between reporting the population was decreasing (36.2%) or increasing (37.6%). Both hunter and nonhunter perceptions have remained largely stable since 2018 (Figure 7-3).

Asked about how deer populations should change over the next five years, most hunters thought populations should increase to some degree (78.5%). Another 15.4% thought populations should be maintained. Responses from nonhunters were evenly distributed, with most indicating that the population should be maintained (35.3%). As with the other deer population questions, these opinions show no clear trend over the last five years (Figure 7-4).

Hunters were asked a few attitudinal questions to rate their hunting satisfaction and experience. Hunters were asked, ***How do you think the total deer harvested in this hunting county has changed compared to five years ago?*** Most hunters reported that they thought total deer harvest had decreased (62.0%). An additional 21.4% reported they thought there was no change. Hunters were asked***, How does the number of deer you harvested in this county in the most recent season compare to five years ago?*** Most hunters thought there was some degree of decrease (59.3%). A third of respondents (33.3%) thought there was no change. For both questions, the distribution of answers has been relatively stable, though fewer hunters perceived a considerable decrease in total or personal harvest over time (Figure 7-5). Hunters were also asked to ***Describe the QUALITY of the bucks in this county during the most recent deer hunting season***. Most hunters (50.1%) thought the bucks were of average quality, followed by low quality (28.1%). This hunter opinion has remained stable since 2018 (Figure 7-6).

Respondents were also asked about attitudes toward management, including ***On a scale of 0 (terrible) to 100 (excellent), how would you rate the job the Indiana DNR is doing managing deer STATEWIDE?*** Nonhunters rated the DNR 75.6 ± 0.76 on average while hunters rated it 66.4 ± 0.45 on average out of 100 (Figure 7-7). Both nonhunters and hunters were asked the same question about how well Indiana DNR is doing managing deer in their county. On average, nonhunters rated the DNR at 75.4 ± 0.81, while hunters rated the DNR at 65.3 ± 0.49 out of 100 (Figure 7-8). Finally, hunters were asked, ***On a scale of 0 (no enjoyment) - 100 (great enjoyment), how would you rate your overall enjoyment of your hunting experience during the 2021-2022 deer hunting season?*** This rating has remained largely steady since 2018 (Figure 7-9). Hunters rated their enjoyment, on average, at 78.9 ± 0.39 out of 100.

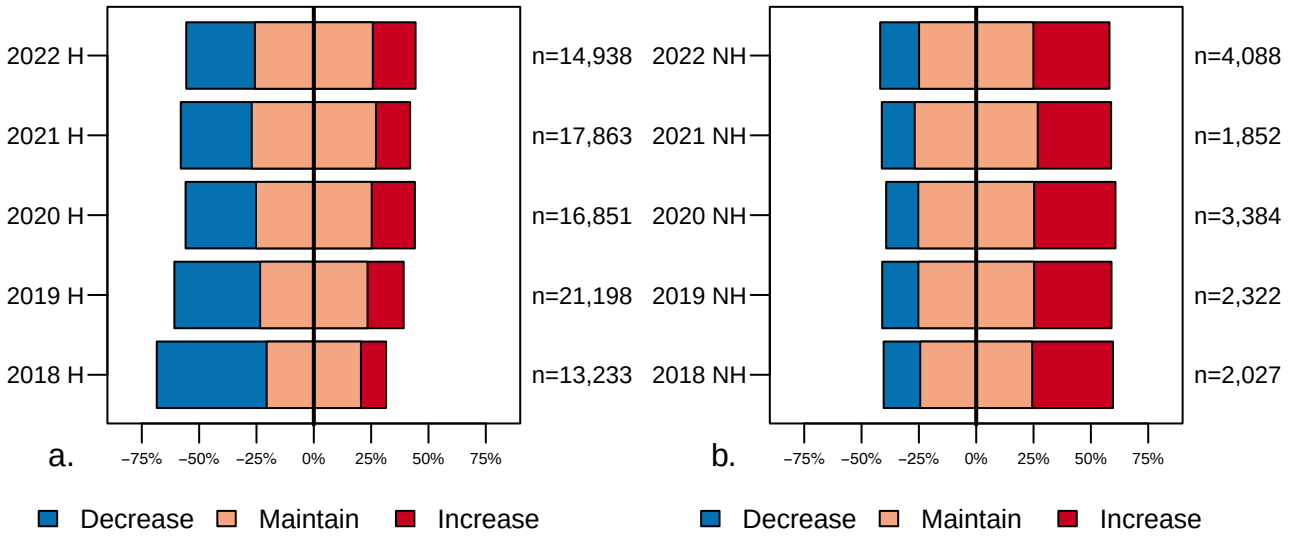

Figure 7-1. Hunter (a.) and nonhunter (b.) opinion on how the County Bonus Antlerless Quota should change the next year in Indiana.

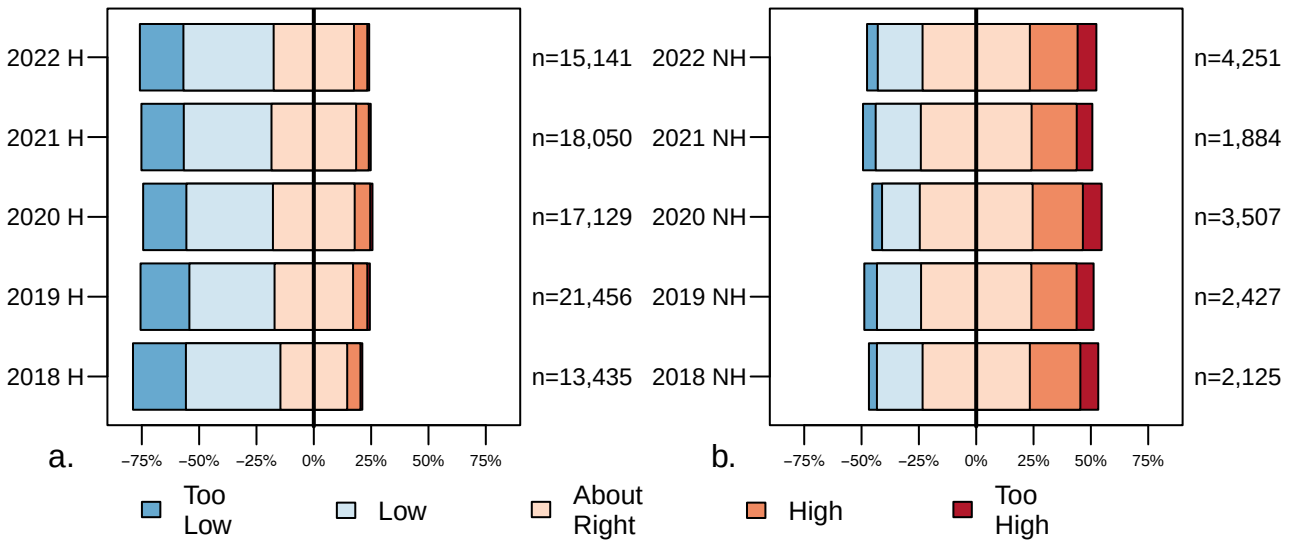

Figure 7-2. Hunters (a.) and nonhunters (b.) describe the current size of the deer population in the county where they hunt and/or live in Indiana.

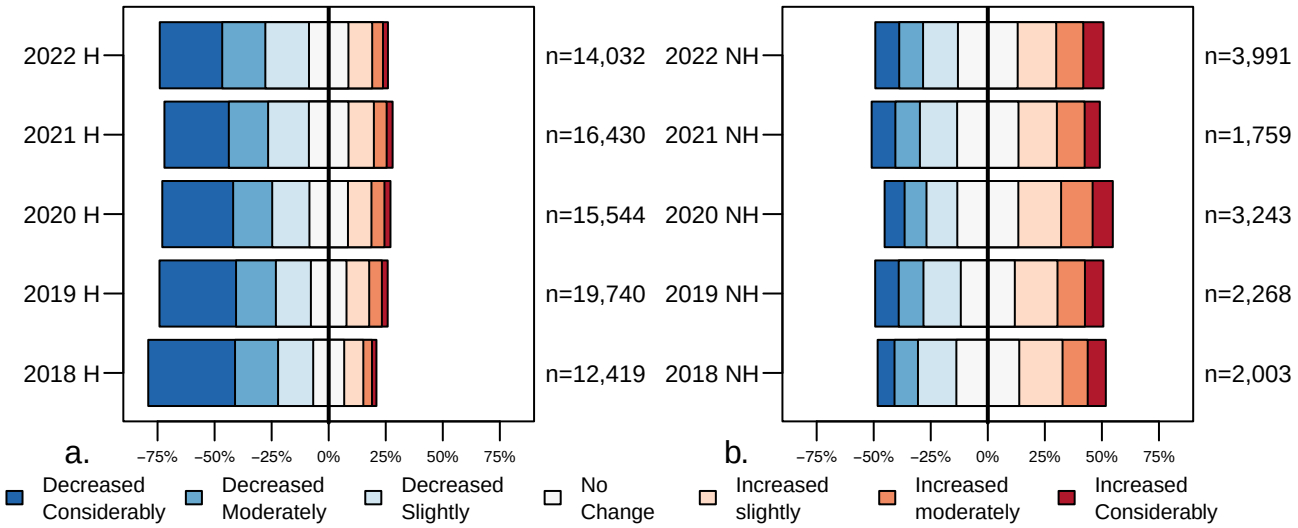

Figure 7-3. Hunters (a.) and nonhunters (b.) describe the number of deer seen now compared to five years ago in the county where they hunt and/or live in Indiana.

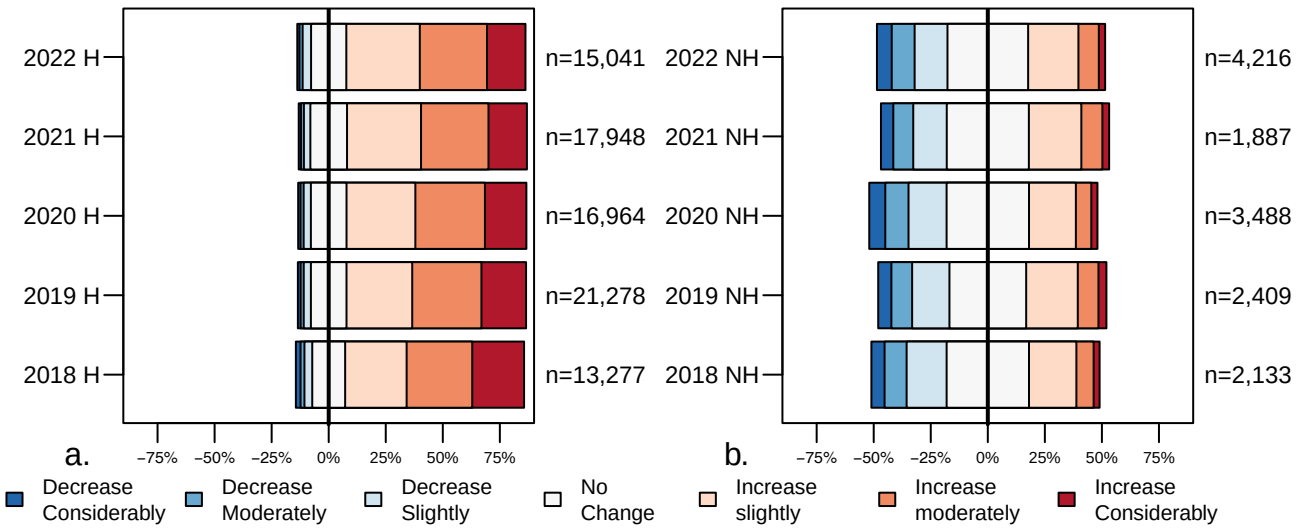

Figure 7-4. Hunters (a.) and nonhunters (b.) describe their desired change in the size of the deer population in the county where they hunt and/or live in Indiana.

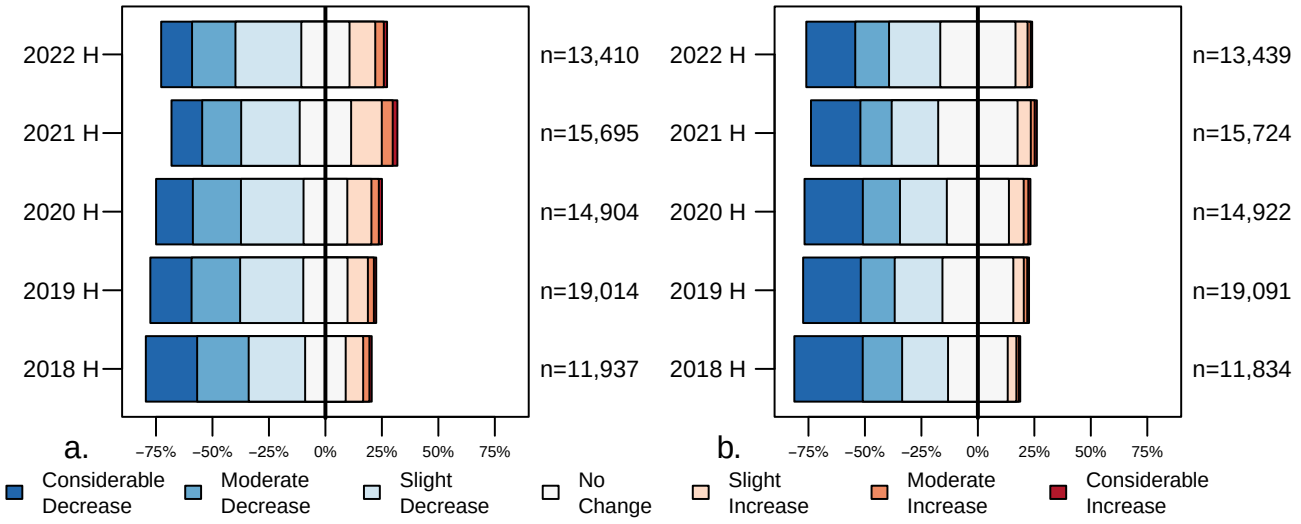

Figure 7-5. Hunter opinion on how the total number of harvested deer (a.) and their personal number of harvested deer (b.) in Indiana has changed over the last five years.

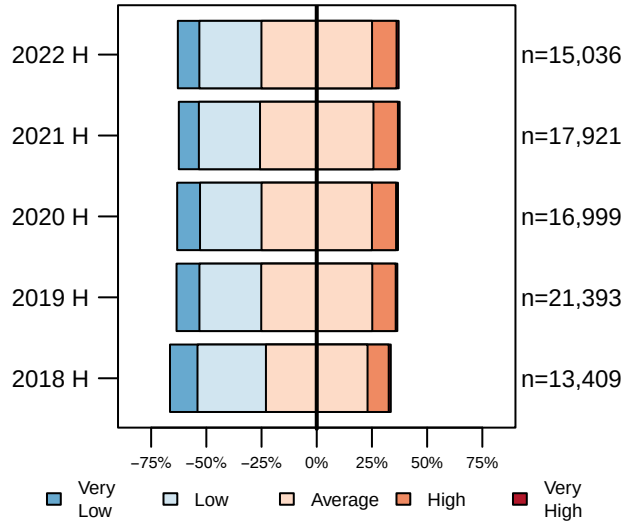

Figure 7–6. Hunters describe the quality of bucks in the county where they hunt in Indiana.

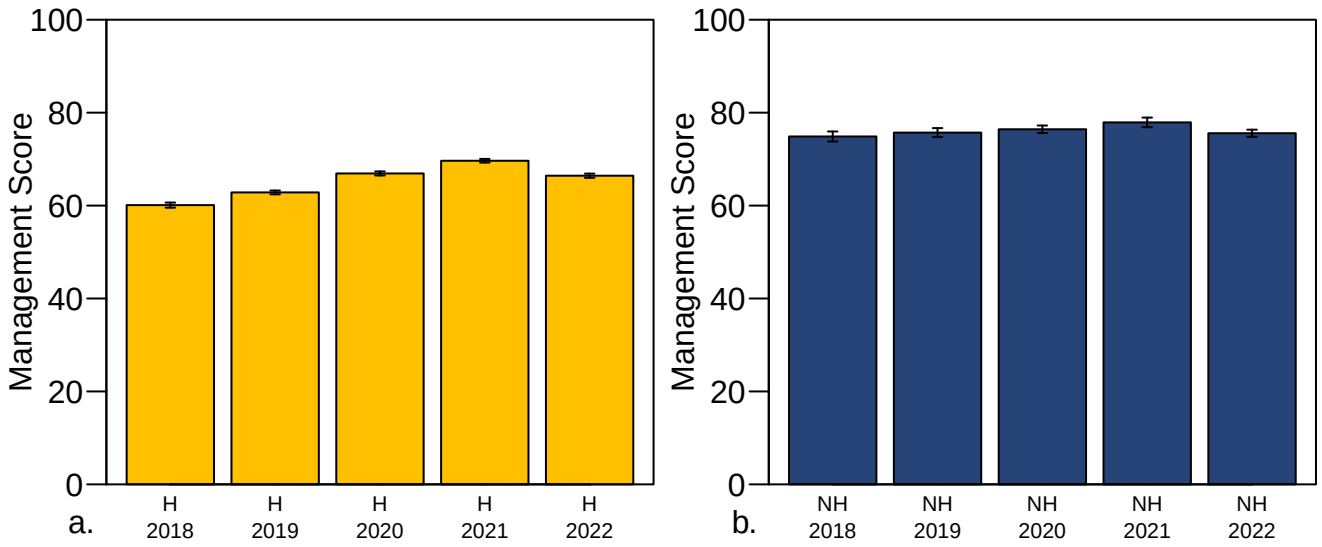

Figure 7-7. Hunters (a.) and nonhunters (b.) were asked to score the Indiana DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

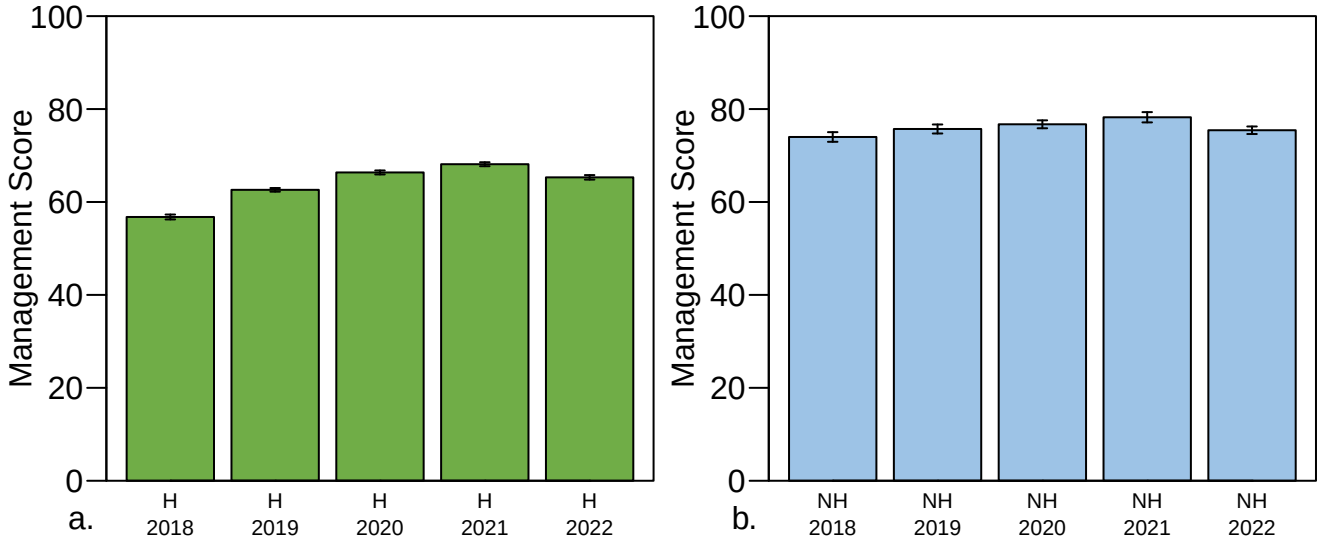

Figure 7-8. Hunters (a.) and nonhunters (b.) were asked to score the Indiana DNR's county deer management on a scale of 0 (poor) to 100 (excellent).

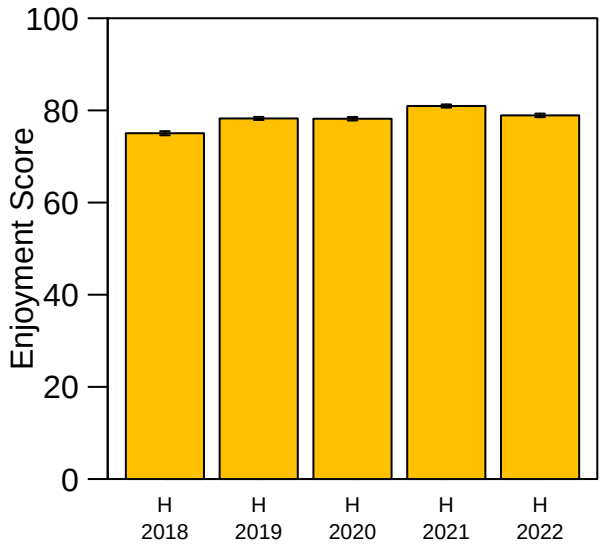

Figure 7-9. Hunters were asked to score their hunting experience on a scale of 0 (no enjoyment) to 100 (great enjoyment) during the previous Indiana deer season.

Chapter 8.
VOLUNTEER MONITORING

ARCHER'S INDEX

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Archery hunters play an important role in monitoring the abundance of furbearers and other wildlife species in Indiana. Since the early 1990s, Indiana archery hunters have voluntarily shared their wildlife observations with Indiana DNR as a way to monitor trends in statewide wildlife populations. The partnership between archery hunters and Indiana DNR has provided a consistent and inexpensive method for monitoring many wildlife species. The Division of Fish & Wildlife (DFW) Furbearer Program currently manages the Archer's Index and has shared its data on deer observations for analysis in the White-tailed Deer Report. The complete Archer's Index report is available on a yearly basis and contains indices for a number of furbearer species. See previous Archer's Index reports by searching wildlife.IN.gov. Volunteers may sign up to participate in the Archer's Index at on.IN.gov/archersindex.

Methods

Before archery hunting season, hunters who volunteered to participate in the survey were sent a standardized survey form and directions for recording wildlife observations. Hunters were asked to record the number of hours they spent hunting each day, noting either morning or evening hunts, and the total number of each wildlife species observed daily.

Historically, the survey ended on the same day as the early archery season ended, typically in late November; however, regulation changes were implemented in 2012 that extended archery season to one continuous season that ended in early January. Since then, the Archer's Index has ended one day prior to the opening of firearms season to ensure an unbiased and standard survey period. After the end of the survey period, participants returned their completed survey form to Indiana DNR.

Population indices were tabulated by dividing the total number of each wildlife species sighted by the total number of hours hunted. Observations per hour, fawn:doe ratios, and doe:buck ratios were calculated statewide and at a regional level based on the 10 deer management units (DMU) the Deer Research Program created in partnership with Purdue University to better understand deer trends across broad habitats (see Figure 3-13). Statewide results are reported in this section, and regional results are reported in the DMU Data Sheets section. Bootstrapped confidence intervals (CI_{95}) were calculated for observations per hour each year.

Results and Discussion

In 2021, a total of 305 hunters in 88 counties reported deer observations in the Archer's Index. Hunters observed a total of 11,313 deer in 14,006 hours during 4,293 observational periods ranging from 0.5 to 12 hours. Hunters observed an average of 0.87 deer per hour (CI_{95}=0.83 – 0.91; Figure 8-1). A total of 2,908 bucks, 4,728 does, 2,724 fawns, and 953 deer of an undetermined age and sex were observed. From the Archer's Index, the statewide fawn:doe ratio was 0.58:1 (CI_{95}=0.55 – 0.60), and the doe:buck ratio was 1.63:1 (CI_{95}=1.55 – 1.70). Comparatively, the harvest doe:buck ratio was 0.76:1 (CI_{95}=0.76 – 0.77; Figure 8-3).

The Archer's Index provides several trends or indices of the size, composition, and recruitment of the deer population and may be useful for monitoring how these populations change over time; however, because these values have not been measured against a known population, it is unclear how closely the values from these indices reflect true population values. Therefore, the results of the Archer's Index can only be used to monitor trends of deer population and not the actual size. One potential bias proposed by critics of volunteer monitoring observer indices is that fawn observations may be underrepresented. Older fawns can look similar to young does, especially if the fawns are not traveling with their doe. Thus, fawn:doe ratios and recruitment data may become skewed. However, the period when the Archer's Index occurs (October to mid-November) is considered an ideal time, because bias from fawns not traveling with their mother is minimized. Fawns are likely at their smallest body size, routinely traveling with their mother, and loss of the parent is minimized prior to firearms season. Furthermore, if the fawn:doe ratios are biased in favor of does, due to misidentified fawns, then the doe:buck ratio would likewise be skewed toward does. This does not appear to be the case for our data,

as doe:buck ratios are between 1.4:1 and 2.5:1 in most areas (see DMU sheets in the Appendices).

Fawn recruitment is the number of fawns that are born and survive to join the huntable population in the fall. The recruitment value is lower than the total number of fawns born each spring. Fawns die or are killed between birth and hunting season due to predation, disease, exposure, abandonment, deer-vehicle collisions, haying operations, and other reasons. Therefore, the recruitment rate is almost always lower than the birth rate. For example, the reproductive characteristics of does were recently studied in Illinois. Green et al. (2017) found an average of 20.5% of recruited fawns and 85.5% of adult does were bred by the end of the breeding season. Their average litter size was 1.9 ± 0.54 fawns. In 2015, Illinois reported its statewide recruitment, based on its fawn:doe ratio, was 0.5:1 (QDMA 2016). Even though a large proportion of deer were bred, resulting in a high rate of births, fawns had a high rate of mortality. Fawn recruitment values can be used for several different purposes, including modeling for allowable buck and/or doe harvest and as an indicator of potential problems with a deer herd, such a slow growth rate.

Although it may initially appear that fawn:doe ratios are low for many of the DMUs and statewide, Indiana has similar fawn:doe ratios compared to those of nearby states, according to the 2015 recruitment data reported to QDMA (2019): Ohio (0.60:1), Illinois (1.18:1), Michigan (0.47:1; QDMA 2015), or the Midwest average (0.81; QDMA 2019). Caution should be taken when directly comparing fawn:doe ratios across states, because different states use different methodologies to calculate them. These differences are often based on how the data have been historically collected. For example, Ohio uses the ratio of fawns to does in the harvest, whereas Wisconsin calculates its fawn:doe ratios on a regional basis, using the total number of biologist observations of fawns and does (0.90:1 in 2017; QDMA 2019). It may seem that all states should use the same system, but for each state's deer management program, the long-term trend (i.e., index) is more important than a comparison with neighboring states. Therefore, readers must understand how the data are collected in other states before comparing their ratios to Indiana's fawn:doe ratios.

Currently, Indiana has an approximately balanced pre-hunt sex ratio (1.63:1). Balanced doe:buck ratios are generally considered to be desirable because they increase the likelihood of all does being bred during the period when they are most receptive, a more condensed rut, and an earlier fawning season (Guynn and Hamilton 1986; Neuman et al. 2017).

Observations per hour is an index that can be used to examine long-term trends in the deer population. It is important to understand that this is an index of the population and does not represent population numbers or an expectation for hunters (i.e., if the average reported observation per hour is 1.1, hunters should not expect to see a deer every hour they are in the woods). The trend during the past 10 years apparently reflects the previous management strategy, with a decrease in observations that corresponds to a general management goal of decreasing the deer population by increasing harvest of does. Observations per hour have leveled off since 2013 (Figure 8-2), with only minor fluctuations since then.

AFTER HUNT SURVEY

Joe Caudell, Emily McCallen, and Julia Buchanan-Schwanke, *Indiana Department of Natural Resources*

For many years, Indiana DNR biologists examined deer at check stations to which hunters brought their deer to record their harvest. Biologists recorded age, sex, and other biological information that was useful for managing the deer herd. In 2015, Indiana moved to an online system, CheckIN Game, to make the process more convenient for hunters. The After Hunt Survey was created in 2017 to allow hunters the opportunity to continue providing biological information about their harvested deer. The goal of the After Hunt Survey is for hunters to self-report on enough deer so that both hunters and managers can examine deer population biology, ecology, and demographics at the county level. The 2021-2022 deer season was the fifth year the After Hunt Survey was available. Because the sample size for most counties was insufficient to report results at the county level, results are reported at regional and statewide levels.

Methods

The After Hunt Survey was administered using Qualtrics, an electronic survey system. Hunters were asked to participate in the survey after they had checked in their deer. They could also access the survey later by visiting deer.dnr.IN.gov and clicking on the After Hunt Survey link under Deer Management. Questions about the following were included: the equipment used to harvest the deer, the location of harvest, the number of hours spent hunting for that deer, their opinion of that particular hunt, and biological information for that deer.

Results and Discussion

Sample Size. A total of 3,643 hunters responded, an approximately 45% increase from the 2020-2021 survey. At least two responses were received from each county. The highest number of responses was 82 from Porter County. Of all responses, 84.2% were entirely completed, while 15.8% were partially completed. To be able to assess data at the county level, 80-120 responses are needed from each county, depending on the number of categories for each question. If these numbers aren't obtained, data can be analyzed at a regional level based on nine of Indiana's 10 Deer Management Units (DMUs; see Figure 3-13). Number of responses per DMU ranged from 142 (Dearborn Upland Unit) to 804 (South Unit; Table 8-1). Seventeen responses were attributed to the Urban Deer Management Unit.

Deer Ages. Hunters were asked to age their deer using tooth wear and replacement patterns. Excluding incomplete responses, hunters did not report the ages of 347 does and 657 bucks, including 152 bucks that were going to be mounted. In total, hunters reported the age of 726 does and 991 bucks.

Statewide, most deer were reported as 2.5 years old (Figure 8-3). There was an insufficient number of aged deer reported to summarize the age structure at the county level. Most of the aged does were from the Muscatatuck Plateau (51%), Dearborn Upland (47%), Wabash Valley (42%), Northwest (40%), and South (39%) were 1.5 years old. In the Dearborn Upland (34%), Muscatatuck Plateau (32%), and the West Central (31%) DMUs, most of the aged bucks 3.5 years old (Figure 8-4).

Lactation Rates. Lactation rates provide an estimate of fawn recruitment, which is especially useful in setting harvest quotas. Low fawn recruitment may warrant a change to quotas because it indicates fewer deer are surviving and entering next year's population.

During the 2021-2022 season, 1,399 hunters who harvested a female deer reported that 421 (30.1%) were lactating and 152 (10.9%) were not; the remaining 826 hunters (59.0%) did not report the lactation status. From Oct. 1, 2021 to Dec. 31, 2021, 37% of adult does age 2.5 years or older were reported to be lactating. Lactation rates for does age 2.5 years or older (n=351) obtained from all four After Hunt Surveys depict a gradual decline as the season progresses (Figure 8-5). To report lactation rates at the county or regional level, especially for one season, the number of responses must increase substantially. The variation that results from the small sample size obtained does not allow for a reliable estimation of recruitment.

Hunter Experience. The After Hunt Survey asks several questions related to a particular hunting experience. On a scale of 0 (poor) to 100 (excellent), hunters

were asked to rate their overall enjoyment of the hunt, the number of does and bucks they saw on the hunt, the quality of those bucks they observed, and how they felt Indiana DNR is managing deer in the county in which they hunt. Responses from quality of bucks (n=3,239), quantity of bucks (n=3,269), and quantity of does (n=3,333) were bimodal (Figure 8-6), meaning most responses were either at the low end or the high end of the scale. Responses about how Indiana DNR was managing deer in the county where they hunted (n=3,203) and how much they enjoyed their hunt (n=3,508) both indicated higher levels of satisfaction (Figure 8-7).

Antler Characteristics. Hunters reported 91% of the bucks harvested had a typical rack; the remaining 9% were non-typical. The total number of points on 1,899 harvested bucks averaged 7.5 (SD=2.9, CI_{95}+0.1) with a median, or midpoint in the range of responses, of eight points. The average inside spread of 1,434 bucks was 13.3 inches (SD=4.6, CI_{95}+0.2) with a median measurement of 14.2 inches. The total inches of antler, defined as the length of the main beam plus the length of each of the tines as measured from the center of the main beam along the longest portion of the tine, from 835 bucks, averaged 51.4 inches (SD=59.7, CI_{95}+4.1).

Body Weights. Body weights can provide valuable information about the quality of deer and the relationship of recruitment to nutrition if data are frequently reported on small scales (i.e., county or 16-mile2 grid level). Hunters (n=624) reported the field-dressed weight of their deer only if it had been weighed on a scale. Live weights (Figure 8-8) were calculated by multiplying the field-dressed weight by 1.26 as reported in Smart et al. (1973). The number of responses was insufficient to summarize body weights by age class at either the county or regional level. Self-reporting of body weights by hunters needs to be significantly higher for this factor to be used to inform management.

Hunter Effort. The number of hours it takes to harvest a deer can be used to calculate harvest per unit effort, which can serve as an index for deer population size. Because this index may have an inherent selective bias, it should be viewed with caution. For example, hunters may spend more time to harvest a particular buck than they would to harvest a doe.

Hunters (n=2,118) reported they hunted an average of 26.7 hours (SD=47.6, CI_{95}+2.0) and a median of 14 hours before harvesting their buck (Figure 8-9). During this time, hunters (n=2,122) saw an average of 3.4 bucks (SD=17.2, CI_{95}+0.7), with a median of two bucks; they (n=2,118) saw an average of 5.3 does (SD=8.9, CI_{95}+0.4), with a median of three does.

Hunters (n=1,368) reported they hunted an average of 17.8 hours (SD=26.3, CI_{95}+1.4) and a median of eight hours before harvesting their doe (Figure 8-9). During this time, they saw an average of 1.2 bucks (SD=2.4, CI_{95}+2.4), with a median of zero bucks and an average of 4.4 does (SD=5.9, CI_{95}+0.3), with a median of three does. A significantly greater level of reporting is needed for hunter effort to inform management strategies at the county or regional level.

Hunter Preference. Hunters (n=2,170) who saw more than one buck when hunting were asked why they waited for the buck they harvested. They could choose more than one reason, which produced 1,626 total responses. A total of 467 hunters (28.7%) were waiting for an older buck, 421 (25.9%) were waiting for a buck with larger antlers, 309 (19.0%) felt that the other bucks were out of the range for their equipment, 151 (9.3%) were waiting for a specific buck, and 142 (8.7%) felt it would not have been a safe shot. A total of 136 hunters (8.4%) reported their reason was not listed.

Hunters (n=1,399) who saw more than one doe while hunting were asked why they waited for the doe they harvested. Hunters were again allowed to choose more than one reason, which produced 1,374 total responses. A total of 485 hunters (35.3%) were waiting for a larger, older doe; 277 (20.2%) felt that the other does were out of range; 146 (10.6%) felt it would not have been a safe shot; 177 (12.9%) passed on does because they had fawns with them; 90 (6.6%) did not want to disturb the buck that was with the doe; and 32 (12.2%) were looking for a smaller, younger doe. A total of 167 hunters (12.2%) reported their reason was not listed.

The After Hunt Survey has potential to provide valuable biological information from harvested deer, including age, sex, and reproductive status. It may also be used to develop an index of harvest per unit effort. Additional research is needed to evaluate the utility of

harvest per unit effort as an accurate estimator of population size. Reporting must increase significantly before information collected in the After Hunt Survey can be reliably applied at the regional, county, or sub-county level. Increasing promotion of the survey in the annual Hunting/Trapping Guide, media outlets, and on social media will help in the effort to obtain a sufficient number of responses for this information to be used for management purposes.

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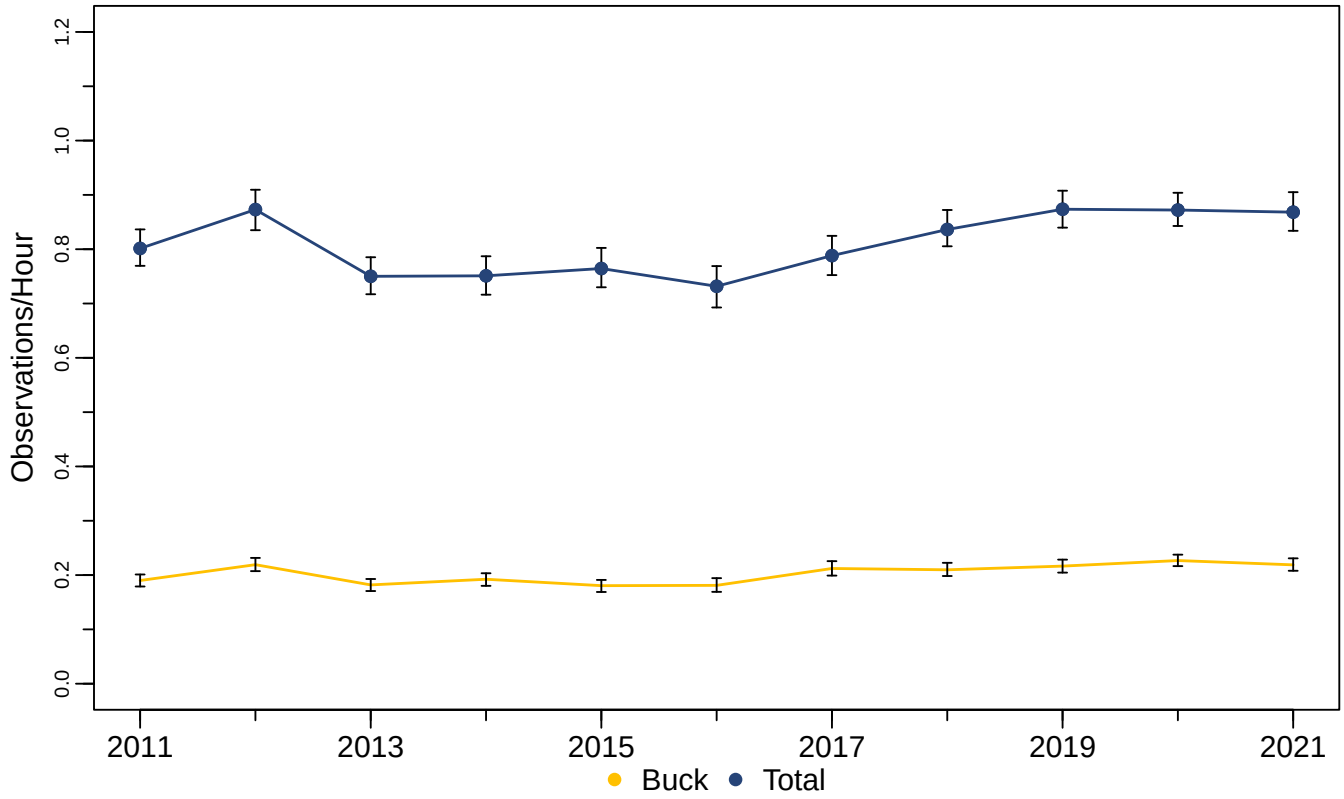

Figure 8-1. Annual mean observations per hour of bucks and total deer based on the Archer's Index.

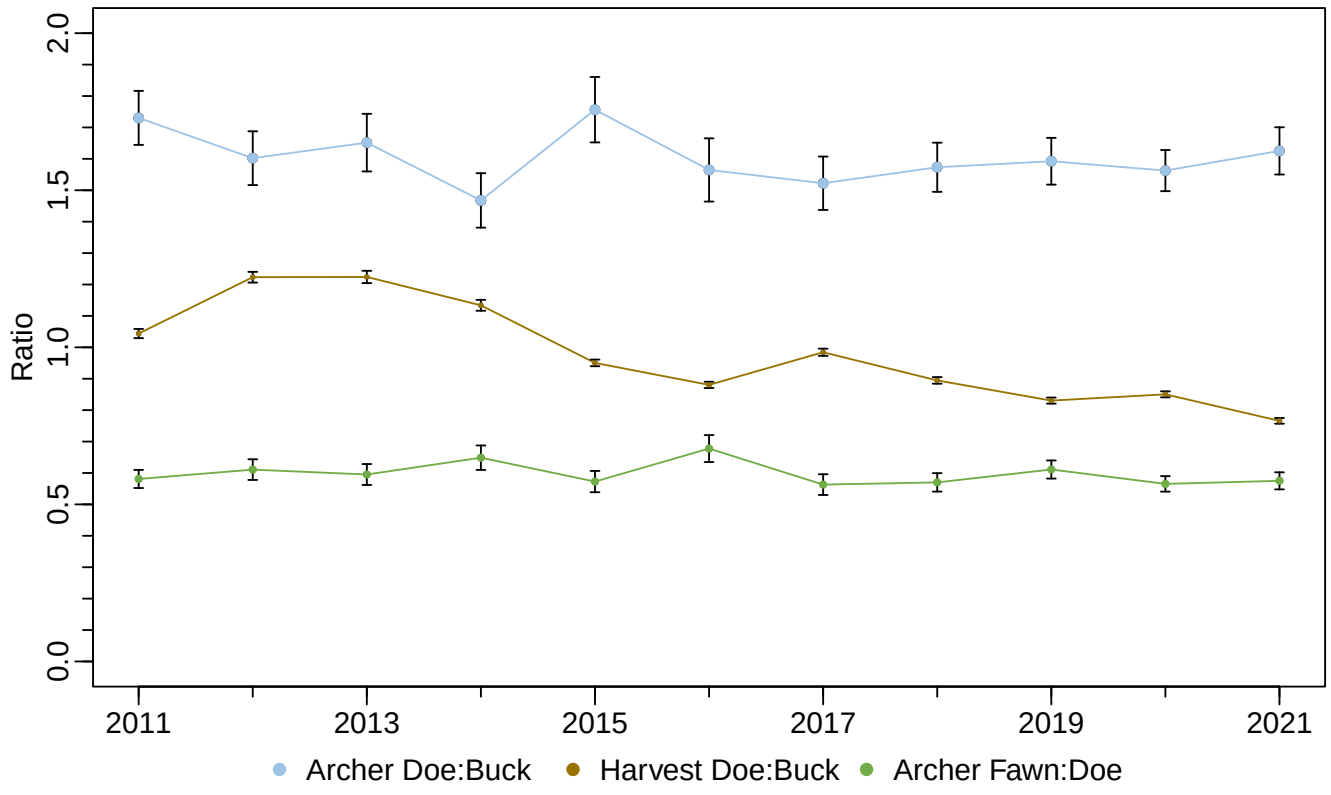

Figure 8-2. Annual doe:buck and fawn:doe ratios based on Archer's Index and harvest records.

Table 8-1. Number of After Hunt Survey responses by Deer Management Unit, 2021-2022. *The Urban DMU incorporates portions of 19 counties (Lake, Porter, Laporte, St. Joseph, Elkhart, Kosciusko, Allen, Tippecanoe, Delaware, Hamilton, Boone, Hendricks, Marion, Morgan, Johnson, Vanderburgh, Warrick, Floyd, and Clark). As such, the total number of counties will not equal 92 when the Urban DMU is included.

Deer Management Units	Number of Counties in Unit	Number of Responses	% of Total Responses
1 - Northwest	13	611	17%
2 - Northeast	4	225	6%
3 - West Central	9	292	8%
4 - East Central	28	628	17%
5 - Wabash Valley	6	269	7%
6 - South	16	804	22%
7 - Muscatatuck Plateau	4	185	5%
8 - Dearborn Upland	3	142	4%
9 - Southwest	9	466	13%
10 - Urban	19*	17	0.5%
		3639	

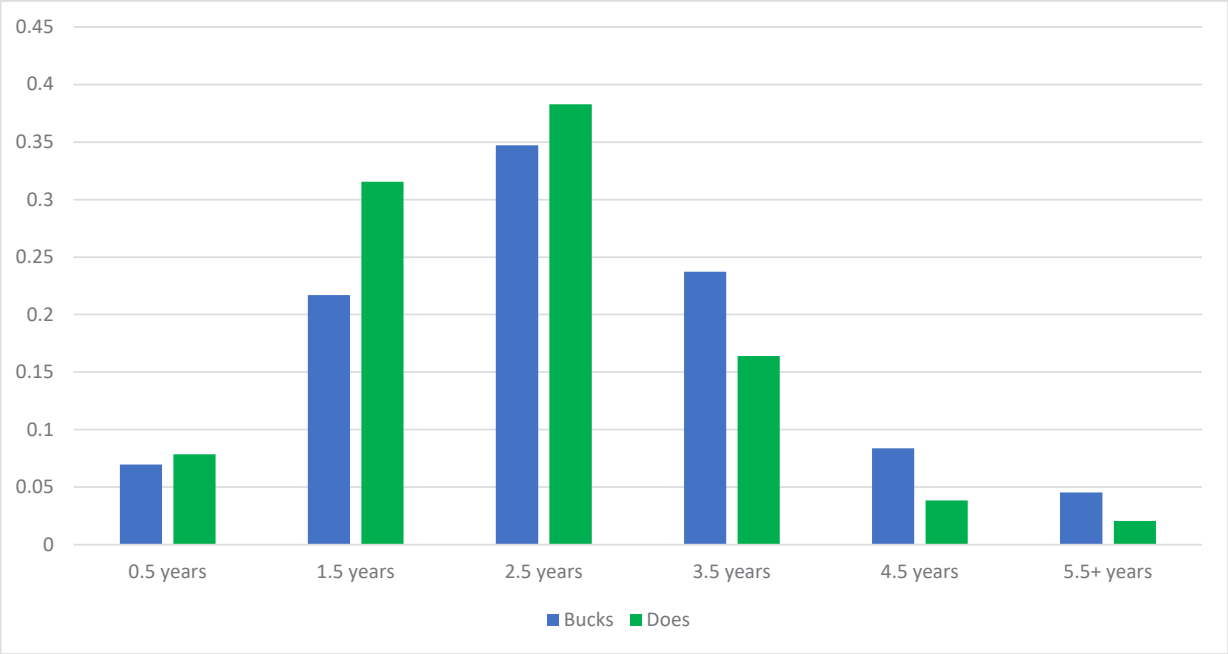

Figure 8-3. Age distribution of the statewide deer harvest reported in the 2021-2022 After Hunt Survey.

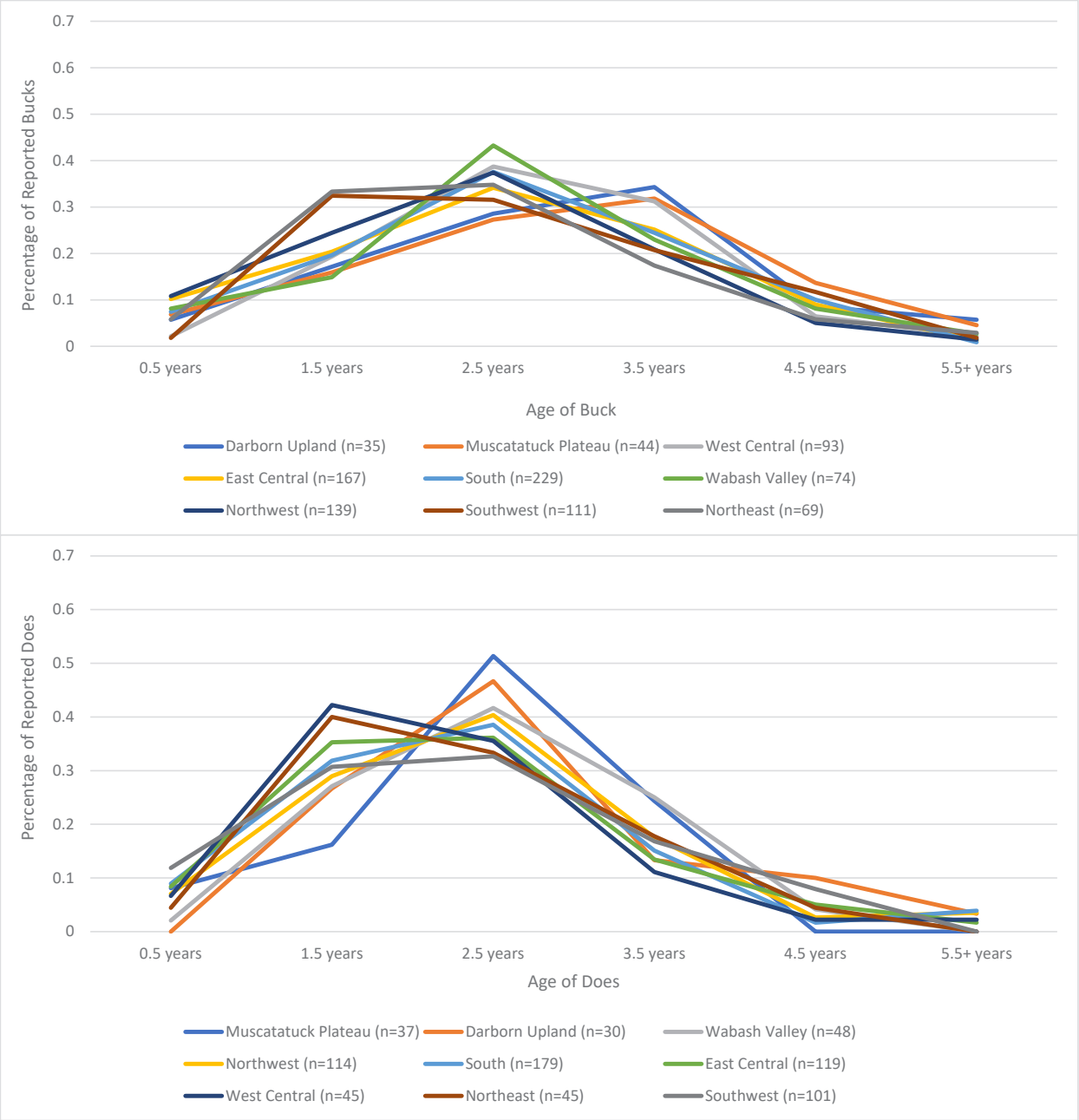

Figure 8-4. Age distribution of harvested bucks (upper graph) and does (lower graph) by Deer Management Unit reported in the 2021-2022 After Hunt Survey. The number of responses in each DMU is next to its name. Due to the lack of data from the Urban DMU, age estimates for bucks and does could not be calculated.

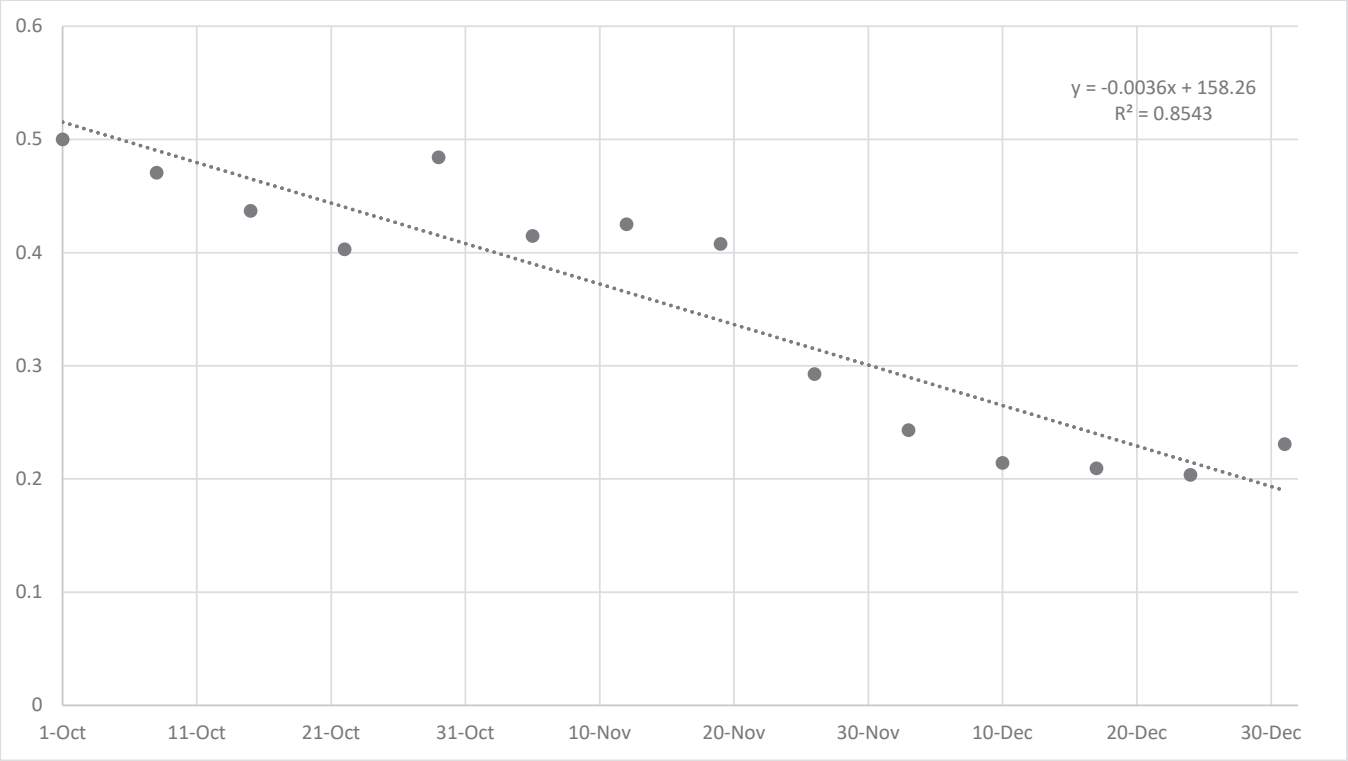

Figure 8-5. Cumulative weekly lactation rates of does at least 2.5 years old reported in the After Hunt Surveys from 2017-2018 to 2021-2022. The trend line indicates a gradual decline in lactation rates as the season ends.

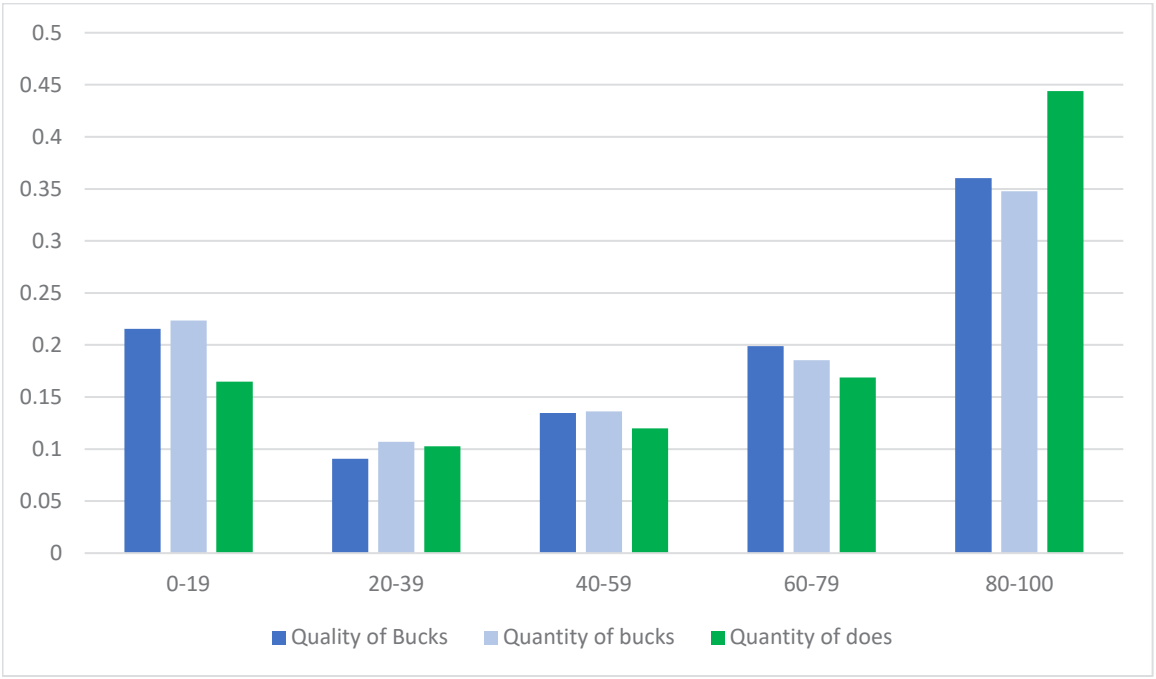

Figure 8-6. Hunter opinion about the quality and quantity of bucks and the quantity of does observed while hunting during the 2021-2022 deer hunting season. Scores range from 0 (poor) to 100 (excellent).

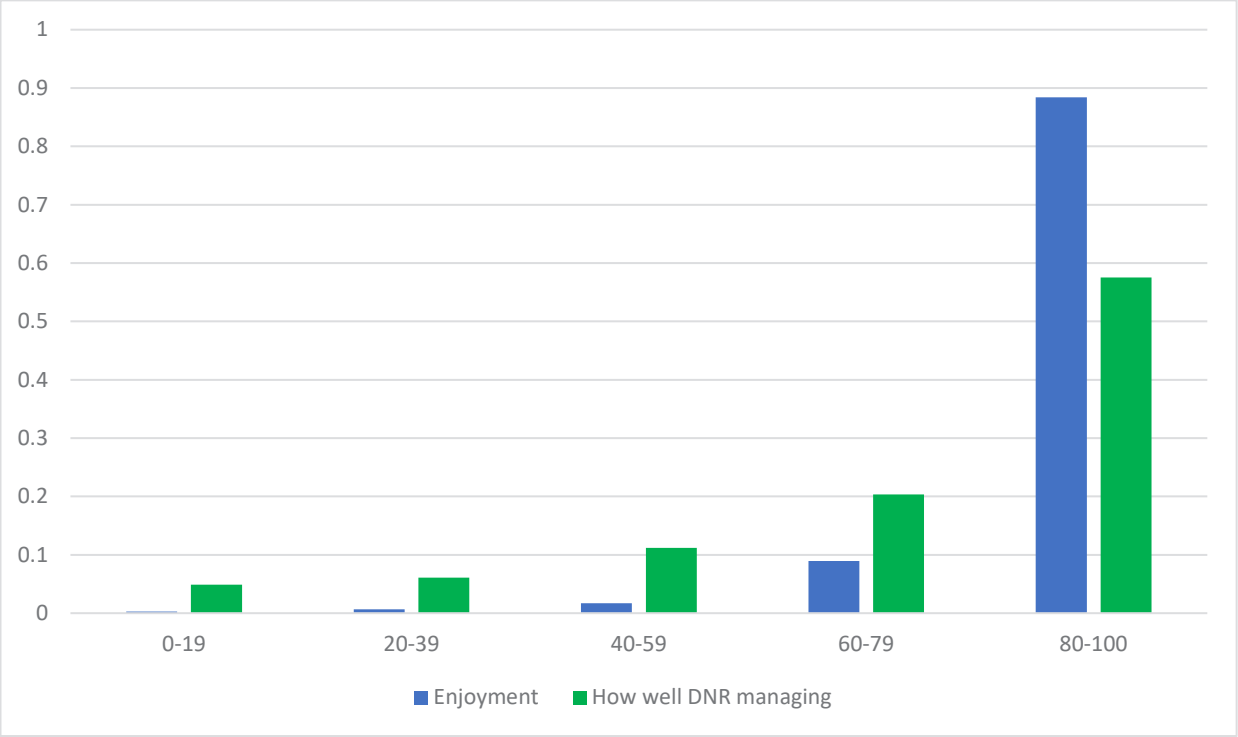

Figure 8-7. Hunter opinion about how the Indiana DNR is managing the deer in the county where they hunted and their enjoyment of the hunt during the 2021-2022 deer hunting season. Scores range from 0 (poor) to 100 (excellent).

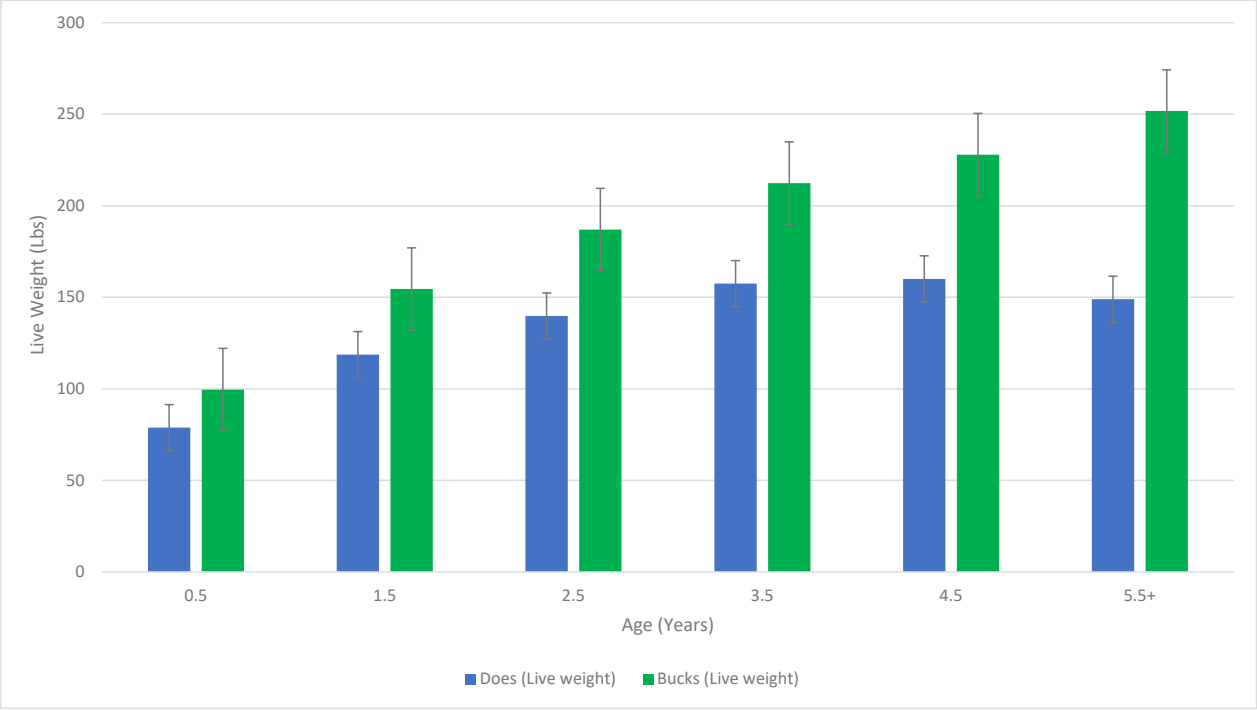

Figure 8-8. Live weights of deer by age class reported in the 2021-2022 After Hunt Survey. Of the 1,009 hunters who reported a weight, 624 (61.8%) also reported the age of the deer.

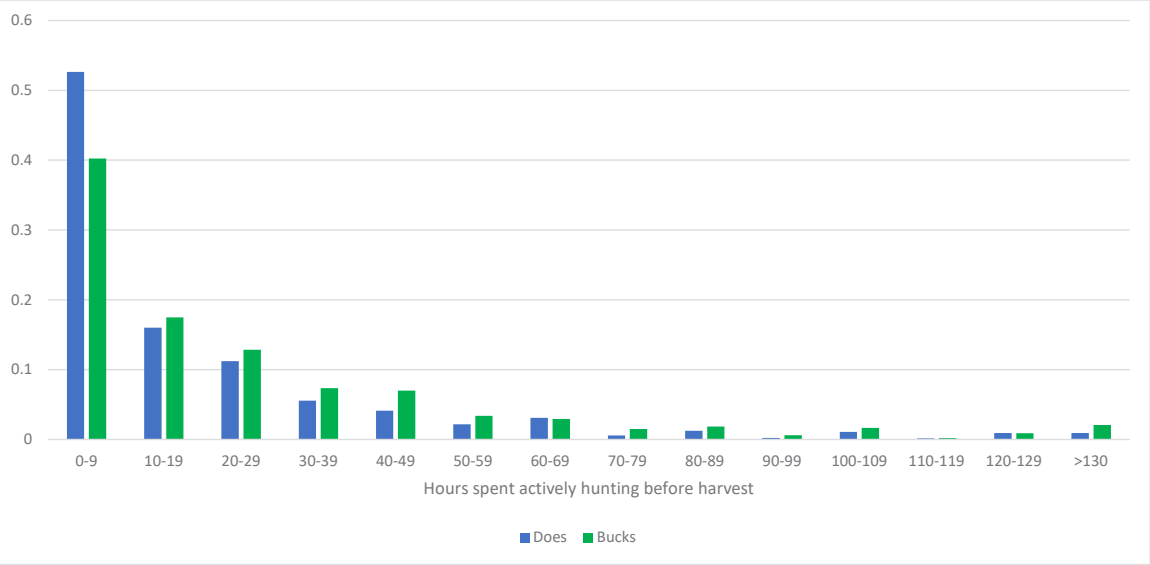

Figure 8-9. Number of hours hunters spent actively hunting before harvesting a buck or a doe during the 2021-2022 deer hunting season, as reported in the 2021-2022 After Hunt Survey.

Chapter 9. DNR DEER RESEARCH

PUBLIC OPINION ON PROPOSED RULE CHANGES

Joe N. Caudell, *Indiana Department of Natural Resources*

Deer management in Indiana is governed by laws that are passed by Indiana's Legislative Branch, and rules that apply those laws that are adopted by Indiana's Natural Resource Commission (NRC). Every two years, the Indiana Division of Fish & Wildlife (DFW) reviews the rules related to deer management, proposes new rules or changes that will simplify and/or improve deer hunting and management, solicits proposals and input on our proposals from the public, conducts analysis on the results, and moves forward to the NRC a package of rule proposals. In 2021, DFW opened the GotINput process to solicit feedback for a series of proposed changes to the deer regulations. We received comments on the proposed changes and proposals from the public for consideration. For rules that would have the greatest impact on the public, and for those proposed by hunters that could be controversial, we collected additional input from the 2022 Deer Management Survey.

On 31 January 2022, we distributed the annual deer management survey via email to 1,012,126 individuals consisting of anyone who had purchased a license since 2015 (n=811,121) and Wild Bulletin subscribers who have never checked in a deer or purchased an annual hunting, trapping, or fishing license from DFW (n=200,980). Respondents were asked to self-identify as a deer hunter or non-deer hunter and to answer basic demographic questions, although a response to these questions was not required. From our total distribution group, 28,109 individuals started the survey (response rate = 2.8%) with a completion rate of 88.2%. We received 22,842 responses from current and lapsed hunters and 5,267 responses from non-deer hunters. Between 15,909 and 17,195 hunters responded to the questions about proposed changes to the deer rules. We have summarized the results from the GotINput process and the Deer Management Survey related to each of the proposed rules and public suggestions below.

Introduce a Statewide Antlerless Bag Limit of Six Antlerless Deer and Remove the Bonus Antlerless Deer Designation

Currently, hunters can theoretically harvest the total amount of deer available in each county, in addition to the bag limits for archery and muzzleloader licenses. This is often a source of confusion for hunters who are trying to determine how many deer they can harvest. Often, upon learning that each hunter can harvest between 150 and 400 antlerless deer (depending upon the year and the total number of bonus antlerless deer available for each county), hunters have expressed that they believe DNR is mis-managing the deer herd and that the ability for each hunter to harvest that many deer is socially irresponsible. To reduce the total number of deer that can be harvested statewide, however, would require a change to the current rule (312 IAC 9-3-4) that governs the take of antlerless deer. Therefore, DFW has proposed a rule change to allow a single hunter to harvest a maximum of six antlerless deer through a combination of archery, muzzleloader, and antlerless licenses. This change would not include special hunts, such as those on military lands, state parks, or deer reduction zones.

The current system of management is based on hunters being able to harvest antlerless deer in addition to the antlerless deer they can harvest for each bag limit for each license type, which are referred to as bonus deer. When this program was started, the designation "bonus" made sense because hunters were used to a bag limit of up to two antlerless deer taken with archery licenses, no antlerless deer taken on a firearms license, and up to one antlerless deer taken on a muzzleloader license. But over time, hunters have forgotten what the bonus designation refers to, confusing them as to how many deer they can harvest in each county. This is one of the most frequent calls to the Deer Hotline in Indiana (see results of Deer Hotline Use in this section). To resolve this confusion, DFW has proposed a rule change to remove the bonus designation from the county antlerless quota system so that the total number of antlerless deer that can be harvested within a county, regardless of equipment or license type, is the county antlerless quota.

In general, respondents from the GotINput process were supportive of both of the proposed rules, and there was no outright opposition to a statewide bag limit. Several comments indicated that some respondents misunderstood the intent of the rule, thinking that it would mean that each county would have an antlerless quota of six, rather than each county quota being individually set (as is currently done) and the total number of deer that a hunter can harvest statewide being six. Other respondents supported this approach, but suggested a lower limit, ranging from one to four per hunter statewide.

A total of 52 individuals responded via the GotINput process to the proposed rule change of creating a statewide bag limit of six deer and removing the "bonus designation" from the rules with a total of 96% agreeing to some degree to the proposal. Fourteen individuals (27%) responded in such a way that indicated they agreed that there need to be limits on the harvest but misunderstood the intent of the proposed rule. The intent was to limit each individual to being able to harvest a total of no more than six antlerless deer statewide. Similar to the results of the deer management survey, many of these respondents indicated they believed that DNR was attempting to remove county limits and impose a quota of six antlerless deer in each county. Eighteen respondents (35%) agreed with the proposed rule as written, while 12 additional respondents (23%) agreed with a statewide limit but thought it should be around four deer. Only two individuals disagreed with the proposal. One stated that as long as a hunter stayed within each individual county's limit, they should be allowed to harvest as many deer as they need (i.e., keep the status quo). The other respondent thought a bag limit would cause more people to harvest more deer for bragging rights. Six respondents agreed with removing the bonus designation from the antlerless deer regulations, and none opposed this change.

We asked a question about limiting the total number of antlerless deer that each hunter can harvest in Indiana to six antlerless deer in the 2022 Deer Management Survey, and we received 17,195 responses. Of those, 74% supported this to some degree (48% of those strongly supporting), 12% were neutral, and 14% opposed (7% opposing; 7% strongly opposing) this proposal.

We also asked a question about removing the "bonus" deer designation from rules in the 2022 Deer Management Survey. We received 16,691 responses to this question. Of those, 64% of hunters supported this rule proposal (37% strongly supporting; 27% somewhat supporting), 24% were neutral, and 12% were opposed (6% opposing; 6% strongly opposing).

Based on harvest records, only a fraction of hunters desires to harvest one buck and six does. In the last three years, about 3.5% of hunters expressed a desire to shoot five or more deer. In the 2019-2020 season, 0.7% of hunters (34 total) harvested five or more deer. In general, people do not harvest more than seven deer (Table 3-5 from the 2020 Indiana White-tailed Deer Report) with approximately 70% harvesting one deer. In 2019 and 2020, less than 0.1% of hunters (37 total) harvested eight or more deer. In 2019, only 35 hunters statewide harvested eight or more deer. In 2020, only 37 hunters reported harvesting more than eight deer. Nevertheless, the fact that hunters can harvest hundreds of deer each is one of the most contentious aspects of deer management in Indiana. Most hunters believe that other hunters should not have what is essentially the unrestricted ability to harvest hundreds of deer statewide.

Adding a statewide bag limit will greatly reduce confusion among the public and reduce the burden to staff responding to questions and comments about the total number of deer that can be harvested per person. This will also more accurately reflect the harvest and what is considered to be socially acceptable.

The reason for the proposed change regarding the "bonus" designation is that many hunters do not remember the reason for this language, and it often confuses them (i.e., "what does bonus mean") when they are trying to determine how many deer they can harvest. The result of this change would be that the county bonus antlerless quota would become the quota for the number of does that could be harvested in that county, making for a simple explanation of how many deer can be harvested in a specific county. Most hunters are likely not to notice this change, and it should not affect hunters or hunting in any significant manner; however, specific rules are based on the "bonus" language, such as the Special Firearms Antlerless Season and the rule that prohibits the use of bonus antlerless

licenses on land owned by the DFW, and those will also need to be changed.

The proposed change would not affect military hunts, deer reduction zones, or other special licenses, so hunters will still have the opportunity to harvest additional deer if they desire. This proposed change should improve public opinion of the DNR because we will no longer give each hunter the opportunity to theoretically harvest more than 400 deer. Although this never happens, it is the perception of hunters that deer are overharvested. We believe it's this perception that keeps hunters from harvesting an additional deer (e.g., because hunters can shoot 400 deer, we need to restrain ourselves so that we have deer into the future). While this would be a widely popular rule change and may cause a slight increase in harvest, not making this change will result in the status quo.

Not Allow Hunters to Shoot Antlerless Deer on Fish & Wildlife Properties with a Firearm

A hunter suggested this rule in the 2021 GotINput process, and it would also be a necessary rule if we remove the bonus antlerless designation from the current rules; therefore, we asked hunters their opinion of not allowing hunters to shoot antlerless deer on Fish & Wildlife areas (FWAs) with a firearm. We received 16,478 responses to this question with 54% of hunters supporting this rule proposal (33% strongly supporting; 21% somewhat supporting), 29% were neutral, and 17% opposed this rule (9% strongly opposing; 8% somewhat opposing). Currently, bonus antlerless licenses cannot be used on FWAs, so this change to the rule language will result in the status quo. This rule would only be necessary if we remove the "bonus" designation from the antlerless licenses.

Change the Bundle License to One Antlered Deer and Two Antlerless Deer

The bundle license currently allows hunters to harvest one antlered deer and two antlerless deer, or three antlerless deer. Although it is generally considered economically advantageous for hunters to have more choices than fewer, in this case, the additional choice often confuses hunters. It often takes a lengthy and complex explanation for hunters to fully understand all the options that can be used with the bundle, such as being used over multiple seasons; three antlerless deer, but not two antlered deer; bonus antlerless deer cannot be harvested on FWAs, but antlerless deer can, provided they are taken during the archery and/or muzzleloader season and they are not bonus deer; etc. Therefore, to make Indiana's hunting regulations simpler, we proposed changing the bundle license to one antlered deer and two antlerless deer.

We received 19 respondents to this question on the GotINput process. Ten people agreed with the proposed change, seven disagreed, and two had additional questions as to our rationale for this change. The primary motivation is to make our licenses more easily understood. By changing the bundle to one antlered and two antlerless deer, it makes it easier to explain the use of this license. New hunters are often confused about what a license can be used for. Our surveys also show that a buck and two does or hunting during multiple seasons for a buck and the desire to also harvest a doe is the most common goal of hunters. The 2020 Deer Management Survey found that 76.3% of hunters want to harvest a buck. When thinking about the total number and combination of deer desired, the most common combination was the desire to harvest one buck and one doe (29.8%), one buck and two does (22.0%), or a single buck (18.6%), which is often hunted over multiple seasons. Only 4.8% of hunters wanted to harvest three deer, regardless of its sex (Boggess and Vaught 2021). Of these, approximately half would harvest a buck by chance. The remaining hunters would have to pass up on at least one doe to harvest a buck (assuming an approximately 1:1 sex ratio and a random distribution of deer).

We asked a question about changing the bundle to allow hunters to only harvest one buck and two does in the 2022 Deer Management Survey. We received 16,374 responses to this question. Of those, 62% of hunters supported the proposed rule (40% strongly supporting), 19% were neutral, 18% opposed (11% strongly opposing). This change would align with current harvest quotas (i.e., one buck and two does per county). It will also improve our ability to estimate effort of harvest, which can be used as another indicator for the relative population size.

Combine the Archery and Crossbow License

In Indiana, different licenses are required to hunt deer in different seasons and/or to hunt a buck or doe. Archery is currently the only season that requires a different license to use a different type of archery equipment. Crossbows are typically distinguished from vertical-type bows because they have some type of limb mounted on a stock, and the bow string is released via some type of trigger. This is compared to vertical bows with which the bow is held with an outstretched arm and released with a trigger held in the hand and/or directly by the finger. Both require some type of limb, string, and long projectile. Vertical bows are further broken down into types (e.g., recurve bows, compound bows, long bows) that often represent some level of technological advancement. Therefore, we propose to combine the archery and crossbow license into one license type.

In the GotINput process, we received 34 total comments with 24 (71%) supporting the inclusion of crossbows into the archery license and 10 comments (29%) that disagreed with this proposal. Most of the agreement was that it would simplify the license structure, reduce confusion about what equipment could be used during archery season, and there was no point to have an equipment-specific license inside a single season. The opposition varied, ranging from opposition to crossbows being in the archery season in general, the importance for DNR to understand the impact of crossbows on the deer population (that does not occur with vertical archery equipment), to the view that in general crossbows should have a separate season. The Indiana DNR monitors deer population trends annually to ensure that we have a thriving deer population for decades. Crossbows have been legal throughout all archery season since 2012, and their use is steadily increasing in Indiana. Much of this increase is being driven by archery hunters changing over to crossbow equipment. There has been no indication of population impacts associated with the use of crossbows and thus no indication that their use is detrimental to Indiana's deer herd. The combination of the archery and crossbow equipment into a single license will not cause any significant change in harvest because the two equipment types currently share a single season.

A question in the 2022 Deer Management Survey asked about combining the4 archery and crossbow licenses into one license. We received 16,462 responses to this question. Of those, 73% supported this rule proposal (61% strongly supporting; 12% somewhat supporting), 12% were neutral, and 19% opposed
(11% strongly opposing; 7% somewhat opposing).

Because it is assumed that archery hunters will have the strongest opposition to this change and will be the group most affected, we looked at hunters who only reported that they archery hunted in 2021 and used no other equipment during the various seasons. We had 894 archery-only respondents out of 16,462 total respondents (5.4%). Of those, 44% supported this proposal (31% strongly supporting; 13% somewhat supporting), 18% were neutral, and 38% opposed (30% strongly opposing; 8% somewhat opposing).

The use of crossbows in the archery season has been a sensitive issue with some hunters in Indiana because it was first considered to be added to the rules for all hunters. We recognize the desire of hunters to keep seasons specific to a type of equipment and to place certain limitations on others who hunt that season. But one of the goals for the Deer Program is to simplify those rules that govern deer hunting so that hunters desiring to enter the sport are less confused by the myriad of regulations. If this proposal is accepted, it will simplify what license is needed for hunting during archery season and increase the value of the archery license.

Change Archery and Muzzleloader Licenses to Antlered Only

The primary goal of the DNR in proposing this rule is to simplify the regulations so hunters can more easily understand what deer can be legally taken each year. One set of rules that can confuse hunters is the options to take different sex deer on the same license, which complicates their understanding of the total number of antlerless deer that can be harvested. Therefore, we proposed that hunters can only take antlered deer on both muzzleloader and archery licenses.

Of the 23 respondents, eight agreed with this proposed rule change, 13 disagreed, one questioned why a change would need to be made, and another asked how this would affect the bundle license. Individuals

who disagreed felt it would be an additional financial burden on hunters because more than one license would be required, that it would encourage hunters to take younger bucks to fill that tag, and that unused "buck tags" would go unfilled, which would be unfair to hunters. Currently, hunters would have to purchase more than one license to harvest a doe with a firearm, so it would make the other single-purchase, equipment-specific licenses similar to the firearms license. The advantage hunters will gain is the antlerless license will be valid for any season and not restricted to a single season, as is now the case with the archery license that is used to target an antlerless deer. If hunters are unable to harvest a doe during archery season, they can use that license to hunt with a firearm, later with a muzzleloader, and then back to archery equipment late in the year to maximize their opportunity to harvest a doe.

The intent of this proposed change is to simplify a complex license structure, and those individuals who want to harvest a deer of either sex during a single season will no longer need to purchase an additional license. Based on survey results in the 2020 Indiana White-tailed Deer Report, few hunters use the single-use archery (7.6%), crossbow (4.1%), and muzzleloader license (2.9%). Likewise, only 6.5% of hunters reported they were interested in harvesting a single deer regardless of sex. Our survey data indicates most hunters (76.3%) want to harvest a buck as part of their annual take. The most common combinations hunters desired were one buck and one doe (29.8%), one buck and two does (22.0%), and a single buck (18.6%). Only a small percentage of hunters purchase an archery, crossbow, or muzzleloader license with the intent of harvesting a single deer regardless of its sex, so only a small number of hunters would be affected by this change.

A biological effect of changing archery and muzzleloader licenses to antlered deer only would be a reduction in the harvest. With the current license structure, if a hunter holds only one license, they can harvest either a buck or a doe. With an antlered-only license, hunters would have to purchase two licenses and have those on hand to shoot either an antlered or antlerless deer. It is unknown what the decrease in overall harvest would be, but it is likely fewer deer would be harvested overall because hunters who purchase individual licenses (i.e., not the bundle) are likely to purchase their licenses one at a time. Further, because most hunters desire a buck, it is likely they would attempt to first fill their antlered license. After harvesting their antlered deer, they would purchase a second license, potentially passing up a doe because they do not have an antlerless license.

Another question in the 2022 Deer Management Survey asked about changing the archery and muzzleloader license to buck-only. We received 16,374 responses to this question. Of those responses, 37% supported this proposal (19% strongly supporting), 23% were neutral, and 40% opposed this proposal (28% strongly opposing).

Although this change would theoretically make the hunting system less confusing, it would also make these licenses less valuable. Because license fees were recently raised, it may not be the best time to pursue this change; therefore, the Deer Program recommended not pursuing the change at this time.

Change the Muzzleloader Regulations to Allow All Calibers

The Deer Program and DNR regularly receive requests to change caliber restrictions. As new technology develops, smaller caliber or different equipment types come to light that are effective at taking deer in a humane fashion. Recent advancements have placed .40 caliber muzzleloading rifles in this category. Using appropriate powder and bullet combinations, the .40 caliber muzzleloading rifle can produce comparable velocities to those of a .308 Remington. In 2021, the Deer Program received several requests from hunters to lower the minimum caliber to .40 inches. Because technology continues to improve, the Deer Program considered removing its caliber restrictions. Many states do not have caliber restrictions and leave it to the hunter to select the firearm and/or muzzleloader that they can use to humanely kill a deer based on the characteristics of the equipment and the skill of the hunter. Therefore, the Deer Program proposed a rule change that would remove the caliber restrictions on muzzleloaders.

We received eight responses to remove the muzzleloader caliber restrictions that were evenly split between those agreeing and disagreeing with the

proposal. Two respondents said that removing a caliber restriction would be less humane and less ethical; however, hunters who use muzzleloaders must understand their powder charge, caliber, and distance to target and make their choice on their bullet and powder combination each time they load their weapon, similar to what handloaders do when they load ammunition. Caliber restrictions do not have the same effect as they do in centerfire rifles because there is no commercially available ammunition (i.e., a manufactured bullet, primer, case, and cartridge combination) for muzzleloaders. Therefore, DNR cannot assess the average reliability, lethal distance, or other terminal aspect of a loaded muzzleloader "round". With muzzleloaders, hunters can choose a weak powder charge with a large diameter bullet that may not have sufficient terminal energy to kill a deer. This may be done to prevent the muzzleloader from having a severe recoil, or because of its age. Because the ultimate decision on the factors that influence muzzle energy are at the sole discretion of the user, limits on caliber size do not affect the lethality of the bullet.

Another objection is that this change would cause the muzzleloader season to move further away from being a primitive weapon season to a modern one, similar to the firearms season; however, the intent of the muzzleloader season has been to provide an opportunity for those desiring to use muzzleloading weapons, not as a primitive-equipment season. Although muzzleloaders have historically been available down to the .30 caliber range (.32 and .36 caliber), these were traditionally used for squirrel hunting. Modern advances in both powder and barrel construction can now push relatively small bullets to a lethal velocity that is suitable for hunting white-tailed deer; however, with the muzzleloader season being intended for muzzleloading firearms and not as a primitive-equipment season, it would be inconsistent to designate a bullet caliber as the minimum based on common calibers that were available at a specific period.

We did not include any questions about this topic in the Deer Management Survey. Although this change will make the hunting system less confusing, it will likely be a controversial topic because many hunters have strong opinions about what equipment other hunters should be able to use. Therefore, because we did not include public opinion questions about this topic, the results from the GotINput process is split, and because we know this topic will be controversial, the Deer Program recommends not pursuing this change at this time. Nevertheless, we do recommend pursuing a change in the rule language to reduce the minimum caliber from .44 caliber to .40 caliber.

Change the Time to Check in Deer and Turkey to 24 Hours

Currently, Indiana allows hunters 48 hours to check in a deer or turkey. This was increased from 24 hours during the time when hunters were still required to visit a check station, before the adoption of the electronic check-in procedures. This allowance is one of the longest periods that hunters must comply with in the midwestern states. This can make it more difficult for law enforcement personnel to pursue suspected cases of poaching, increases the likelihood of hunters mistakenly forgetting to check in their game, both of which result in inaccurate harvest records. Therefore, the Deer and Turkey programs proposed a rule change to reduce the time to check in a deer and turkey from 48 hours to 24 hours.

We received 16 comments on the topic of reducing the time to check in deer from 48 to 24 hours. Of those, five disagreed with the proposed change, nine supported it, and two commented that deer should only be checked-in at a check station in person. The Indiana DNR uses the CheckIN Game system to record legally harvested deer and provide hunters with confirmation numbers to legally possess their deer. This not only helps DNR to collect important information related to deer harvest to monitor populations, but also allows law enforcement officers to enforce game laws. The proposal to reduce the check-in window to 24 hours is intended to provide DNR law enforcement officers with a better tool to charge poachers taking deer. This change would modernize Indiana's rules by shortening the check-in deadline to a length of time more comparable with neighboring states. Illinois, Kentucky, and Ohio have shorter check-in deadlines than what Indiana currently has or is proposing.

The 2022 Deer Management Survey asked a question about reducing the check-in time from 48 hours to 24 hours, and it received 16,220 responses. Of those, 64% supported this proposal (45% strongly supporting;

19% somewhat supporting), 19% were neutral, and 17% opposed it (9% strongly opposing; 8% somewhat opposing).

Although there was wide support for this change, it would make hunting more restrictive. A general guideline for proposing rule changes is to avoid setting rules that are more restrictive or place additional burdens on the public, especially when there is no strong biological justification for that change. This guideline makes it challenging to get such a rule proposal through the state's internal process. Because there is not a biological reason for this change and would make the process of checking in deer and turkey more restrictive, and considering the long list of other proposed changes, the Deer Program does not recommend moving forward with this change at this time.

Change Indiana's Deer Management Strategy to a Type of Trophy Deer Management

Indiana DNR's policy toward harvest management is to "Provide hunters with opportunities to harvest deer". In general, this means we want to ensure that deer are in sufficient numbers that localized populations do not decline precipitously due to a particular level of harvest, disease, deer-vehicle collisions, predation, or other forms of mortality. Currently, deer population and yearly production for Indiana deer far exceeds annual mortality. In the 2021 GotINput process, several hunters put forth the idea that Indiana DNR should move deer management strategy away from managing the statewide herd to one that provides opportunities for hunters to harvest trophy deer. Suggestions included stopping buck harvest altogether for a few years in a couple of counties to see how the deer herd responds (one person), restrict buck harvest based on the number of points it has on its antlers (three people), eliminate spotlighting from the road to find deer (one person), and managing for quality deer (one person). What these hunters are generally proposing is a system whereby hunters will see and harvest more trophy animals in Indiana. Although this is contrary to current policy, we needed to understand if this desire was widespread or limited to a smaller subset of hunters; therefore, we explored this topic in the 2022 Deer Management Survey and examined past data related to this topic.

In 2018, DNR asked hunters what characteristics of bucks are important to them (see 2018 Deer Report). Fifty-five percent responded that harvesting a buck was important; the remaining 45% responded they do not care if they harvest a buck. Of those 55% of hunters who felt harvesting a buck was important, we asked what characteristics of a buck were important. About 75% of those hunters were interested in harvesting a big-bodied buck, wanted to harvest a Boone and Crockett trophy deer, harvest a buck with at least a 15-inch spread, and/or harvest a buck older than 3 years old. Trophy management often requires passing on the chance to shoot many bucks, tight restrictions, and having an overall smaller deer herd to balance numbers with the available habitat and to maximize antler growth. This would be difficult to reconcile with hunters who also state that there are currently not enough deer.

The 2022 Deer Management Survey asked a question about moving to some type of trophy deer management system. We received 15,909 responses to this question. Of those respondents, 27% supported the proposal to some degree (12% strongly supporting; 15% somewhat supporting), 19% were neutral, and 54% were opposed (37% strongly opposing; 17% somewhat opposing). Currently, the DFW deer management goal is to provide hunting opportunities and a healthy deer population. To move toward Quality Deer Management and/or a trophy system would require antler point restrictions, a minimum antler spread, and/or other selective harvest techniques to allow bucks to grow older. Trophy status is not achieved until the buck is at least 4.5 years old. Other states such as Mississippi practice trophy deer management, while others practice Quality Deer Management. Mississippi went to a system to produce trophy deer solely at the request of its hunters. But based on the responses from the most recent and past Deer Management Surveys, Indiana hunters do not broadly support this measure; therefore, the Deer Program does not recommend a change to move toward a trophy management model.

Depredation Permits

In the 2021 GotINput process, two people suggested eliminating the depredation permits that farmers and others use to control deer-related damage to private landowners. The Indiana DNR takes this subject seriously and must evaluate these permits from both the perspective of herd viability and damage to personal

property. Depredation permits are an integral part of managing Indiana's deer herd because they allow deer to be removed in limited localized areas where they are causing specific problems. These permits allow for statewide county antlerless quotas to remain low; otherwise, localized, short-term damage would need to be considered in setting county-level quotas. Part of the proposed change to 312 IAC 9-10-25 is to add language concerning a damage inspection by DNR staff and the ability for DNR to require that deterrents first be attempted in some circumstances. This subject is sensitive because both property owners and hunters have a stake in deer management and are affected by the issuance of permits. The DNR is constantly evaluating this system to make improvements through the proposed changes to 312 IAC 9-10-25.

Elk Reintroduction

In the 2021 GotINput process, two people suggested reintroducing elk to Indiana or allowing a non-governmental organization (NGO) to conduct a study to determine its feasibility. Indiana DNR also receives several inquiries on this topic annually. The DNR values native wildlife species and appreciates the interest in recovery efforts for all native species. Should an NGO choose to fund a habitat suitability project for southern Indiana, DNR would cooperatively work with the NGO and funded research project; however, DNR has not received a formal offer for a fully funded research project to assess the habitat suitability of elk in southern Indiana.

There are many challenges associated with reintroducing elk to the eastern United States that require large expenditures to identify. Meningeal worm has created a population growth constraint in several eastern states that have reintroduced elk. This parasite is deadly to elk. It circulates in but is not detrimental to white-tailed deer or their populations. The level of mortality from meningeal worm is difficult to overcome for a small, reintroduced elk population. Chronic Wasting Disease is also a real concern because the movement of elk from anywhere could bring this always-deadly neurological wasting disease to the white-tailed deer of southern Indiana

Elk are an intermediate grazer and require forage that is available within their reach. Upland hardwood forests supply little food for elk. The hard mast they do provide is not available every fall and when it is available, it is only available for a few months during mast years. Alone, upland hardwoods do not supply enough forage to support a thriving elk population. All these biological issues make the reintroduction of elk an incredibly difficult proposition.

In addition to the biological risks and limitations in southern Indiana, the reintroduction of elk would almost certainly lead to costly property damage for southern Indiana residents. There is already limited habitat available in the southern part of the state, and that space is decreasing as urbanization continues. Public land ownership in forested south-central Indiana is also fragmented, which would cause additional hurdles in creating habitat. Moreover, the openings in the canopy that are typical of small, private properties provide ideal grazing habitats for elk, but they are used for other purposes, such as farming. Elk reintroduction would likely lead to damages to landowners' trees, lawns, landscaping, and crops, in addition to increasing the safety risk of cervids having collisions with vehicles traveling Indiana roads.

The challenges facing elk reintroduction are great, and DNR does not have the financial means currently budgeted to fund a project with this high level of expense and low prospect for success. Therefore, the DNR does not recommend moving forward with this change. Nevertheless, if full funding were made available for an elk reintroduction project, DNR would cooperate with the principal investigator and funding source to evaluate these issues more thoroughly.

Legalizing Baiting

In the 2021 GotINput process, four people suggested that rules should be changed that would allow hunting over bait for Indiana hunters. One respondent suggested that putting out corn would be no different than hunting over waste grain that drops from combines during harvest. Another suggested that baiting only be allowed with a permit. Hunting deer over bait is not legal in Indiana and traditionally has not been allowed. Waste grain is accidentally spilled by farmers occasionally; it is not intentionally done for the taking of deer. The DNR values the historical precedent that has been maintained in Indiana to provide deer hunting through the natural movement of deer and avoid the artificial congregation

of deer associated with baiting. There is currently no biological or societal issue that requires the evaluation of the current deer baiting law in Indiana. The Deer Program does not support pursuing this change.

Have a Deer Season that Would Allow Harvest of Deer in Velvet

In the 2021 GotINput process, one hunter suggested that Indiana DNR establish a season so that hunters have the opportunity to harvest a deer while it is in velvet. DNR asked this question in the Deer Management Survey and received 16,194 responses. Of those, 54% opposed the season to some degree (42% strongly opposed; 12% somewhat opposed), 19% were neutral, and 27% supported the season to some degree (15% somewhat supportive; 16% strongly supportive). Based on the negative response, DNR is not considering a velvet season.

Other comments

Many other single comments were received by DNR during the 2021 GotINput process. Here is a condensed version of each comment and DNR's response.

- Allow infrared equipment to harvest deer – This is an option that is being considered.
- Allow arrow guns to be used by hunters with a disability during the archery season – This was discussed, but no resolution was decided upon.
- Allow tree stands to be placed on public land a week before and after the Deer Reduction Zone season – This is being considered for possible inclusion into the rules.
- Change barrel length for muzzleloading pistols to 9.5 inches – Research would need to be conducted to determine the effects of this change.
- Create a true primitive equipment season (i.e., boulders, sticks, slings) – The Indiana DNR sets regulations for hunting equipment to ensure that it will effectively and quickly kill the intended animal. Unconventional methods of take could lead to maimed deer and a negative perception of the hunting community by the general public.
- Have a traditional archery season – Indiana DNR has considered creating a primitive equipment season, and several hunters have expressed interest. But restricting a season to a single type of equipment would result in each group of hunters desiring a separate season for each type of equipment; therefore, it would not be practical to start creating additional seasons for each type of equipment; however, DNR will continue to explore the possibility of creating a primitive equipment season.
- Allow atlatls and air guns – Currently, Indiana DNR allows for deer hunting with air guns during firearms season. Although we have not considered the use of atlatls, we have received little interest in adding them as legal hunting equipment. In 2021, we asked hunters about the use of alternative forms of equipment, such as sling bows, air rifles, and arrow guns. The vast majority found such alternative forms of equipment to be extremely unacceptable. Air rifles were the most accepted alternative form of equipment, which led to their adoption in late 2020.
- Allow same calibers on private and public land – The current limitations on public lands are intended to shorten the trajectory of rifles to reduce potential bullet damage to objects, animals, or humans beyond the intended target. On public lands, this helps keep hunters and those around the public hunting lands safe.
- Revamp the entire license structure rather than small changes – The DNR has proposed a set of deer license changes that will simplify regulations; however, due to the 200,000+ hunters annually who are adapted to the current license structure and the state laws that the regulations are based on, there are limitations on how far changes can be made from the current precedent.
- Several hunters suggested changes to a statewide limit on antlerless harvest (i.e., one doe only), while others suggested specific limits in their own county – Antlerless deer quotas are not set as permanent rules; they are considered annually for each county.
- One hunter suggested allowing all counties to be included in the Special Antlerless Firearms Season (SAFS) and not require they

have a county have a Bonus Antlerless Quota of four. Another hunter suggested eliminating the SAFS – We asked hunters about this topic in the 2020 Deer Management Survey. Those results can be found on pages 96 and 97 in the 2020 Indiana White-tailed Deer Management Report, which can be accessed through deer.dnr.IN.gov. Indiana hunters are divided on this topic. Those who are in favor of this season like it because it provides them additional hunting opportunities, but do not necessarily use it to harvest more deer than they normally would. Harvest does not change significantly in counties where this season is in effect compared to those where it is not. With this in mind, a change to the SAFS is being discussed related to the proposed change to the County Bonus Antlerless system.

- Allow spike bucks to be removed from the population (because a spike buck is deformed) and that such a buck not count toward the one-buck rule – Spike bucks are typically not considered a deformation. Given another year of growth, these bucks will produce a branched set of antlers the next year. Because antlers are shed in January, there is only a short period where this condition might be dangerous to humans or other deer. Hunters who perceive this to be an issue can harvest such a deer, but it will continue to count toward their annual quota of one buck.
- Eliminate the bundle license – DNR values the Deer License Bundle because of the options and cost savings it provides hunters. The license is intended to be simple for hunters who hunt multiple seasons and for multiple deer; therefore, DNR will not remove the bundle license.
- Allow powder to be loaded from the breech in muzzleloaders – This topic was recently addressed by the DNR and the Natural Resources Commission. The decision was that the Firestick and other breech-loading muzzleloaders could be included, but only in firearms season.
- Allow air rifles to be used for deer hunting – This is currently legal during firearms season.
- Allow smaller caliber rifles (e.g., .223 Remington) to be used during firearms season – The inclusion of the .223 Remington has been discussed by DNR; however, such a change would require a change to the law, rather than a change to DNR administrative rules. We will continue to work on this topic.
- Change deer licenses so that they are not equipment specific – Given the historical structure of deer licenses in Indiana, it is unrealistic to completely redesign the system. Rather, the proposed changes are intended to improve the structure already in place while maintaining the overall license system that more than 200,000 Indiana hunters are accustomed to using.
- Need more clarification of Deer Reduction Zones – DNR has a website dedicated to this topic, and we will work to make the hunting guide clearer.
- Raise the restitution fee for poaching deer from $500 to $5,000 – There is little information available on what the replacement cost of a white-tailed deer in Indiana should be, based on a deer's value to the economy. The DNR is working with researchers at Purdue University to examine the economic impacts of deer hunting in the state. One of the intended products of this research will be an accurate assessment of the value of an Indiana deer. This could lead to a future proposal for an adjusted restitution price.
- Place additional limits on how many hunters private landowners can allow on their land for deer hunting related to leasing – DNR cannot regulate the number of hunters allowed on private land for hunting.
- Increase nonresident hunting license fees – This was done in 2021.
- Require an additional permit to hunt state-owned properties – Because revenue from hunting licenses is used by the DFW to purchase land, hunters are already paying the fee for the land by purchasing a hunting license.
- Return earn-a-buck to the firearms season – Earn-a-buck has not been used as a general deer management tool in Indiana. The purpose of earn-a-buck program is to reduce the deer herd. It is only used in deer reduction zones to

target areas where deer are causing significant problems that can be identified in a specific geographic area. DNR has no plans to initiate a broader earn-a-buck program.

- Require hunters to report harvest based on the grid system used for the Archer's Index – This suggestion has been discussed previously. Currently, we are unable to incorporate this into our existing deer check-in procedures but doing so may be possible in future years as we transition to a more advanced check-in platform.
- Change the law to make it more difficult to check in a "phantom doe" in deer reduction zones – Ideas for this have been discussed and may be used in the future.
- Change the firearms season so that it is shorter – During the 2018 Deer Management Survey, DNR asked hunters their opinion on the number of firearms hunting days, and 43.4% said there should be no change. Approximately 30% said the number of days should be increased, and less than 25% of hunters said firearms season was too long. Based on this survey, the majority of hunters are not interested in major changes to the firearms season. Accordingly, DNR currently has no plans to change it. We are also asking additional questions on this topic in the 2023 Deer Management Survey.
- Move youth season to late October – The DNR has maintained youth season in late September to allow youth an opportunity to take deer before any other hunters. This provides a high-quality experience for youth hunters when deer are still in their natural early season patterns and have not had their movement altered by the presence of hunters.
- Limit landowner exemptions to one deer per person per year – Individuals who own farmland currently have an exemption from purchasing hunting licenses when hunting on their property. They are only limited by the antlerless limits within the county and by the one-buck rule. This exemption is provided for landowners by state law, and any change would need to be made by the legislature, not DNR.
- One hunter suggested to change the cartridges allowed on state property for deer hunting to include straight-walled cartridges without a length restriction. Another hunter suggested specifically allowing the 45-70 Government caliber – DNR examined this issue and decided that allowing all straight-walled cartridges would open up the use of large calibers that exceed some of the calibers used on private property. DNR considered the 45-70 Government caliber and decided, as general policy, not to start including specific calibers on a case-by-case basis, but rather to maintain the system of inclusion based on case length and caliber. Although this can exclude a specific caliber that might be suitable on public land while allowing one that is slightly more powerful, it keeps regulations simpler overall, which is a general DFW goal.
- Bring back the two-buck rule (1 for archery, 1 firearms) – DNR recently asked for hunter opinion on this topic and reported those results in the 2018 White-tailed Deer Report. Approximately 80% of hunters favor keeping the one-buck rule; therefore, DNR is not looking to revert to the two-buck rule.
- Hunters should be allowed to use the gutless method for packing out deer – Indiana hunters are allowed to do this as long as they check in their deer online prior to quartering their deer and if they have permission from the landowner to leave the carcass parts on the landowner's property.

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CHANGES IN THE AGE OF ANTLERED DEER AND BOONE AND CROCKETT SCORE OVER TIME

Joe N. Caudell, *Indiana Department of Natural Resources*

Hunters and deer managers are often curious about where Indiana ranks for large deer when compared with other states. To answer this question, we worked with the Boone and Crockett Club's Big Game Record Department to access their records through their Big Game Records Live (BGRL) portal (https://www.boone-crockett.org/big-game-records-live-all-new). The public can access this portal for a small fee. Boone and Crockett records are awarded for "typical" white-tailed deer with a score of over 160 and "non-typical" deer over 185.

We compiled data from 2000 to 2020 for both typical and non-typical white-tailed deer in the states that hunters most often compare Indiana to, including Illinois, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. To adjust for the size difference between these states, we examined the records on a per-1,000-square-mile basis. We also looked at records for Indiana to create a heat map of the counties where Boone and Crockett deer commonly are harvested.

The records were accessed from the BGRL on March 24-25, 2022. Boone and Crockett records are constantly being updated as new records are submitted; therefore, the dates when the records were accessed are important to note. There can often be a lag of one or more years as hunters wait to receive their deer back from taxidermists. Records from the 2021 harvest are not included because only a small fraction of deer harvested and measured that year had been uploaded into the system. Also, data examined at a later date may not match with this report because there is no cutoff for when deer are harvested (as long as it is longer than the 60 day drying period for the rack), and they have to be measured. Therefore, hunters who inherit, purchase, or find previously unscored deer, may submit those records, sometimes years later, adding to the records for that state.

In 2019 and 2020, Indiana had the most Boone and Crockett records submitted with 53 records accepted in 2019, and 46 records accepted in 2020 (Table 1). When number of records are normalized for the size of the various states, Indiana has been the top producing Boone and Crockett state for the past five out of six years (Table 2). The number of Boone and Crockett records of deer harvested in Indiana has been increasing since 2001, with periods of sharp declines in years that correspond to significant epizootic hemorrhagic disease (EHD) outbreaks (Figure 1).

Indiana has apparently been increasing in the number of Boone and Crockett trophy deer since 2001. This may be partially attributed to the one-buck rule that was initiated that year. During this same period, Indiana has seen an increasing age structure in bucks, which had a strong correlation with the increasing number of Boone and Crockett submissions ($r^2 = 0.82$, Figure 2), a smaller overall deer population (Caudell and Vaught 2018), a more balanced age structure (~1.6:1 doe:buck ratio; see doe:buck relationship in Chapter 8 of this report), and a relatively balanced harvest (0.8 doe:buck), all of which are important factors in improving the overall "quality" of a deer herd (Miller and Marchinton 1995).

Another likely reason for the increase in Boone and Crockett deer in Indiana is the apparent increasing interest in intensive deer management on private lands by individuals who manage for deer hunting. While DNR has not measured this in Indiana, the number of podcasts, television shows, live events, products, service providers, and educational information related to private deer management has increased during the past few decades. Private landowners can work to improve their deer herd while being more selective about what they harvest. Passing on a buck to let it grow another year, or selectively removing deer that do not appear to be contributing to the management objective of a property can lead to increasing quality of deer over time.

During the past 21 years, there have been years where there are significant drops in the number of bucks reported. This is likely due to the short-term effects of EHD. Indiana and other states were hit with significant occurrences of EHD during 2007 and 2012,

with a smaller but widespread outbreak in 2013, and in 2019 (Caudell and Vaught 2020). But, in 2019, the disease seemed to have had a smaller effect in Indiana on older bucks than in past years, and possibly a smaller effect compared to other Midwestern states that are more commonly affected by this disease. But overall, Indiana appears to be on an upward trend in the number of bucks reported with EHD.

Shooting a wild trophy deer is a rare occurrence for most hunters. Even though Indiana had the highest number of Boone and Crockett deer submitted in 2019 and 2020 (53 and 46, respectively), that still only represents about 0.1% of the bucks harvested in both years. Hunters have expressed interest in Indiana DNR adopting trophy deer management strategies, but that is still a relatively low number (see article on the desirability of trophy management in this report). Typically, there is no universal preference for regulations that hunters desire (Cornicelli et al. 2011), complicating the assessment of a need to pursue large-scale and/or significant changes. In Indiana, most hunters continually express a desire to be able to shoot the buck they want rather than being constrained by the DNR to shoot a particular size of buck (see article on desirability of trophy management in this report). Additionally, regular outbreaks of EHD, annual mortality from brain abscess syndrome (BAS), and regular deer-vehicle collisions are likely to impede significant improvements on a statewide basis. Therefore, further increases in the quality of the deer herd and quantity of Boone and Crockett deer will not be caused by widespread changes in deer regulations, but it will instead likely be caused by localized deer management decisions made by private landowners, such as those that are achieved through deer management cooperatives (Mitterling et al. 2021).

Deer cooperatives have the greatest likelihood of success because a cooperative effort by a group of landowners can have a much greater effect than a single landowner who owns less land than a buck will use on a yearly basis. Hunters and landowners who desire further increases in buck quality should consider the development of cooperatives in the areas they hunt. Additional information about wildlife management cooperatives can be found at the National Wildlife Cooperative website (https://www.nationalwildlifecoop.com/national-wildlife-cooperative).

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Table 9-1. Total number of Boone and Crockett trophy records submitted for white-tailed deer harvested from 2015 to 2020 with a score of >160 for typical deer and >185 for non-typical deer.

State	2015	2016	2017	2018	2019	2020
Illinois	18	32	30	28	28	30
Indiana	31	71	51	38	53	46
Iowa	32	38	31	33	30	43
Kansas	38	34	19	32	30	20
Kentucky	50	36	42	36	38	43
Michigan	9	14	12	2	9	8
Minnesota	40	26	33	13	22	26
Missouri	25	38	49	19	12	22
Ohio	48	72	62	40	44	39
Wisconsin	62	74	58	37	22	44

Table 9-2. Total number of Boone and Crockett trophy records submitted for white-tailed deer harvested from 2015 to 2020 with a score of >160 for typical deer and >185 for non-typical deer divided by the number of square miles per state.

State	2015	2016	2017	2018	2019	2020
Illinois	0.12	0.21	0.2	0.19	0.19	0.2
Indiana	0.33	0.75	0.54	0.4	0.56	0.49
Iowa	0.22	0.26	0.21	0.23	0.21	0.3
Kansas	0.18	0.16	0.09	0.15	0.14	0.09
Kentucky	0.48	0.34	0.4	0.34	0.36	0.41
Michigan	0.04	0.06	0.05	0.01	0.04	0.03
Minnesota	0.18	0.12	0.15	0.06	0.1	0.12
Missouri	0.14	0.21	0.27	0.11	0.07	0.12
Ohio	0.41	0.62	0.53	0.34	0.38	0.34
Wisconsin	0.37	0.44	0.34	0.22	0.13	0.26

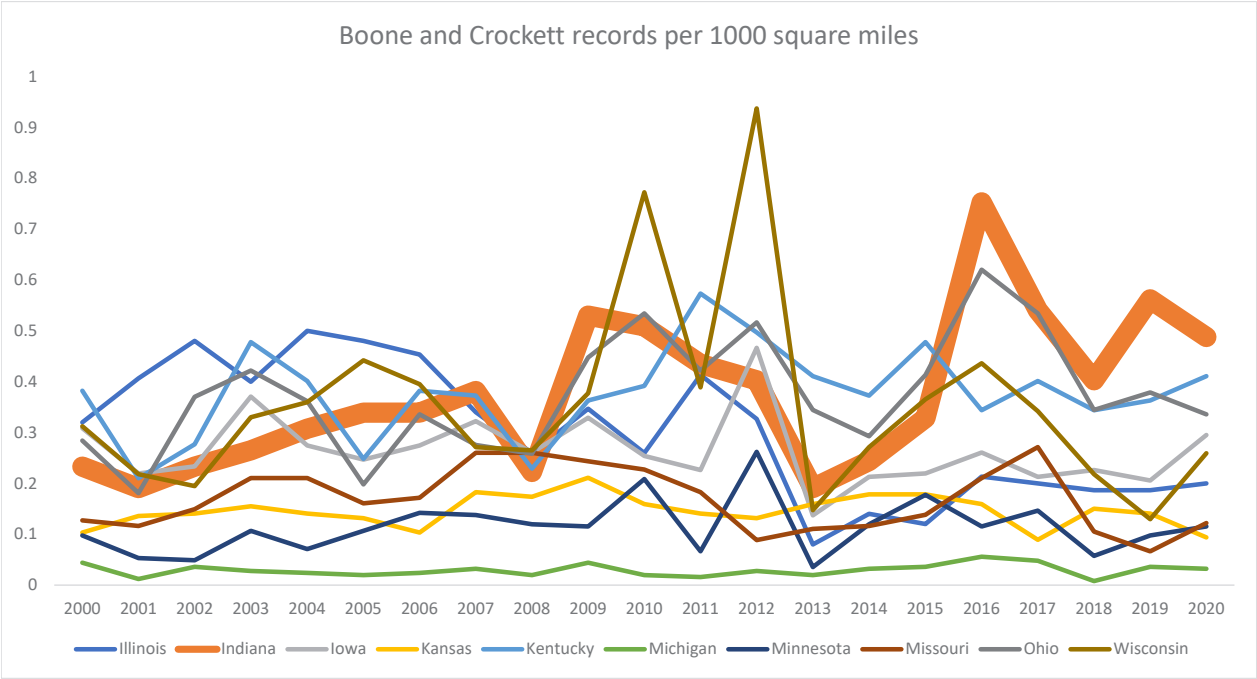

Figure 9-1. Trend in the total number of Boone and Crockett trophy records submitted for white-tailed deer harvested from 2015 to 2020 with a score of >160 for typical deer and >185 for non-typical deer divided by the number of square miles per state.

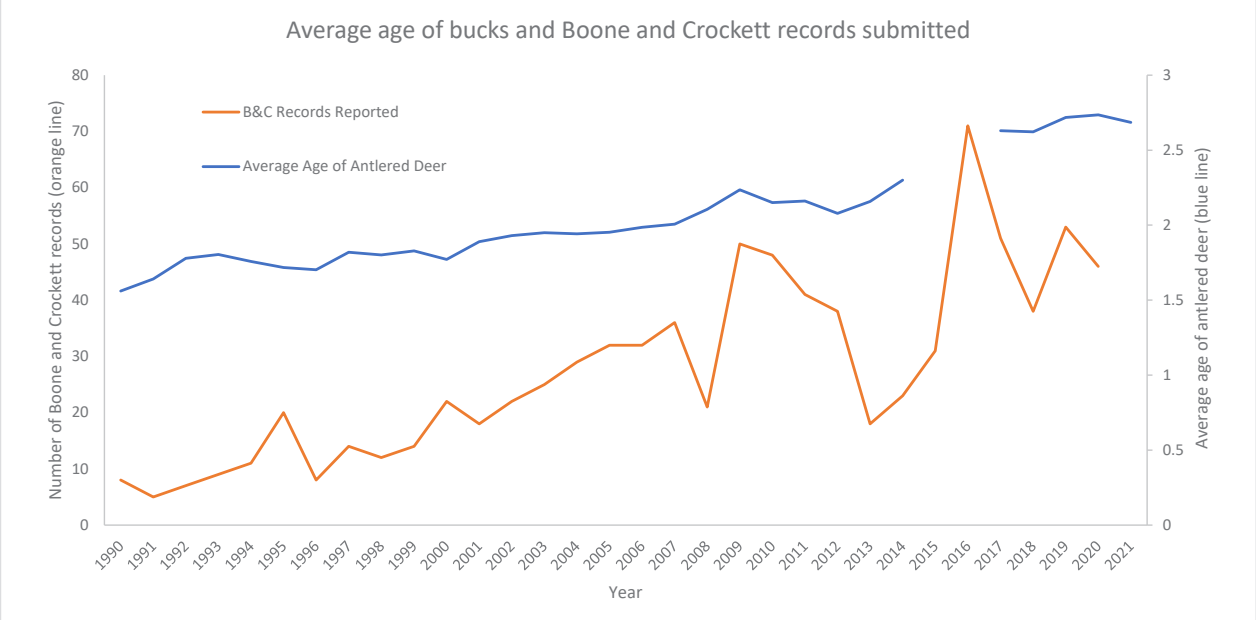

Figure 9-2. Trend in the average age of antlered deer and number of trophy deer reported to the Boone and Crockett Club for entry into their records. Data from 2015-2017 is unavailable due to the inability to obtain age data during this time.

TROPHY DEER MANAGEMENT FOR INDIANA

Joe N. Caudell, *Indiana Department of Natural Resources*

Indiana DNR's policy toward harvest management is to "Provide hunters with opportunities to harvest deer". In general, our minimum population goal is to ensure that deer are in sufficient numbers that their population does not go extinct with a particular level of harvest, disease, deer-vehicle collisions, predation, and other forms of mortality. Our current deer population and yearly production far exceeds the mortality, resulting in a long-term sustainable deer harvest. But it is not uncommon for hunters to ask DNR to change their deer management model to a trophy management system, rather than just providing opportunity to harvest deer. Suggestions from hunters often include stopping all buck harvest for a few years to allow all bucks the opportunity to grow older, placing restrictions on the bucks that can be harvested based on the number of points it has on their antlers (commonly referred to as antler point restrictions [APR]), and/or begin a system based on Quality Deer Management (Miller and Marchinton 1995). Therefore, to understand hunter's opinion on this topic, DNR asked a series of questions in the 2021 Deer Management Survey.

Methods and Results

On 31 January 2022, we distributed the annual deer management survey via email to 1,012,126 individuals consisting of anyone who had purchased a license since 2015 (n=811,121) and Wild Bulletin subscribers who have never checked in a deer or purchased an annual hunting, trapping, or fishing license from DFW (n=200,980). Respondents were asked to self-identify as a deer hunter or non-deer hunter and to answer basic demographic questions, although a response to these questions was not required. From our total distribution group, 28,109 individuals started the survey (response rate = 2.8%) with a completion rate of 88.2%. We received 22,842 responses from current and lapsed hunters and 5,267 responses from non-hunters. Between 15,909 and 15,655 hunters responded to the questions changes related to trophy deer management. I have summarized the results below. A table is available on the last page which also summarizes this data.

We asked hunters do you support a trophy deer management system for Indiana, and we received 15,909 responses to this question. Of those who responded, 27% supported the proposal to some degree with 12% strongly supportive and 15% somewhat supportive, 19% were neutral on the question, and 54% were opposed with 37% strongly opposed and 17% somewhat opposed.

We asked several questions related to why hunters would choose to support or oppose a shift toward a trophy management system. In general, hunters want to have a choice of shooting the buck they saw, that Indiana should manage for deer and not trophies, they did not want Indiana becoming a trophy state because it would attract even more non-resident hunters, they did not want to see additional rules placed on their deer hunting, and they did not want to get fined for shooting a buck that was too small (Table 1).

Discussion

In general, hunters want to see and harvest more large-antlered or trophy bucks in Indiana. This is a natural evolution of hunters from learning how to hunt deer, becoming more skilled, and having a desire to harvest a larger buck than they have harvested in the past. But the natural progression of age-classes in animals works against this. Also, Ditchkoff et al. (2001) found that mortality in 1.5- to 2.5-year-old bucks was mostly from hunting and vehicle accidents, whereas older class deer (e.g., > 3.5 years old) were more likely to die from non-human causes, such as the result of fighting and predation. They also recommended that any management strategy that is geared toward mature males account for this difference in mortality.

Older age-class bucks on the landscape make up a smaller and smaller portion of the deer population over time. In Indiana, ~10% of harvested bucks are more than 3.5 years old (see estimated age structure of the harvest in Chapter 8). While increasing the proportion of older deer in the overall population is possible, it requires a strict set of rules placed on hunters for the harvest of specific deer. Based on responses, 63% of Indiana hunters value the ability to shoot any deer they

see and do not like the idea of additional rules being placed on deer hunting (Table 1). Even more concerning to hunters (81%) is the possibility of being fined for harvesting a buck that is too small (Table 1).

Currently, Indiana has a moratorium on the creation of new regulations placed on the public (Executive Order 13-03), unless those proposed regulations fulfill an objective related to job creation and increasing investment in Indiana or improve the quality of Indiana's workforce. Potential exceptions include regulations that repeal existing rules or reduce their regulatory impact or implement a federal mandate and no waiver is permitted; rules necessary to avoid a violation of a court order or federal law that would result in sanctions by a court or the federal government against the state for failure to conduct the rulemaking action; rules to address matters pertaining to the control, mitigation or eradication of waste, fraud or abuse within a state agency or wasteful or abusive activities perpetrated against a state agency; rules that reduce State spending; and rules whose predominate purpose and effect are to address matters of emergency or health or safety, including the promulgation of an emergency rule under Ind. Code § 4-22-2-37.1. But any effort to significantly increase the age structure of the deer population would require new, restrictive regulations on deer harvest that included large monetary penalties to serve as a deterrent to change behavior. Because any new regulation would not meet the exemptions to moratorium on new regulations, it is unlikely a proposed rule would be allowed to move forward; therefore, because there is low public support for this effort, proposals that add rules that would result in large fines would likely fail.

The results from this study resemble those of past studies. In 2018, DNR asked hunters about bucks and what buck characteristics are important for them (see Caudell and Vaught 2019). Fifty-five percent of hunters responded that harvesting a buck is important to them, while 45% responded that they do not care if they harvest a buck. DNR asked the 55% of hunters who said harvesting a buck is important to them what their desired characteristics of a buck were. Approximately 75% of the hunters who responded that harvesting a buck was important to them said they were interested in harvesting a big-bodied buck, wanted to harvest a Boone and Crockett trophy deer, harvest a buck with at least a 15-inch spread, and harvest a buck more than 3 years old. However, trophy management often requires passing up on the opportunity to shoot a lot of bucks a hunter sees, tight restrictions, and having an overall smaller deer herd to balance numbers with the available habitat and to maximize antler growth. This would be difficult to reconcile with hunters who also state that there are currently not enough deer.

Indiana already has one regulation in place that helps with producing older age-class bucks, the one-buck rule. Past studies have shown this rule is popular (Caudell and Vaught 2019), as it helps produce older age-class bucks and allows hunters to choose what deer they want to shoot. Recent research into the number of Boone and Crockett entries from Indiana demonstrated that it is already one of the top Boone and Crockett white-tailed deer states (DelHomme 2022), some of which is attributed to the one-buck rule. The result is a win for both types of hunters, those who are interested in trophy management, as well as those who are just interested in harvesting deer for meat.

Summary

Currently, Indiana DNR's deer management goal is to provide hunting opportunities and a healthy deer population. To move toward Quality Deer Management, Selective Harvest System, Antler Point Restrictions, or a different type of trophy system would require antler point restrictions, minimum spread, and/or other selective harvest techniques for bucks to allow them to grow older. Each would require a new regulation to enforce. Trophy status is not achieved until a buck is at least 4.5 years old. Other states such as Mississippi practice trophy deer management, while others practice Quality Deer Management. Mississippi went to a system of working to produce trophy deer solely at the request of its hunters. But based on the responses received in DNR's most recent and past deer management surveys, Indiana hunters do not broadly support this measure. Therefore, at this time the Deer Program does not recommend a change to move toward a trophy management model.

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Table 9-3. Responses from the question from the 2021 Deer Management Survey asking hunters why they support or oppose a shift toward a trophy management system for Indiana's deer management program.

Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Number of hunters who responded
I want the option of shooting any buck I see	8%	13%	15%	27%	36%	15,912
Indiana should be managing for deer hunting and not trophy hunting	5%	8%	16%	30%	42%	15,762
I am concerned that I would lose the place where I hunt for free	13%	17%	33%	18%	20%	15,713
Indiana should be managing for trophy bucks	26%	27%	25%	15%	7%	15,655
I don't want Indiana attracting new out-of-state hunters	4%	7%	27%	25%	37%	15,721
I hunt primarily for the meat	2%	9%	21%	31%	37%	15,713
I don't like the idea of additional rules on my deer hunting	3%	8%	26%	29%	34%	15,723
Trophy management would increase my enjoyment of deer hunting	26%	27%	24%	15%	8%	15,707
I don't want to get fined for shooting a buck that is too small	3%	5%	11%	27%	54%	15,722

ANALYSIS OF AGE REPORTED BY HUNTERS USING CITIZEN SCIENCE

Joe N. Caudell, *Indiana Department of Natural Resources*

From at least 1990 until 2014, Indiana DNR staff were present at physical check-in stations during the opening weekend of firearms season. During this period, hunters were required to bring their deer to a check-in station within 24 hours (48 hours starting in 2004) of harvesting that deer. This allowed DNR to record the age and sex of the deer, what type of property it was harvested on (public or private), and to collect samples to test for diseases such as chronic wasting disease (CWD). In 2015, DNR switched to online reporting of deer. This change decentralized hunters reporting their deer, and they no longer needed to take their deer to a physical location to check it in. While this is a huge convenience for both hunters and the DFW, the change made it more difficult to determine the age structure of the deer population.

Age structure can be an important component for population models and for other aspects of managing deer. In an attempt to regain some of this data, in 2017 DNR started a survey (called the After Hunt Survey [AHS]) that it invited successful hunters to participate in immediately after harvesting their deer. Immediately upon checking in their deer online, hunters are emailed a confirmation number. The confirmation email includes an invitation and a link to participate in the AHS. In this survey, hunters report the amount of time it took to harvest their deer; the deer they saw and did not harvest; their opinion of their hunt; and the age, sex, weight, and antler characteristics of the deer they harvested.

Hunters receive instructions to age their deer using tooth wear and replacement. Photos are provided, and a link to a video is included for those who need more instruction. Hunters are also given the opportunity to provide a second opinion on the age of their deer using other techniques. This approach is used to offset the desire to report a deer that is older than the animal harvested based on observations of body size or trail camera footage. Hunters report the age of their deer in one-and-a-half year increments (i.e., 0.5 years old, 1.5 years old, etc.) until age 5.5 after which they are to be reported as 5.5 years or older. The data from the check-in stations were estimated to older age classes but were lumped into the same 5.5-year-or-older age class that is currently used in the AHS.

To compare the two methods, DNR examined the trends of the data from 1990 to 2014 and from 2017 to 2021 for both male and female deer. We had an average of 1,317 reports (95% CI = 152) of antlerless deer each year from 1990 to 2014 and 493 reports (95% CI = 132) from antlerless deer each year from 2017 to 2021. We had an average of 3,131 reports (95% CI = 308) of antlered deer each year from 1990 to 2014 and 639 reports (95% CI = 192) of antlered deer each year from 2017 to 2021.

We found a similar trend in most age classes of antlered deer in hunter-reported ages when compared with trends from biologist-aged deer from 1990 to 2014. The downward trend reported by hunters in the AHS in fawns (0.5) and 1.5-year-old deer is similar to what biologists reported seeing in the prior period. Similarly, the increasing trend in 2.5-year-old and older aged deer is also similar to deer aged in prior years (Figure 1). These two trends correspond to the introduction of the “one-buck rule” in 2001, which was a significant deer management change for Indiana. Biologists hypothesized that it would cause the age structure to slowly shift toward an older age structure in antlered deer because hunters could only take one deer. As hunting culture has shifted more toward the harvest of older bucks, hunters who want to harvest a trophy deer may harvest a doe and pass on smaller bucks rather than forfeit their one opportunity to harvest a trophy buck each year.

The trend in age can also be seen in the increase in trophy deer reported to the Boone and Crockett club during the past 10 years. Indiana has moved from the middle of the ranks of Mid-western states to be the top producer of bucks (on a per-square-mile basis) for the last five out of six years (see Boone and Crockett reporting statistics in this report). The increase in Boone and Crockett records is positively correlated (r-square = 0.82) with the increasing average age of deer reported each year (Figure 2); therefore, hunters may be a valuable source of information for reporting the age of bucks.

Hunters appear to be less skilled at reporting the ages of antlerless deer (Figure 3), and because the harvest of antlerless deer is generally non-selective for age, a consistent trend in antlerless deer age is expected throughout the years. But there was a large shift in antlerless deer age from 1990–2014 to 2017–2018 for fawns and 1.5-year-old and 2.5-year-old deer; therefore, the age data from antlerless deer should not be considered reliable.

In these age classes, it is possible to see a reason for the difference in aging between antlered deer and antlerless deer. It may be that hunters are first becoming anchored on a perceived age based on the body size of antlerless deer, which tend to be large in Indiana even in relatively young deer. Alternatively, if hunters are not counting the teeth first to determine if the deer is a fawn or an adult deer but instead are looking at tooth wear, mistakes can easily be made. For example, the third premolar is sharp in fawns, which can lead observers to believe the age is 1.5 years old. The worn appearance of the third premolar in 1.5-year-old deer may cause a hunter to believe the doe is older than she is. In antlered deer, hunters are likely becoming anchored on the antler characteristics of the deer. Fawns are easily recognized based on the characteristic of their antlers. Likewise, 1.5-year-old deer are also relatively easy to identify.

The age reported from antlered deer may still serve as a general index of the age of the population, but the age reported on antlerless deer should not be used as an index. The Deer Program needs to find another method for creating a population index for the ages of harvested deer. This may be accomplished by a team of personnel visiting random deer processors on opening weekend to age antlerless deer in cold storage, having processors save antlerless deer heads for later evaluation, having hunters submit teeth from their deer, or using some other method to collect this data.

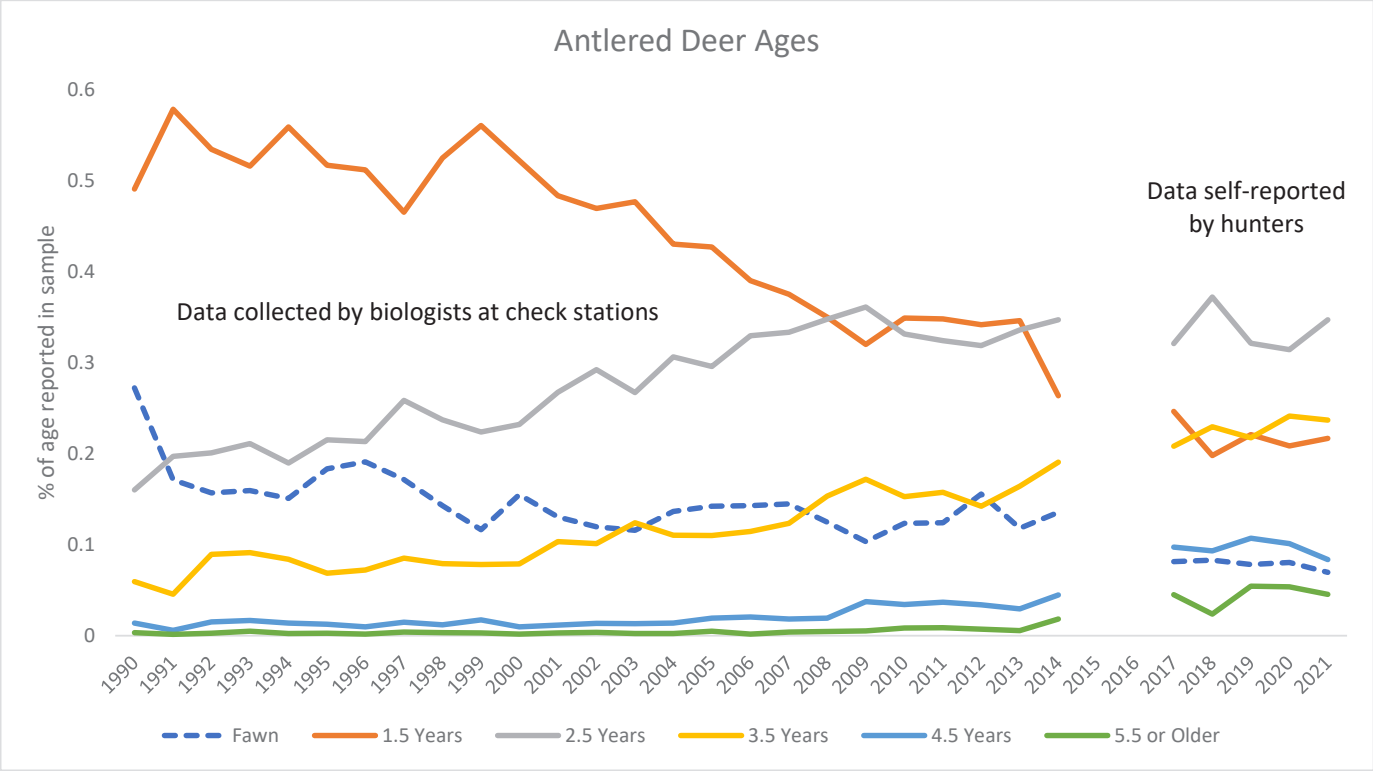

Figure 9-3. Age of antlered deer reported over time by DNR biologists (1990-2014) and the public (2017-2021) in the After Hunt Survey.

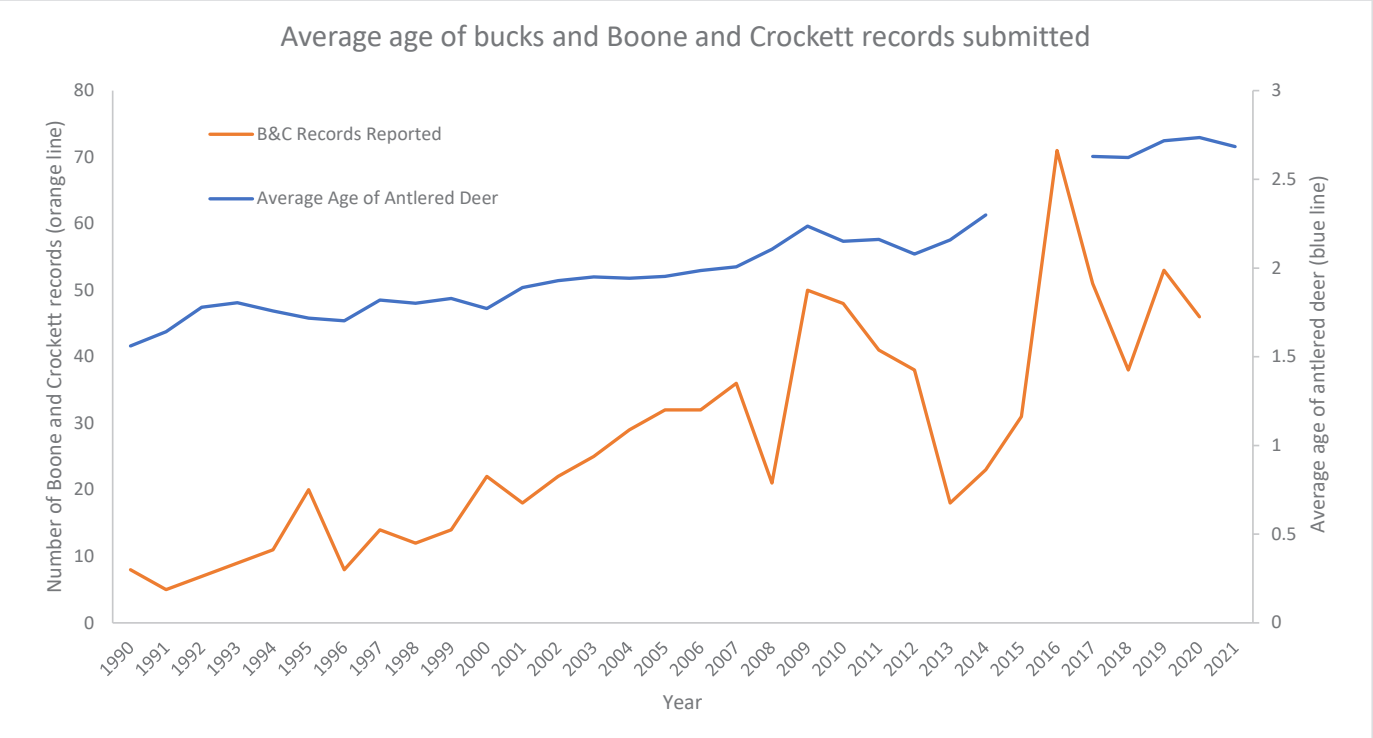

Figure 9-4. Average age of deer and the number of Boone and Crockett Records submitted from 1990-2021.

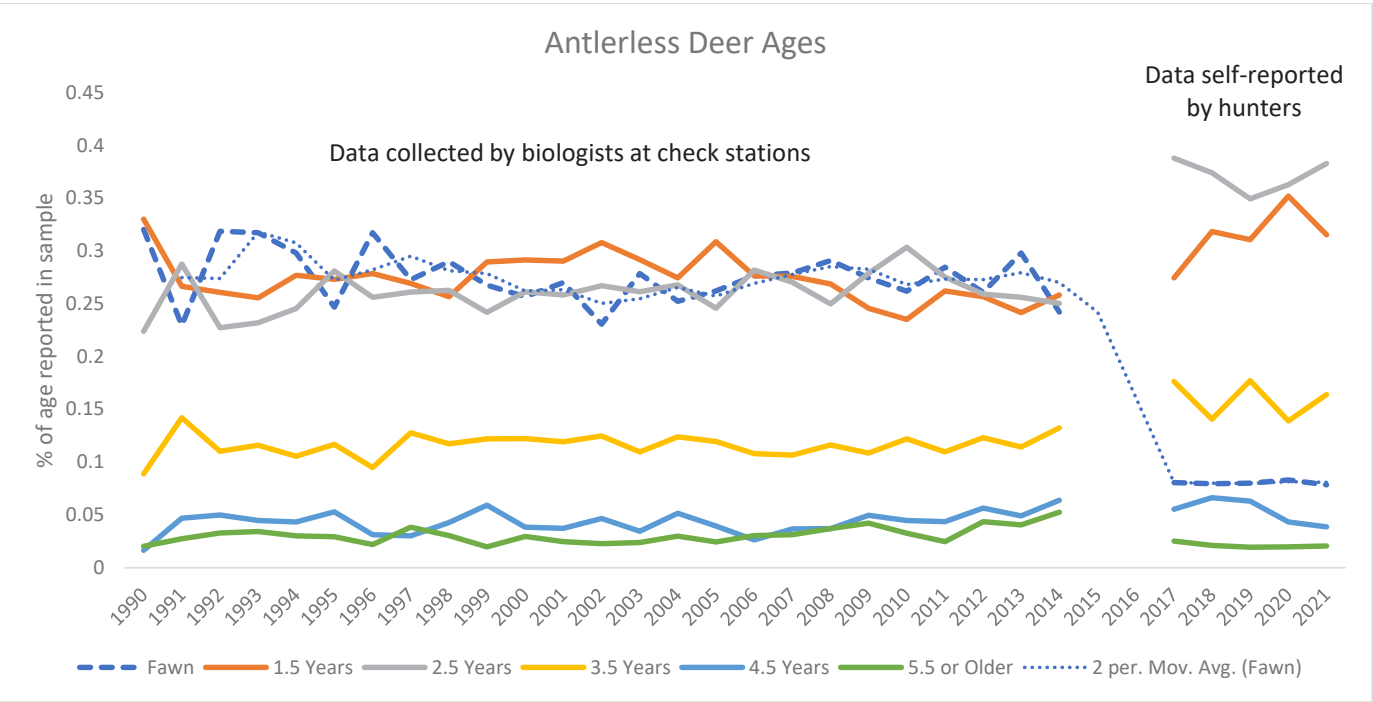

Figure 9-5. Age of antlerless deer reported over time by DNR biologists (1990-2014) and the public (2017-2021) in the After Hunt Survey.

THE USE OF DEER PROCESSORS IN INDIANA

Joe N. Caudell and Julia Buchanan-Schwanke,
Indiana Department of Natural Resources

Deer processors are commonly used by hunters to process the meat from their harvested deer. While hunters can process their own deer, they often use processors because hunters may be inexperienced, not have the proper equipment, may not have easy access to an area where they can process their own deer (e.g., they might live in an apartment), or they may desire cuts of meats to be further processed into ground venison, summer sausage, or many other processed meats. Because of this, deer processors can be found throughout Indiana. But recent concerns about processors leaving the business have raised questions about how hunters would process deer if the processor they used were no longer in business; therefore, we asked several questions about deer processing on the 2022 deer management survey.

Methods and Results

On 31 January 2022, we emailed the annual survey to 1,012,126 individuals. The mailing list included anyone who had purchased a license since 2015 (n=811,121) and Wild Bulletin subscribers who have never checked in a deer or purchased an annual hunting, trapping, or fishing license from DFW (n=200,980). Respondents were asked to self-identify as a deer hunter or non-deer hunter and to answer basic demographic questions, although responses to those questions were not required. From our total distribution group, 28,109 individuals started the survey (response rate = 2.8%) with a completion rate of 88.2%. We received 22,842 responses from current and lapsed hunters and 5,267 responses from non-hunters. We received responses from 13,809 hunters to the questions about deer processors in Indiana. We asked hunters if they ever used a deer processor to process their deer meat, and 13,809 hunters responded to this question. From those responses, 28% selected they never used a processor, 25% always used a processor, 18% used a processor most of the time, 16% used a processor some of the time, and 12% rarely used a processor.

DNR asked hunters who said they used a processor three more questions. We asked hunters how far (in miles) their typical processor was from their home, and 9,813 responded. Most (45%) lived within 11¬–25 miles of their processor, 31% lived within 1–10 miles of their processor, 18% lived within 26–50 miles of their processor, and 6% lived more than 50 miles from their processor. To create a range of weighted averages, we used the minimum and maximum distances in each category and used 75 miles for the maximum of the "greater than 50 miles" category. The weighted average for distance that hunters are traveling to the processor they normally use is a minimum of 12.9 miles and a maximum of 28.1 miles.

We also asked hunters if their typical deer processor was no longer in business, what would they do, and 10.072 hunters responded. Most hunters (56%) selected they would find another deer processor, 42% would process the deer themselves, and 2% select "Other" and wrote in an answer. Only 49 hunters out of 10,072 (about 0.5%) responded they would stop hunting.

We also asked hunters if their typical deer processor went out of business, how many additional miles they would be willing to drive to find another processor, and 9.894 responded. Most hunters said they would drive an additional 11-25 miles (41%), 20% said 1-10 miles, 19% said 26-50 miles, and only 4% said they would drive more than 50 miles to find another processor. However, 16 % of hunters said they would not willingly drive any farther to find a deer processor than they do now. To create a range of weighted averages, we used the minimum and maximum distances in each category, with 75 miles being used for the maximum of the "greater than 50 miles" category. The weighted average for the additional distance that hunters are willing to travel to find a new deer processor would be a minimum of 11.3 miles and a maximum of 22.9 miles.

To process deer in Indiana, prospective processors must register with Indiana DNR. During the registration, they can indicate if they are interested in being listed as a commercial processor and being included on the list of deer processors on the DNR website. These processors accept deer from the general public and are often

advertised openly; therefore, we have designated them as public deer processors. If they do not want to be listed on the DNR website as a commercial processor, we designate them as a private deer processor, meaning they often process deer for family and friends, but the designation does not preclude them from taking deer from the general public. As of 17 November 2022, DNR had 158 registered processors consisting of 101 (64%) public and 57 (36%) private processors.

We mapped the locations of deer processors in Indiana overlain with the density of where hunters live in Indiana using information received from the deer management survey. We placed a 13-mile buffer (Figure 1) and a 28-mile buffer (Figure 2) around deer processors registered as public in Indiana. Based on the results of this mapping, with a 28-mile buffer, there were only two small areas in Indiana (centered around Benton and southern Marion counties) that are underserved by processors. With a 13-mile buffer (Figure 1), these areas grow in size, and additional areas emerged in several counties. The underserved area in Benton County has a low density of hunters living there, while the underserved area in Marion County has a high density of hunters living there. We also placed a 13-mile buffer (Figure 3) and a 28-mile buffer (Figure 4) around deer processors registered as private in Indiana. Last, we placed a 13-mile (Figure 5) and a 28-mile buffer (Figure 6) around both the private and public processors in Indiana.

Discussion

Indiana currently has good coverage of deer processors throughout the state. When considering the average of how far hunters typically drive to use a processor, most of the state is well served through a combination of public and private deer processors. When you include the additional miles that most hunters would be willing to drive if their normal processor were no longer in business, there is still good coverage within the state for most hunters. Currently, the most underserved area in the state with the highest density of hunters is Marion County and its surrounding counties. At the 13-mile buffer (Figure 1), there are several counties that do not have an easily accessible public processor, although most of these hunters live within 28 miles of a public processor (Figure 2).

Because processors fluctuate in and out of the business, even if a particular processor shuts down, doing so provides an opportunity for another deer processing business to open. Based on the results of the mapping, there are several places throughout the state that are underserved by processors and would likely be good business opportunities for someone desiring to enter the business of deer processing. Alternatively, some private processors may expand their business over time and start processing deer for the general public and fill in some of the current areas underserved by public processors.

Processors are ultimately limited by the capacity of their cold and frozen storage. Increasing capacity is costly and represents a significant investment. It is not uncommon for processors to run out of space early during the opening weekend of firearms season, leaving hunters to scramble for a place to process and/or store their deer. The survey did not assess if the number of hunters harvesting deer on opening weekend is being served by the available storage space of processors. If there is insufficient volume, this may be a place for expansion. Therefore, Additional research on this topic should include questions about the capacity of each processor, especially around opening weekend of firearms season when demand is greatest.

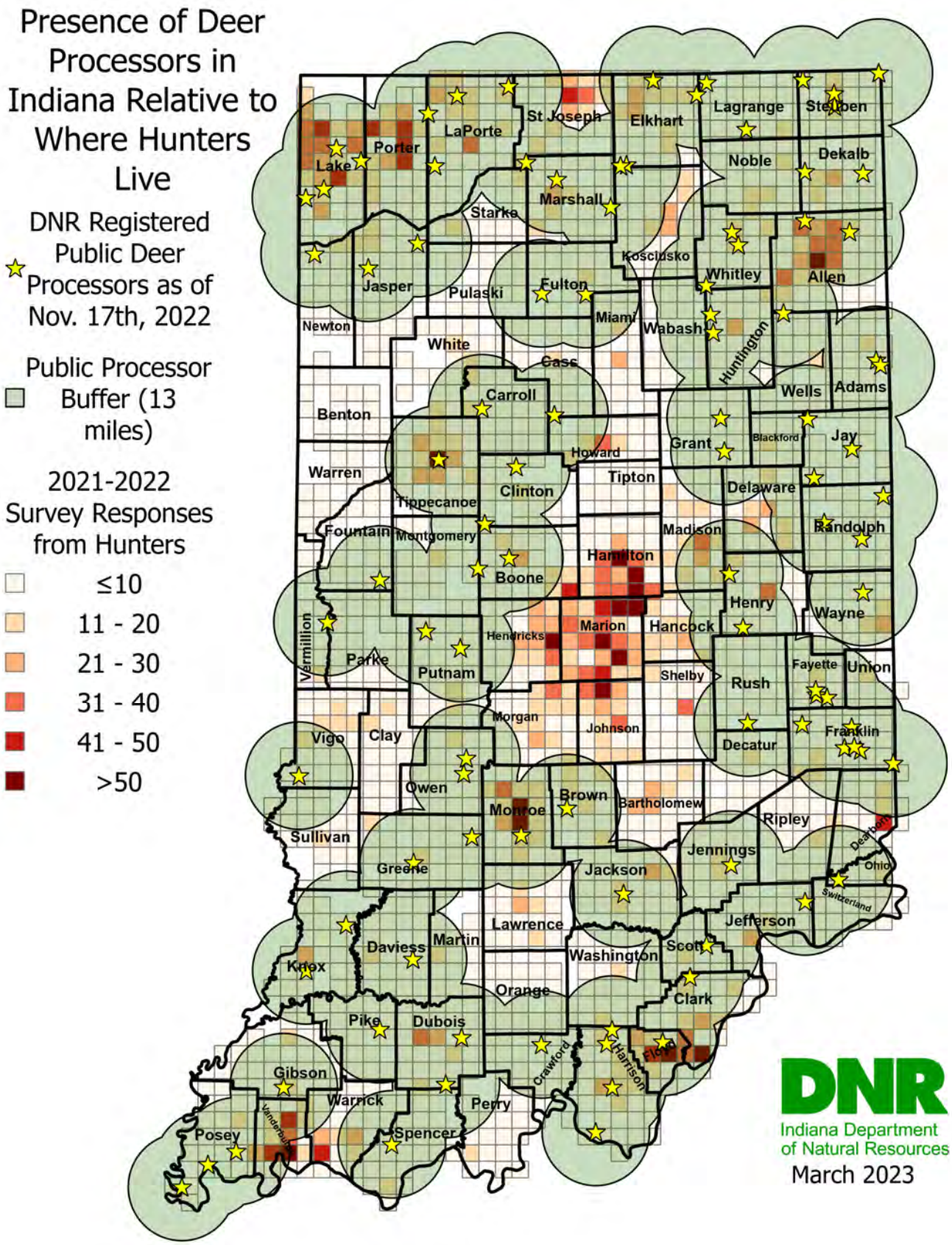

Figure 9-6. Publicly listed deer processors with a 13-mile buffer around each processor representing the lower range of the average distance hunters travel to reach their deer processor.

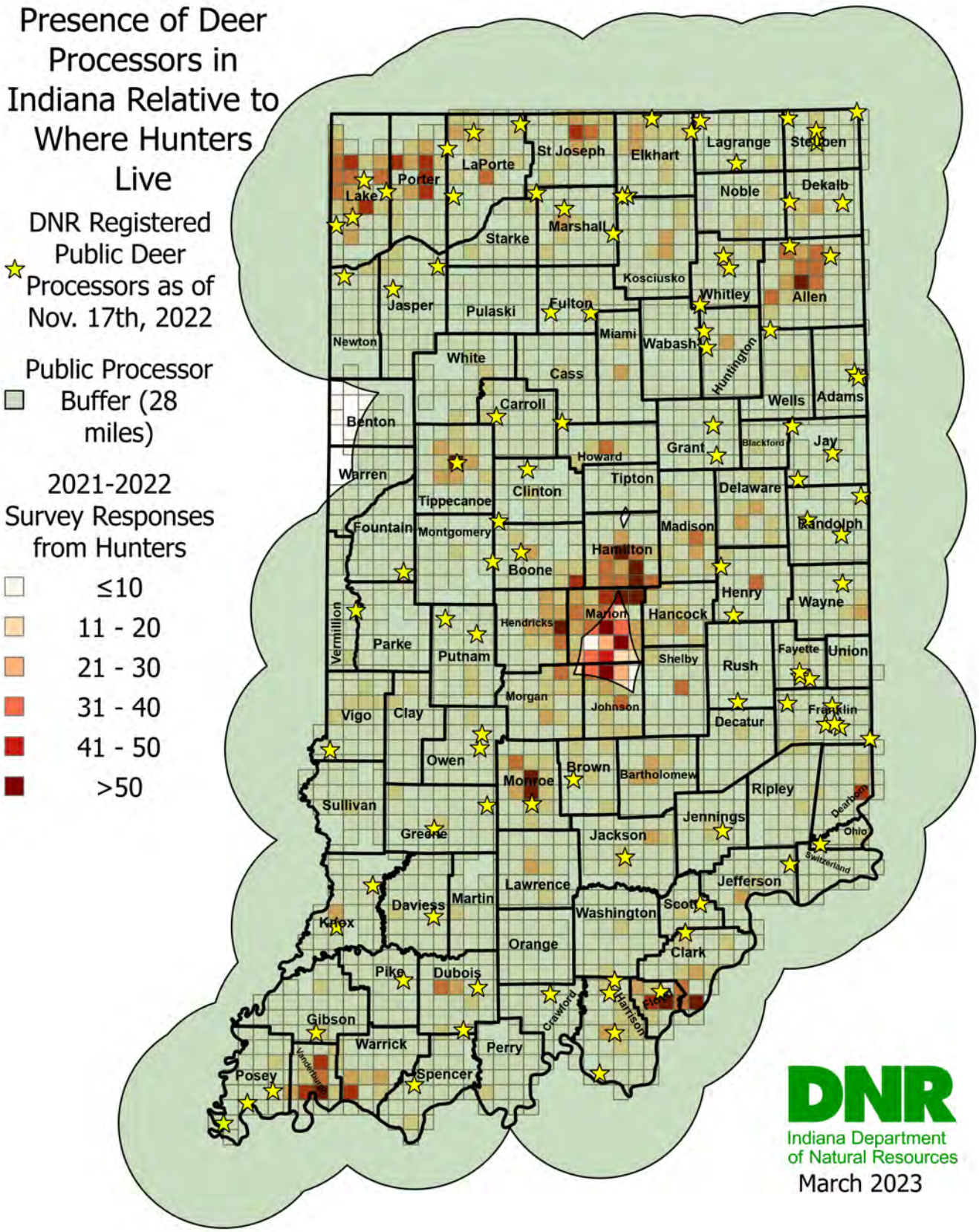

Figure 9-7. Publicly listed deer processors with a 28-mile buffer around each processor representing the upper range of the average distance hunters travel to reach their deer processor.

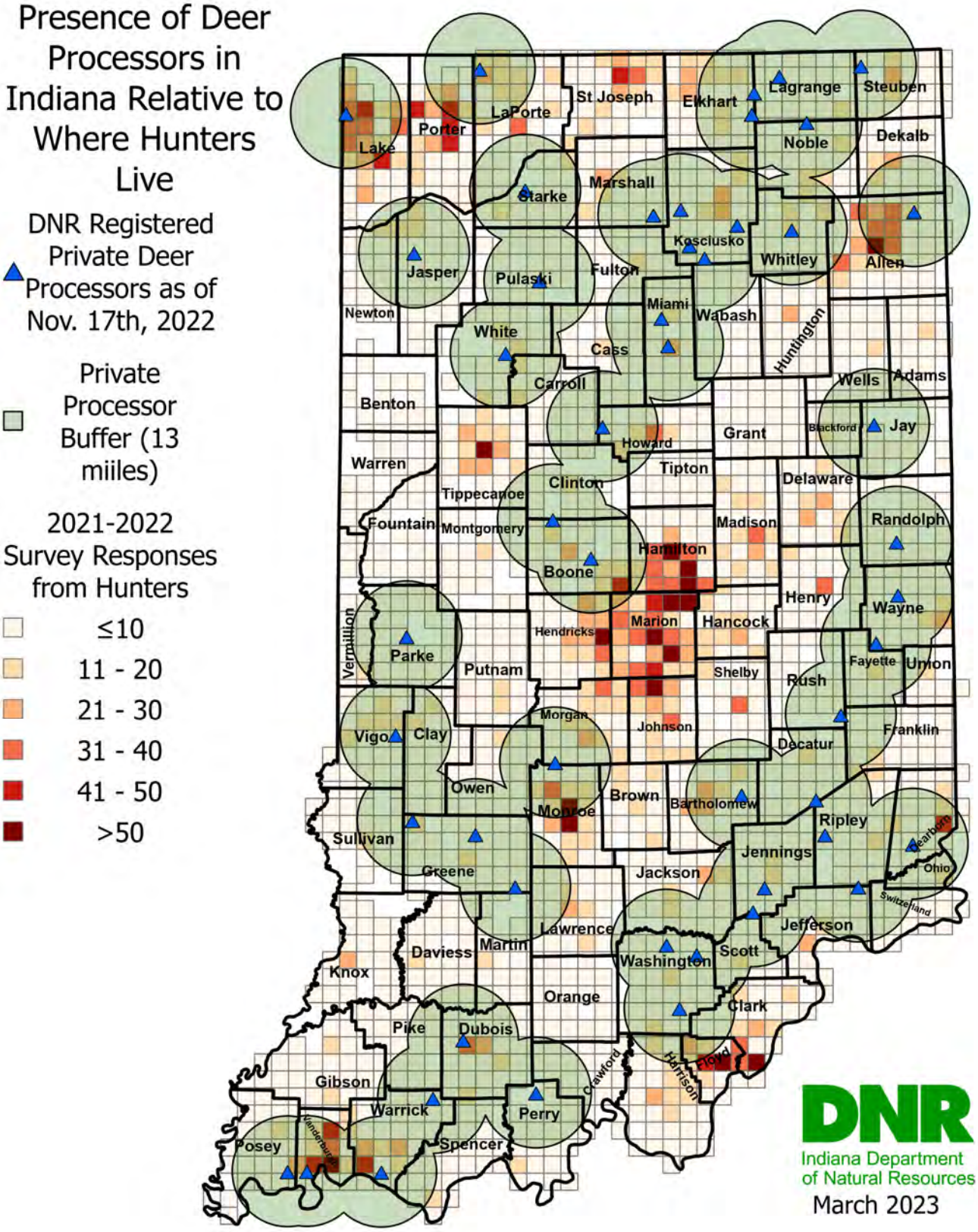

Figure 9-8. Privately listed deer processors with a 13-mile buffer around each processor representing the lower range of the average distance hunters travel to reach their deer processor.

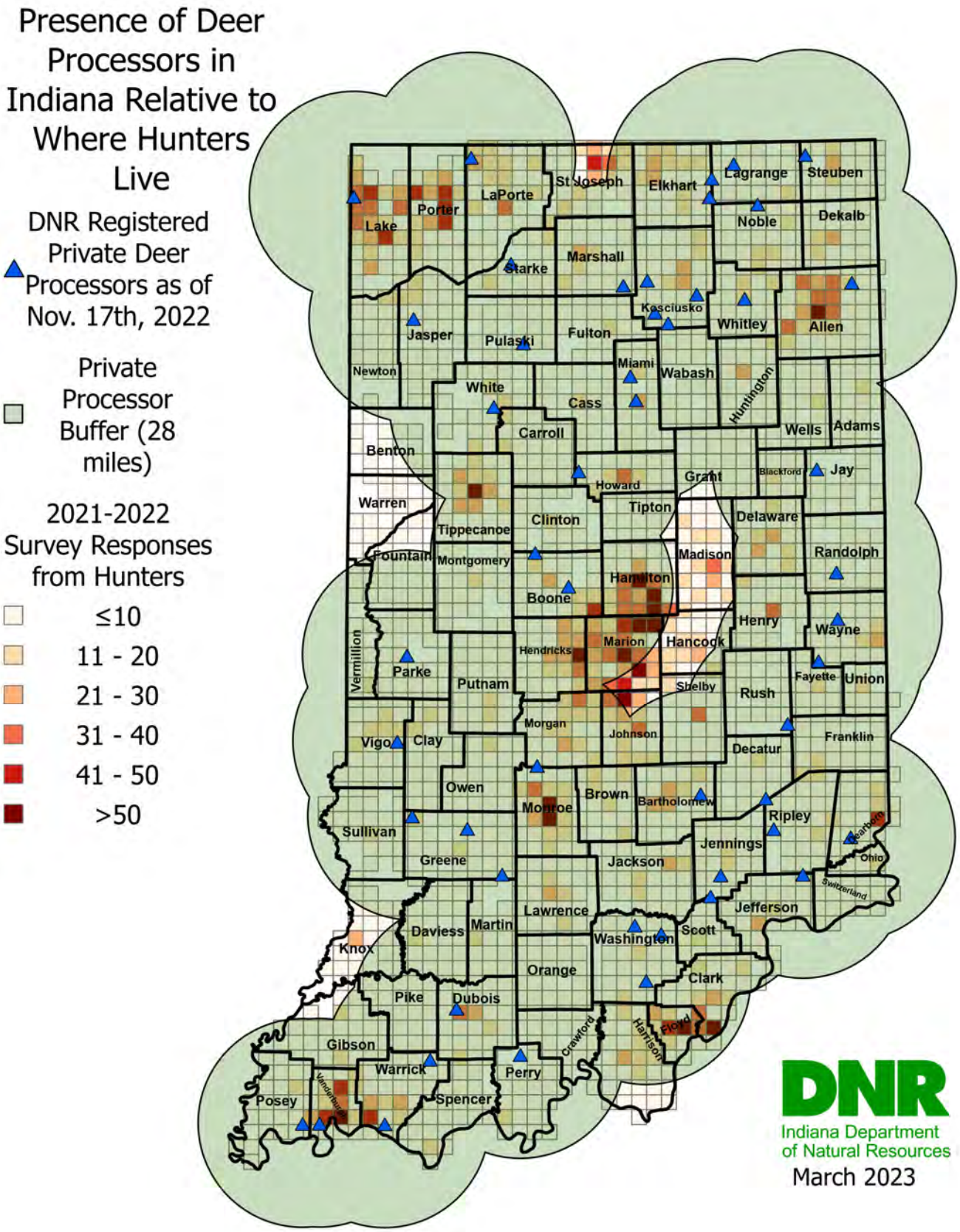

Figure 9-9. Privately listed deer processors with a 28-mile buffer around each processor representing the upper range of the average distance hunters travel to reach their deer processor.

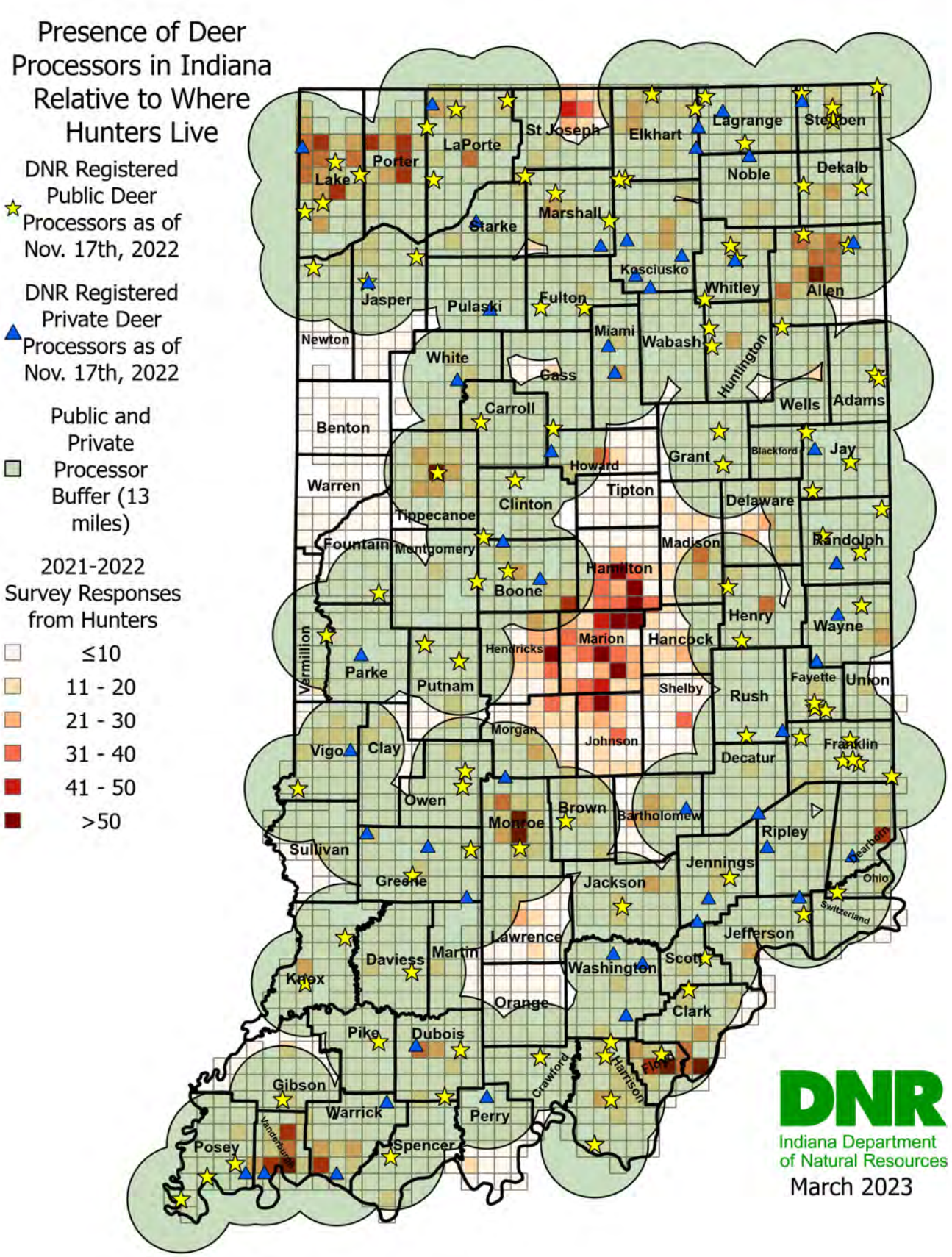

Figure 9-10. Publicly and privately listed deer processors with a 13-mile buffer around each processor representing the lower range of the average distance hunters travel to reach their deer processor.

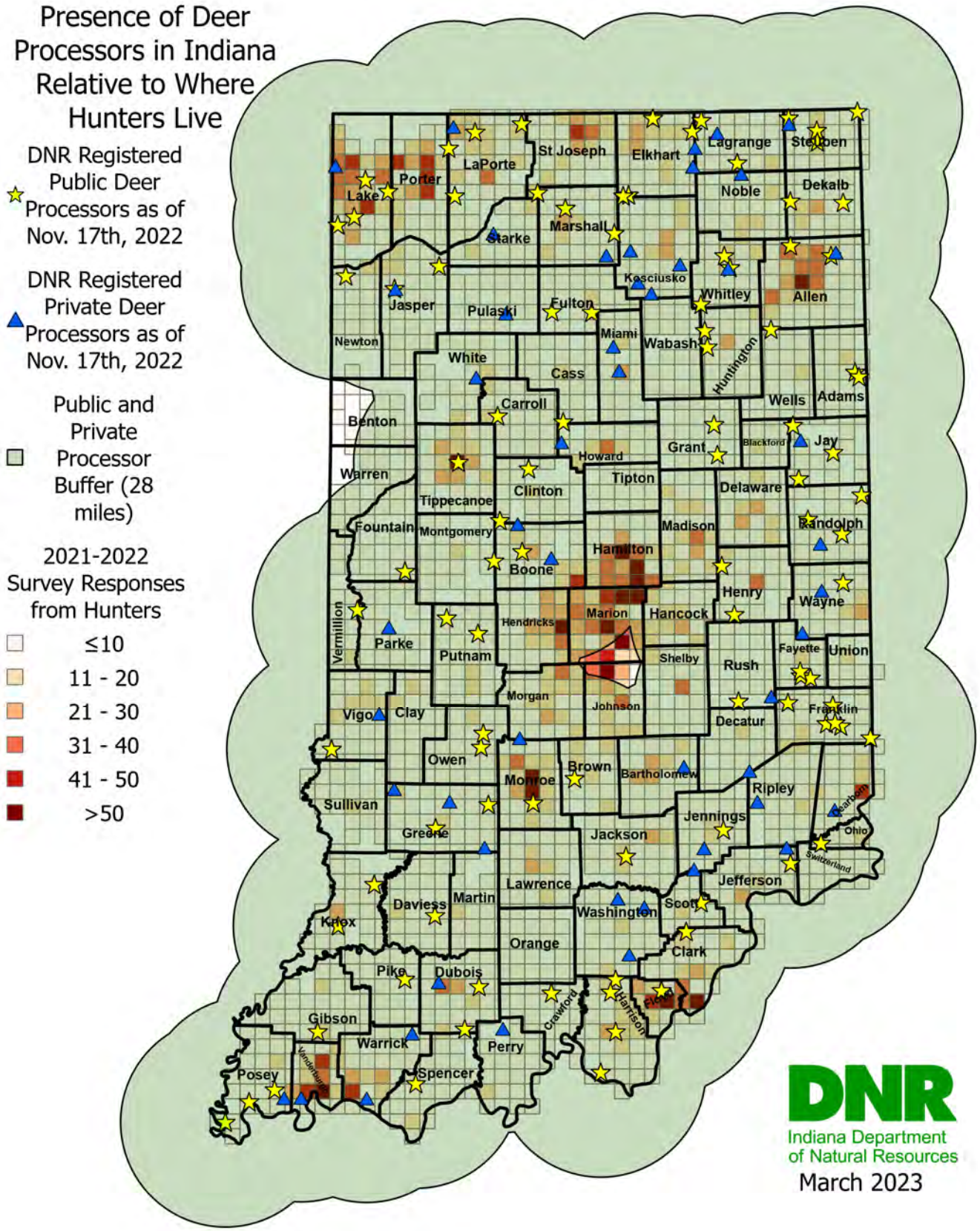

Figure 9-11. Both publicly and privately listed deer processors with a 28-mile buffer around each processor representing the upper range of the average distance hunters travel to reach their deer processor.

FEEDING WILD WHITE-TAILED DEER AND INTERACTIONS WITH FAWNS BY THE PUBLIC IN INDIANA

Joe Caudell and Julia Buchanan-Schwanke,
Indiana Department of Natural Resources

The DNR is responsible for managing white-tailed deer in Indiana. Decker et al. (2016) put forth wildlife governance principles, and those principles are used as a model to manage deer in Indiana. Two of its key principles are to be adaptable and responsive to the needs and interests of a state's citizens, and to seek and incorporate diverse perspectives. To understand the diverse needs and interests of Indiana's citizens regarding deer management, DNR conducts an annual survey of hunting and non-hunting DFW customers. The objectives of this survey are to monitor for changes in opinions toward the deer population size, understand opinions regarding deer that may affect regulations, and better understand the relationship between Indiana's citizens and deer.

Nationally, feeding birds and other wildlife is popular, with 70% of respondents reporting feeding birds and 18% of respondents feeding other wildlife (US Department of Interior et al. 2016). Both hunters and non-hunters use food to attract deer for photos, to view deer, and to provide sustenance during periods where there is reduced forage available. But little is known about the extent to which deer are fed in Indiana. Because it is illegal to bait deer while deer hunting in Indiana, any feed provided to deer by hunters is likely for the purposes of providing additional nutrition and/or wildlife watching, with the exception being food plots that mature during the fall. We also know that a primary form of direct contact between citizens and wildlife is when people discover what is presumed to be abandoned newborn wildlife. The most frequent type of call to the Deer Program from mid-May to early July is about perceived orphaned fawns (unpublished data). The advice DNR gives the public about abandoned fawns is to not disturb them, to observe them from a distance to ensure the doe returns, and to contact a rehabilitator if they are truly abandoned. But it is unclear what interactions occur with fawns after DNR provides this information. Therefore, to better manage deer for Indiana's citizens, we sought to understand more about two primary forms of non-hunting interaction between people and deer, the recreational feeding of deer and interactions with fawns.

Methods and Results

To understand the needs of Indiana citizens, DNR created an annual online survey in 2018 that is distributed to customers who purchase a hunting, trapping, and/or fishing license and who provided a valid email to DFW (Caudell and Vaught 2019). To obtain opinions from a broader segment of the public, in 2022, we expanded this survey to include anyone who signed up for the DFW quarterly email newsletter Wild Bulletin. On 31 January 2022, we distributed the annual deer management survey via email to 1,012,126 individuals, including anyone who had purchased a license since 2015 (n=811,121) and Wild Bulletin subscribers who have never checked in a deer or bought an annual hunting, trapping, or fishing license from DFW (n=200,980). Respondents were asked to self-identify as a deer hunter or non-deer hunter and to answer basic demographic questions, although responses to these questions were not required. From our total distribution group, 28,109 individuals started the survey (response rate = 2.8%) with a completion rate of 88.2%. We received 22,842 responses from current and lapsed hunters and 5,267 responses from non-hunters.

The survey asked, Do you provide any of these on your property for the benefit of deer? and requested that respondents select the option(s) that best describes your interactions with fawns so DNR could assess the level and type of contact that individuals have with deer. Respondents could choose a combination of these answers for the support question: feeding with corn/grains; feeding with foods other than corn/grains, such as fruits or hay; food plots; mineral blocks; water; other; and none. Respondents could choose a combination of the following answers to describe their interactions with fawns: I have no direct contact with fawns; I see fawns but don't go near them; I see fawns and watch over them until I'm sure the mother is around or returns; I have taken fawns to rehabilitators; I have raised fawns myself; and other.

Of those starting the survey, 89% were license holders, and 11% were Wild Bulletin subscribers. Survey respondents were mostly deer hunters (78%), male

(89%), White/Caucasian (92%), and 45–64 years old (45%; Table 1). A total of 19,988 individuals responded to the questions about feeding deer (Table 2), and 19,931 individuals responded to the question about contact with fawns (Table 3). Just under half of respondents (48.9%) reported providing some support to deer, with 54.2% of hunters reporting they provide some type of support to deer, and 28.8% of non-hunters providing support (Table 2). Deer hunters most commonly provided food plots (33.8%), mineral blocks (27.1%), a water source (21.3%), and corn (17.8%), while non-deer hunters provided water (14.4%), mineral blocks (8.8%), and corn (8.7%; Table 2). Most non-deer hunters reported that they do not have direct contact with fawns (45.5%), or they see fawns and do not go near them (53.1%; Table 3). Likewise, most deer hunters either have no direct contact with fawns (50.8%) or they see fawns but do not go near them (49.3%; Table 3).

Discussion

We know people can form strong emotional connections with wildlife. When those emotional interactions are positive, people seek additional interactions (Jacobs and Vaske 2019, Stinchcomb et al. 2022). These interactions can take the form of providing care to wildlife by providing food or other nutritional requirements and caring for wildlife directly, as in the case of orphaned fawns. While some may believe that hunters do not care for wildlife because they kill the thing they purport to care about, many hunters care deeply about wildlife. This is often reported as one of the motivating factors in their desire to control predators (also Stinchcomb et al. 2022), when providing food during winter, when reporting dead deer, or their desire to rescue orphaned deer. Therefore, it is not surprising to find that almost half of hunters, along with many non-hunters, reported providing some form of supplemental support to deer.

Few people responded that they have direct contact with fawns, even though they frequently see fawns (Table 2). While the reason for this is unknown, it is a positive finding because of the vulnerability to disease fawns present, as Martins et al. (2022) found with SARS-CoV-2. In the absence of contradictory evidence, DNR should continue its efforts to message to the public that unattended fawns should be left alone and monitored from a distance, and/or that intervention should only occur after the fawn is left unattended for several days.

Decker et al. (2016) stressed the importance of understanding the needs of all citizens within a state when managing wildlife populations. When interpreting results, it is important not to extrapolate the results to the entire population because the results are not representative of the demographic of Indiana (Table 1). Our deer management surveys are sent to all individuals whom the DFW has an email address for and who do not object to receiving a survey. Thus, the survey is not expected to result in a representative sample of the population. But, when our non-deer hunter respondent demographics were investigated, they were similar to a recent stratified random survey conducted about deer management in Indiana, with the largest difference being the age of respondents in paper surveys (mean age = 60; Stinchcomb 2022) and our online survey (mean age = 51). Therefore, the respondents that we are obtaining from our surveys of non-hunters are similar to what we would obtain from a randomized paper survey of individuals who do not purchase a hunting license from DFW. If a representative sample of the population is desired in order to determine the magnitude of these behaviors in the population, it would likely require oversampling population segments, panels, or qualitative methods in order to obtain the desired results.

Our results provide additional insight for DNR to better understand the potential magnitude of deer feeding that occurs outside of the hunting season by both deer hunters and non-deer hunters. Through this understanding, agencies can better adapt and respond to the needs and interest of their state's citizens, as stressed by Decker et al. (2016). This may be in the form of providing advice on how to feed in a more responsible way, or through disease modeling efforts to understand the potential impact of increased contact between deer and increased contact between deer and people.

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Table 9-4. Observed proportions on characteristics of survey respondents (n=28090) for the 2021 Indiana Deer Management Survey. Statewide proportions are from Stinchcomb (2022).

Demographic Questions	n	Sample Proportion	Statewide Proportion
Identifies as a Deer Hunter	**23,364**		
Yes		0.78	0.04
No		0.21	0.96
Gender	**23,364**		
Man		0.89	0.49
Woman		0.09	0.51
Ethnicity	**19,244**		
White/Caucasian		0.92	0.62
Black/African American		0.003	0.12
Hispan/LatinX		0.003	0.19
Asian/Asian American		0.001	0.06
Native American/Alaska Native		0.002	0.01
Pacific Islander		0.000	0
Household Income	**14,226**		
<$50,000		0.16	0.43
$50,000-$99,999		0.39	0.32
>$100,000		0.45	0.25
Highest Education	**18,639**		
High school or less		0.25	0.44
Associates degree or some college		0.39	0.29
College of graduate school		0.37	0.27
Age	**17,663**		
18 to 24		0.03	0.1
24 to 44		0.29	0.26
45 to 64		0.45	0.25
65 and older		0.23	0.17

Table 9-5. Responses to the 2022 Indiana Deer Management Survey when participants were asked to select any type of support they provided to deer. Because respondents could select multiple answers, results do not tally to 100%.

Type of Support	Non-hunter	(n)	Hunter	(n)
Corn	8.7%	(350)	17.8%	(2,704)
Fruit and/or hay	4.9%	(197)	6.3%	(956)
Food plot	3.1%	(125)	33.8%	(5,139)
Mineral blocks	8.8%	(352)	27.1%	(4,121)
Water	14.4%	(580)	21.3%	(3,240)
Other support	5.6%	(225)	4.8%	(727)
None	71.2%	(2,858)	45.8%	(6,971)

Table 9-6. Responses to the 2022 Indiana Deer Management Survey when participants were asked to select their interactions with fawns. Because respondents could select multiple answers, results do not tally to 100%.

Type of contact with fawns	Non-hunter	(n)	Hunter	(n)
I have no direct contact with fawns	45.5%	(1,821)	50.8%	(7,690)
I have raised or rehabilitated fawns	0.5%	(19)	0.3%	(48)
I have taken fawns to rehabilitators	0.3%	(13)	0.3%	(47)
I watch over fawns until mother returns	3.9%	(156)	3.7%	(565)
I see fawns but don’t go near them	53.1%	(2,134)	49.3%	(7,474)
Other	1.3%	(51)	0.6%	(89)

TIMING AND FREQUENCY OF CALLS TO THE INDIANA DEER HOTLINE

Joe N. Caudell, *Indiana Department of Natural Resources*

The Indiana DNR has operated a telephone line for deer hunters with questions about deer licenses and deer hunting since 2002. The hotline was started as deer regulation complexity increased, starting with the creation of the County Bonus Antlerless Quotas (CBAQs). Since then, DNR has maintained a dedicated phone line to answer questions from the public on deer hunting related topics. In more recent years, an email address was created to provide an additional avenue for hunters to have their questions answered. To better understand how the Indiana Deer Hotline is used, we kept records of the subject of calls and emails during the 2020-2021 and 2021-2022 hunting seasons.

From February 2020 until January 2022, 1,684 emails and calls were documented. Of those calls, 1,198 provided enough detail to be placed into categories. The remaining calls asked for a call-back, with no details provided. Most calls (67%) are received in November, followed by 14% in October, 12% in December, 5% in September, 1% in January and August, and 2% in all of the other months combined.

We found that the single most-asked question was about how many deer could be legally harvested in a county (i.e., County Quotas; 14% of all calls), followed closely by what firearm is legal to use for deer hunting (13%; Table 1). The "other" category consisted of calls about tagging deer, the late antlerless firearms season, the use of hunter orange, checking in deer, the use of blinds, other questions about deer reduction zones, donating deer, and other uncategorized calls.

Table 9-7. Number and frequency of calls to the Indiana Deer Hotline from February 2020 through January 2022. The bold numbers are the totals for each category. The smaller, non-bold numbers are specific questions that had a significant percentage of calls within that category.

Question	Number	Percentage
Hunting Questions	**324**	**23%**
General	92	7%
Where to hunt	91	7%
Deer Reduction Zones	58	4%
Questions about License Type	**469**	**34%**
Bundle	104	7%
Landowner	85	6%
Nonresident	64	5%
Youth	55	4%
What Weapons are Legal	**233**	**17%**
Firearm	184	13%
County Quotas	**191**	**14%**
Other	**172**	**12%**

Chapter 10.
EXTERNAL DEER RESEARCH

Studies described in the External Deer Research chapter are projects being conducted by university partners to better understand deer and inform management decisions in Indiana.

INTEGRATED DEER MANAGEMENT PROJECT

Cost: $2,626,340 for the complete five-year project

Project Personnel

- Dr. Robert Swihart - Principal Investigator, Purdue University
- Dr. J. Andrew DeWoody - co-Principal Investigator, Purdue University
- Dr. Brian Dillman - co-Principal Investigator, Purdue University
- Dr. Elizabeth Flaherty - co-Principal Investigator, Purdue University
- Dr. Michael Jenkins - co-Principal Investigator, Purdue University
- Dr. Zhao Ma - co-Principal Investigator, Purdue University
- Jarred Brooke - co-Principal Investigator, Purdue University
- Elizabeth Jackson - co-Principal Investigators, Purdue University
- Patrick McGovern - Project Coordinator, Purdue University
- Scott Allaire - Field Research Coordinator, Purdue University
- Zackary Delisle- Ph.D. Student, Graduate Research Assistant, Purdue University
- Jessie Elliott – M.S. Student, Graduate Research Assistant, Purdue University
- Richard Sample - Ph.D. Student, Graduate Research Assistant, Purdue University
- Taylor Stinchcomb - Ph.D. Student, Graduate Research Assistants, Purdue University
- Dr. Rebecca Cain - Postdoctoral Research Associate, Purdue University
- Dr. Safia Janjua - Postdoctoral Research Associate, Purdue University
- Dr. Joe N. Caudell – DNR Project Liaison, Indiana Division of Fish and Wildlife

White-tailed deer are perhaps the most popular and economically important resource managed by the Indiana DNR Division of Fish & Wildlife (DFW). Sound management requires DFW to be able to measure and incorporate into agency decisions the biological, ecological, and social factors that affect deer populations. The purpose of this project is to collect and evaluate biological, ecological, and sociological information for its potential to improve management decisions in an integrated context, with the ultimate goal to maintain deer populations within both ecologically and socially acceptable limits. Biological information currently is collected by DFW from multiple sources, including harvest returns, indexes of hunter effort, license sales, archer surveys, depredation permits, and deer-vehicle collisions. In this project we will explore the utility of augmenting current data with population estimates derived from systematic counts collected using different sampling methods. We also will supplement our understanding of potential fawn predators by estimating population parameters from non-invasively collected genetic samples. Ecological information on habitat condition and the effects of deer on forest communities in Indiana has relied on scattered studies, mostly local in scale and relying on non-standardized methods. The systematic statewide assessment of deer impacts on state parks is an exception; however, parks rely on hunting and land use not representative of the rest of the state. We will explore the utility of multiple measures of habitat condition and plant community integrity, and their associations with deer abundance as well as prevailing land use and land cover. From a societal perspective, information on public perceptions of deer and deer management by DFW has received even less attention than biological or ecological information and focused primarily on hunters. We will solicit perceptions of a wide range of stakeholders to gain greater understanding of their attitudes, values, beliefs, and expectations regarding Indiana deer and deer management. The specific objectives of the project are to:

- Estimate deer population density using counts derived from aerial surveys, remotely triggered cameras, and ground-based pellet-group surveys.
- Evaluate cost-effectiveness of these count-based methods of estimating deer abundance.
- Estimate coyote population density using genetically determined individual identities of systematically collected scat and hair samples.
- Evaluate deer impacts on vegetation using elapsed time since browsing of woody twigs, fencing and oak sentinel plantings, herbaceous indicators of browse pressure, and a metric of browsing intensity on woody plants.
- Evaluate the utility of stump sprouts to index browse pressure in closed-canopy stands.
- Rank browse selection of woody plants and quantify associations between deer abundance, browse intensity, and plant communities.
- Identify key social factors shaping deer-human interactions.
- Investigate how judgments about deer management are affected by emotions, beliefs, and attitudes.
- Assess existing levels and drivers of public satisfaction with deer management.
- Develop tools DFW can use to better account for social perceptions and concerns in its planning process.

The project identified 10 regional management units (RMUs) in Indiana that serve as project study areas. Currently, studies are being conducted in RMUs 3, 4, and 9 (Figure 10-1). RMU 3 includes nine primarily agricultural counties spanning from Newton County south to Montgomery County. RMU 4 stretches from Morgan County south to the Ohio River. These 16 counties are mostly forested and unglaciated; they include many state and federal properties such as Brown County State Park, Martin State Forest, and Hoosier National Forest. RMU 9 is in Indiana's natural lakes region in the northeast corner of the state. Land cover is a mix of woodlots, wetlands, forested riparian areas, cultivated crops, and pasture.

Indiana DNR adapted the RMUs into deer management units (DMUs; Figure 3-7) to make them more suitable for management applications. The DMUs are referenced throughout the Indiana White-tailed Deer Report and have slightly different county groupings and labels than the RMUs.

In our third year, we concluded data collection pertaining to deer density, impacts on vegetation, and stakeholder perceptions. These data were supplemented with data on predator populations and stump sprout performance. Analysis of data is in full swing, and results are being shared with a diverse array of stakeholders to improve wildlife management generally and management of Indiana deer specifically.

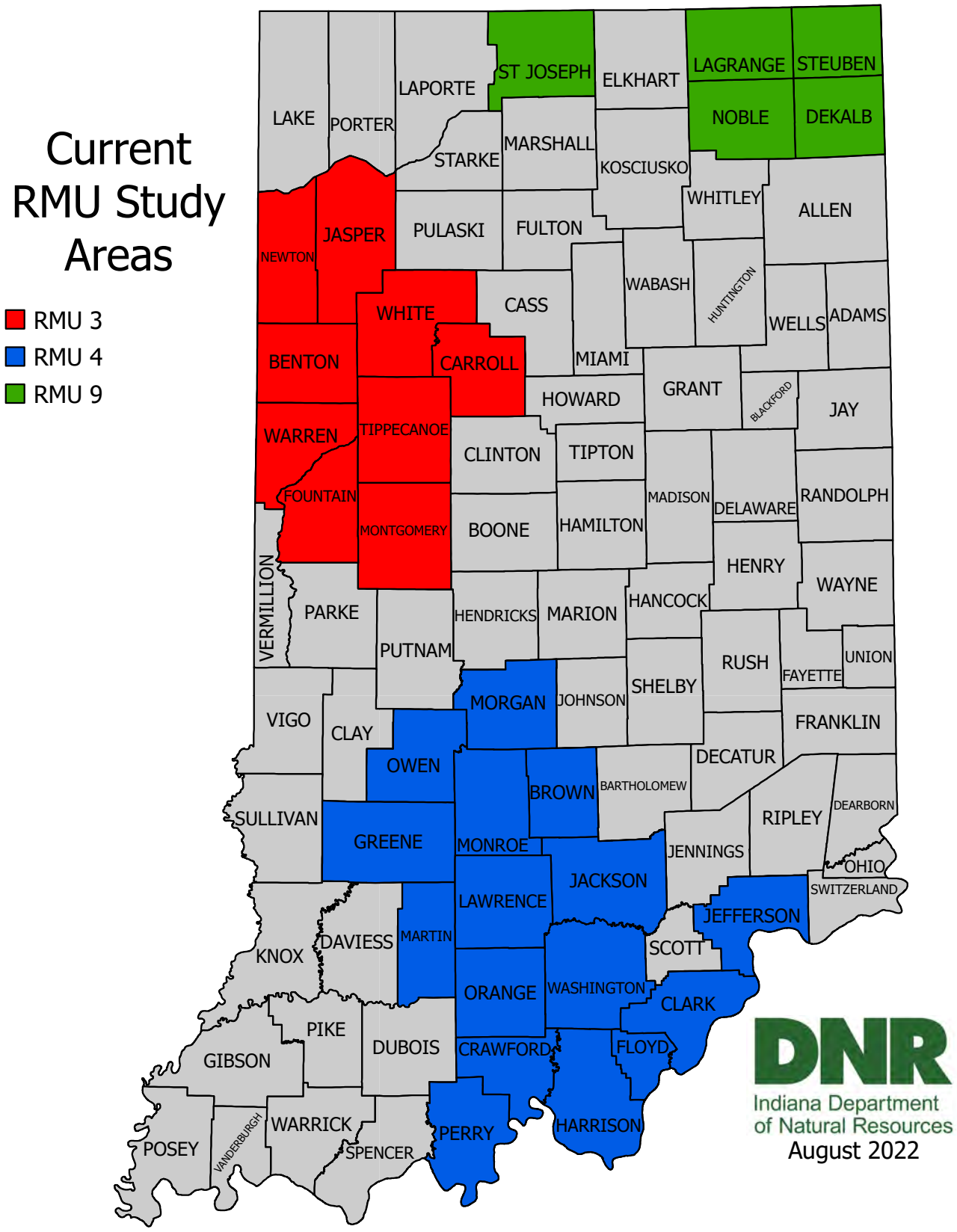

Figure 10-1. Current regional management unit (RMU) study areas for Purdue University deer management research projects.

Population Biology

Deer population density will be estimated using a statistical approach known as distance sampling. Aerial surveys were flown along parallel transects, and the distance from the transect line was measured for each deer detected. Flights occurred at altitudes of 1,000-1,500 feet, high enough so deer wouldn't react to the aircraft. A high-resolution digital camera was used alongside an infrared camera to confirm that a detected heat signature was actually a deer. Ground-based surveys were walked along transects, and distances were measured for each pellet group encountered. Cameras are increasingly used to study wildlife behavior and ecology, but only recently in conjunction with distance sampling (reviewed by Delisle et al. 2021). For surveys using remotely triggered cameras, the distance from the camera to each deer in an image was recorded. The utility of each of the three methods will be assessed by conducting cost-effectiveness analysis to estimate cost of the method relative to precision of its density estimate.

Population density of coyotes and occurrence of bobcats will be estimated from scat and hair samples. Surveys were repeatedly driven on transects to collect scat, and hair samples were collected by deploying a pair of snares at multiple sites in each RMU, a rub pad design for coyotes and a "cubby" design for bobcats. DNA was extracted, purified, concentrated, and used in conjunction with a panel of 96 genetic markers to genotype each sample and identify species, sex, parasite occurrence, and for coyotes, individual identity.

In Year 3 we flew aerial transects in all 20 test landscapes and detected 2,894 deer along 1,280 transect miles during mid- to late winter. Using these detections, we will estimate deer density in open and concealed habitat types in each RMU. We walked 32.5 miles of ground transects in March 2021 and found 1,262 pellet groups. We will use methods for estimating persistence rates of pellet groups that we developed (Delisle et al. 2022) to estimate deer densities overall as well as in open (grassland, agricultural fields) and concealed (forest, wetland) habitat types. We deployed 428 cameras in Year 3, including 99 in row crop and 329 in permanent cover. In total, we captured 1,015,178 photos and identified wildlife detections for 294,335 photos within a two-week period (25 Feb 2021 to 10 Mar 2021) for all cameras. We also measured a total of 30,732 and 9,505 distances to deer in concealed and open habitat, respectively. These data will be used to estimate deer density in open and concealed habitat types in each RMU. Preliminary estimates for all methods from Year 3 indicate highest deer densities in RMU 9 in northeast Indiana, and lowest densities in RMU 3 in west-central Indiana. Once density estimates are finalized, data on costs, sampling effort, and precision of estimates will be combined to assess the relative cost-effectiveness of the three methods.

A total of 676 scat samples were collected from sampling ~450 miles of transects during January–April 2021. A total of 213 hair samples were collected from 321 hair snares deployed in January and checked weekly for eight weeks. These were combined with samples collected in 2020 for genetic analysis. A panel of 96 single nucleotide polymorphism (SNP) markers were designed for genotyping of extracted DNA. A total of 705 of the 1,221 genotyped samples were identified as coyotes, from which 522 unique individuals were estimated. The probability that two random individuals will have identical SNP genotypes was essentially zero (3.2×10^{-13}). We will validate sex determination on a subset of the coyote samples. Coyote scat revealed low levels of parasitism, with presence of tapeworm and heartworm detected for 5.6% and 3.7% of samples, respectively. Computer code will be modified from other studies to estimate population density of coyotes from the SNP genotypes.

Habitat Condition and Deer Impacts

Four methods were compared to assess deer impacts on vegetation at selected woodlots within each RMU. All sampling was conducted in the "deer molar zone", the height at which plants are available to deer: 1) The twig aging method relies on age determination of 50-60 randomly selected twigs in each woodlot back to a browsed parent twig. Given that greater twig age signifies a greater number of years since a twig was last browsed, greater twig age indicates lower browsing intensity. 2) Oaks are generally regarded as palatable to deer, and heavy deer use can inhibit oak regeneration. The oak sentinel method compares growth and survival of 10 oak seedlings planted inside of deer-proof fences to 20 planted outside them. In other words, the oak seedlings are either protected or unprotected from

deer browsing. 3) Prior work in Indiana has shown that three common Indiana plant species, sweet cicely, jack-in-the-pulpit, and white baneberry, are indicators for deer browse impacts on native herbaceous plant communities. Heights of the tallest individuals of each species were measured in each woodlot–shorter height is correlated with higher deer impacts. 4) Browsing intensity of woody plants also was assessed by estimating the proportion of twigs available to deer that were browsed by deer. Counts of all available and browsed twigs were made for each species in regularly spaced plots along transects. The proportion of available twigs browsed was computed for all species other than those highly avoided by deer.

Recent research has suggested that stump sprouts may be useful as indicators of high browse intensity, but no evaluation of stump sprout indicators has been conducted in closed-canopy forests such as those typical of Indiana. To examine stump sprout performance under these conditions, we created stumps in nine different stands across the southern, central, and northern regions of Indiana. Sixty stumps from two different species were created at each site, and 1/3 of these were protected from browsing. Camera traps were also installed at each of the stands from 20 May to 20 June 2021. Sprouting performance and the proportion of browsed twigs on sprouts and neighboring seed-origin stems were assessed from late June to early July. Leaf nutrient levels were compared between parent trees, sprouts, and neighboring stems.

Overstory, midstory, and understory sampling was conducted to determine whether plant communities and deer browsing differed with deer use and landscape characteristics. To quantify preferred browse species for deer, we used the same data we recorded for estimating the proportion of available twigs browsed and separated species into five preference classes: Highly preferred, marginally preferred, neutral, marginally avoided, and highly avoided. Intensity of deer use of each locality was estimated from the remotely triggered camera stations. Land cover and use measures were computed from 2016 satellite images.

Twig aging was conducted in March 2021 in 66 woodlots. Average twig ages for woodlots varied slightly across RMUs. RMU 4 had the highest twig age (lowest browse intensity) at 2.8 years, followed by RMU 3 with 2.5 years, and RMU 9 with 2.0 years. Exclosures for the oak sentinel method were constructed in 41 woodlots in February 2021, followed in April by planting of 1,710 red oak seedlings. Browsing appeared to depress relative height growth of seedlings planted in 2021: Browsing was highest in RMU 3 (56%) and lowest in RMU 9 (41%), whereas average relative height growth was highest in RMU 9 (15%) and lowest in RMU 3 (7%). However, browsing seemed to have no effect on survival, as we observed the same trend for survival rate as for browsing rate. At least one indicator species was found in 60 of 67 woodlots sampled from May-June 2021. Only jack-in-the-pulpit may work as an indicator of historical browsing intensity, as increasing height of jack-in-the-pulpit correlated well with increasing percent cover of native herbaceous-layer species within woodlots. Average jack-in-the-pulpit heights were tallest in RMU 3 and similar in RMUs 4 and 9, which indicates that browsing intensity is highest in RMUs 4 and 9 and lowest in RMU 3. Available and browsed twigs were counted May-June 2021. The proportion of available twigs browsed was highest in RMU 4, with 31% of available twigs browsed, and similar in RMUs 3 and 9, with 14% and 17% of available twigs browsed, respectively, which suggests that browsing intensity of woody species in 2021 was highest in RMU 4 and lowest in RMU 3 and 9.

We created 540 stumps in nine different stands, with 30 stumps for each of two species at each stand. Hackberry, Northern red oak, red maple, and white ash stumps sprouted vigorously, with 85%, 93%, 83%, and 92% of stumps sprouting, respectively. Sugar maple sprouted moderately well, with 62% of stumps sprouting, and only 23% of sassafras stumps sprouted. Hackberry produced the highest number of sprouts per stump (sprout density), with 25 sprouts per stump, followed by white ash, Northern red oak, and red maple with 16, 12, and 10 sprouts per stump, respectively. Northern red oak (136 cm) and white ash stumps (119 cm) produced the tallest sprouts, followed by hackberry (97 cm) and red maple (94 cm), while sugar maple (34 cm) and sassafras sprouts (22 cm) were the shortest. In general, stump sprouts had greater nutrient contents than parent and uncut neighbor stems grown from seed. The increased nutrient contents in stump sprouts generally led to an increased proportion of browse on stump sprouts compared to seed-origin stems. Hackberry was the most nutritious stump-sprout species, with the highest crude protein, calcium, phosphorous, and total digestible nutrients. A moderate correlation

occurred between the height discrepancy of caged and open sprouts and the percent of available twigs browsed on seed-origin stems. Thus, stump sprouts may be useful for monitoring deer browsing intensity within woodlots.

Statewide, preference rankings were derived for 63 woody species. The most highly preferred group included maple species, most oaks, ash, dogwood, and *Viburnum* species. The most highly avoided species included not only invasive species such as bush honeysuckle and multiflora rose, but also natives such as *Rubus* species, pawpaw, American beech, and spicebush. To further explore variation in patterns of browse selection, deer use and landscape characteristics will be included as predictors in statistical models of probability of browsing.

Societal Perspectives on Deer and Deer Management

Existing perceptions, beliefs, attitudes, and emotions of Indiana residents related to deer and deer management were assessed with 59 semi-structured interviews conducted around the state and two focus groups in Bloomington. These results informed development of a quantitative survey distributed to 6,000 residents across the state. Statistical analysis of survey responses was used to predict anticipated emotional responses to hypothetical human-deer encounters in relation to their influence on the acceptability of lethal control. Survey responses also will be used to develop and analyze indices of public satisfaction with DFW and potential for social conflict over deer management approaches.

Findings from the semi-structured interviews (Stinchcomb et al. 2022) were used to develop a statewide survey that was implemented June-August 2021. Of 6,000 residents sampled, 1,806 responses were received and formed the basis for analyses. In one part of the survey, participants answered questions after being presented with four scenarios of encounters with a deer appearing in front of the participant while walking on a path: 1) an adult deer appears, stops, and begins eating plants; 2) a buck appears on the path, stops, and looks your way; 3) a fawn appears, stops, and looks your way; 4) an adult deer stops, looking diseased. Statistical models were built to show relationships among general deer attitudes, mutualist wildlife beliefs, scenario-specific emotions, and scenario-specific acceptability of hunting or culling. Emotions influenced decisions, but the strength of emotional influence depends on the type of deer encountered. Emotions mediated 14% of the effect of general attitudes on lethal control acceptability in the fawn encounter, and completely mediated this effect in the encounter with a diseased deer, but they showed no effect when encountering a large buck nor a deer eating the nearest plants. Because emotions play a significant role in formulating people's perceptions of human-wildlife interactions, accounting for emotions in decision-making will help practitioners develop more effective and socially accepted approaches to wildlife conservation and management.

Survey responses also were used to develop an index of public satisfaction with deer management based on service quality, agency performance, trust in the agency, and trust in information. The satisfaction index was used in regression analyses to examine what variables explain whether residents are satisfied with and trusting of the Indiana DNR and its management of deer. Preliminary results indicate that residents' perceived acceptability of management approaches and deer-related concerns most strongly affected performance and quality measures of satisfaction. In contrast, demographic characteristics including self-identity, wildlife value orientation, and allowance of hunting on one's property exerted the strongest influences on trust.

Survey results also were used to quantify the potential for social conflict regarding six deer management methods among (a) resident self-identity ("stakeholder") groups and (b) resident political ideologies. The resulting conflict index was mapped across Indiana to enable an analysis identifying areas of significantly high social conflict ("hotspots") and significantly low social conflict ("coldspots"). Preliminary results suggest that conflict potential varied across resident self-identities and management methods but showed more predictable variation with political ideologies. Hotspots of conflict over lethal methods clustered around urban areas.

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Delisle, Z.J., E.A. Flaherty, M.R. Nobbe, C.M. Wzientek, and R.K. Swihart. 2021. Next-generation camera trapping: Systematic review of historic trends suggests keys to expanded research applications in ecology and conservation. Frontiers in Ecology and Evolution 9:1-18. https://doi.org/10.3389/fevo.2021.617996.

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Stinchcomb, T.R., Z. Ma, and Z. Nyssa. 2022. Complex human-deer interactions challenge conventional management approaches: the need to consider power, trust, and emotion. Ecology and Society 27(1):13. https://doi.org/10.5751/ES-12899-270113.

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Publications and Abstracts

Delisle, Z. J., E. A. Flaherty, M. N. Nobbe, C. M. Wzientek, and R. K. Swihart. 2021. Next-generation camera trapping: systematic review of historic trends suggests keys to expanded research applications in ecology and conservation. Frontiers in Ecology and Evolution 9:617996. doi: 10.3389/fevo.2021.617996

Abstract - Camera trapping is an effective non-invasive method for collecting data on wildlife species to address questions of ecological and conservation interest. We reviewed 2,167 camera trap (CT) articles from 1994 to 2020. Through the lens of technological diffusion, we assessed trends in: (1) CT adoption measured by published research output, (2) topic, taxonomic, and geographic diversification and composition of CT applications, and (3) sampling effort, spatial extent, and temporal duration of CT studies. Annual publications of CT articles have grown 81-fold since 1994, increasing at a rate of 1.26 (SE = 0.068) per year since 2005, but decelerating in growth since 2017. Topic, taxonomic, and geographic richness of CT studies increased to encompass 100% of topics, 59.4% of ecoregions, and 6.4% of terrestrial vertebrates. However, declines in per-article rates of accretion and plateaus in Shannon's H for topics and major taxa studied suggest upper limits to further diversification of CT research as currently practiced. Notable compositional changes of topics included a decrease in capture-recapture, recent decrease in spatial-capture-recapture, and increases in occupancy, interspecific interactions, and automated-image classification. Mammals were the dominant taxon studied. Within mammalian orders, carnivores exhibited a unimodal peak, whereas primates, rodents, and lagomorphs steadily increased. Among biogeographic realms, we observed decreases in Oceania and Nearctic, increases in Afrotropic and Palearctic, and unimodal peaks for Indomalayan and Neotropic. Camera days, temporal extent, and area sampled increased, with much greater rates for the 0.90 quantile of CT studies compared to the median. Next-generation CT studies are poised to expand knowledge valuable to wildlife ecology and conservation by posing previously infeasible questions at unprecedented spatio-temporal scales, on a greater array of species, and in a wider variety of environments. Converting potential into broad-based application will require transferable models of automated image classification, and data sharing among users across multiple platforms in a coordinated manner. Further taxonomic diversification likely will require technological modifications that permit more-efficient sampling of smaller species and adoption of recent improvements in modeling of unmarked populations. Environmental diversification can benefit from engineering solutions that expand ease of CT sampling in traditionally challenging sites.

Stinchcomb, T. R., Z. Ma, and Z. Nyssa. 2022. Complex human-deer interactions challenge conventional management approaches: the need to consider power, trust, and emotion. Ecology and Society 27(1):13. https://doi.org/10.5751/ES-12899-270113

Abstract - In the United States, the management of white-tailed deer (*Odocoileus virginianus*) has typically focused on improving hunting opportunities and mitigating human-deer conflicts. Yet the expansion and diversification of human communities and activities implies that human-deer interactions may also be diversifying. Approaches based on complex adaptive systems theories have been posited as a way to better attend to the diversity of these interactions between humans and wildlife. Using Indiana as a case, this study draws from the Integrated Adaptive Behavior Model (IABM) to understand human-deer interactions as a complex system. We use empirical social science to understand how citizens across Indiana perceive deer populations, what outcomes they desire, and how these perceptions could be integrated into Indiana's deer management

plan. In Indiana, neither wildlife managers nor researchers have assessed public perceptions of deer beyond those of hunting and farming stakeholders. From May to September 2019, we collected 59 semistructured interviews and two focus groups (n = 14) with deer stakeholders including woodland owners, farmers, deer hunters, and urban area residents. Through mixed inductive-deductive coding, we found that Indiana citizens hold complex emotions toward deer regardless of their stakeholder identity. Factors influencing these emotions include past experiences, current livelihood and behavioral contexts, beliefs about responsibilities and ethics in deer management, and beliefs about other social groups. Our results suggest that the IABM, despite adding in much-needed complexity and realism to the analysis of human-wildlife interactions, still lacks explanatory power over several important dynamics that emerged from our interviews. Here, we discuss how mixed emotions, situational context, and power dynamics challenge conventional management approaches that focus narrowly on mitigating human-deer conflicts and reduce public interests to demographic categorizations. To better inform social-ecological governance, models of complex human behavior should account for power within management institutions and across management scales. Our work contributes a refined understanding of how multidimensional emotions and experiences influence public (dis)interest in natural-resource management, and what this implies for managers who aim to balance competing social interests with ecological conditions.

MITIGATING SPREAD OF CHRONIC WASTING DISEASE THROUGH AN ECOLOGICAL TRAP

Cost: $236,174 for the complete two-year project

Project Personnel

- Dr. Patrick Zollner - Principal Investigator, Purdue University
- Dr. Aniruddha Belsare - Research Scientist (Academic Research), Emory University
- Jonathan Brooks - Ph.D. Student, Graduate Research Assistant, Purdue University
- Dr. Zhao Ma - Professor of Natural Resource Social Science, Purdue University
- Lan Zhao - Research Scientist, Purdue University
- I Luk Kim - Ph.D. Candidate, Graduate Research Assistant, Purdue University
- Dr. Joe N. Caudell - DNR Project Liaison, Indiana Division of Fish and Wildlife

Disease outbreaks are an increasingly common cause of severe declines in wildlife populations. One disease with the potential to cause declines in large ungulates such as white-tailed deer is chronic wasting disease (CWD). CWD has been detected in free-ranging cervids in 25 states, including Illinois, Michigan, and Ohio; however, as of the 2021 deer hunting season, CWD has not been detected in Indiana. The nearest documented occurrences of CWD to Indiana come from four infected deer near Kankakee, Illinois. These occurrences were approximately 30 miles from the Indiana boarder. Given the history of CWD spread and its proximity to Indiana, there is a clear need to consider strategies that may mitigate the risk of CWD infecting Indiana's white-tailed deer populations.

Forested corridors along the Kankakee River provide one of the mostly likely routes by which CWD-infected deer may enter Indiana. This narrow strip of permanent forest cover amid a landscape dominated by agriculture connects Indiana deer populations to the portion of Illinois where CWD has been detected. Given the significance of this forested cover for deer movement, it may be possible to reduce the likelihood of CWD spreading to Indiana by establishing an artificial ecological trap (AET) in this corridor. An AET is an area that white-tailed deer perceive as favorable but will actually decrease survival through greater harvest mortality. This increased mortality could be accomplished by establishing a deer management zone with increased hunting pressure or implementing a sharpshooter culling program within a focal area.

Measuring the effect of an AET as a preventive measure against CWD spread along the Kankakee River through field experiments would be challenging. Quantitative approaches like mathematical models or computer simulations provide an effective alternative to investigate such questions. One approach that is particularly well suited to modeling disease in mammal populations is agent-based modeling. An agent-based model (ABM) of CWD spread in white-tailed deer would virtually represent deer movement and behaviors across a digital landscape. The virtual deer are given characteristics such as age, sex, and disease infection status and perform actions in the virtual landscape such as moving, giving birth, dying, and transferring infection. By tracking the location and number of infected individuals over time, we can estimate population-level metrics such as disease prevalence and rate of contact. ABMs make it easier to simulate rare events and individual differences in behaviors like dispersal because they track each individual deer within a population. Similarly, ABMs make no assumptions about rates of contact because those emerge from model inputs specifying the behavior of individuals.

ABMs are useful tools for wildlife managers to compare the relative effectiveness of different AET scenarios; however, implementing an AET in the real world requires stakeholder support. For example, deer hunters must be willing to harvest more deer or allow sharpshooters to cull deer to implement an AET. Furthermore, landowners must be willing to allow hunters or sharpshooters to harvest deer on their land. Although stakeholder cooperation is critical for effective CWD management, stakeholders have resisted these policies in some states. This resistance stems from a number of factors, including conflict with traditions, a lack of certainty about disease spread, and mistrust. To successfully implement an AET along the Kankakee River, wildlife management agencies would benefit from addressing these barriers to stakeholder acceptance.

One way to reduce stakeholder barrier to acceptance is through providing information about how implementation of an AET will affect deer populations; however, information does not always lead to action. The Theory of Planned Behavior provides a framework that can be used to predict whether an individual will engage in a behavior. This theory states that the best predictor behavior is the individual's plans, and an individual's planned behaviors result from attitudes toward the behavior, perceived ability to successfully engage in the behavior, and norms of important social groups regarding the behavior. The Theory of Planned Behavior has been successfully used to explain willingness to engage in waste recycling and pro-climate behaviorssuch as recycling, is an emerging focus in public health. Purpose: This study was designed to examine the determinants of recycling intention on a college campus. Methods: Undergraduate students (N=189. By considering the behavior that information is intended to promote or discourage in the context of the Theory of Planned Behavior, management agencies can improve the likelihood that information on CWD will lead to support for disease control policies.

The objectives of this project are to (1) simulate the spread of CWD along the Kankakee River under different CWD management scenarios using an ABM and (2) develop a web-based tool that the public can use to compare simulations across different scenarios and use the Theory of Planned Behavior to investigate how use of this tool affects stakeholders' support of various scenarios for mitigating the spread of CWD into Indiana.

We will implement the *Ov*CWD model framework in northwest Indiana and northeast Illinois to simulate CWD spread in a white-tailed deer population. The *Ov*CWD framework represents the landscape as a grid with cells that correspond to a 1.0 square mile area. Each grid cell represents the percent of forested land within that area. We determined the percent forest cover of each cell using the National Landcover Database data. The model begins by placing virtual deer on the landscape based on the percentage of forest cover. The number of deer initially placed within each cell is a function of estimates of deer density in the scientific literature and from Indiana DNR data (Delisle, personal communication; Boggess and Vaught, 2020; Nixon et al., 2021). Each virtual deer is assigned characteristics including sex, age, herd membership, and infection status. The model represents the passage of time by simulating each deer's location and status every month for 10 to 25 years. During each run, virtual deer perform actions such as giving birth, dying, dispersing to another grid cell, or transferring infection. This simulates real- world processes such as population dynamics and CWD spread. By modifying parameters like the probability of dying in the model, we can emulate different approaches to addressing CWD. The effectiveness of each CWD management scenario can then be compared by summarizing the deer population size and CWD prevalence at the end of a time period. Scenarios we test will include countywide increased hunting, sub-county increased hunting, and targeted sharpshooter culling.

Knowledge gained from the comparisons of scenarios with the ABM will have a larger impact if it is communicated in an understandable way to stakeholders. One way to do this is using a web tool that allows stakeholders to select control scenarios and view a summary of outcomes from those choices. This stakeholder version of the ABM allows anyone to construct scenarios by manipulating the timing, duration, and location of the AET to reduce the deer population and see the predicted impacts upon CWD transmission. In addition to building a tool for displaying ABM results in a way that increases public acceptance of management decisions, we will also test how the visual elements included in the user interface affect stakeholder willingness to engage in action to prevent CWD spread. To do this, we will create a version of the tool that displays an illustration of healthy deer or CWD-infected deer, depending on the prevalence of CWD in the scenario selected. Images of sick deer have been shown to evoke strong emotions regarding CWD (Stinchcomb et al., 2022) and may increase stakeholder intention to prevent CWD spread. Before using the tool, users will take a survey assessing their willingness to take action to prevent CWD spread. The survey will be designed in a Theory of Planned Behavior context (Ajzen, 1991). In this context, willingness to act is a function of individual attitudes, the attitudes of socially relevant peers, and perceived ability to perform the action. Users will take the same survey again after using the tool, a process that will provide data to evaluate how inclusion of illustrations changes willingness to engage in actions to reduce CWD spread.

Currently, we are implementing the *Ov*CWD model framework for a landscape that includes northwest Indiana and northeast Illinois. We are calibrating model parameters such as initial population density, proportion of fawns in population, proportion of yearlings in population, and mortality rates to produce a realistic snapshot of the deer population. After obtaining this population snapshot, we will introduce CWD into the virtual deer population under a variety of AET scenarios to determine how CWD spreads. We have also begun production of the public facing web tool in collaboration with the Purdue University Information Technology Research Computing group. Work on the web tool to date has focused on construction of a user interface. We are also collaborating with artist Gaby Sincich to produce illustrations of CWD-infected deer. These illustrations will communicate the effects of CWD on white-tailed deer to users and give the web tool a more professional appearance. We are in the process of designing a survey to assess user willingness to engaging in activities that can reduce the spread of CWD. After that, we will collaborate with the Indiana Department of Natural Resources to develop AET scenarios to simulate using our ABM and deploy the web tool for data collection.

IMPACTS ON HARVEST RESULTING FROM LICENSE STRUCTURE CHANGES

Cost: $279,324 for the complete three-year project

Project Personnel

- Dr. John Lee - Principal Investigator, Purdue University
- Dr. Carson Reeling - Principal Investigator, Purdue University
- Dr. Nicole Widmar - Investigator, Purdue University
- Dr. Joe N. Caudell - DNR Project Liaison, Indiana Division of Fish and Wildlife

Traditionally, hunting has been the primary vehicle for managing wildlife populations, and state wildlife management agencies have relied on hunting and fishing license revenue for most of their funding. Deer hunting is particularly important for Indiana, where it accounts for 58% of all hunting efforts. Deer hunting effort is primarily managed though a license and quota system, making license design (e.g., pricing, privileges conveyed) important for encouraging hunter participation. Changes to license structure are relatively infrequent. Since 1987, there have been only three major changes to deer hunting licenses and regulations in Indiana. Changes in license structure and harvest rules make deer hunting complex, which may serve as an obstacle to legal participation in deer hunting.

This project will study the optimal design of deer license structure for Indiana. We propose developing a model of deer harvests in Indiana that captures the relationships between license structure, license demand, and harvest effort. We will use this model to simulate the effect of license pricing and structure decisions on harvest, with an eye toward maximizing participation in Indiana deer hunting. Our objectives are to:

1. Systematically investigate qualities of other states' hunting license structures as well as social and environmental factors as they relate to changes in hunting participation, and to identify which factors may be transferable or relevant in Indiana.

2. Assess hunter preference for different license structure attributes (cost, number of licenses, privileges conveyed, etc.).

3. Forecast changes in hunter participation and harvest based on alternative license structures.

We will conduct a review of other Midwestern states and select Southeastern states to catalog deer license rules and regulations. We will focus on these states because they (i) are similar to Indiana in terms of deer species targeted (i.e., white-tailed deer; ***Odocoileus virginianus***) and means of license allocation (i.e., licenses are sold over the counter in all of these states); (ii) represent a wide distribution of hunter backgrounds and profiles, which is important for identifying ways of encouraging participation of underrepresented groups in Indiana, and (iii) represent a wide distribution of environmental characteristics that may interact with license design and influence participation. Our review will provide an initial set of license structures and pricing options relevant to Indiana that have not been available to hunters to date.

We will use this set of structures and pricing options as a starting point for developing several surveys that we will use to identify optimal license prices and structure. We will collect demographic data and deer-hunting behavior for each respondent. Each survey will include a discrete choice experiment to elicit hunter preferences for different license structures. Respondents undertaking the choice experiment will be presented with a series of different choice exercises. Each choice exercise will ask the respondent to choose whether they would purchase a deer license with certain attributes (such as price, what sex of deer can be harvested, and how many can be harvested per license) or opt not to purchase a license (and hence forgo hunting). The license structure and price will differ across choice exercises. By observing how respondents' choices vary with license structure and price, we can infer individuals' preferences for license attributes and estimate demand for different license types.

We will conduct different versions of this survey. The first will be a mail-based survey of 10,000 Indiana residents who have hunted deer in Indiana in the past five years. These 10,000 respondents will be divided into two groups. Three-quarters of the respondents will receive a survey with a choice experiment asking

them about their preferences for potential single-season licenses (like those currently offered by the Indiana Department of Natural Resources [IN DNR]). The remainder will receive a survey with a choice experiment asking them about their preferences for potential lifetime deer hunting licenses. These licenses, which the Indiana DNR is considering offering, would allow the buyer to harvest a given number of deer each year for the rest of their life in exchange for a relatively large up-front license fee. The second version will be a web survey of all nonresident Indiana deer hunters with email addresses listed in the Indiana DNR license database. Each respondent will be shown both the single-season and lifetime license choice experiments.

As a final step, we will estimate (i) individual harvest effort conditional on buying a given license based on our survey information, and (ii) total deer harvest at each location. We will use these models of effort and harvest to forecast the effect of different license structures and prices on deer population dynamics within different regions of Indiana using bioeconomic models.

We have performed our review of neighboring states' license structures, implemented our mail and web surveys, and analyzed our survey data (objectives 1 and 2). We collected 1,398 and 1,603 usable resident and nonresident single-season surveys, respectively, along with 487 and 901 usable resident and nonresident lifetime surveys, respectively. We have used these surveys to estimate robust models of demand for different licenses that are under consideration by the Indiana DNR and to identify license prices that maximize agency revenues. Our work in the current year will involve using these estimated demand models to calibrate bioeconomic models so that we can simulate the effect of different license structures on deer population dynamics.

WHITE-TAILED DEER AND FURBEARER ECONOMICS

Cost: $725,606 for the complete three-year project

Project Personnel

- Dr. Carson Reeling - Project Co-Lead Investigator, Purdue University
- Dr. Mo Zhou - Project Co-Lead Investigator, Purdue University
- Dr. John Lee - Project Co-Lead Investigator, Purdue University
- Dr. Zhao Ma - Co-Principal Investigator, Purdue University
- Dr. Richard Melstrom - Project Co-Lead Investigator, Loyola University – Chicago
- Dr. Robert Swihart - Project Co-Lead Investigator, Purdue University
- Dr. Joe N. Caudell - DNR Project Liaison, Indiana Division of Fish and Wildlife
- Geriann Albers - DNR Project Liaison, Indiana Division of Fish and Wildlife

Indiana's deer and furbearers generate economic value from both "consumptive" and "non-consumptive" uses. Consumptive uses of deer and furbearers primarily include hunting and trapping. The direct economic value hunters receive from hunting takes the form of surplus, equal to the maximum amount a hunter would be willing to give up to obtain a hunting opportunity. Indirect values take the form of changes in regional incomes spurred by hunting-related spending. Hunters may buy equipment, incur travel costs to reach a hunting site, and may pay processing fees upon completing the hunt. These expenditures increase incomes of related business owners. Non-consumptive uses of deer and furbearers include wildlife watching and the "existence" values individuals receive from knowing their state contains a healthy deer and furbearer population. Of course, deer and furbearers can also generate economic damages through vehicle collisions and damage to crops and other property. White-tailed deer are involved in more than 14,000 deer-vehicle collisions per year in Indiana alone. Additionally, deer and furbearers can serve as vectors for infectious disease.

Efficient deer and furbearer management in Indiana requires weighing the economic benefits from consumptive and non-consumptive uses against the associated economic damages and management activity costs, yet these benefits and costs for Indiana are not well known. The overarching goal of our research involves quantifying the value of economically important white-tailed deer and furbearer species (beavers, coyotes, gray and red foxes, long-tailed weasels, minks, muskrats, opossum, raccoons, river otters, and striped skunks). Our objectives are to:

1. Estimate the benefits of consumptive uses of white-tailed deer.
2. Estimate the benefits of consumptive uses of furbearers.
3. Estimate the non-consumptive benefits and costs of white-tailed deer and furbearers.
4. Assess the distributional effects of outdoor activities and deer-and-furbearer management.
5. Derive an integrated dynamic model of hunter and nonhunter behavior and deer and furbearer population dynamics to simulate the effects of various management decisions on the economic value of deer and furbearers.

The consumptive value of white-tailed deer and furbearers (objectives 1 and 2) is derived primarily from hunting and trapping. The surplus hunters and trappers receive from harvesting these species depends on the number of hunting and trapping trips taken—that is, on the demand for trips. We will estimate a model of deer hunters' demand for trips using existing Deer Management Survey data collected by the Indiana Department of Natural Resources (IN DNR). This survey collects information on hunters' site choices and trip frequency, among other details. We can use this information to estimate the cost of hunting trips. This information, along with data on trip frequency, will allow us to estimate the demand for deer hunting trips among deer hunters and, hence, the surplus from consumptive uses of deer.

No such survey exists for furbearer harvesters. We will develop a survey of licensed Indiana hunters and trappers to collect this information ourselves. This survey will collect information on (i) participation in furbearer harvesting, trip frequency, harvest locations,

methods and harvest quantity, (ii) spending on hunting for different game species and hunting events (e.g., predator hunting tournaments), and (iii) hunter and trapper demographics, including income, residential location, and age. We can use the harvest and trip-demand models to estimate economic values from furbearer hunting.

We will estimate non-consumptive values for deer and furbearers (Objective 3) with data collected from a separate household survey. We will conduct the survey in two stages. The first stage will collect data about non-consumptive activities related to deer and furbearers, including viewing, photography, and the value of deer and furbearers' ecological role from Indiana households. The survey instrument used in this stage will include questions to assess individuals' knowledge and experience with these species and their related ecosystem services, a discrete choice experiment to measure their preferences for different levels of deer and furbearers on the landscape, and demographics. We will use the data from the first stage to measure the value of deer and furbearers' ecological role. The first part of the survey will also serve to screen households that have experienced deer and furbearer damages. The second stage of the survey will follow up with these households to measure the quantity and value of damages and any spending on repairs and mitigation associated with deer- and furbearer-related damages.

Using the data collected from objectives 1 and 2, we will assess the total economic contributions made by outdoor activities related to hunting and trapping in Indiana (Objective 4), with a static input-output (I-O) model that tracks the flow of goods and services among interconnected sectors within an economic system, at one point in time. Then we will calculate two types of multipliers typically used in I-O analysis to measure the total or partial effects relative to the direct effect. The type-I multiplier is defined as the sum of direct and indirect effects divided by the direct effects, indicating industrial integration or linkage relative to the economic system of interest. The type-II multiplier is calculated as the total effects divided by the direct effect, thus capturing consumption patterns of households and their impacts on the economic system. Next, we will analyze how changes in recreational behavior and government regulations will affect the participants' expenditures in different sectors as well as in the economy-wide impacts.

Finally, we will combine the information derived from outputs from objectives 1–4 into an integrated bioeconomic model that can simulate the effects of management decisions on the economic value of deer and furbearer populations We can calibrate these models given data on species populations, growth rates, net migration, and harvest. Data on deer populations for various deer management units in Indiana are available through an ongoing DNR-funded project overseen by our co-investigators. We will work with contacts at DNR to obtain data for calibrating models of furbearer population dynamics.

In Year 1 of the project, we developed and implemented the furbearer harvester survey for Objective 2. We sent the survey to a random sample of 2,000 licensed furbearer hunters and trappers and received 421 completed surveys. A main goal of this survey was to elicit harvesters' willingness to pay for bobcat harvest licenses. Bobcat hunting and trapping are currently not permitted in Indiana. We found a mean willingness to pay between $10.40 and $26.40 depending on the bag limit and harvest quota. The total statewide economic outputs of hunting and trapping activities were estimated to be $238.7 and $6.7 million dollars, respectively.

Our work in 2022 will focus on implementing the household surveys to estimate non-consumptive values for deer and furbearers from Objective 3, and on compiling and analyzing Deer Management Survey data to estimate consumptive uses for deer (Objective 1). We will also finalize the economic impact assessments with updated information and analyze sector-wise responses to demand shocks in hunting and trapping activities.

Appendix A. DMU DEER DATA SHEETS 2021

A detailed explanation of how to read and interpret the DMU Deer Data Sheets is available in the 2018 Indiana White-tailed Deer Report (Page 140).

DMU 1: Northwest

4/11/2022

Total Square Miles: 6,022
Square Miles of Deer Habitat: 1,245
Percent Deer Habitat: 21

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	24,042		11,890		9.6	12,152		9.8	50.5		257.5		3.6
2009	24,688		11,806		9.5	12,882		10.3	52.2		256.6		6.3
2010	25,088	1.3	12,043	1.2	9.7	13,045	1.3	10.5	52.0		241.1	-1.3	6.4
2011	22,870	-0.4	11,139	-0.8	8.9	11,731	-0.2	9.4	51.3		232.8	-2.7	7.1
2012	23,755	-0.2	10,527	-3.3	8.5	13,228	1.4	10.6	55.7		206.4	-3.4	6.8
2013	20,195	-4.5	9,402	-3.3	7.6	10,793	-2.8	8.7	53.4		210.4	-1.4	5.8
2014	19,810	-1.8	9,456	-1.4	7.6	10,354	-1.9	8.3	52.3		200.0	-1.4	4.4
2015	19,854	-1.1	9,968	-0.5	8.0	9,886	-1.5	7.9	49.8		207.3	-0.6	4.3
2016	19,132	-1.2	9,849	-0.3	7.9	9,283	-1.4	7.5	48.5	165	185.7	-2.0	4.6
2017	17,327	-1.8	8,418	-3.1	6.8	8,909	-1.2	7.2	51.4	295	194.4	-0.8	3.3
2018	18,245	-0.9	9,463	0.1	7.6	8,782	-1.4	7.1	48.1	188	191.6	-0.8	2.6
2019	19,757	0.8	10,626	2.0	8.5	9,131	-0.5	7.3	46.2	180	201.4	0.7	2.0
2020	22,730	3.6	11,899	2.7	9.6	10,831	3.8	8.7	47.7	179	186.4	-1.1	2.0
2021	19,330	-0.1	10,483	0.3	8.4	8,847	1.7	7.1	45.8	245	196.9	0.8	2.0

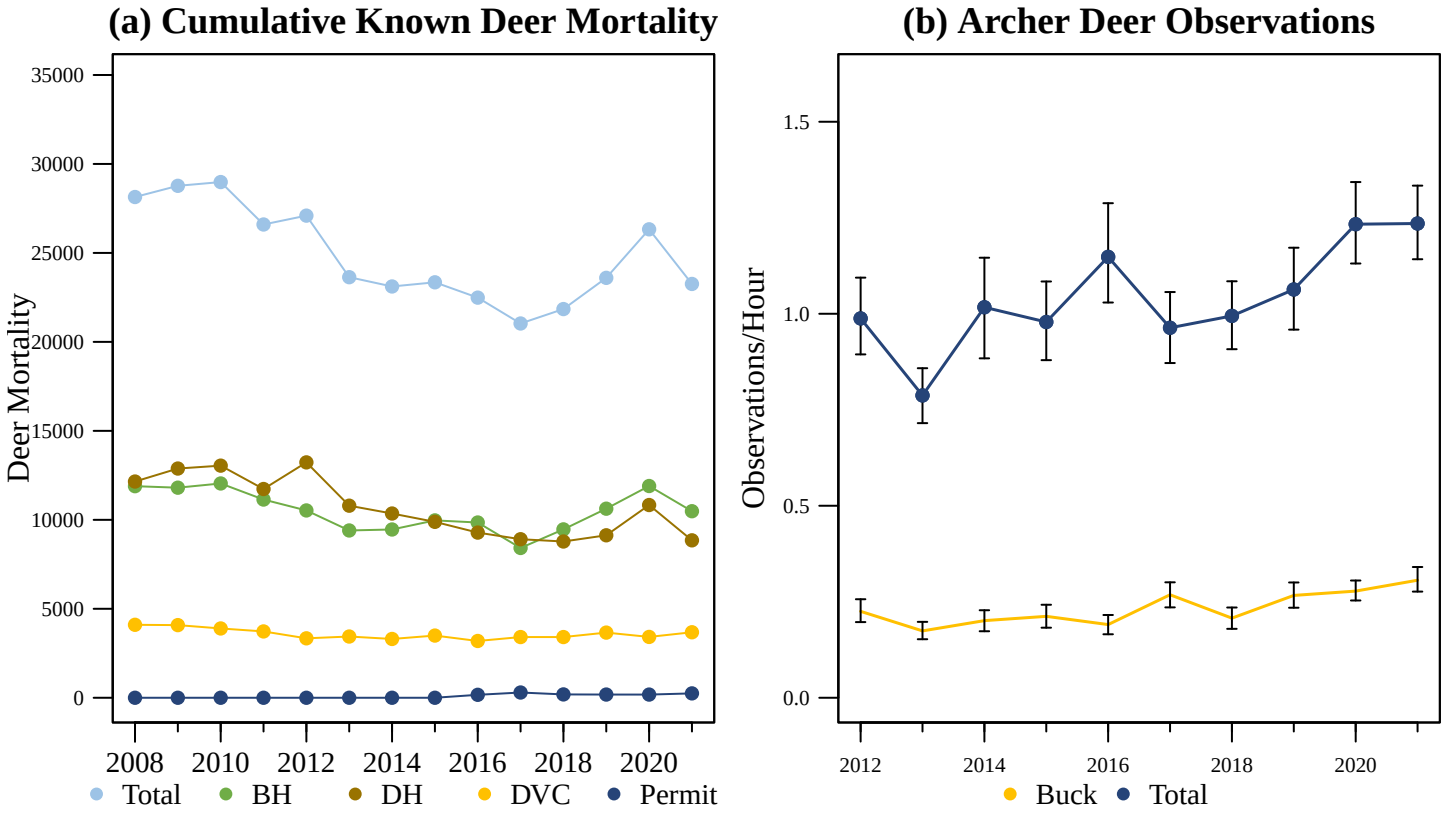


Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 1: Northwest

4/11/2022

Total Square Miles: 6,022
Square Miles of Deer Habitat: 1,245
Percent Deer Habitat: 21

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	14,283	6,488	7,740	54	1	5,665	6,580	1,580	347	72	24	13	2	0	0	0
2017	12,917	6,368	6,488	61	0	4,630	6,398	1,492	292	82	14	4	3	2	0	0
2018	13,603	6,088	7,428	86	1	5,356	6,340	1,535	302	47	13	6	2	0	0	1
2019	14,758	6,011	8,633	113	1	6,077	6,839	1,580	199	38	15	5	2	2	0	0
2020	16,468	6,993	9,329	145	1	6,327	7,703	2,058	289	63	15	6	5	0	0	0
2021	14,542	5,951	8,473	118	0	6,132	6,587	1,550	208	41	12	7	2	1	1	0

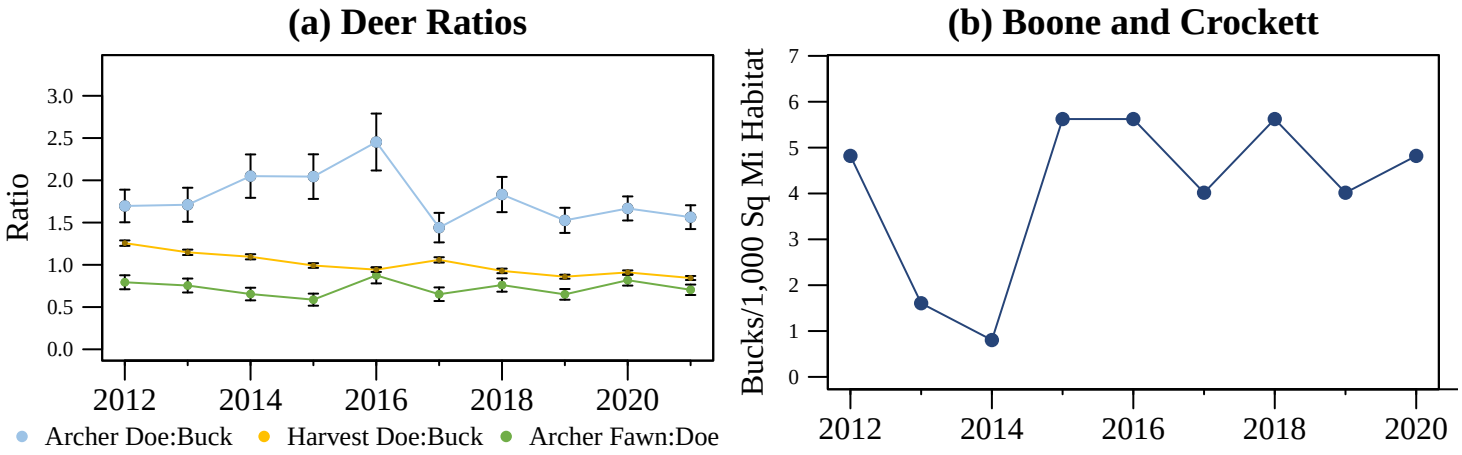


Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

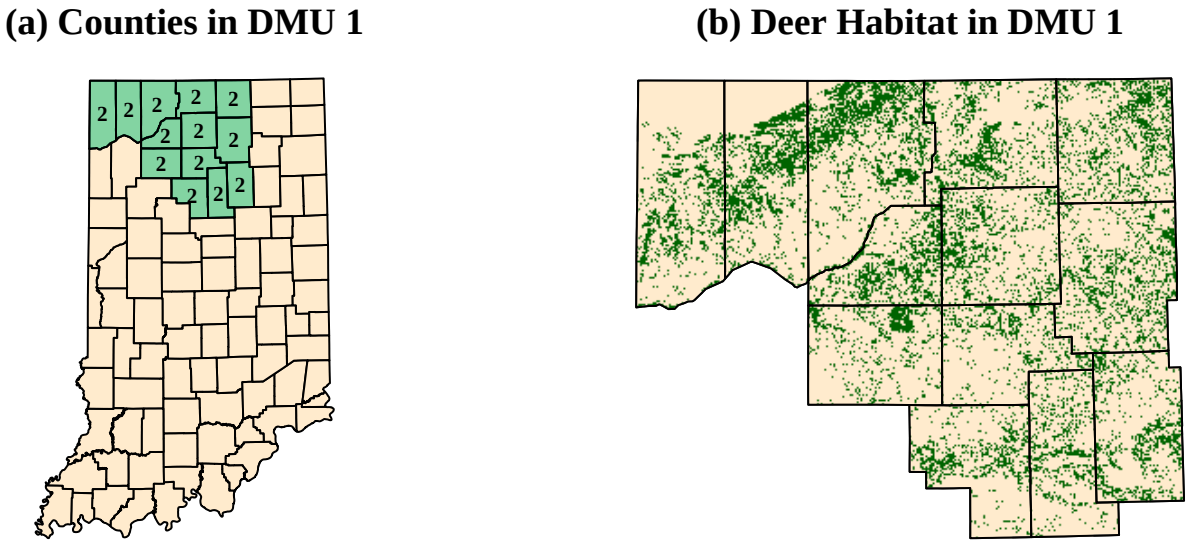


Figure 3. (a) Counties included in DMU 1 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 1.

DMU 1: Northwest

4/11/2022

Deer Management Survey Results

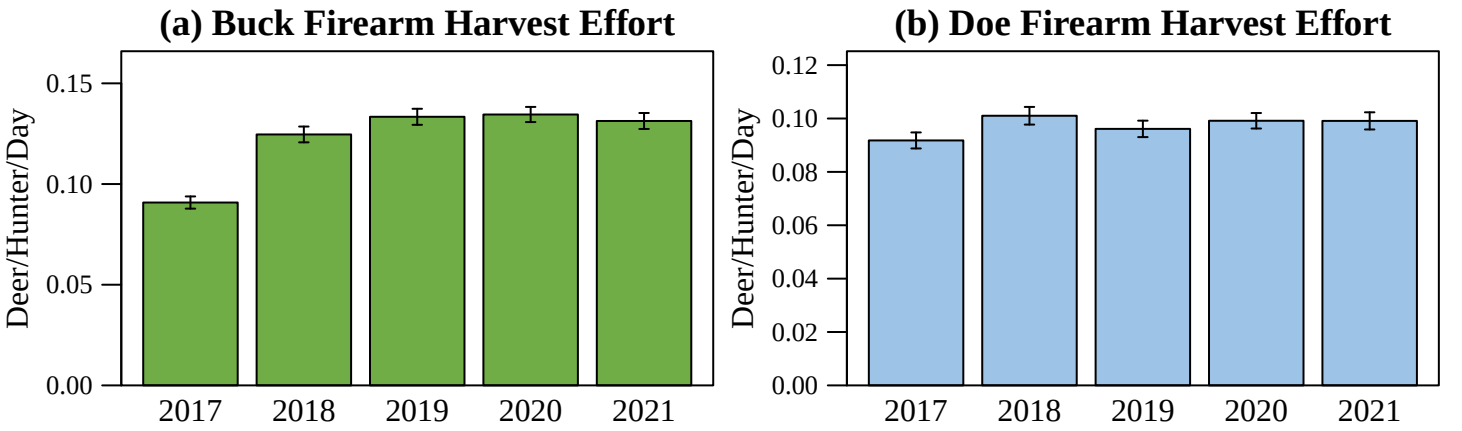


Figure 4. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

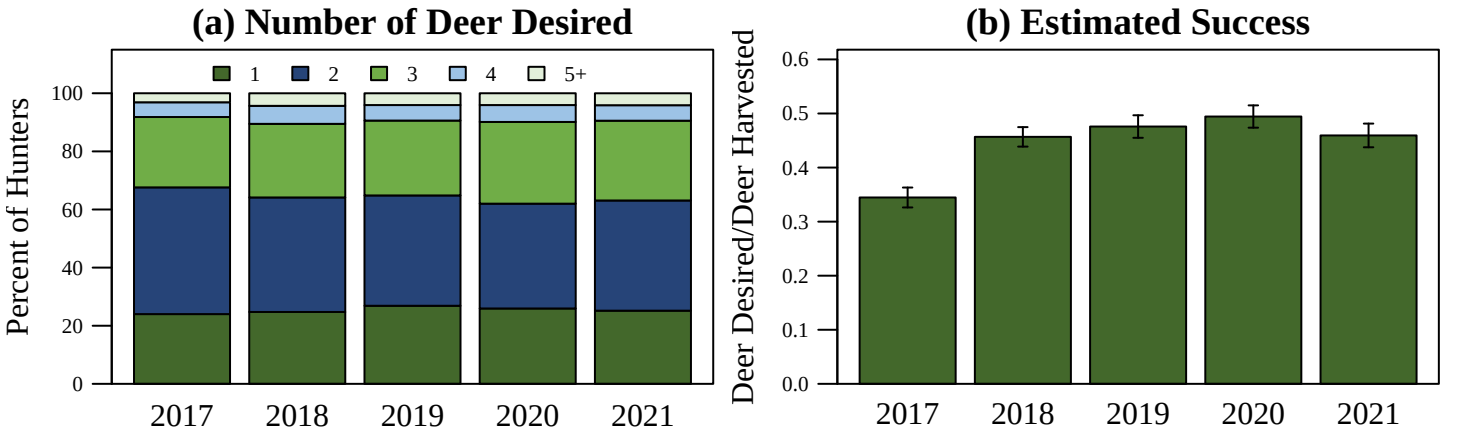


Figure 5. (a) The annual percent of hunters wishing to harvest each number of deer as reported in the deer management survey. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

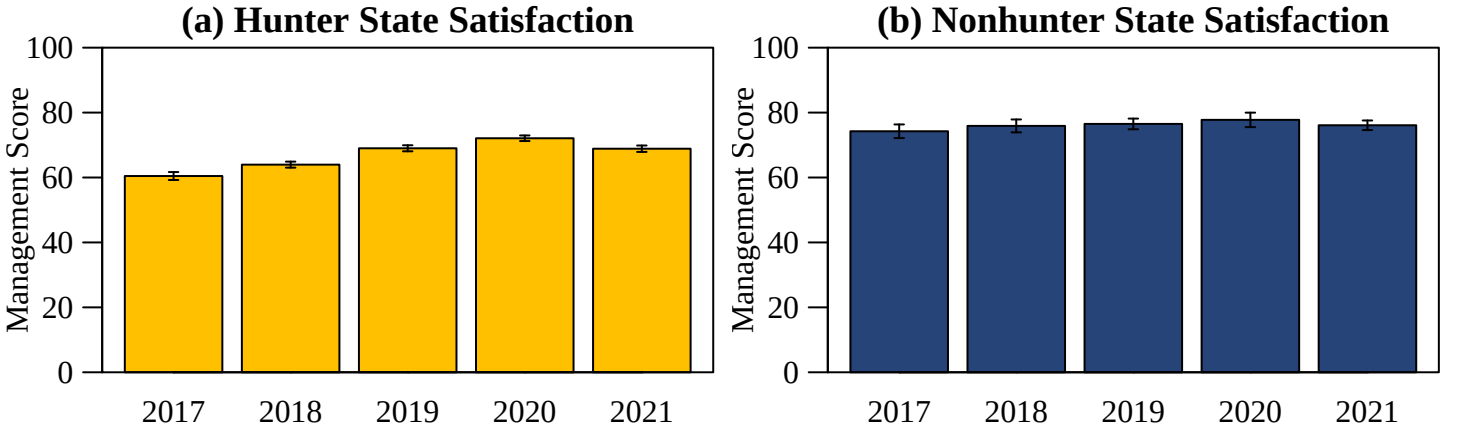


Figure 6. Hunters (a) and nonhunters (b) were asked to score the DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

DMU 1: Northwest

4/11/2022

Deer Management Survey Results

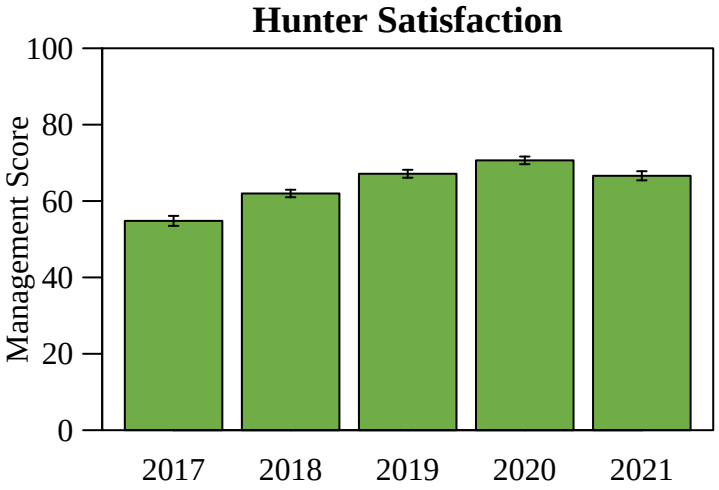


Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 1 where they hunt.

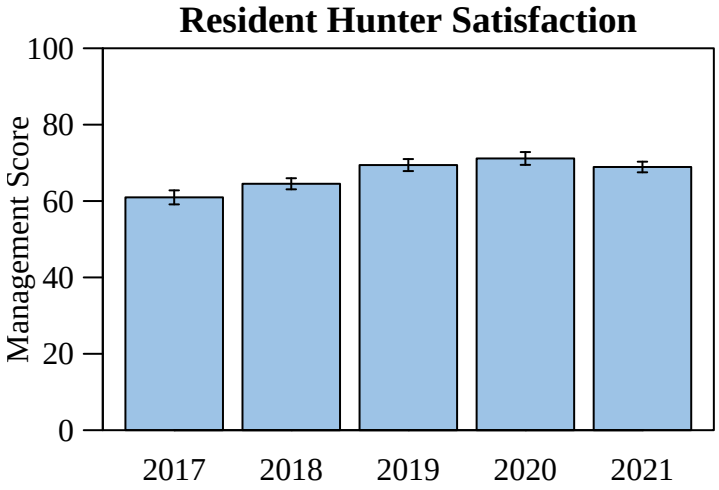


Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 1 where they live.

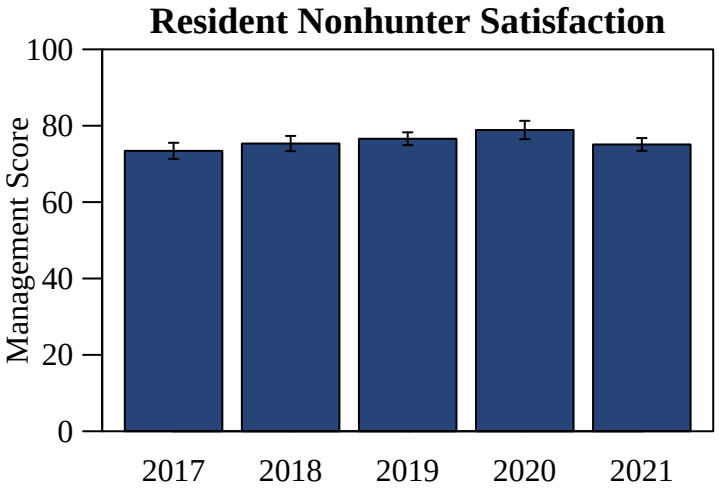


Figure 9. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 1 where they live.

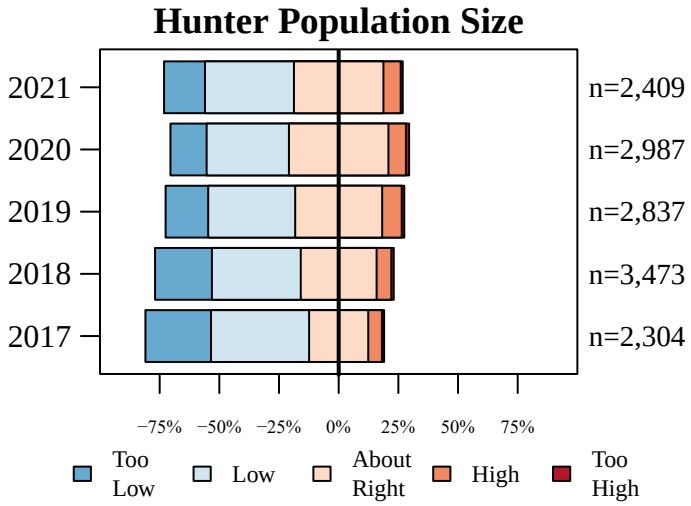


Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 1.

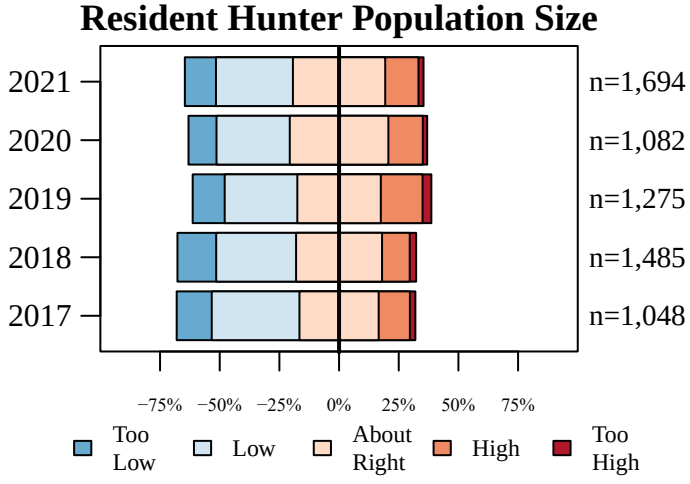


Figure 11. The current size of the deer population described by hunters in the county where they live in DMU 1.

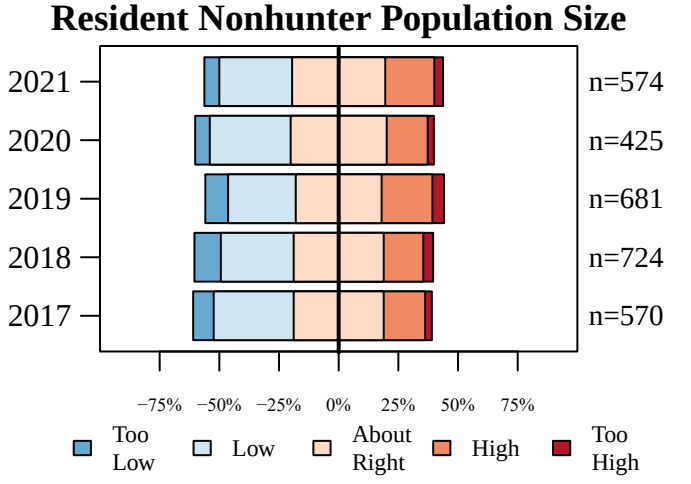


Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 1.

DMU 1: Northwest

4/11/2022

Deer Management Survey Results

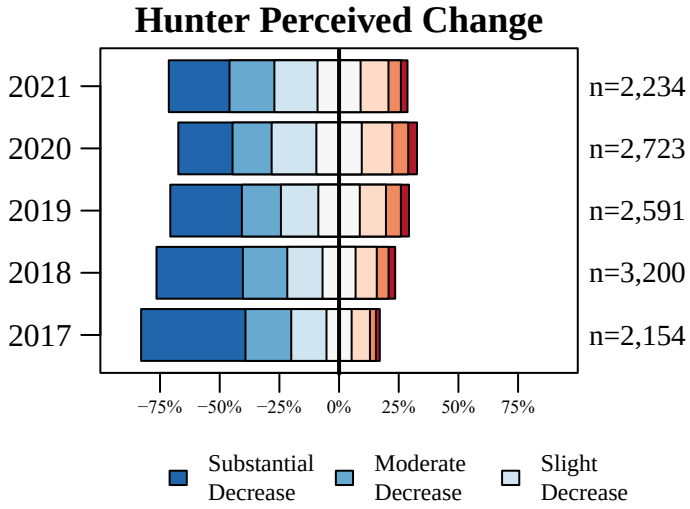


Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 1.

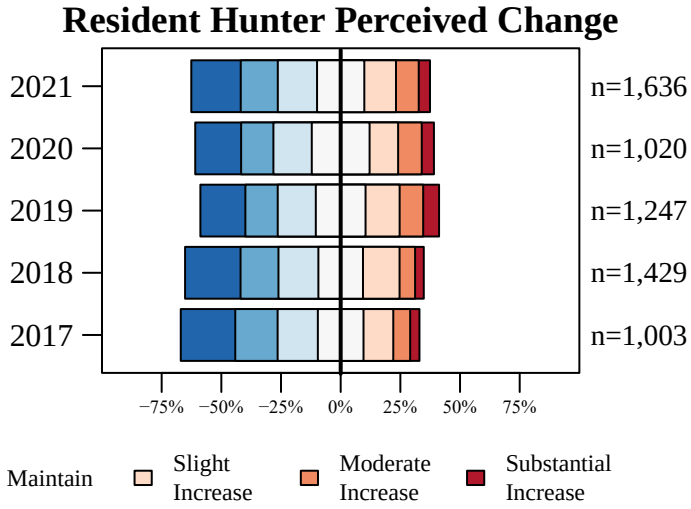


Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 1.

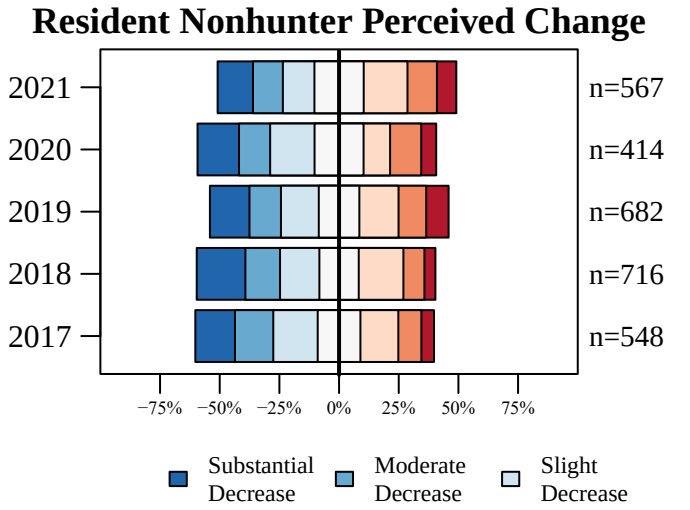


Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 1.

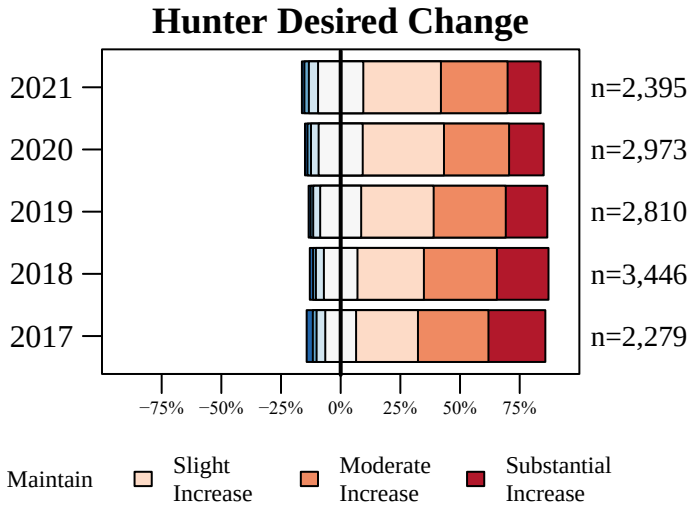


Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 1.

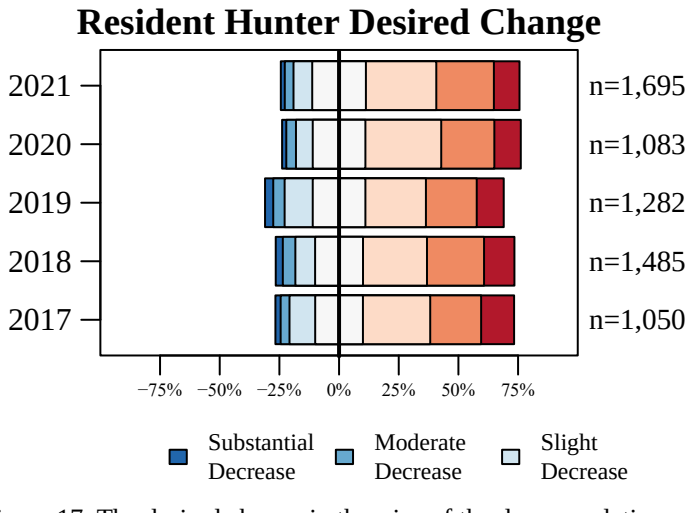


Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 1.

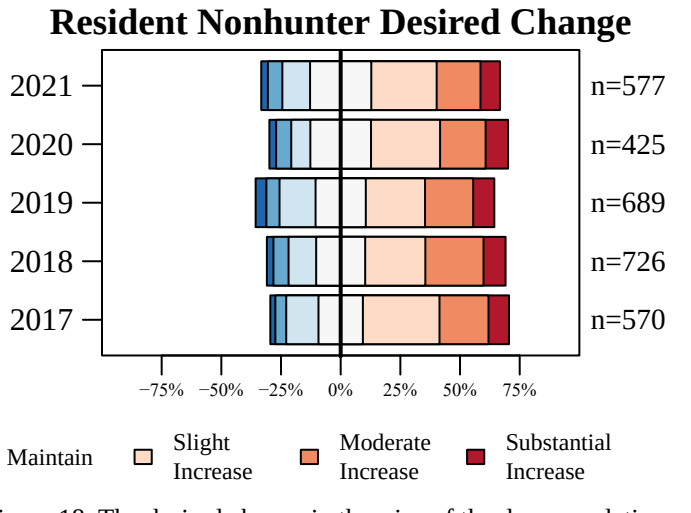


Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 1.

DMU 1: Northwest

4/11/2022

Deer Management Survey Results

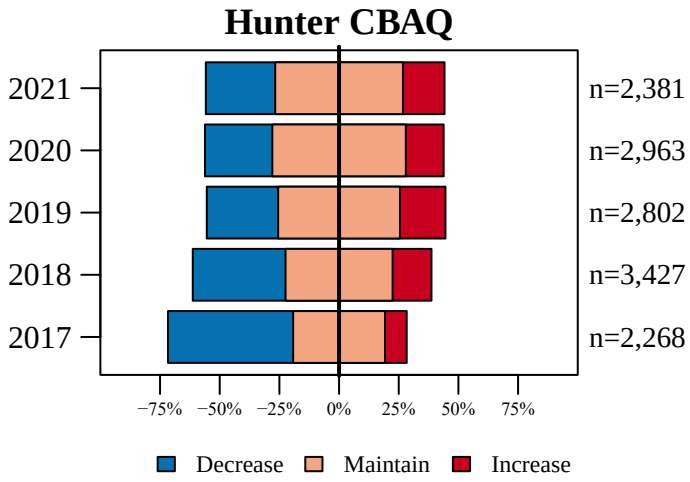


Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 1.

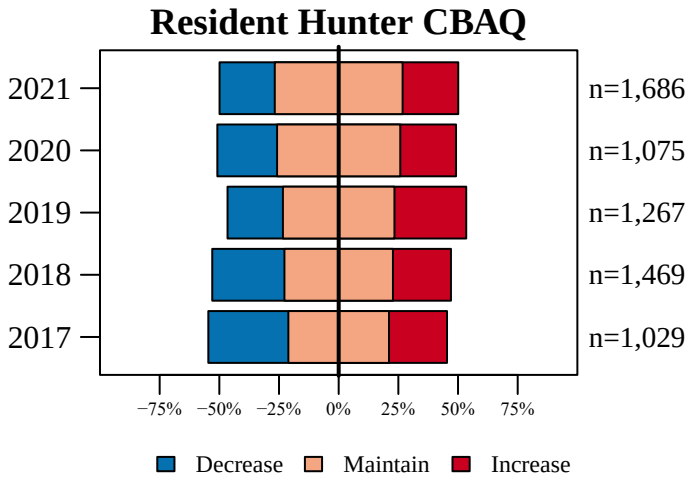


Figure 20. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they live in DMU 1.

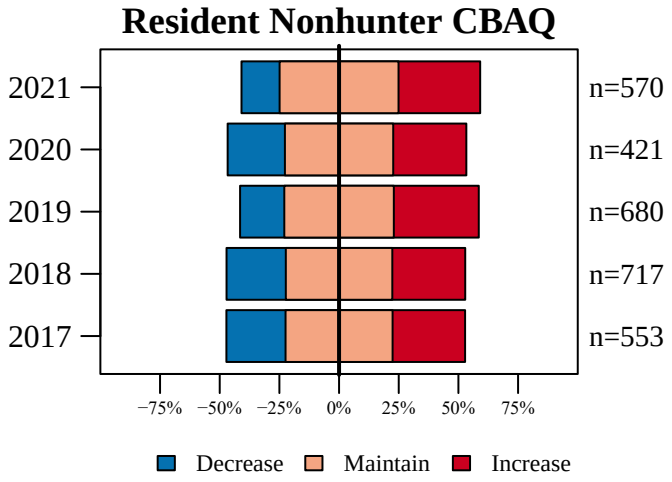


Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 1.

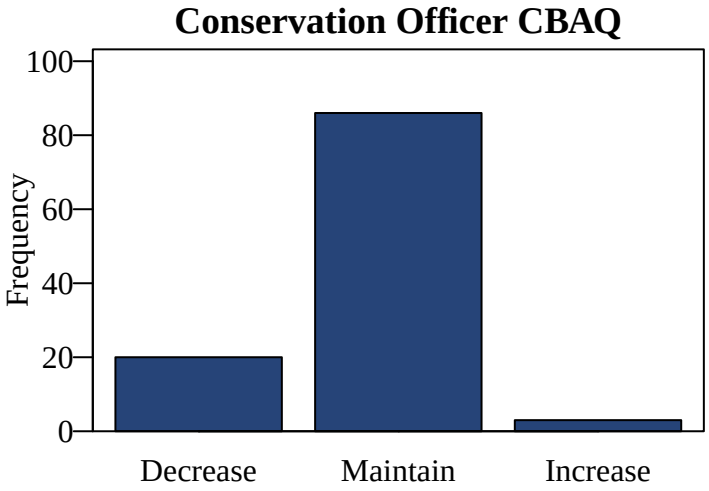


Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 1.

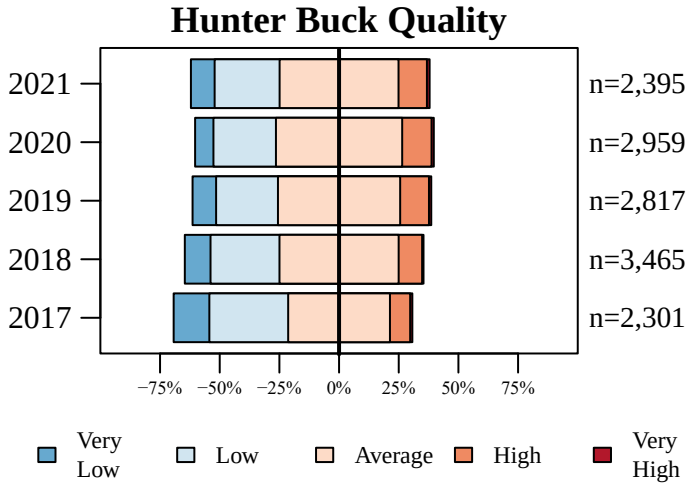


Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 1.

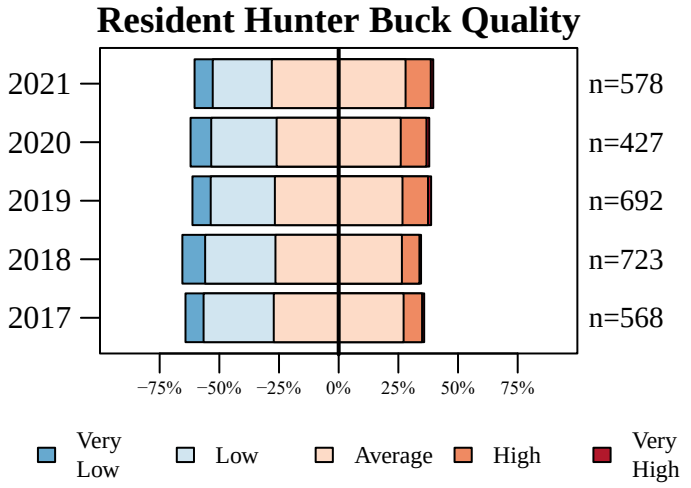


Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 1.

DMU 1: Northwest

4/11/2022

Deer Management Survey Results

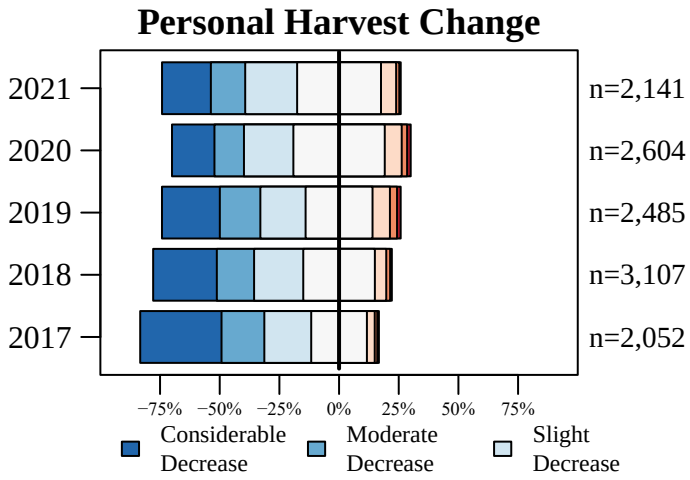


Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 1.

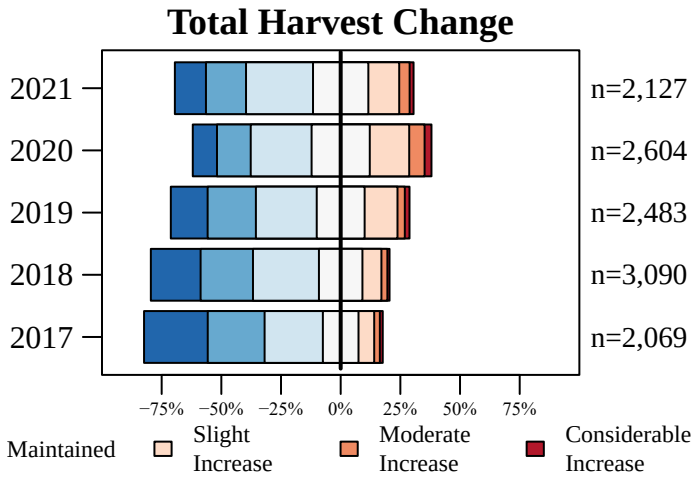


Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 1.

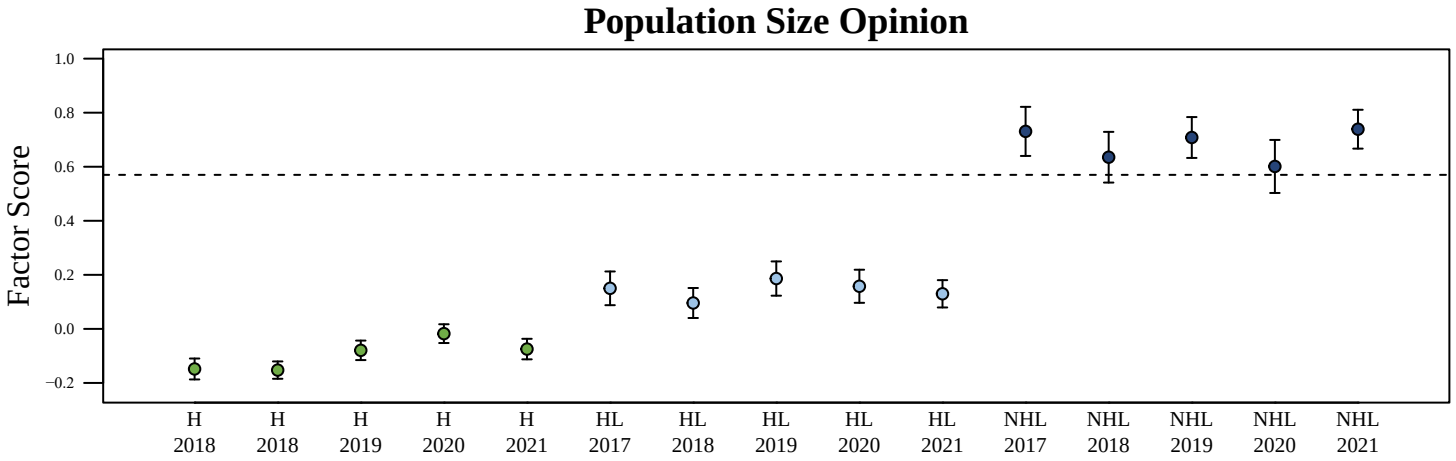


Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

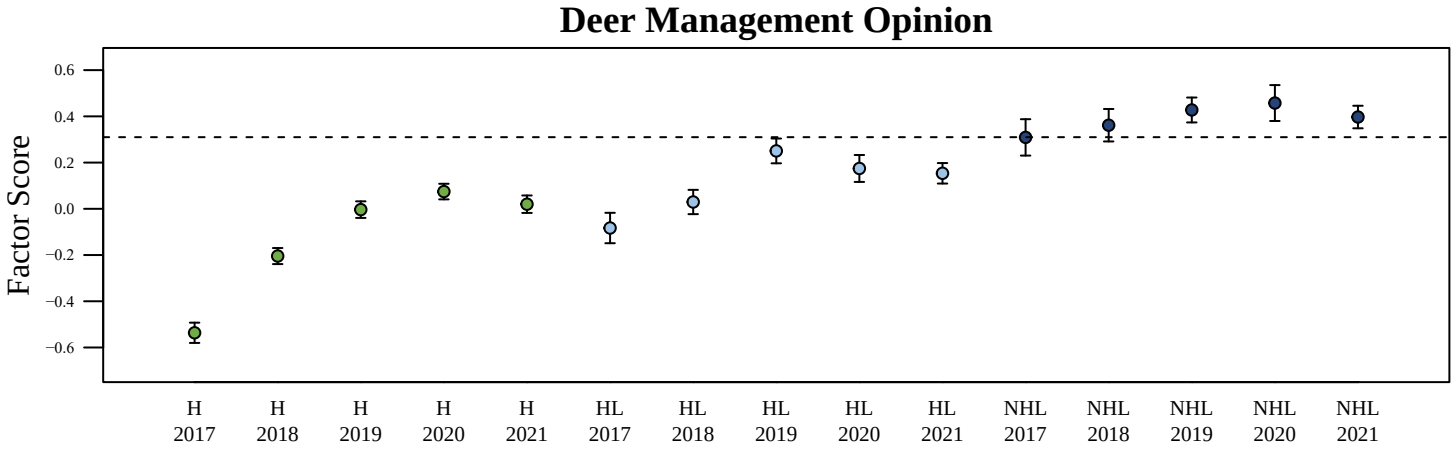


Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

DMU 1: Northwest

4/11/2022

Deer Management Survey Results

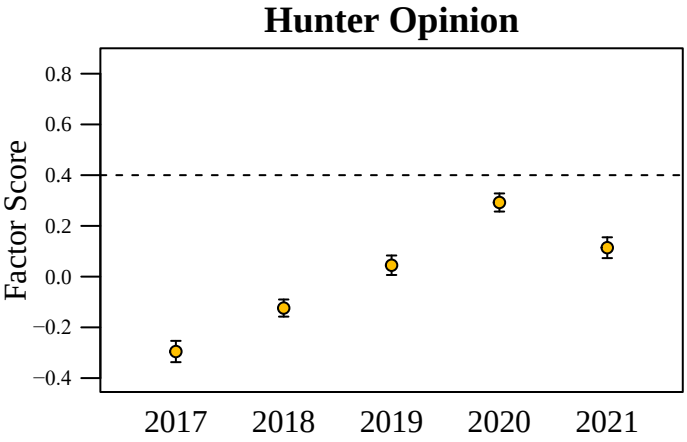


Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

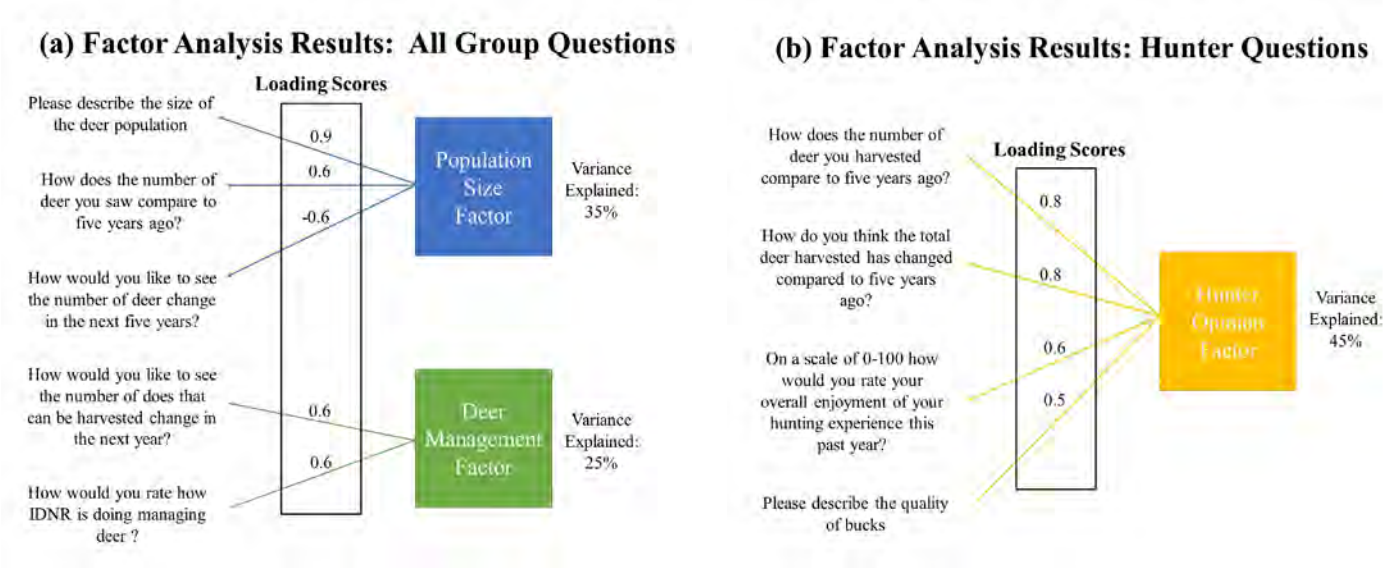


Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: No deer population estimate available for the Northwest DMU. There were several counties with reports of EHD in 2020, however these were very isolated to a few localized areas and no adjustments to the county bonus antlerless quotas were made.

DMU 2: Northeast

4/11/2022

Total Square Miles: 1,490
Square Miles of Deer Habitat: 506
Percent Deer Habitat: 34

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	12,080		5,261		10.4	6,819		13.5	56.4		580.0		3.2
2009	12,268		5,375		10.6	6,893		13.6	56.2		588.9		6.0
2010	12,661	1.6	5,730	2.2	11.3	6,931	1.1	13.7	54.7		577.0	-0.6	6.0
2011	11,499	-0.3	5,150	-0.3	10.2	6,349	-0.3	12.5	55.2		519.2	-6.9	8.0
2012	9,941	-3.7	4,306	-4.3	8.5	5,635	-2.9	11.1	56.7		491.8	-2.7	8.0
2013	9,540	-2.0	4,412	-1.4	8.7	5,128	-2.5	10.1	53.8		533.1	-0.4	5.0
2014	8,610	-1.9	4,132	-1.4	8.2	4,478	-2.2	8.8	52.0		515.9	-0.6	4.0
2015	9,123	-0.8	4,609	-0.2	9.1	4,514	-1.2	8.9	49.5		507.5	-0.6	3.5
2016	9,090	-0.6	4,676	0.4	9.2	4,414	-1.0	8.7	48.6	90	523.6	0.7	3.5
2017	7,994	-2.5	3,989	-2.0	7.9	4,005	-1.6	7.9	50.1	68	554.9	2.6	2.5
2018	8,880	0.0	4,600	0.8	9.1	4,280	-0.6	8.5	48.2	79	605.9	4.3	1.8
2019	9,785	2.3	5,141	2.3	10.2	4,644	1.5	9.2	47.5	61	634.2	2.3	1.5
2020	11,058	3.2	5,642	2.5	11.2	5,416	4.3	10.7	49.0	77	548.0	-0.3	1.5
2021	9,284	-0.1	4,986	0.3	9.9	4,298	1.6	8.5	46.3	77	608.4	0.8	2.0

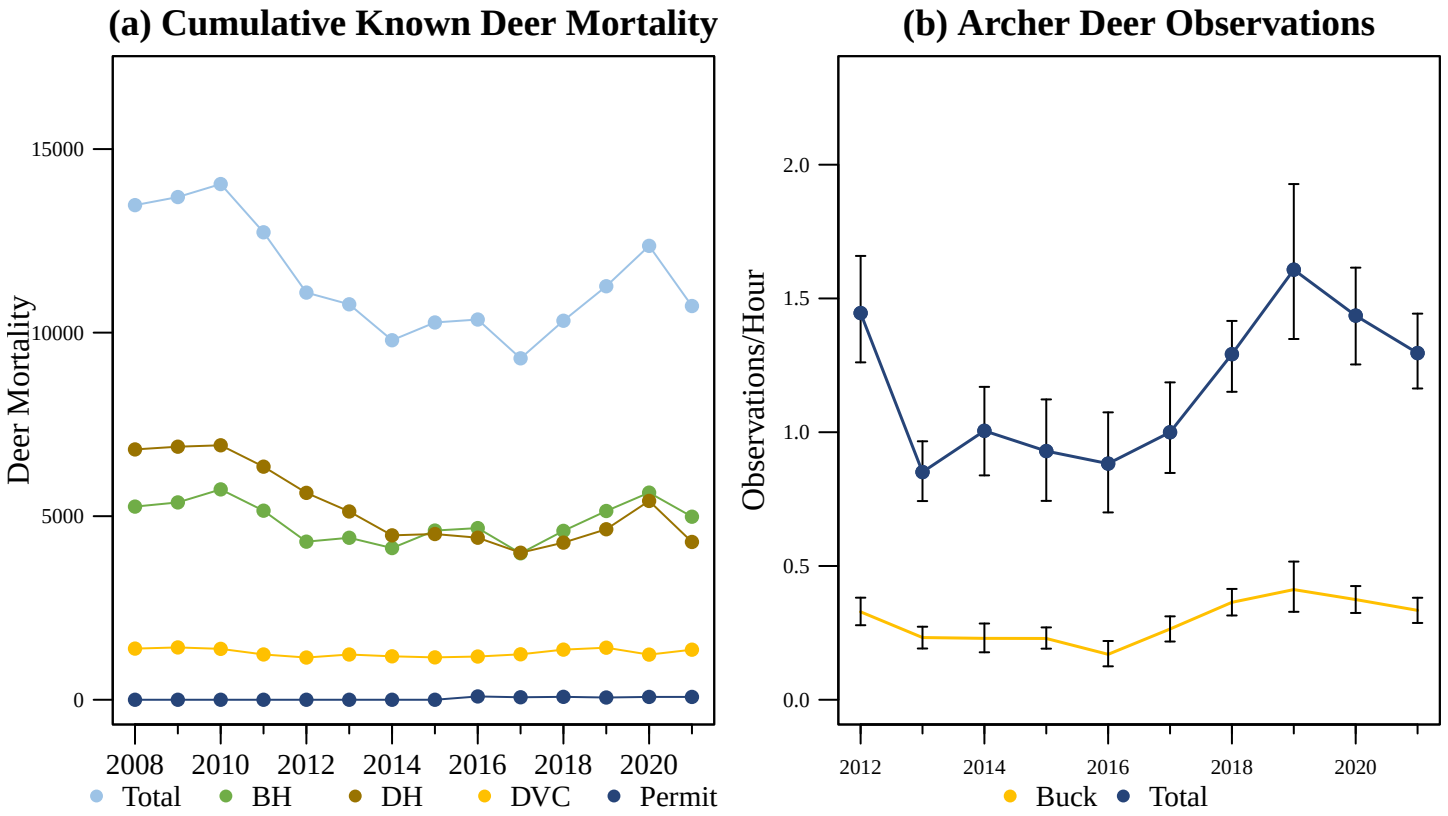


Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 2: Northeast

4/11/2022

Total Square Miles: 1,490
Square Miles of Deer Habitat: 506
Percent Deer Habitat: 34

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	6,866	3,128	3,726	11	1	2,729	3,175	772	147	36	7	0	0	0	0	0
2017	6,172	3,009	3,157	6	0	2,307	3,051	691	104	16	2	1	0	0	0	0
2018	6,874	3,127	3,716	31	0	2,693	3,401	662	100	15	2	0	1	0	0	0
2019	7,487	3,189	4,261	37	0	2,988	3,682	712	87	13	2	1	1	1	0	0
2020	8,193	3,583	4,558	52	0	3,090	3,990	971	109	28	5	0	0	0	0	0
2021	7,101	2,927	4,131	42	1	2,979	3,306	716	79	17	1	3	0	0	0	0

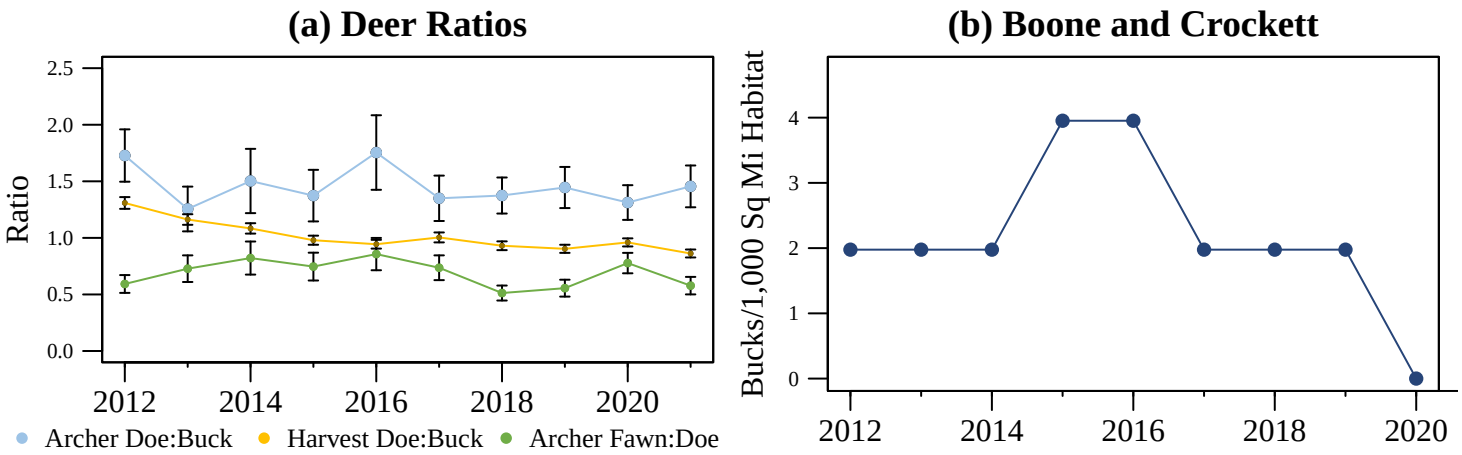


Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

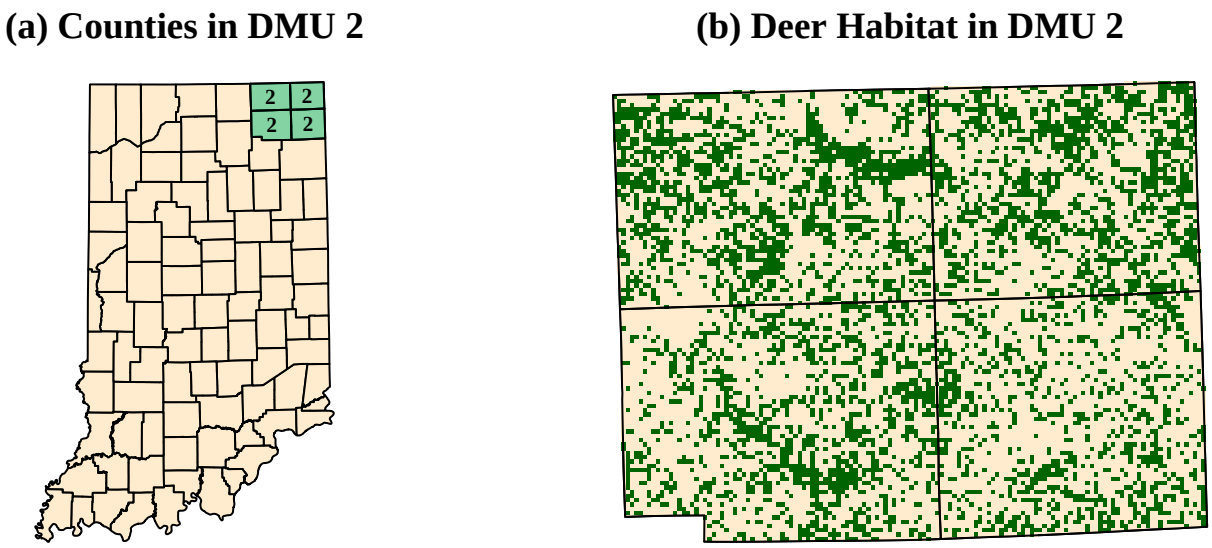


Figure 3. (a) Counties included in DMU 2 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 2.

DMU 2: Northeast

4/11/2022

Deer Management Survey Results

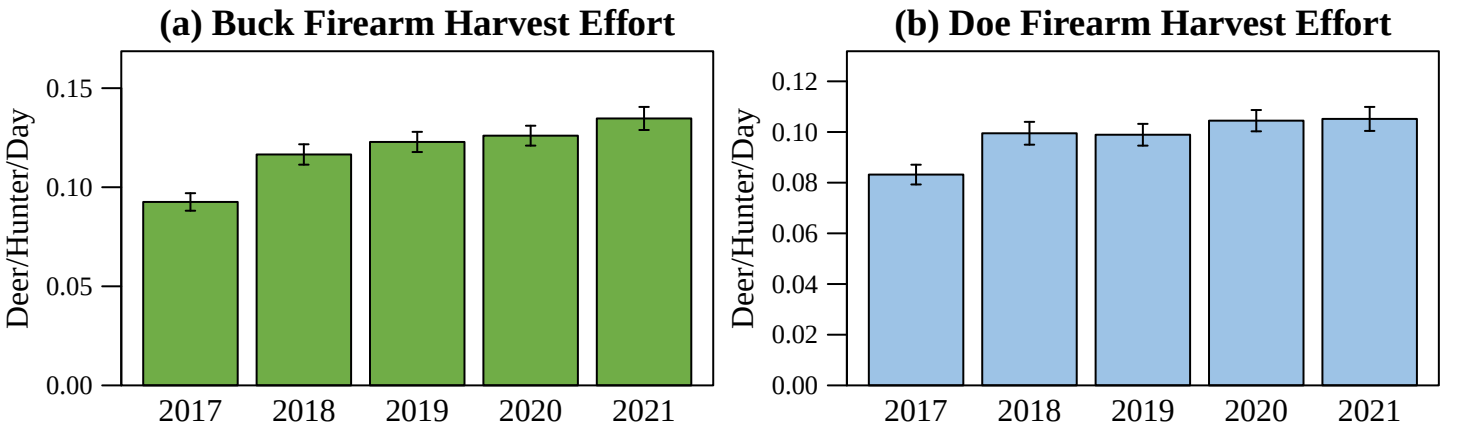


Figure 4. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

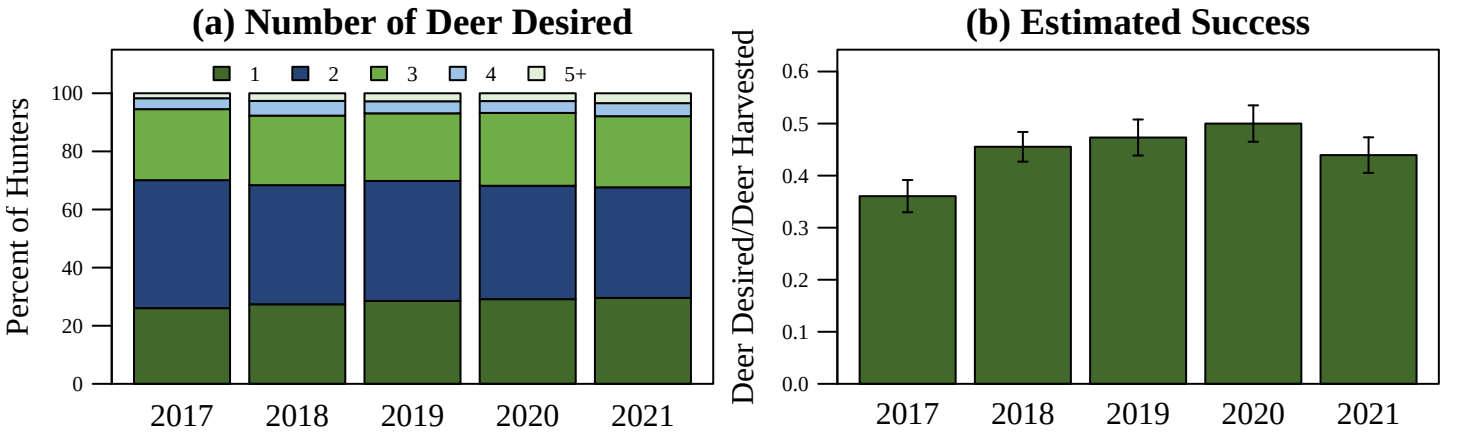


Figure 5. (a) The annual percent of hunters wishing to harvest each number of deer as reported in the deer management survey. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

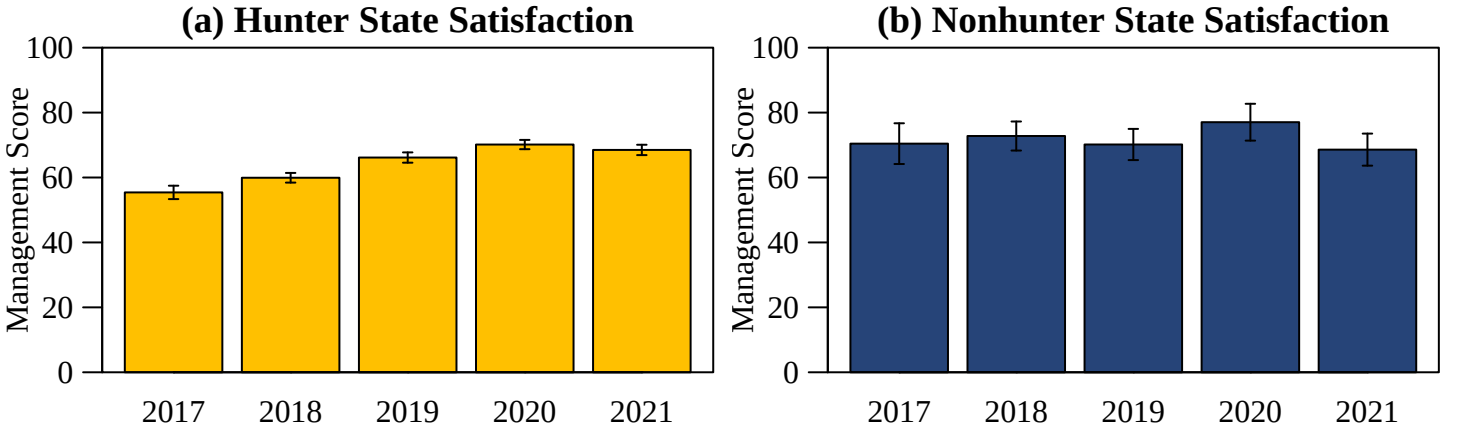


Figure 6. Hunters (a) and nonhunters (b) were asked to score the DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

DMU 2: Northeast

4/11/2022

Deer Management Survey Results

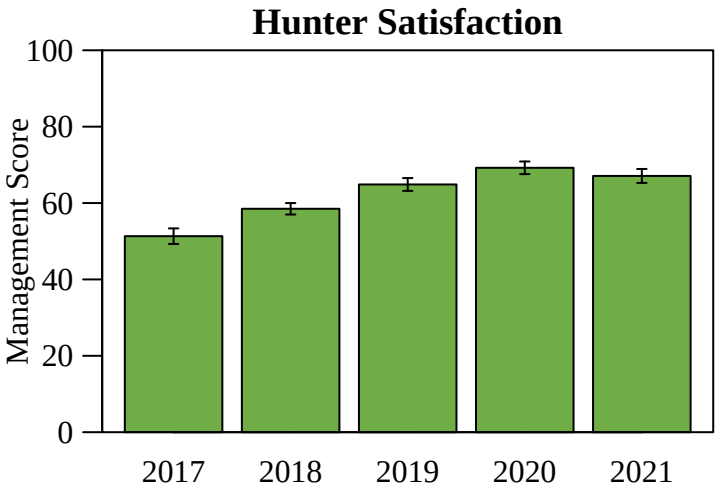


Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 2 where they hunt.

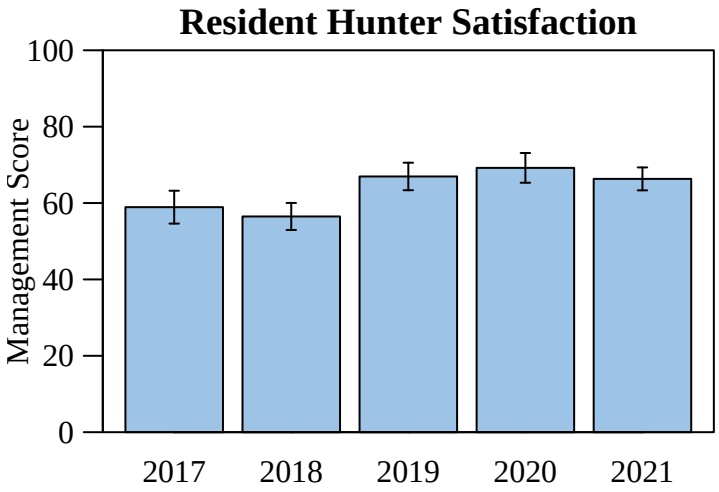


Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 2 where they live.

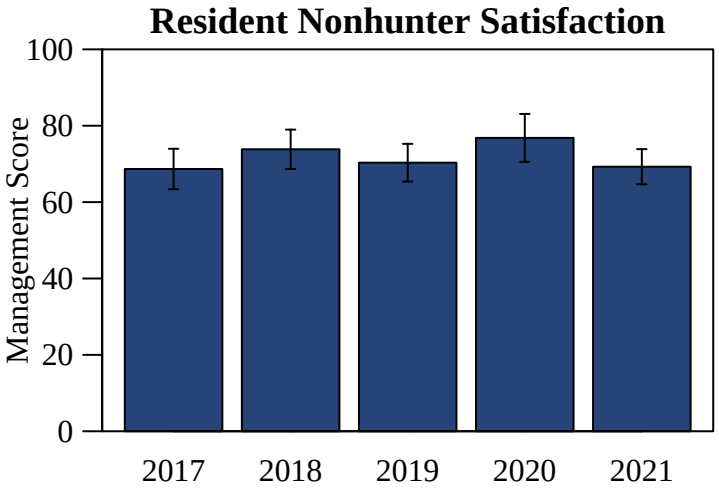


Figure 9. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 2 where they live.

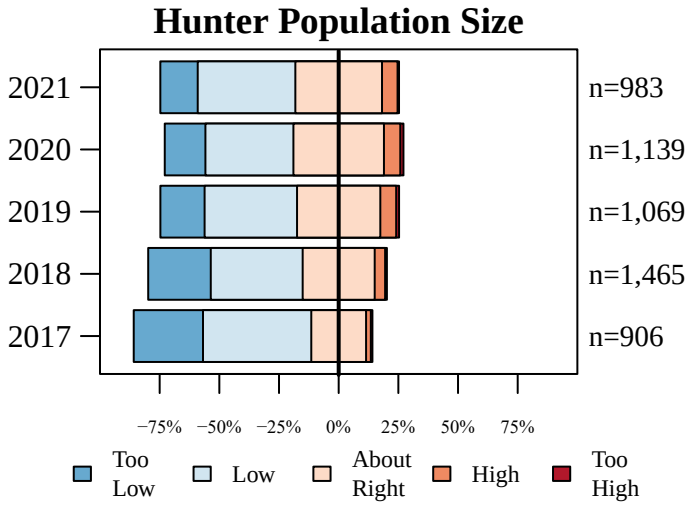
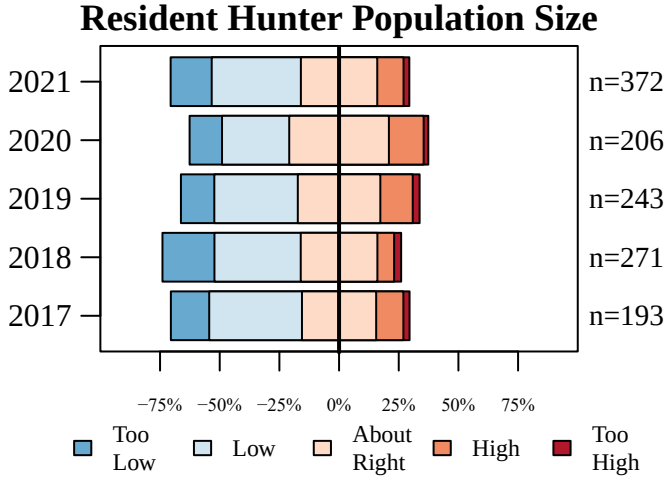


Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 2.



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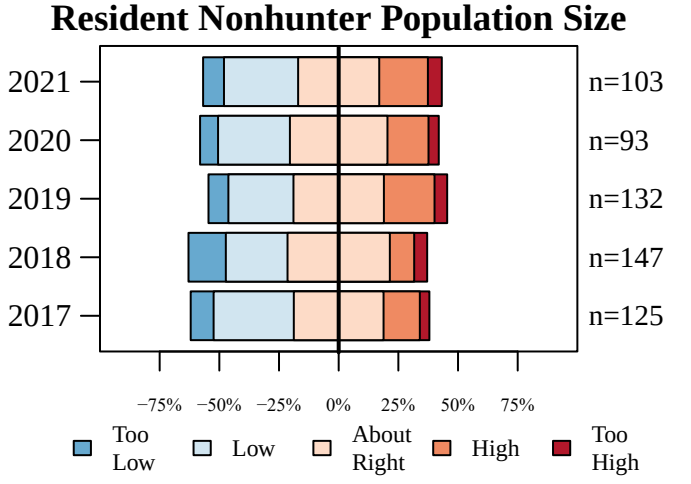


Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 2.

DMU 2: Northeast

4/11/2022

Deer Management Survey Results

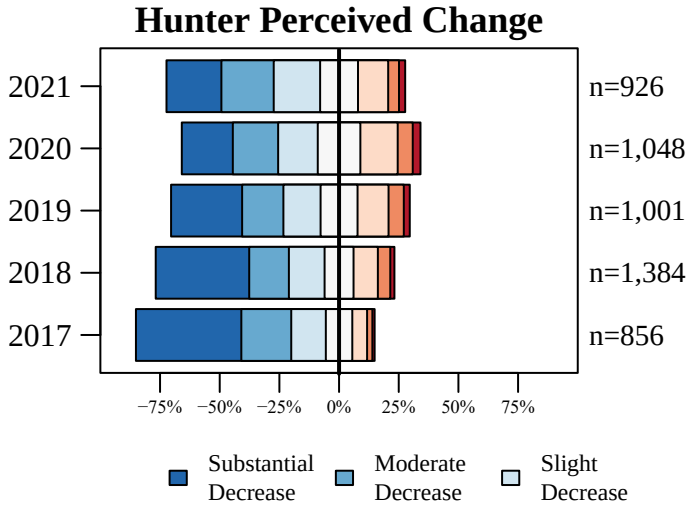
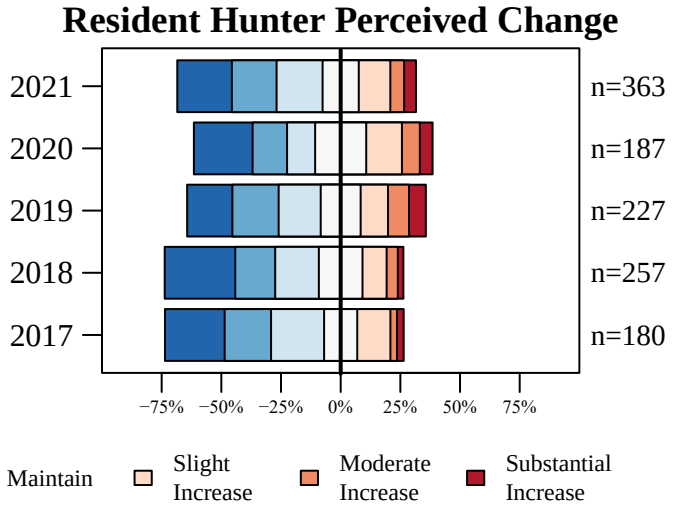


Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 2.



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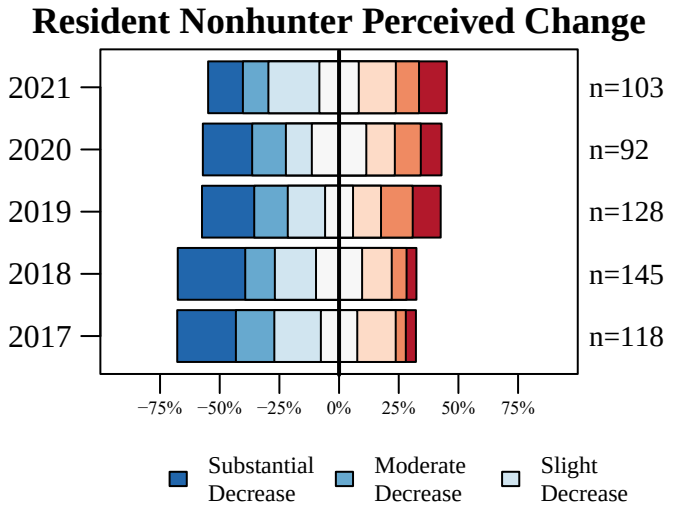

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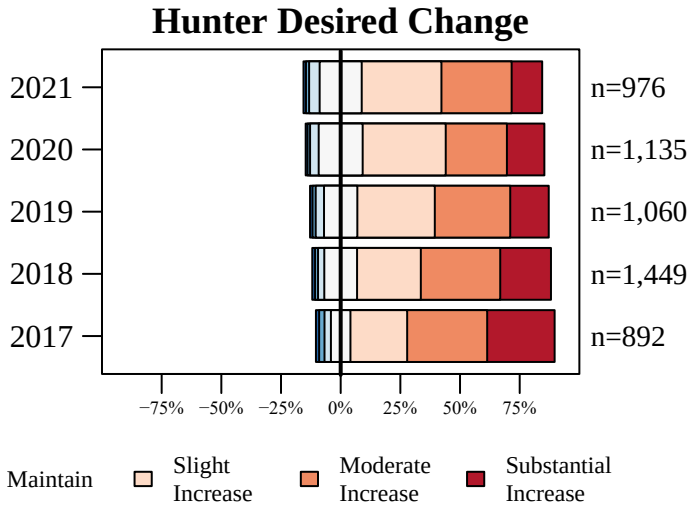


Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 2.

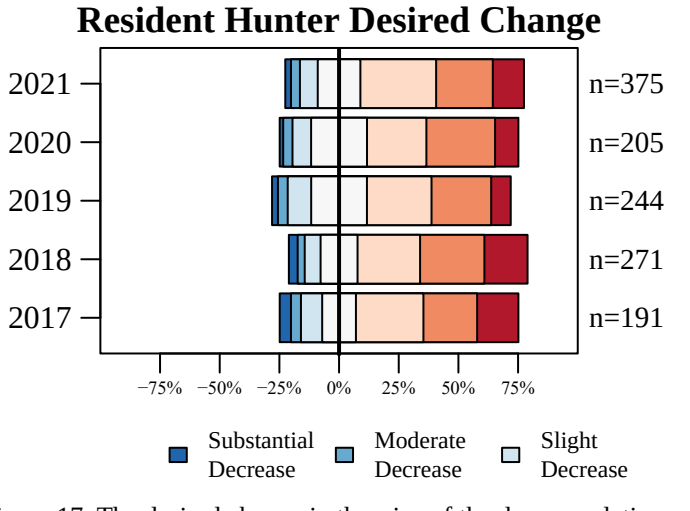


Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 2.

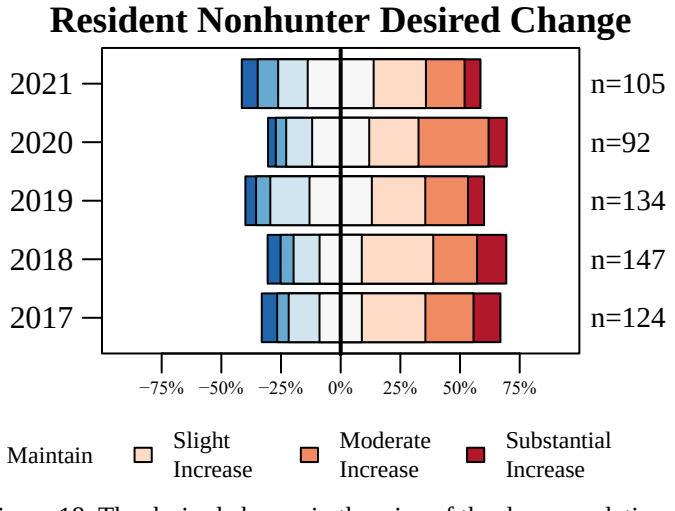


Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 2.

DMU 2: Northeast

4/11/2022

Deer Management Survey Results

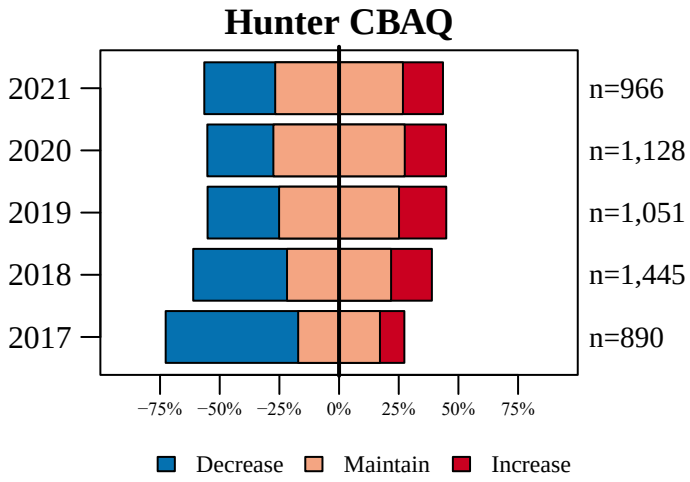


Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 2.

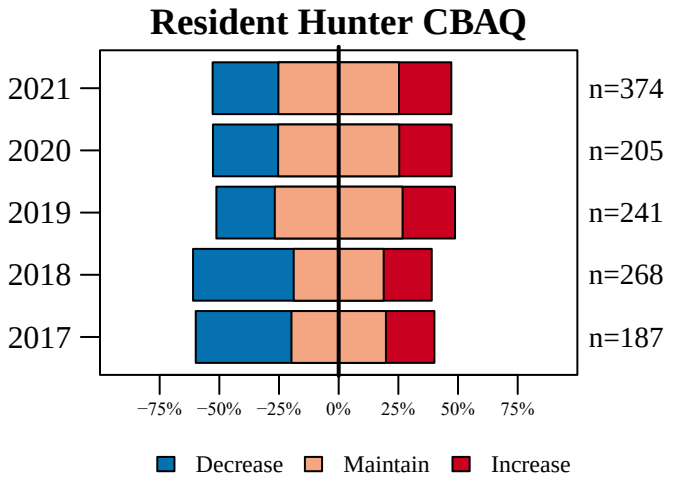


Figure 20. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they live in DMU 2.

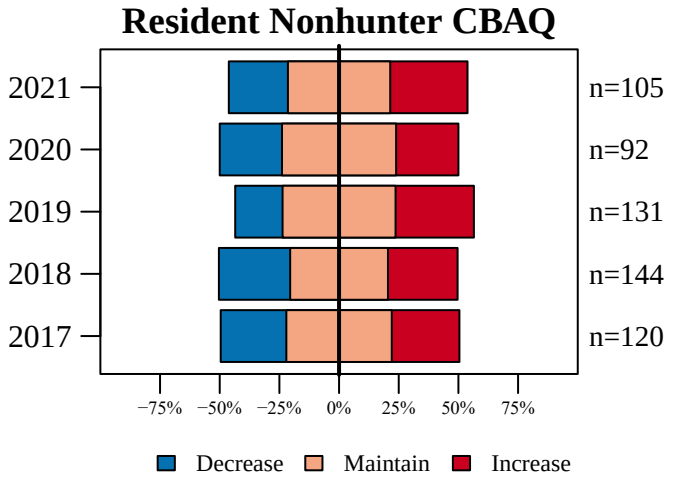


Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 2.

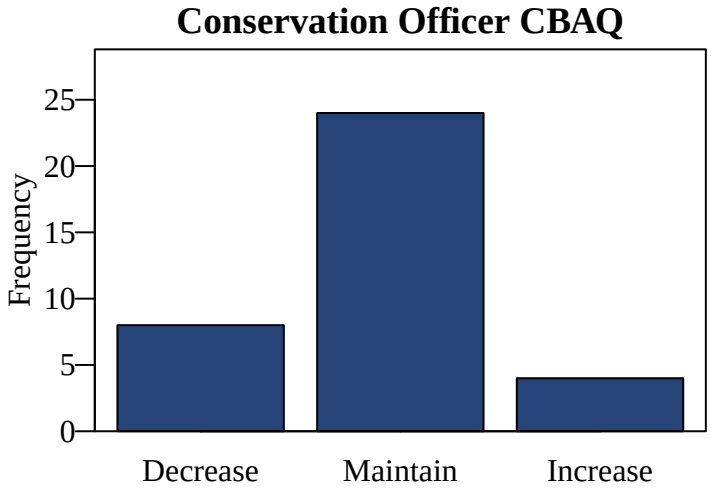


Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 2.

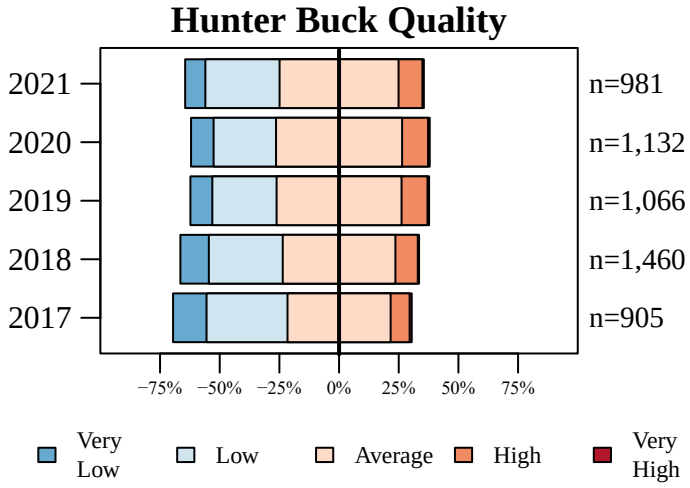


Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 2.

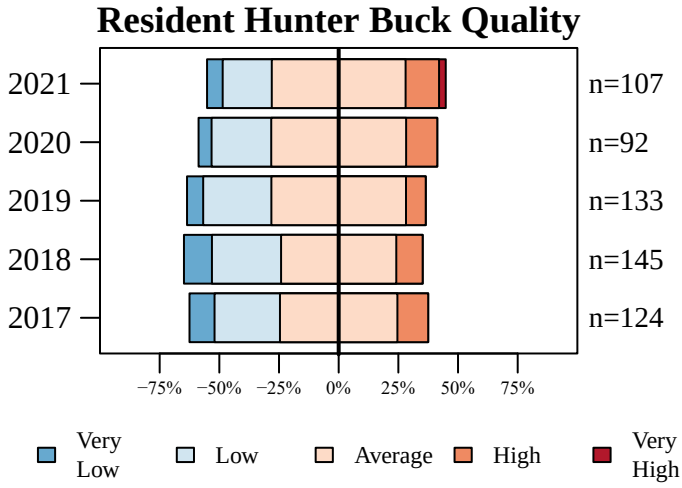


Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 2.

DMU 2: Northeast

4/11/2022

Deer Management Survey Results

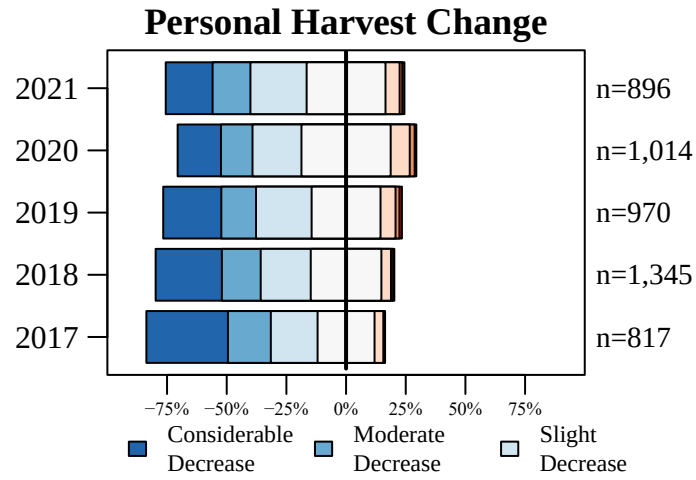


Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 2.

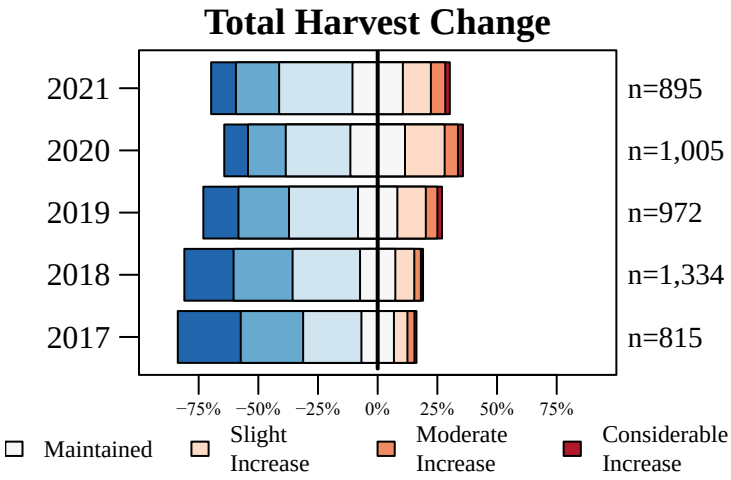


Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 2.

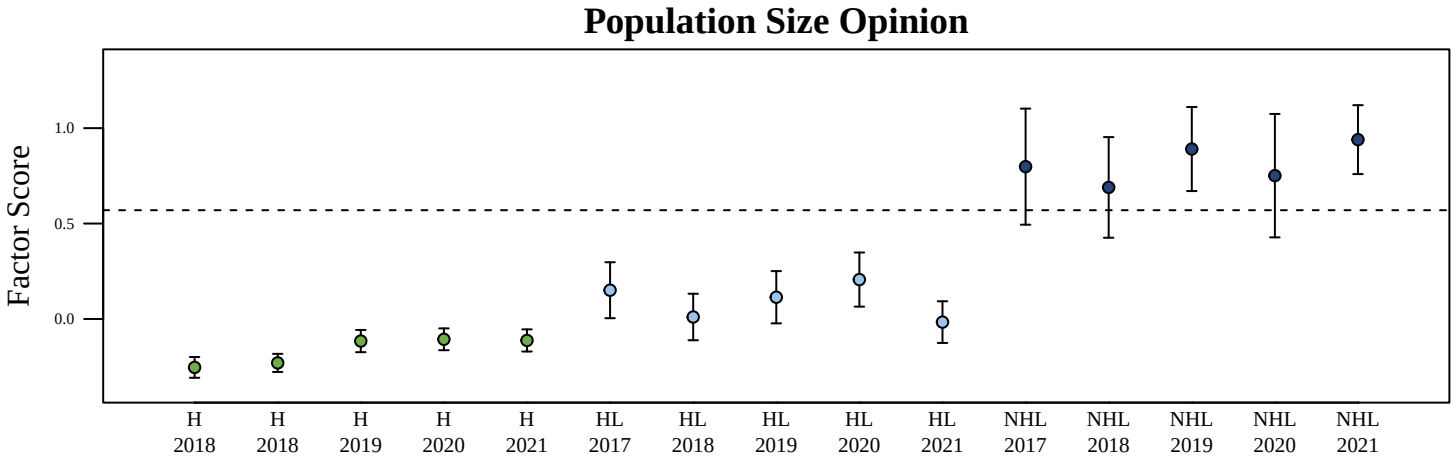


Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

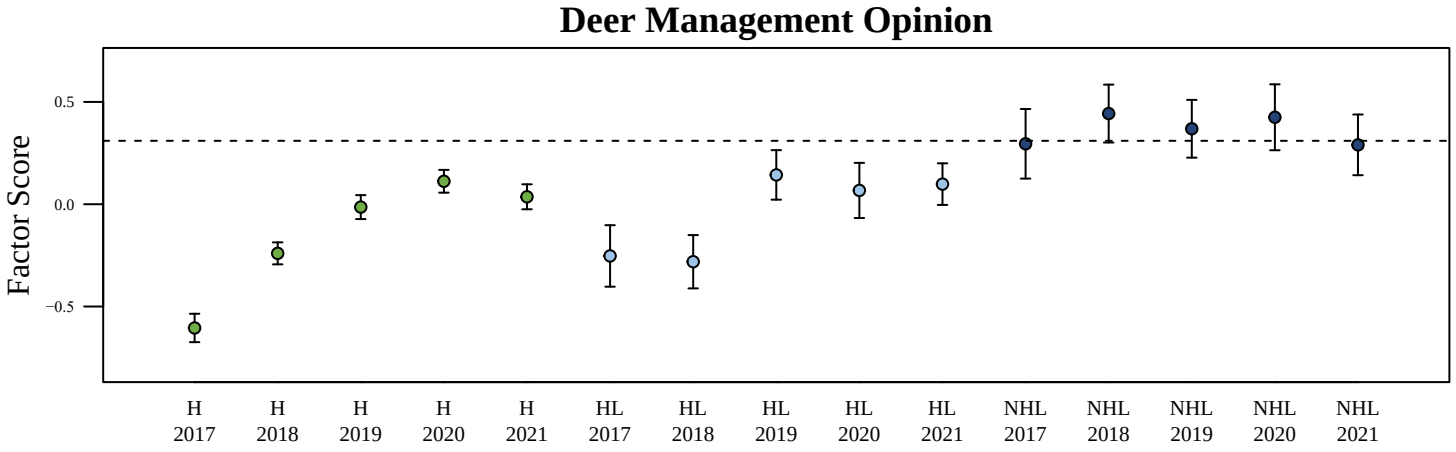


Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

DMU 2: Northeast

4/11/2022

Deer Management Survey Results

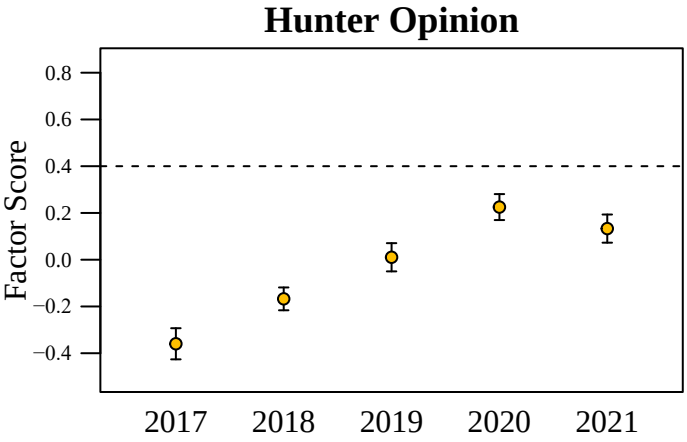


Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

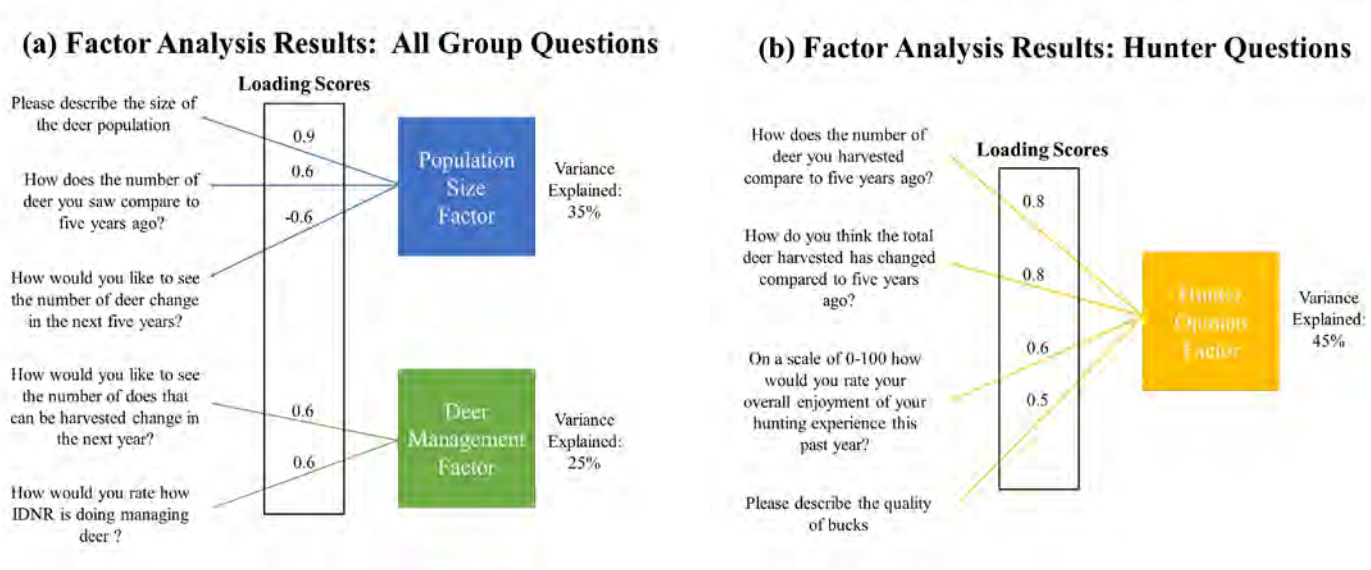


Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: The Northeast DMU was evaluated in 2021 and 86.4 deer/square mile (95% CI 16.9) was observed in woodlots and other areas of concealment and 5.5 deer/square mile (95% CI 3.6) was observed in crop lands, pastures, grasslands, and other areas with no concealment. Therefore, values for deer populations can easily range between these two values based on local habitat conditions, interspersion of areas of woodlots or forests and cropland. On average, 24.4 deer/square mile (95% CI 4.9) were observed. An average value is provided for the Northeastern DMU because of the highly integrated characteristics of the land in the northeastern corner of Indiana. The estimates were made using data from daytime flights as part of the Purdue Integrated Deer Management project. Because flights were made during the day, most deer were observed in concealed areas. Noble county had 25 reports of EHD in 2021, however, that outbreak was limited to a couple of small areas. No adjustment to the county-wide bonus antlerless quota is recommended.

DMU 3: West Central

4/11/2022

Total Square Miles: 4,025
Square Miles of Deer Habitat: 565
Percent Deer Habitat: 14

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	9,547		5,002		8.9	4,545		8.0	47.6		352.9		4.1
2009	9,446		4,831		8.6	4,615		8.2	48.9		343.1		5.3
2010	10,294	3.0	5,379	3.3	9.5	4,915	2.0	8.7	47.7		308.4	-2.1	5.3
2011	10,218	1.4	5,338	1.3	9.4	4,880	1.3	8.6	47.8		301.7	-2.1	5.9
2012	10,781	2.4	5,001	-0.6	8.9	5,780	5.5	10.2	53.6		271.4	-2.5	5.9
2013	9,176	-1.6	4,456	-2.8	7.9	4,720	-0.5	8.4	51.4		309.3	-0.2	5.4
2014	8,698	-2.0	4,424	-1.5	7.8	4,274	-1.5	7.6	49.1		293.9	-0.5	4.3
2015	8,344	-1.7	4,380	-1.2	7.8	3,964	-1.7	7.0	47.5		274.4	-1.5	4.3
2016	8,057	-1.3	4,471	-0.6	7.9	3,586	-1.6	6.3	44.5	102	257.4	-2.0	4.2
2017	7,017	-1.9	3,705	-3.3	6.6	3,312	-1.4	5.9	47.2	61	276.3	-0.2	2.9
2018	7,191	-1.3	4,023	-0.8	7.1	3,168	-1.4	5.6	44.1	42	290.3	0.4	2.1
2019	8,123	0.4	4,695	1.5	8.3	3,428	-0.5	6.1	42.2	44	292.5	1.0	1.8
2020	9,358	2.7	5,226	2.5	9.2	4,132	2.1	7.3	44.2	39	290.8	0.9	1.8
2021	8,240	0.3	4,874	0.8	8.6	3,366	1.6	6.0	40.8	48	298.6	1.1	1.8

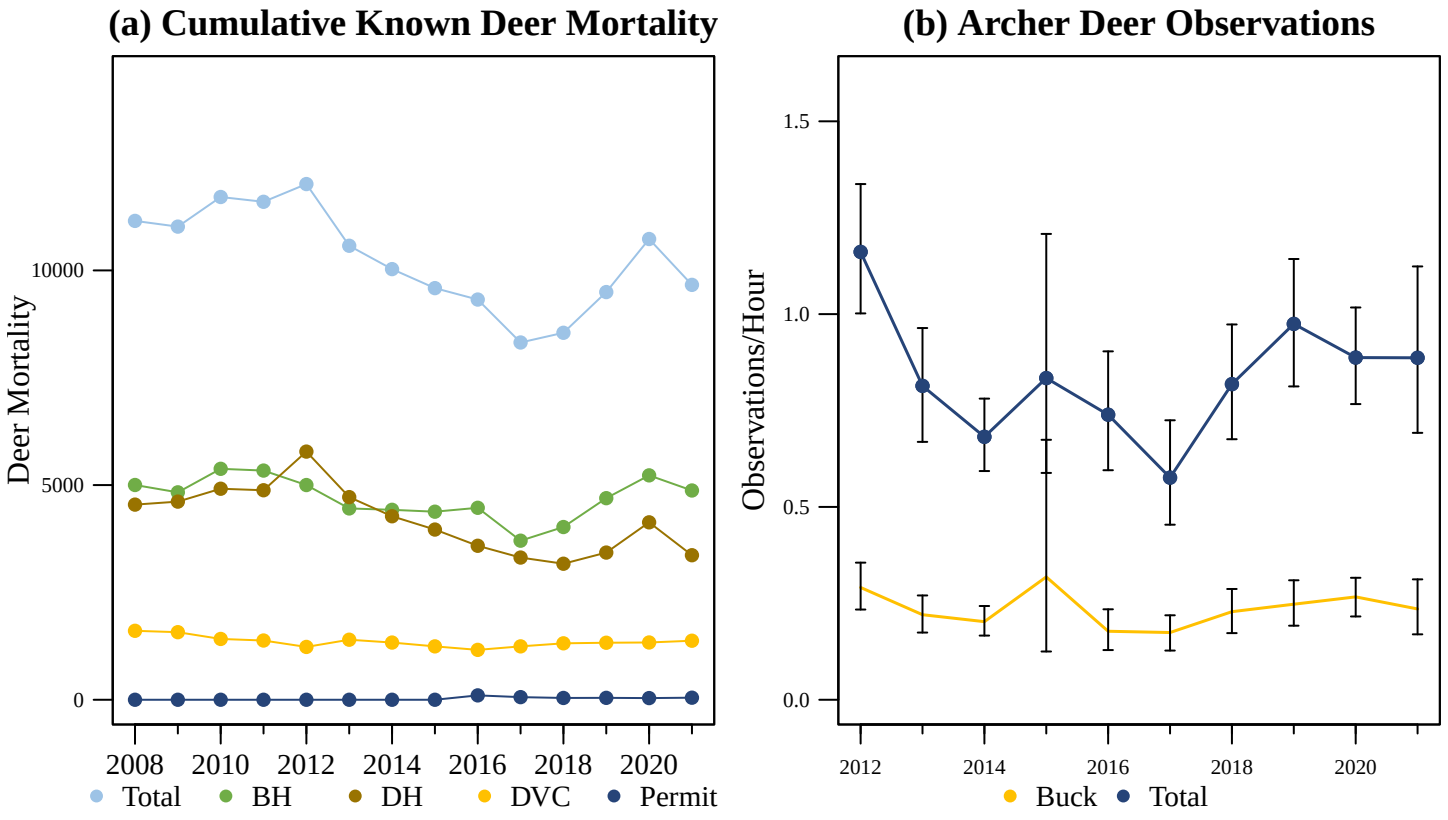


Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 3: West Central

4/11/2022

Total Square Miles: 4,025
Square Miles of Deer Habitat: 565
Percent Deer Habitat: 14

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	6,209	2,547	3,655	7	0	2,797	2,633	636	102	30	9	2	0	0	0	0
2017	5,364	2,439	2,916	8	0	2,213	2,388	629	102	31	1	0	0	0	0	0
2018	5,646	2,302	3,329	15	0	2,519	2,493	570	59	3	2	0	0	0	0	0
2019	6,215	2,246	3,955	14	0	2,873	2,625	651	54	10	1	1	0	0	0	0
2020	6,993	2,682	4,290	21	0	3,038	3,006	853	77	16	2	0	0	0	1	0
2021	6,418	2,229	4,183	6	0	3,159	2,543	657	52	5	1	0	1	0	0	0

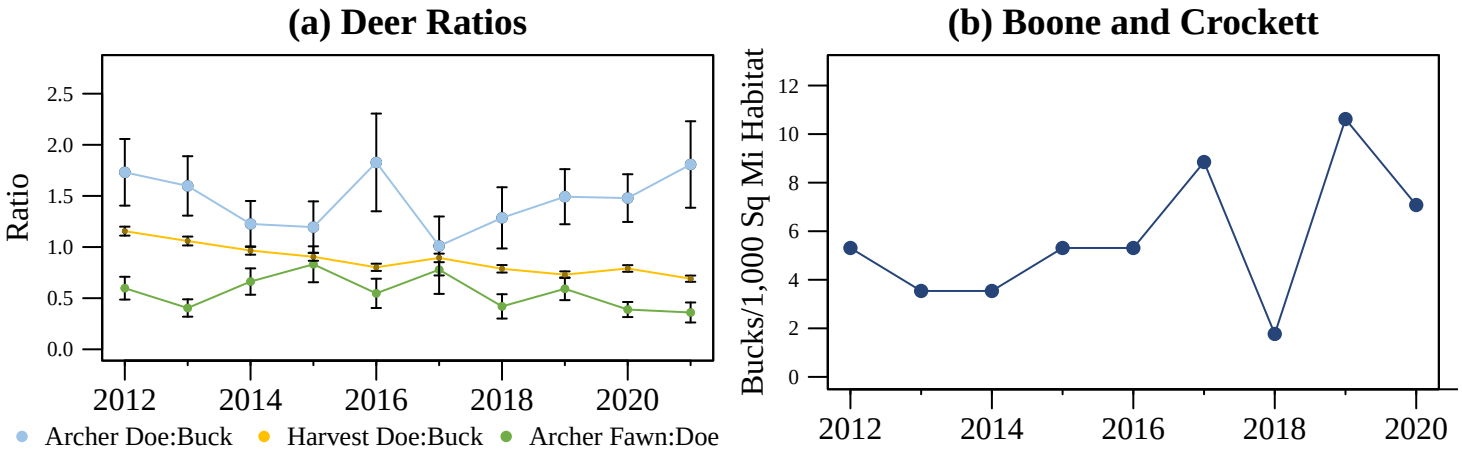


Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

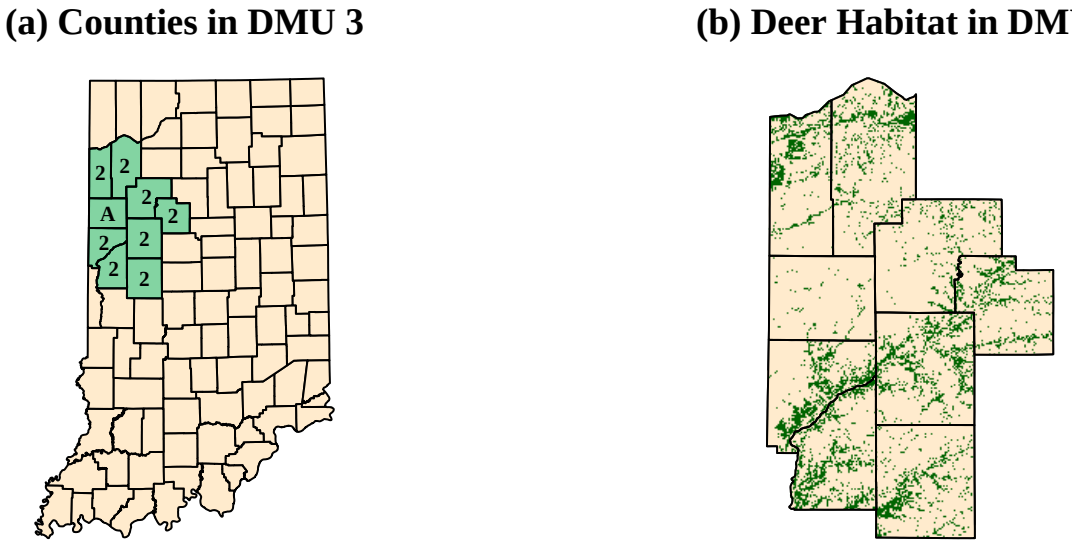


Figure 3. (a) Counties included in DMU 3 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 3.

DMU 3: West Central

4/11/2022

Deer Management Survey Results

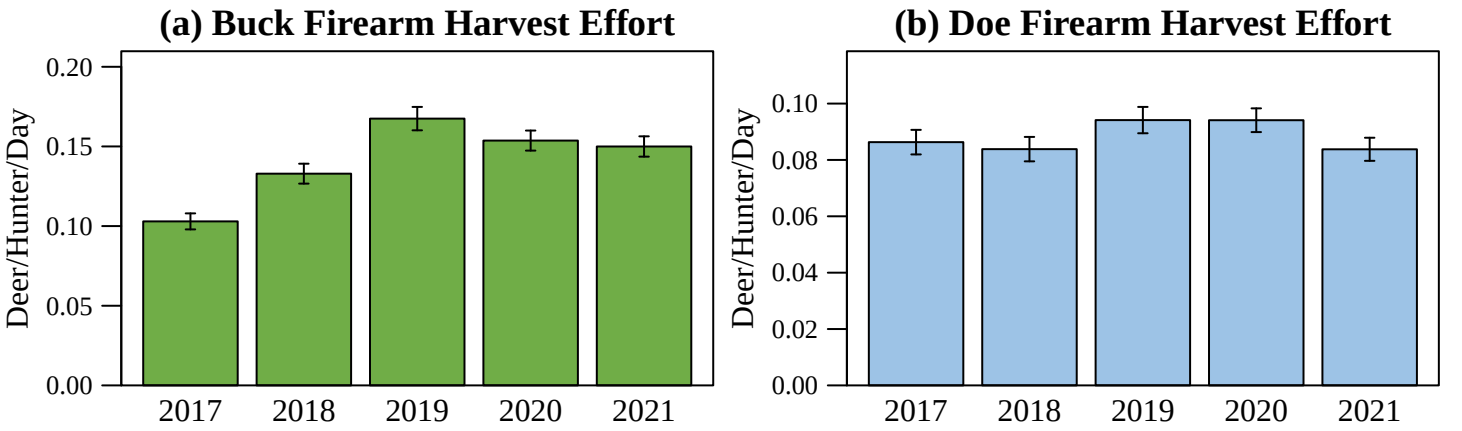


Figure 4. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

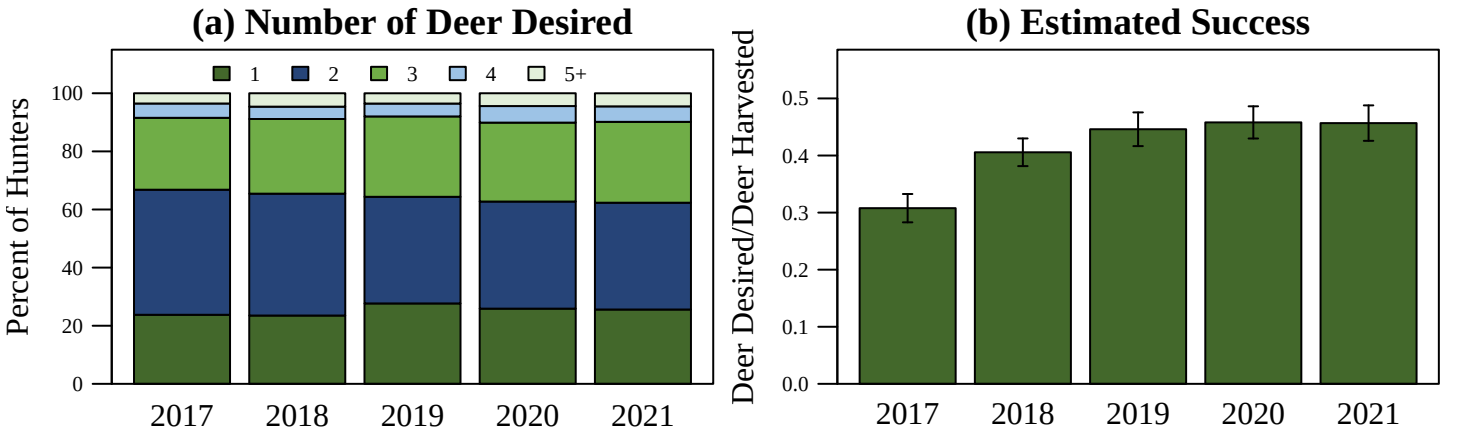


Figure 5. (a) The annual percent of hunters wishing to harvest each number of deer as reported in the deer management survey. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

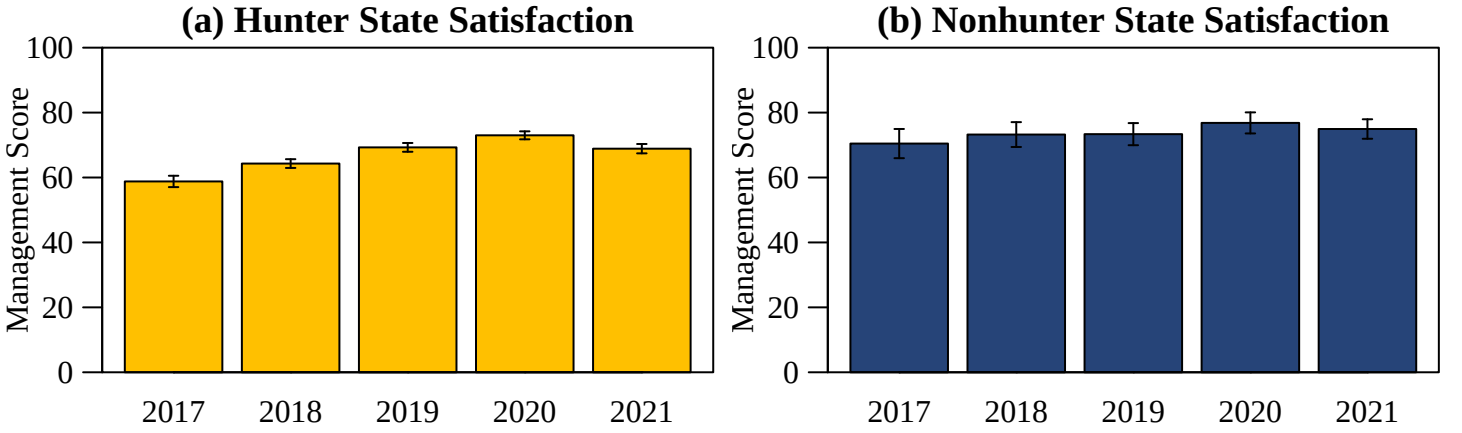


Figure 6. Hunters (a) and nonhunters (b) were asked to score the DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

DMU 3: West Central

4/11/2022

Deer Management Survey Results

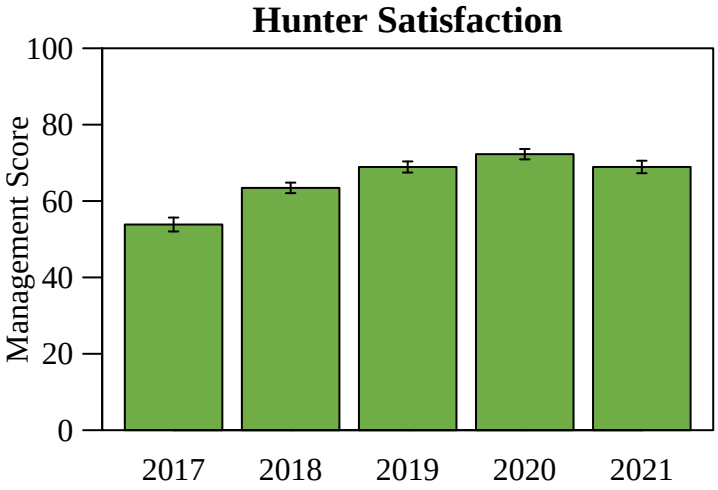


Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 3 where they hunt.

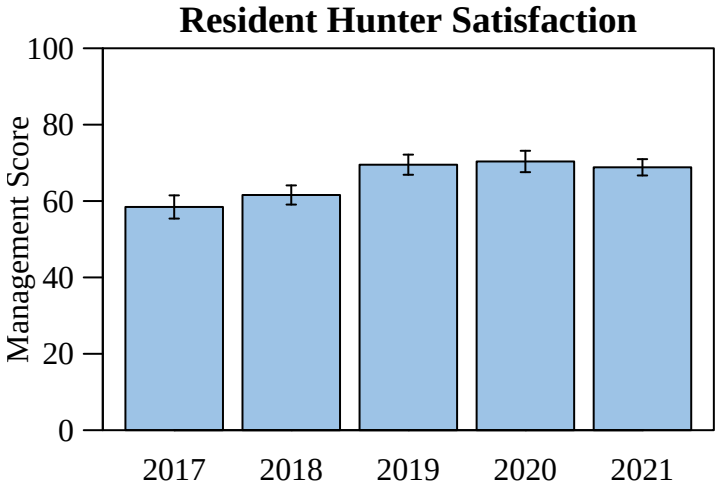


Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 3 where they live.

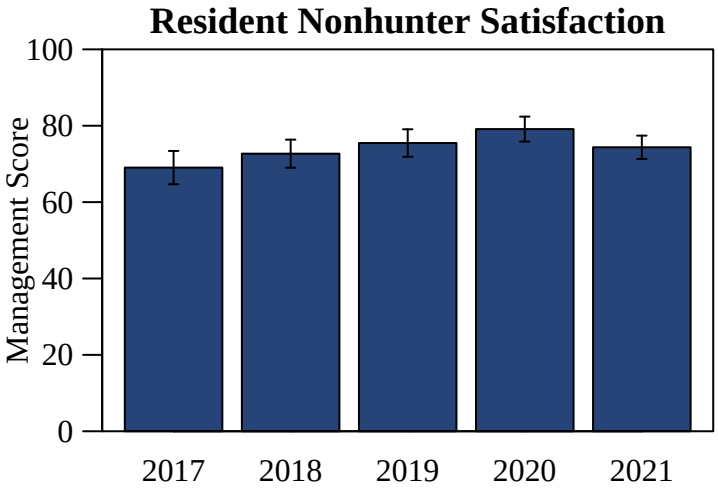


Figure 9. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 3 where they live.

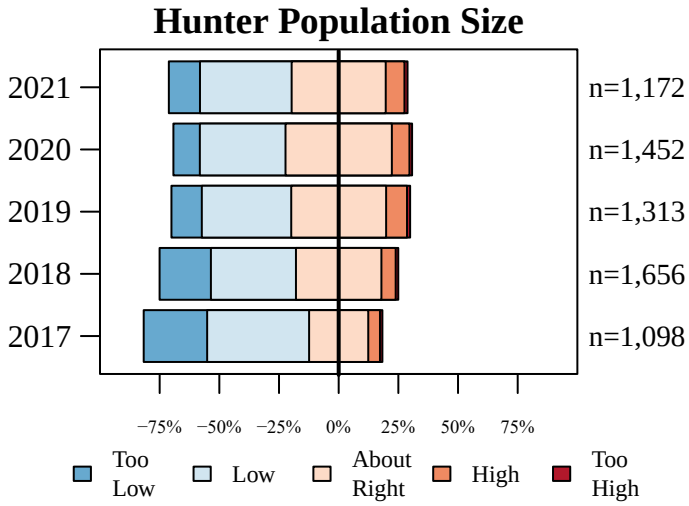


Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 3.

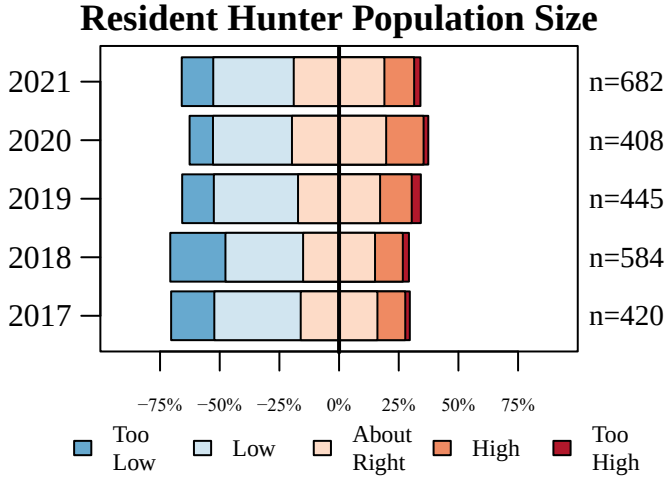


Figure 11. The current size of the deer population described by hunters in the county where they live in DMU 3.

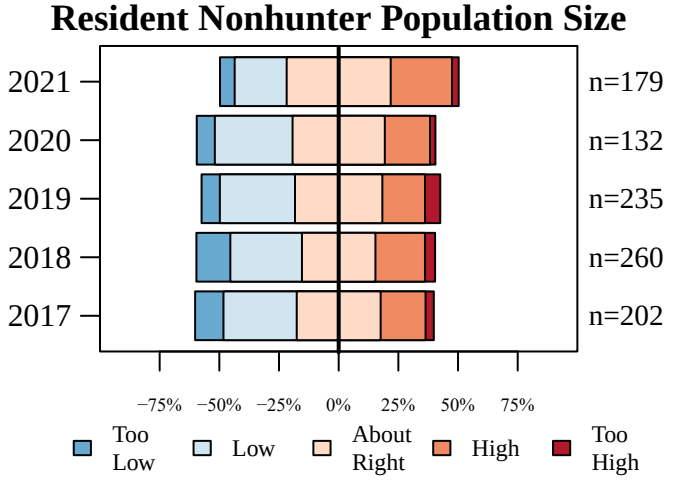


Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 3.

DMU 3: West Central

4/11/2022

Deer Management Survey Results

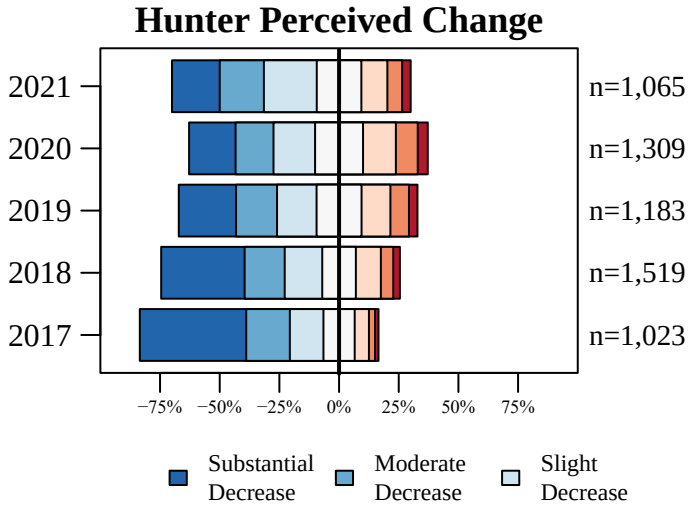


Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 3.

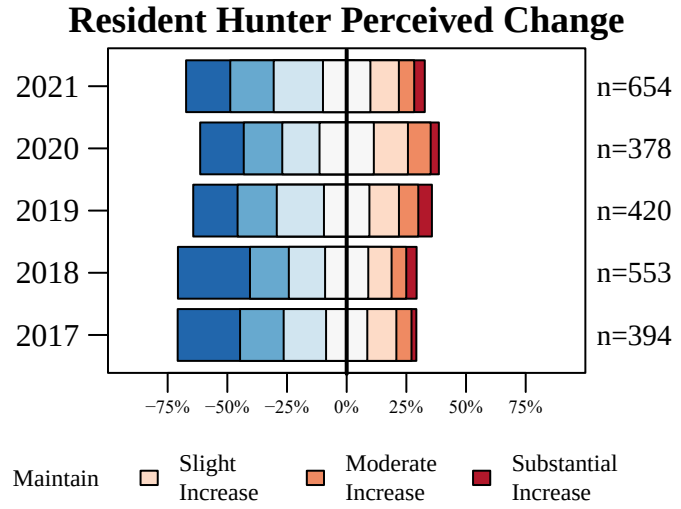


Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 3.

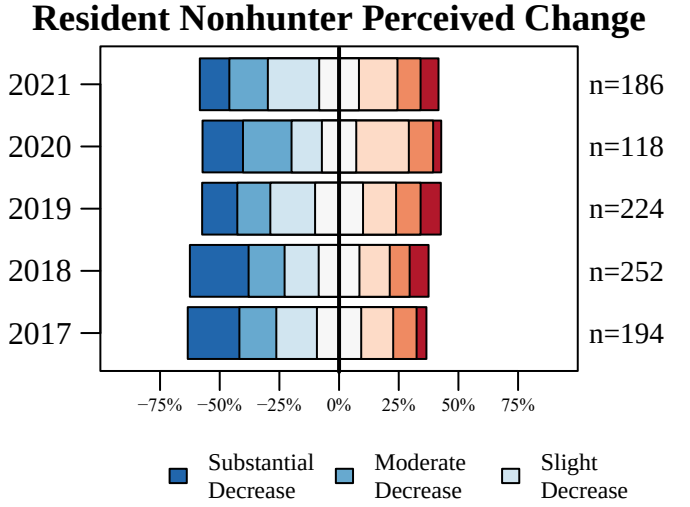


Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 3.

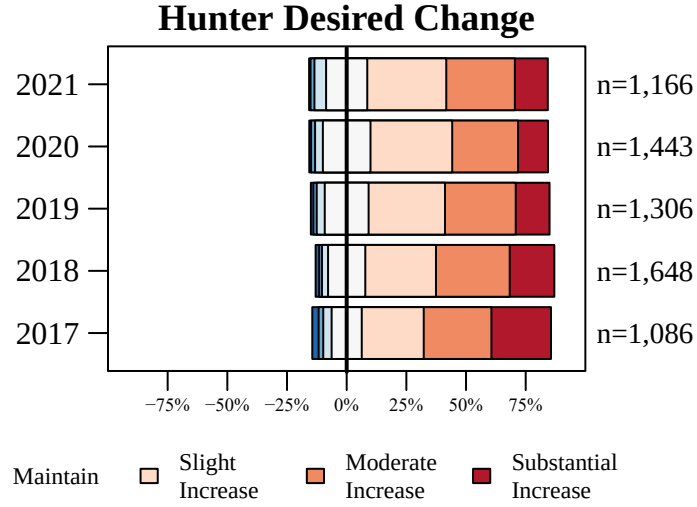
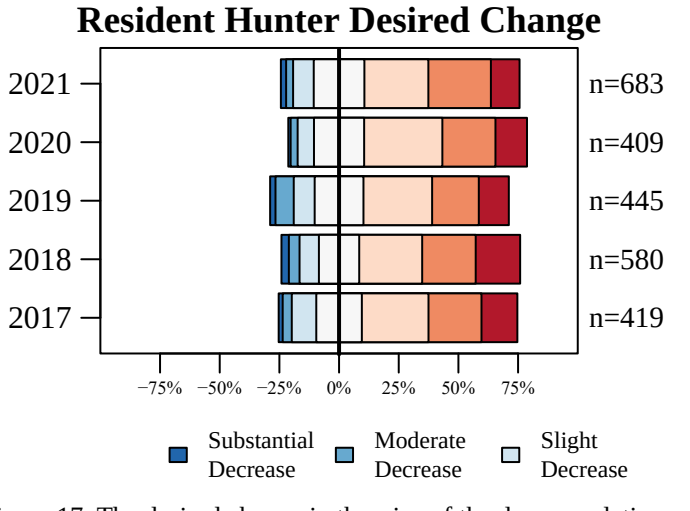


Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 3.



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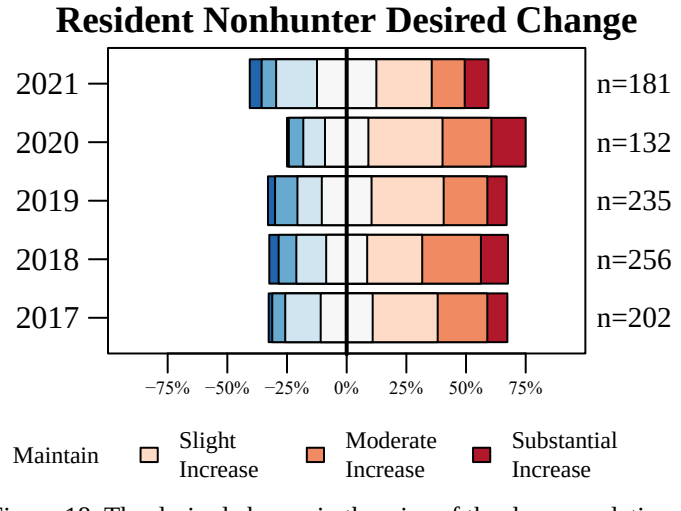
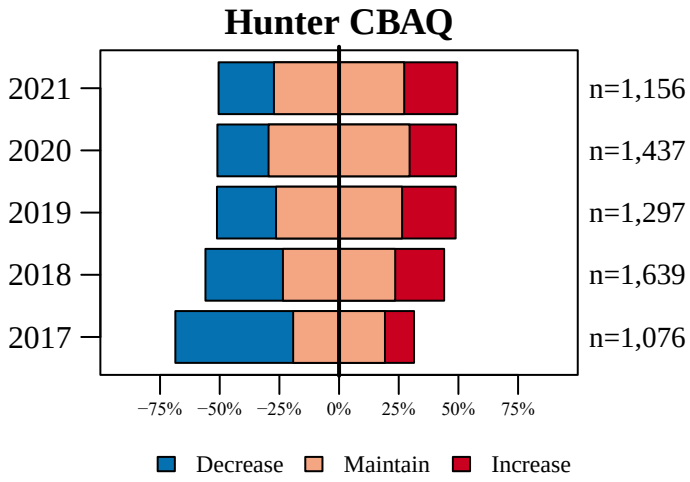


Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 3.

DMU 3: West Central

4/11/2022

Deer Management Survey Results



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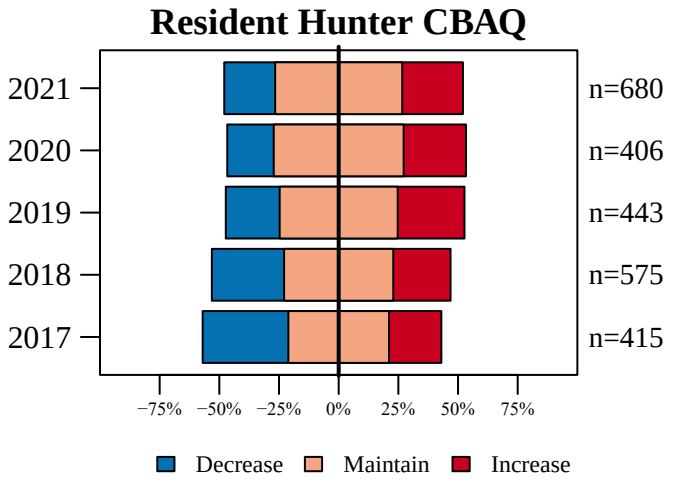

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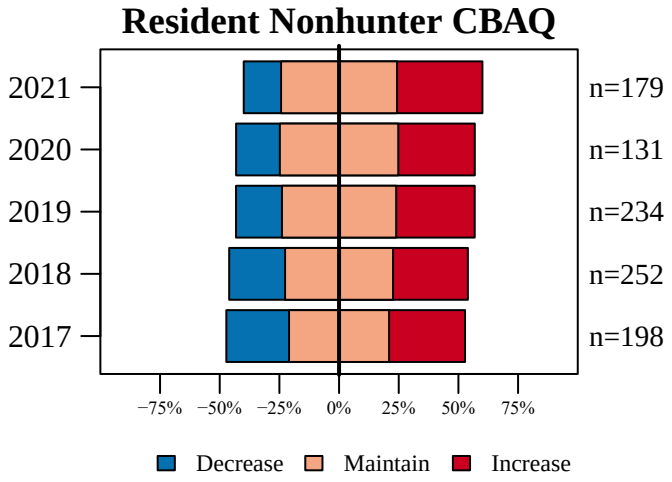

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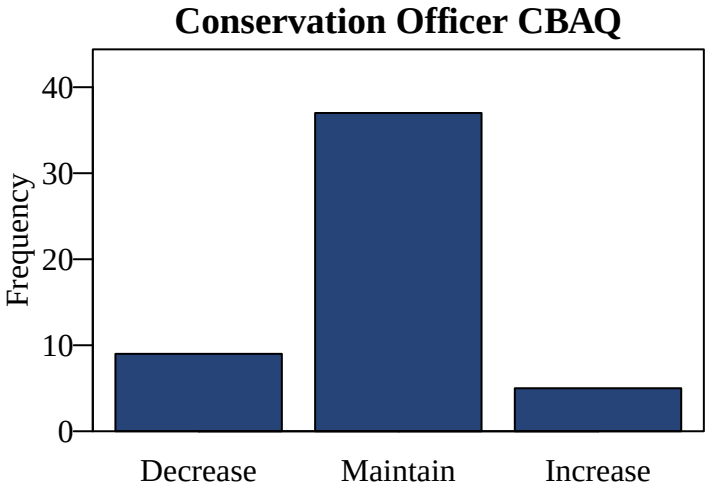

Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 3.

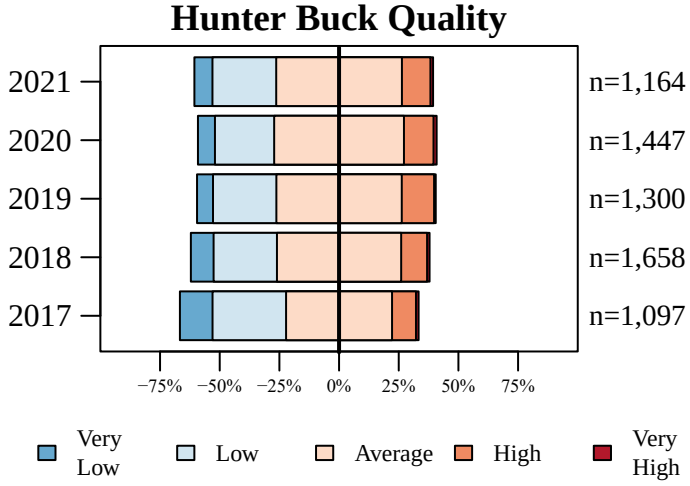

Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 3.

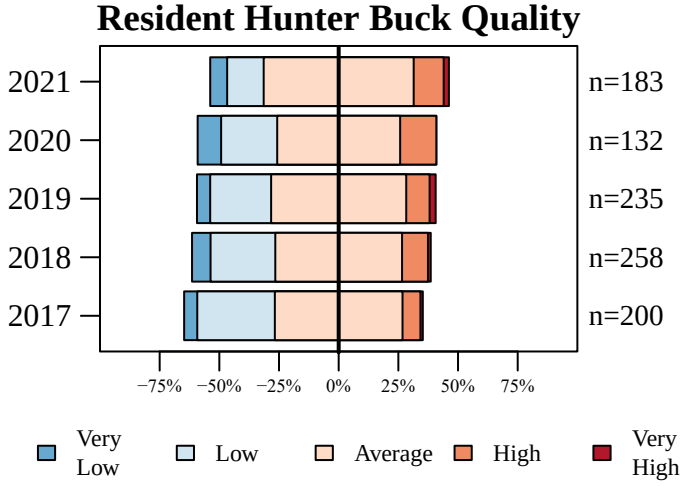

Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 3.

DMU 3: West Central

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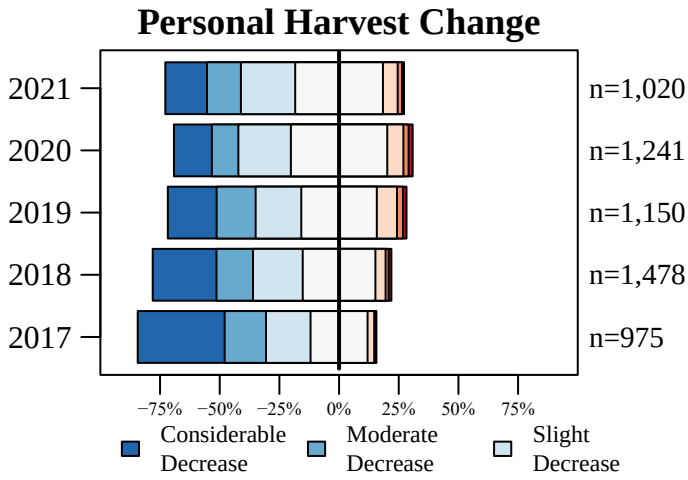

Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 3.

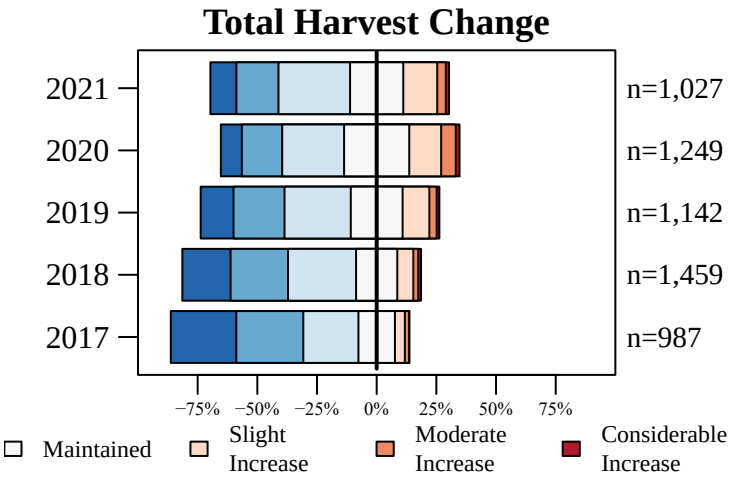

Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 3.

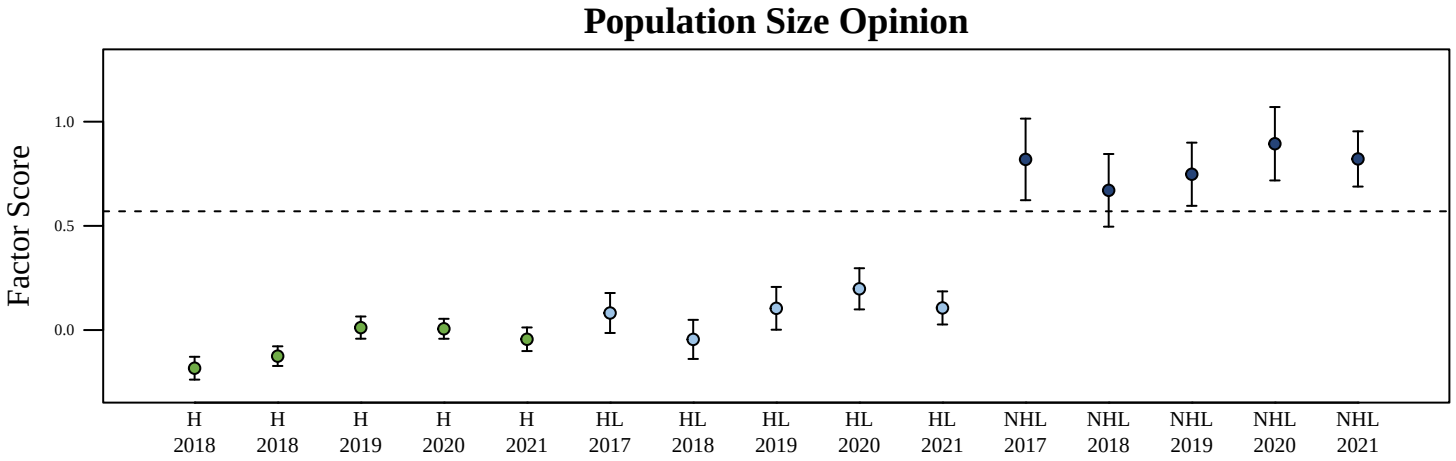

Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

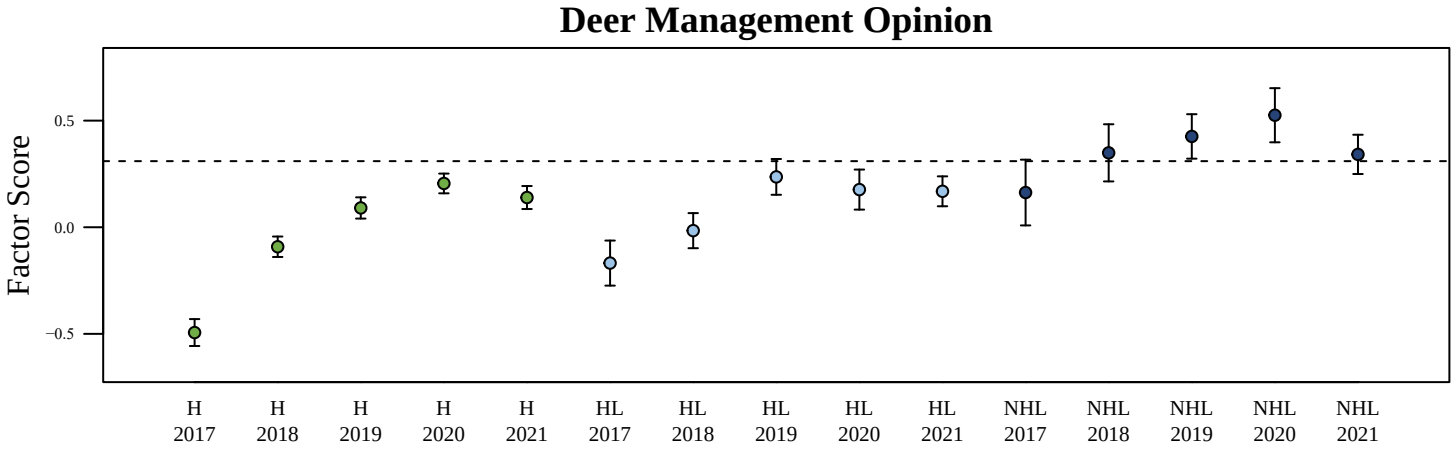

Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

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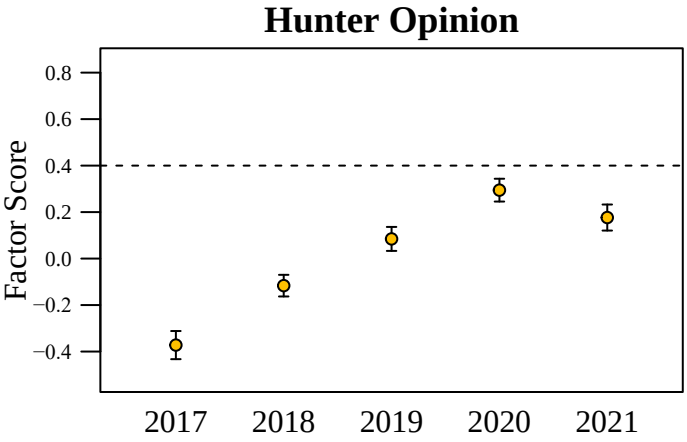

Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

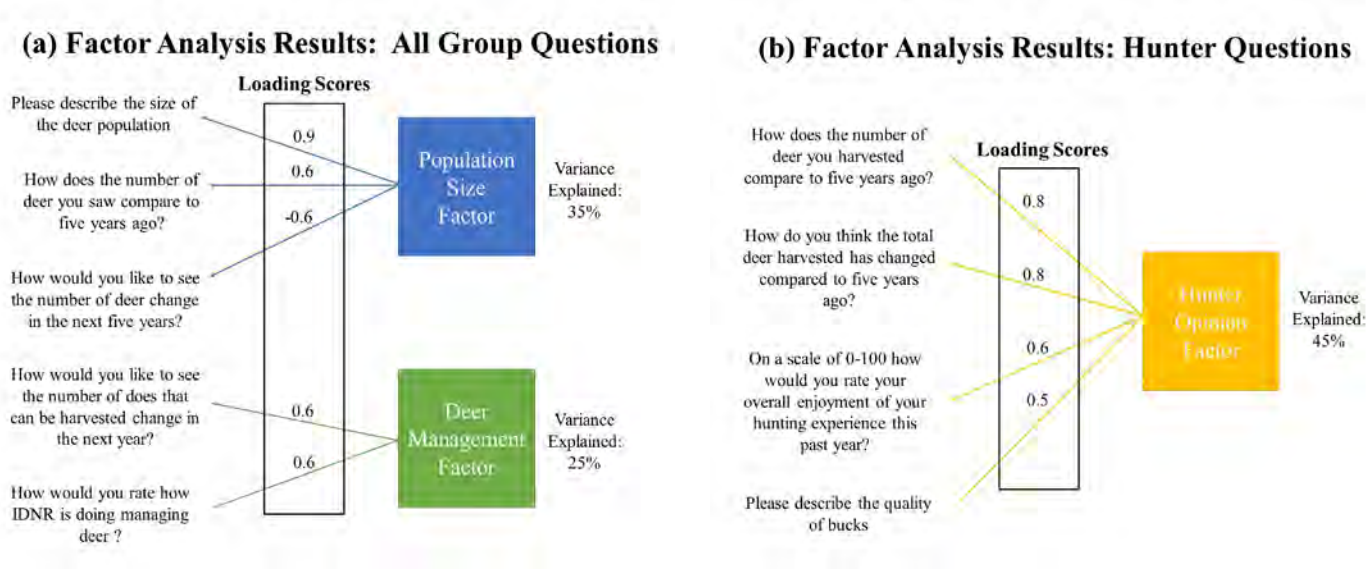

Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: The West Central DMU was evaluated in 2021 and 49.9 deer/square mile (95% CI 15.7) was observed in woodlots and other areas of concealment and 1.4 deer/square mile (95% CI 1.0) was observed in crop lands, pastures, grasslands, and other areas with no concealment. Therefore, values for deer populations can easily range between these two values based on local habitat conditions, interspersion of areas of woodlots or forests and cropland. No average value was provided because of the highly clumped nature and wide dispersion of habitat seperated by large areas of agriculture. The estimates were made using data from daytime flights as part of the Purdue Integrated Deer Management project. Because flights were made during the day, most deer were observed in concealed areas.

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Total Square Miles: 9,965
Square Miles of Deer Habitat: 1,589
Percent Deer Habitat: 16

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	17,151		8,974		5.6	8,177		5.1	47.7		175.4		3.2
2009	18,223		9,567		6.0	8,656		5.4	47.5		174.5		3.2
2010	17,914	0.7	9,538	0.6	6.0	8,376	0.6	5.3	46.8		164.3	-1.3	3.5
2011	18,487	1.2	9,673	0.8	6.1	8,814	1.7	5.5	47.7		162.1	-1.9	3.9
2012	18,258	0.5	8,873	-2.0	5.6	9,385	3.6	5.9	51.4		150.8	-2.5	3.8
2013	17,243	-1.5	8,733	-1.6	5.5	8,510	-0.4	5.4	49.4		146.7	-1.8	3.5
2014	18,029	0.0	9,321	0.1	5.9	8,708	-0.1	5.5	48.3		154.2	-0.5	3.4
2015	18,299	0.7	9,755	1.3	6.1	8,544	-0.6	5.4	46.7		155.7	0.0	3.3
2016	17,875	-0.4	9,838	1.2	6.2	8,037	-2.1	5.1	45.0	44	136.5	-3.0	3.3
2017	16,481	-3.4	8,651	-1.3	5.4	7,830	-1.7	4.9	47.5	43	149.3	0.1	3.0
2018	16,985	-0.8	9,476	0.4	6.0	7,509	-2.2	4.7	44.2	43	152.3	0.5	1.9
2019	18,638	1.4	10,644	2.6	6.7	7,994	-0.3	5.0	42.9	69	155.3	0.7	1.6
2020	20,441	3.1	11,337	2.3	7.1	9,104	3.0	5.7	44.5	51	145.3	-0.6	1.6
2021	18,006	-0.1	10,393	0.4	6.5	7,613	1.7	4.8	42.3	60	151.0	0.4	1.6

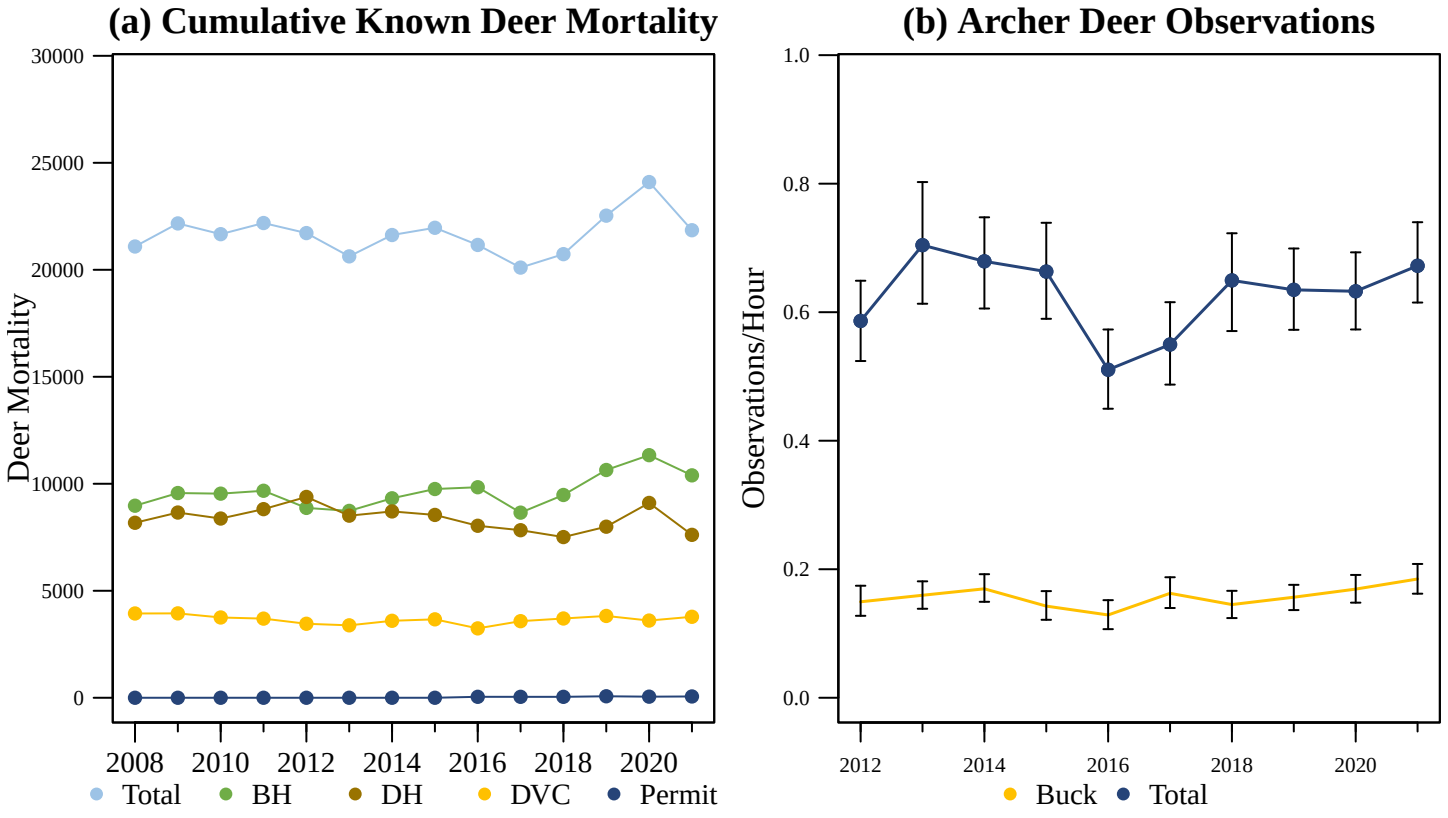

Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 4: East Central

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Total Square Miles: 9,965
Square Miles of Deer Habitat: 1,589
Percent Deer Habitat: 16

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	14,211	6,526	7,628	55	2	5,968	6,705	1,277	203	42	7	4	4	1	0	0
2017	12,981	6,363	6,573	43	1	4,976	6,470	1,311	182	33	9	0	0	0	0	0
2018	13,655	6,203	7,404	48	0	5,709	6,596	1,197	126	21	4	1	1	0	0	0
2019	14,887	6,256	8,578	51	2	6,468	7,035	1,274	90	12	3	3	0	1	0	1
2020	16,167	7,044	9,064	59	0	6,725	7,811	1,473	135	19	3	1	0	0	0	0
2021	14,507	5,932	8,517	57	1	6,585	6,601	1,213	95	9	2	1	0	1	0	0

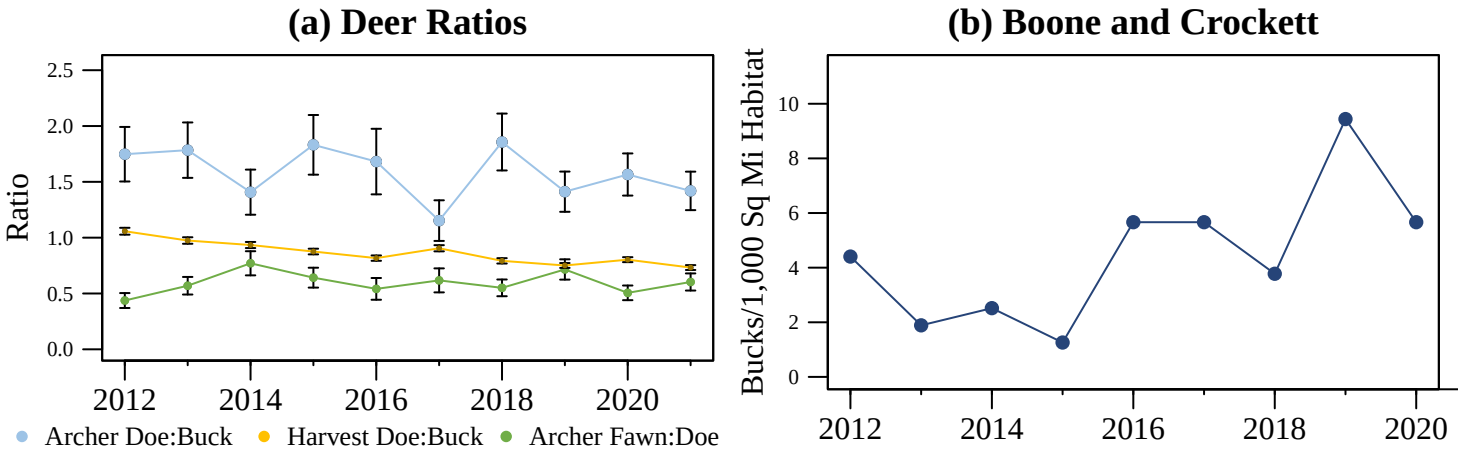

Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

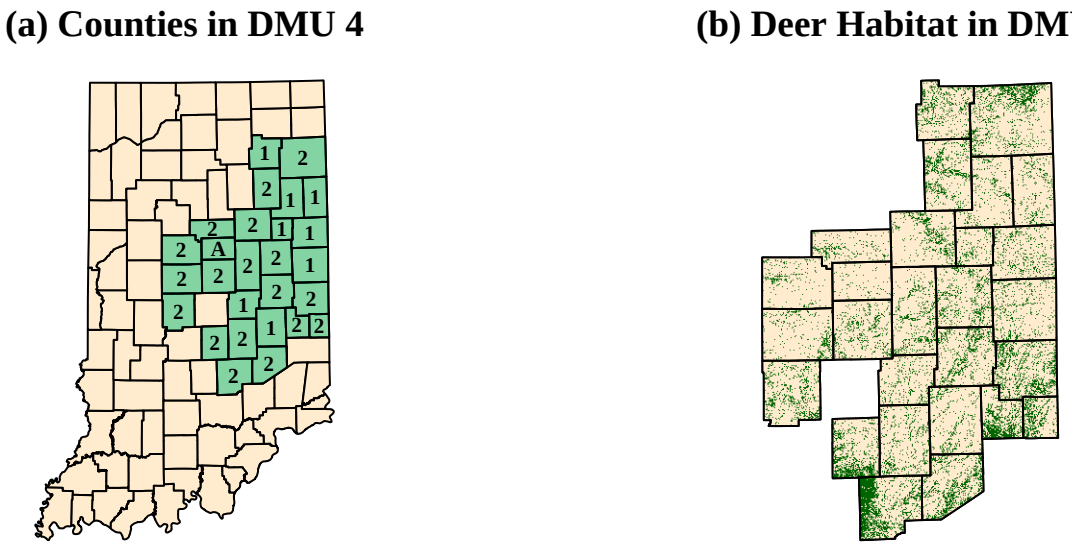

Figure 3. (a) Counties included in DMU 4 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 4.

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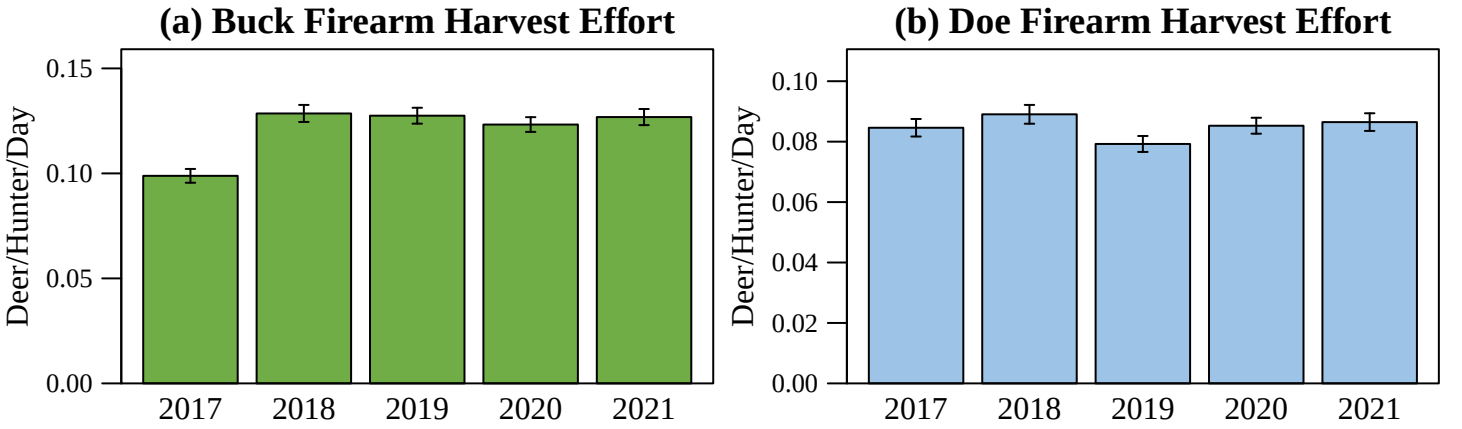

Figure 4. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

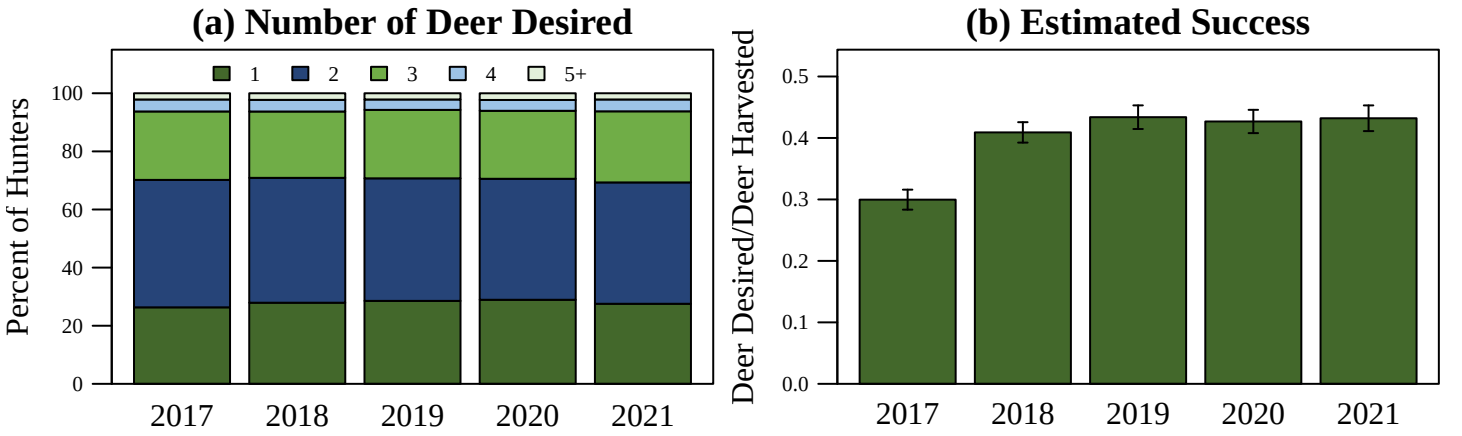

Figure 5. (a) The annual percent of hunters wishing to harvest each number of deer as reported in the deer management survey. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

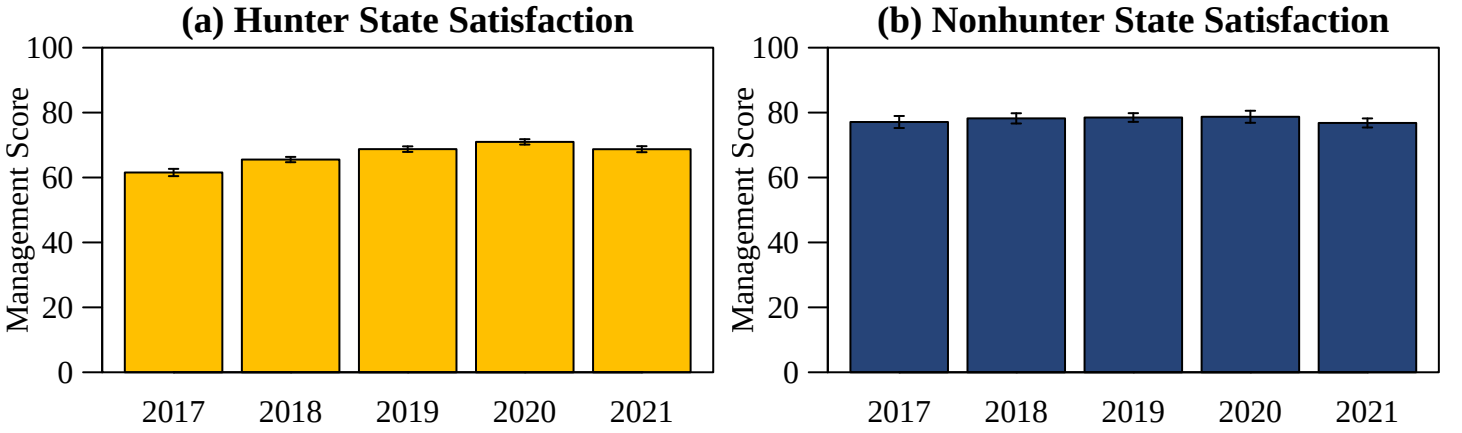

Figure 6. Hunters (a) and nonhunters (b) were asked to score the DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

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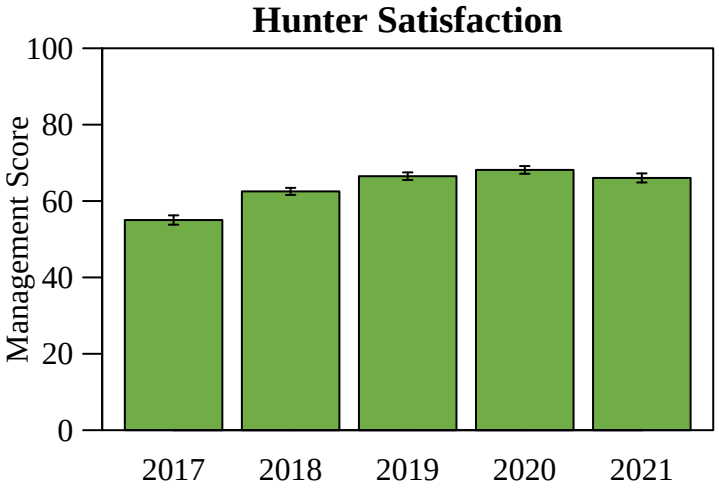

Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 4 where they hunt.

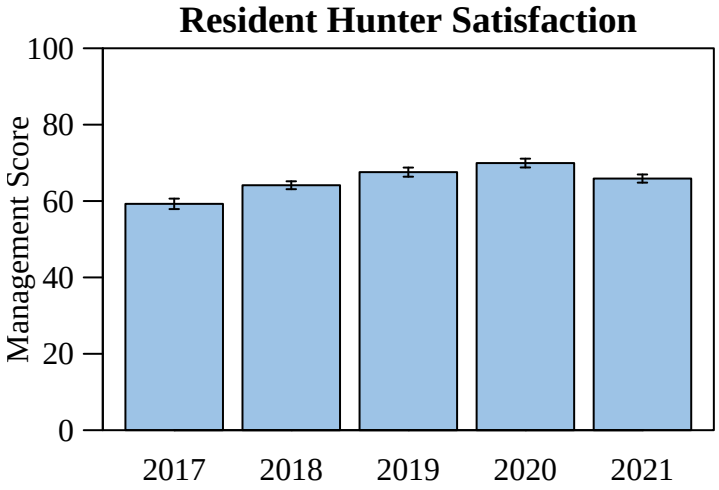

Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 4 where they live.

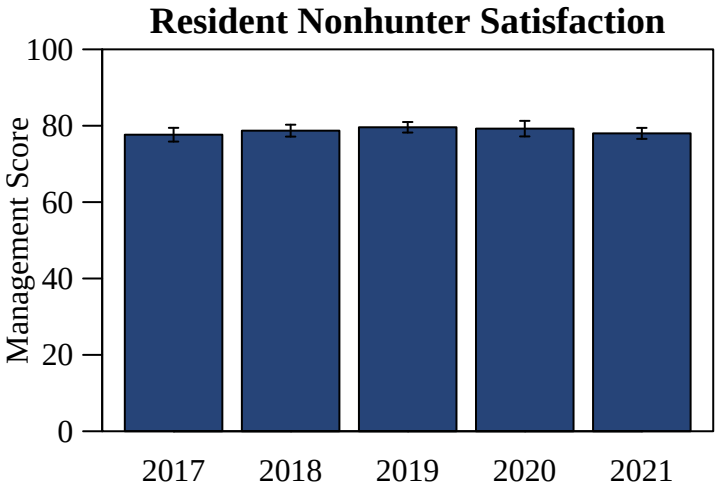

Figure 9. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 4 where they live.

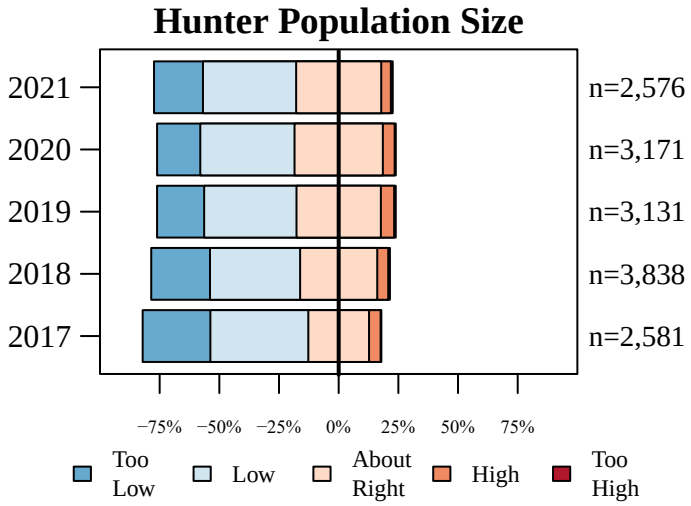

Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 4.

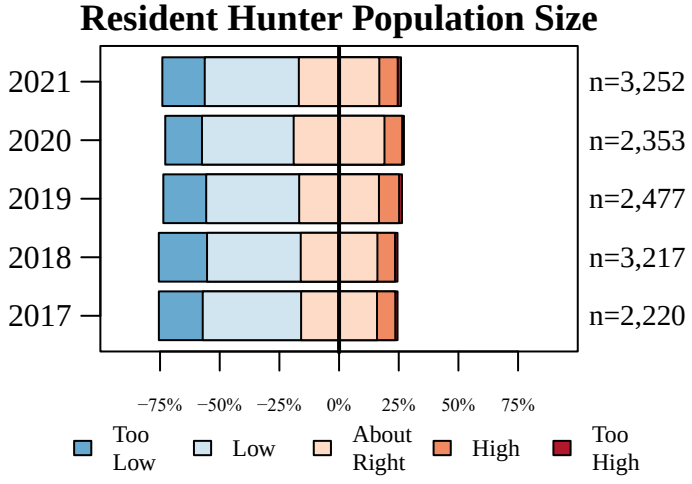

Figure 11. The current size of the deer population described by hunters in the county where they live in DMU 4.

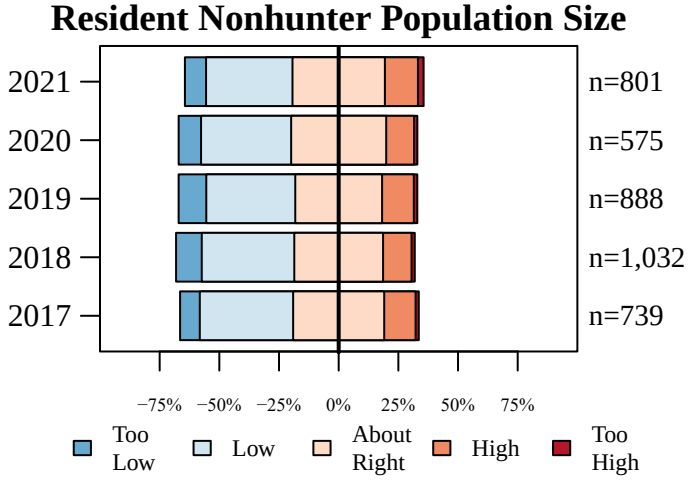

Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 4.

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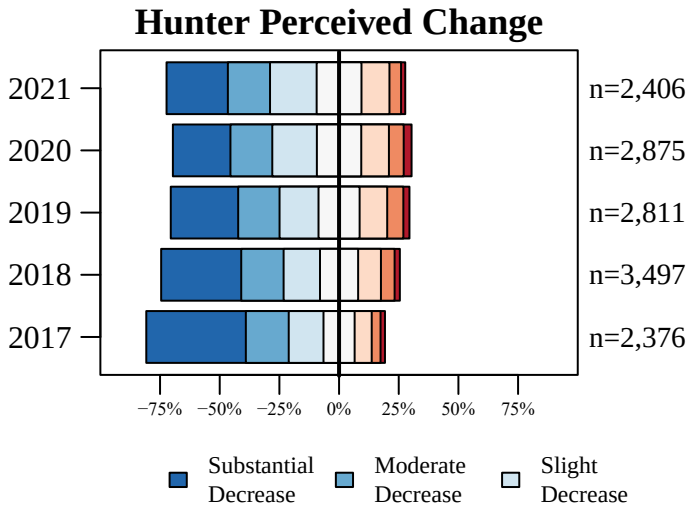

Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 4.

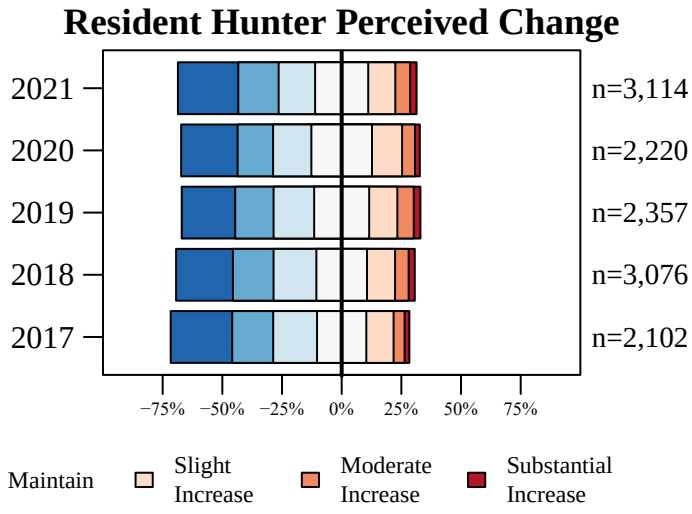

Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 4.

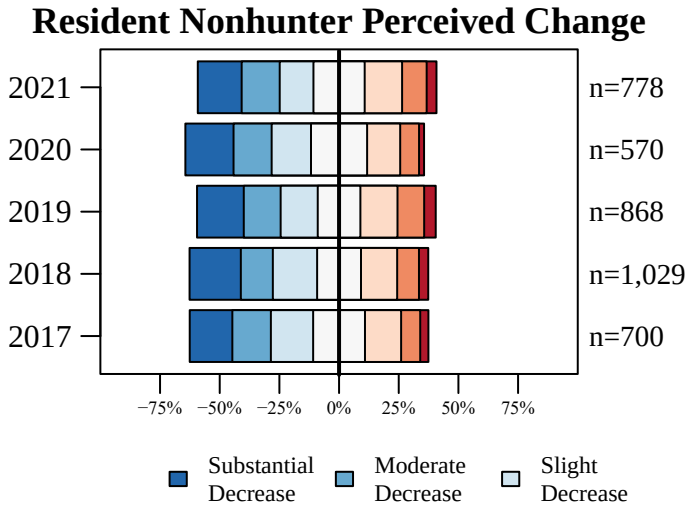

Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 4.

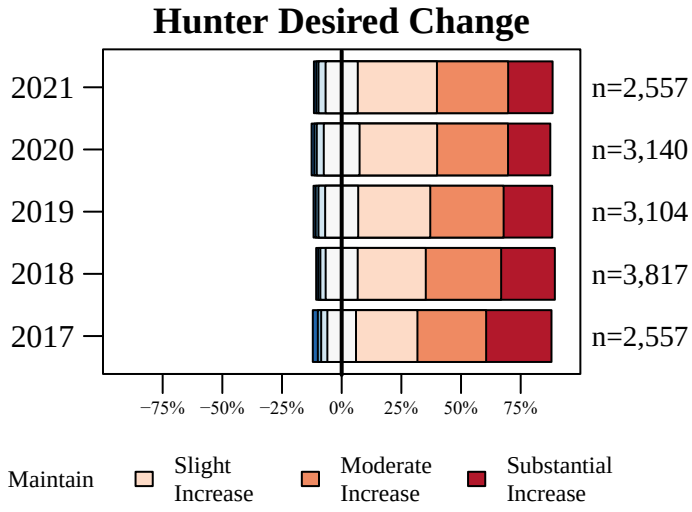

Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 4.

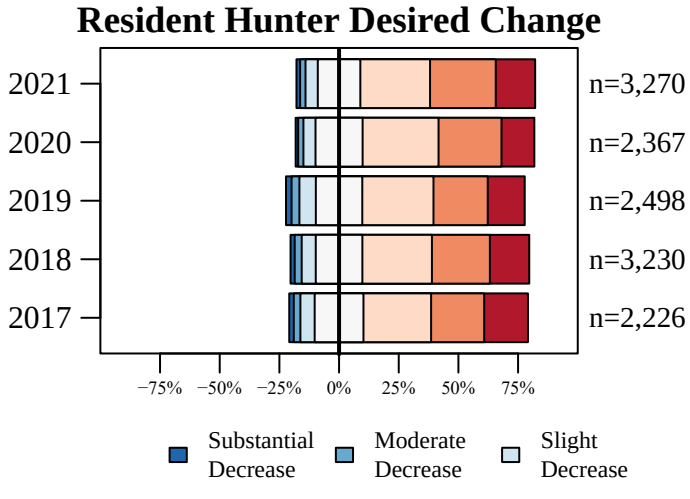

Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 4.

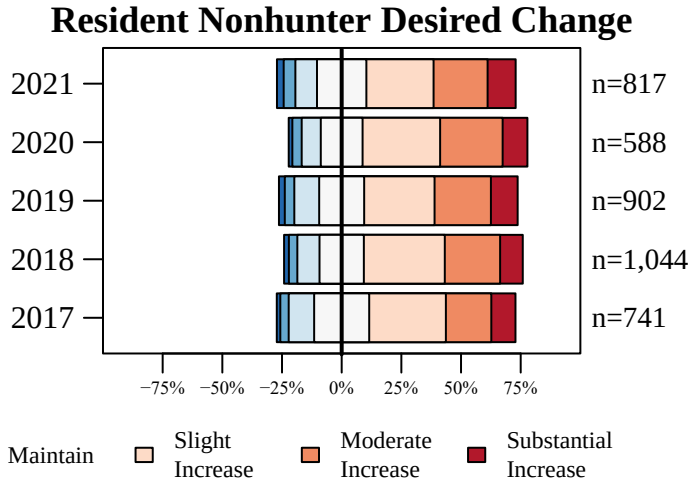

Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 4.

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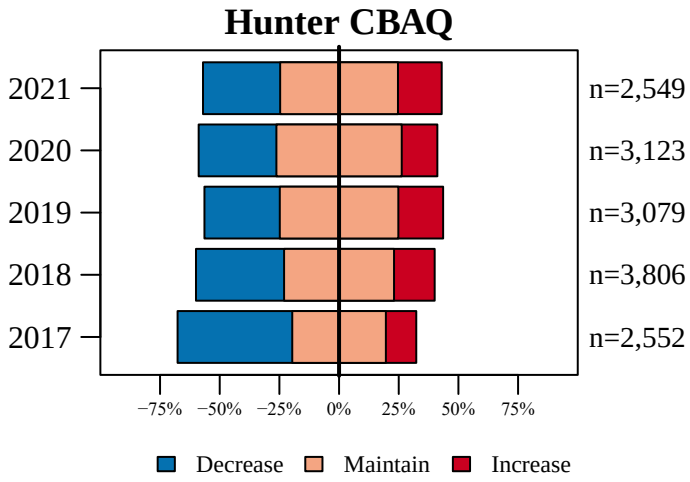
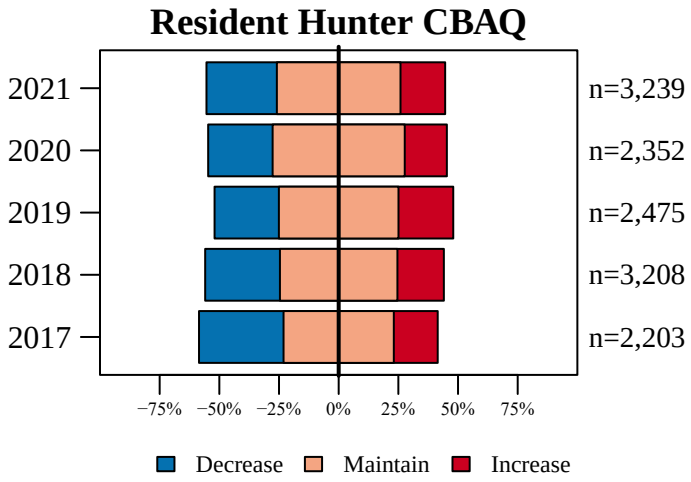


Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 4.



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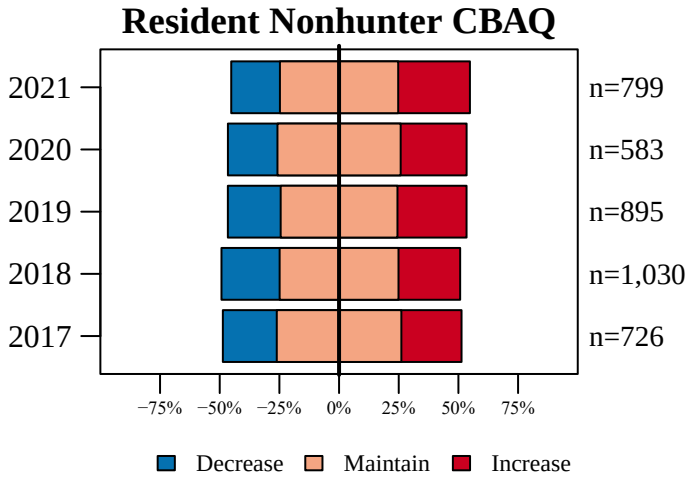


Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 4.

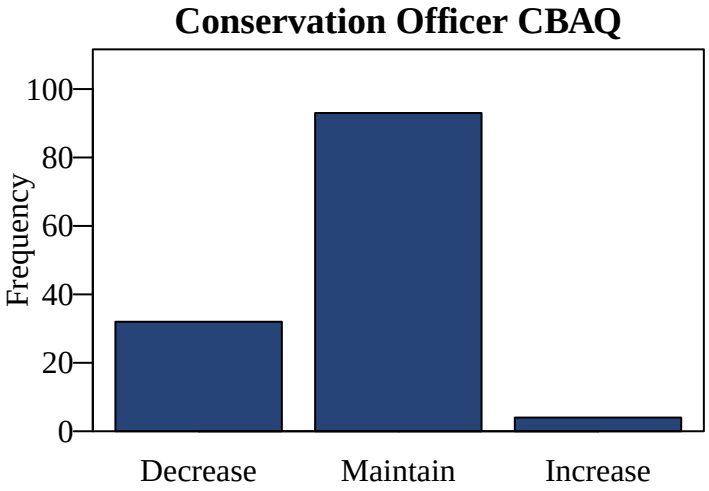
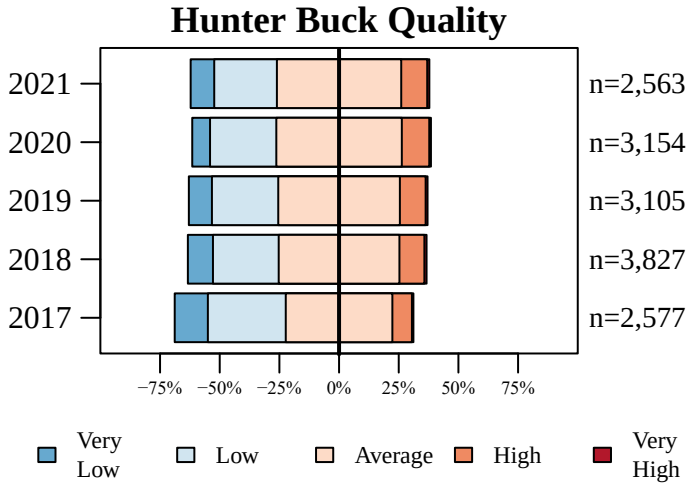


Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 4.



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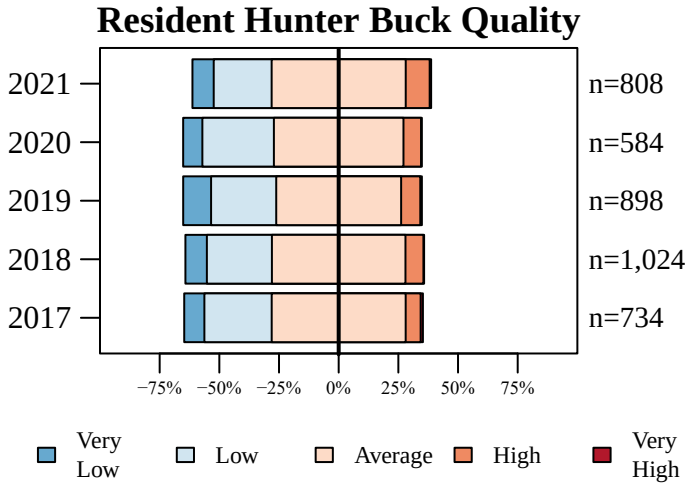

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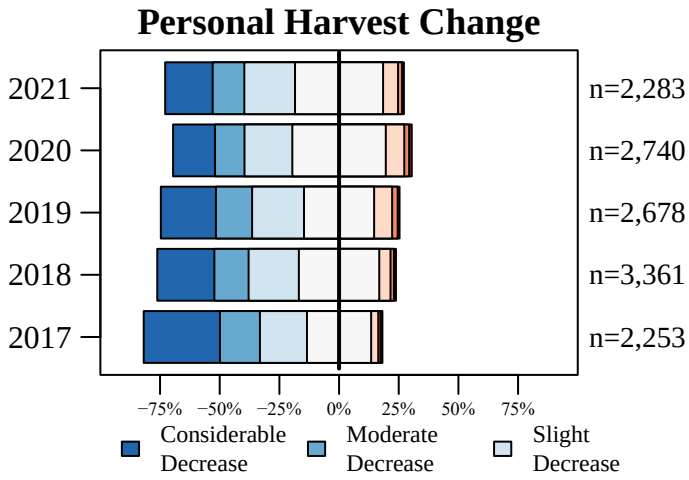

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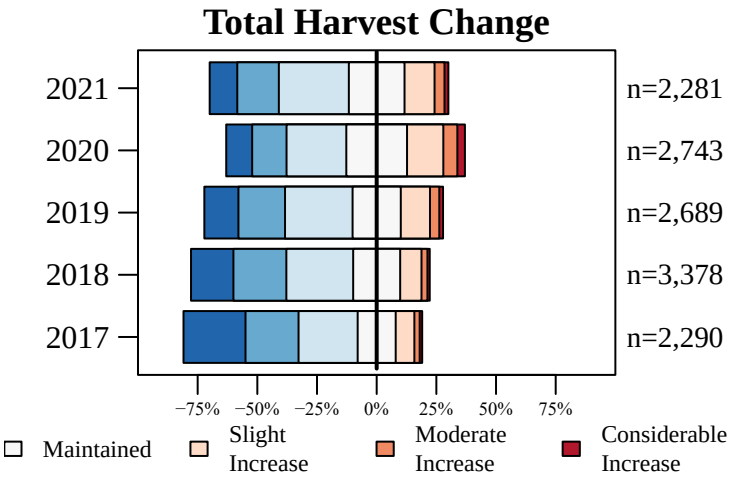

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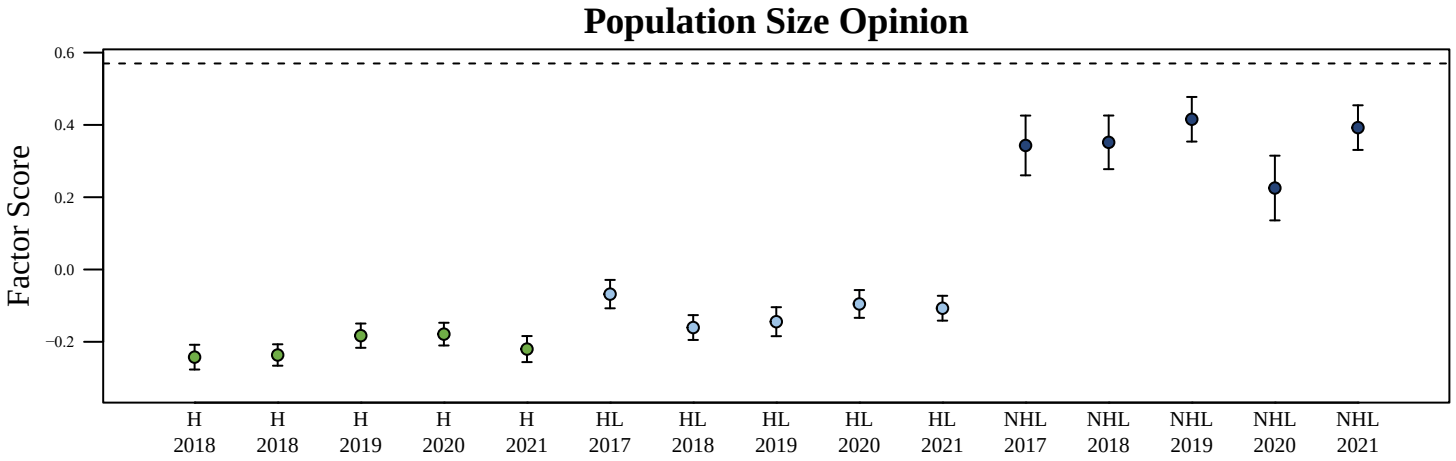

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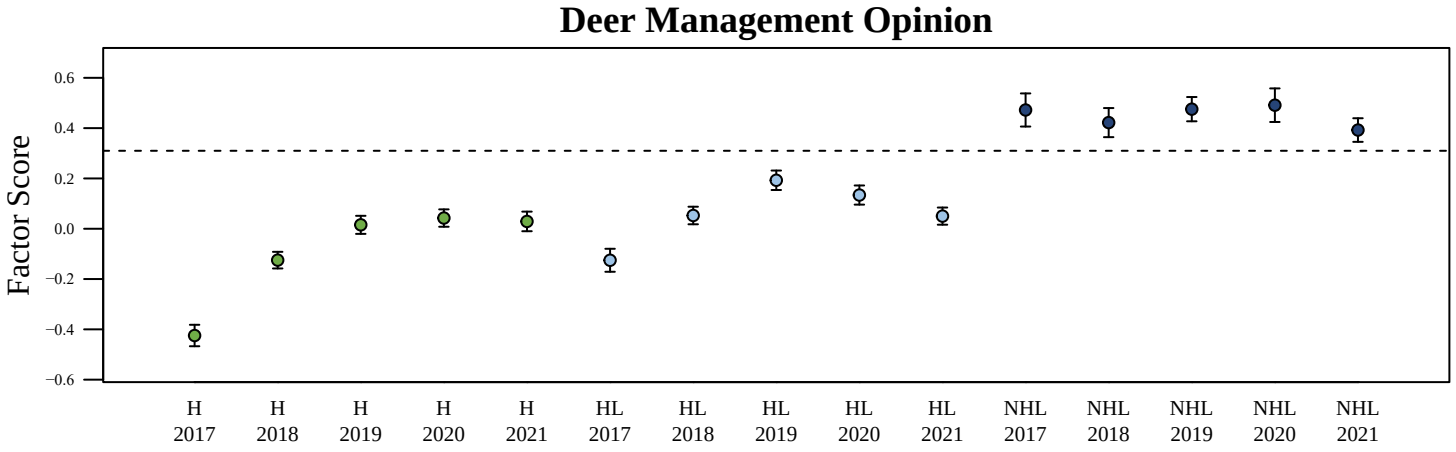

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Deer Management Survey Results

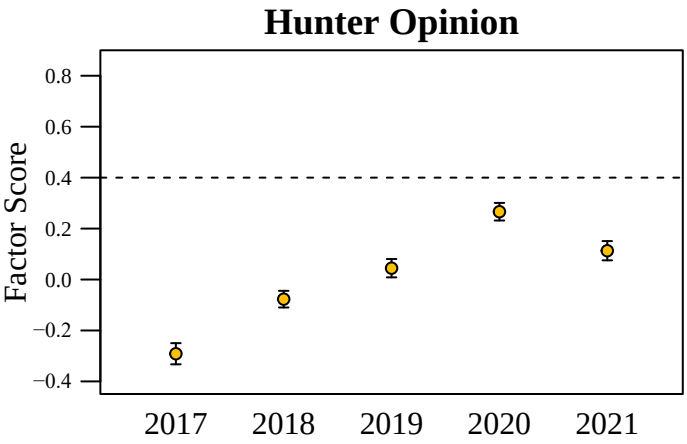

Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

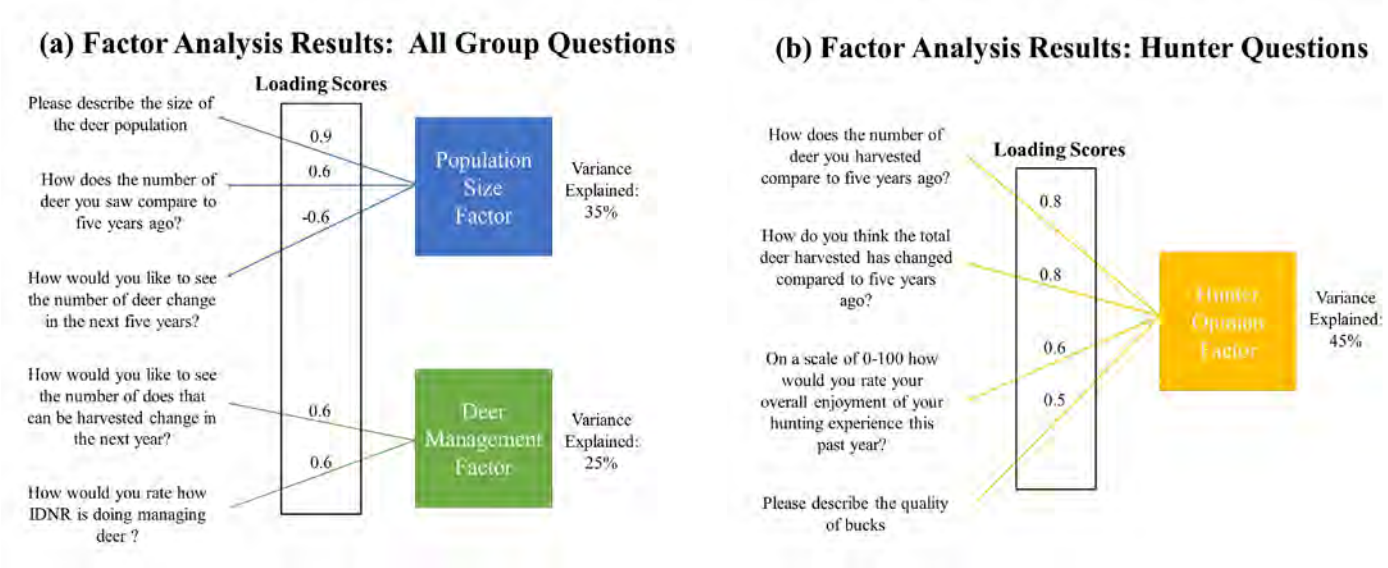

Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: No deer population estimates for the East Central DMU are available; however, it is likely that the East Central and West Central deer population densities are similar enough to use the West Central data until esimates for the West Central DMU can be obtained.

DMU 5: Wabash

4/11/2022

Total Square Miles: 2,416
Square Miles of Deer Habitat: 957
Percent Deer Habitat: 40

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	9,868		5,180		5.4	4,688		4.9	47.5		279.5		5.8
2009	10,377		5,429		5.7	4,948		5.2	47.7		289.6		5.8
2010	10,633	1.6	5,599	1.3	5.9	5,034	1.3	5.3	47.3		259.4	-0.5	6.7
2011	10,827	1.7	5,657	1.5	5.9	5,170	1.5	5.4	47.8		265.2	-0.7	6.7
2012	11,128	1.6	5,243	-0.8	5.5	5,885	3.1	6.1	52.9		237.9	-2.1	7.3
2013	9,510	-2.2	4,840	-2.8	5.1	4,670	-1.1	4.9	49.1		253.7	-0.6	6.0
2014	9,116	-2.2	4,727	-1.9	4.9	4,389	-1.7	4.6	48.1		236.8	-1.3	5.3
2015	9,785	-0.5	5,115	-0.2	5.3	4,670	-0.6	4.9	47.7		267.1	1.3	5.2
2016	9,931	-0.2	5,475	1.0	5.7	4,456	-0.8	4.7	44.9	78	284.5	2.2	5.2
2017	9,619	-0.4	5,013	-0.2	5.2	4,606	-0.3	4.8	47.9	76	268.7	0.6	4.5
2018	9,831	0.8	5,387	1.2	5.6	4,444	-0.9	4.6	45.2	72	288.1	1.5	3.5
2019	9,176	-1.5	5,185	0.1	5.4	3,991	-4.4	4.2	43.5	82	269.4	0.0	2.0
2020	10,103	1.5	5,813	3.0	6.1	4,290	-0.5	4.5	42.5	63	251.4	-2.4	2.0
2021	9,594	-0.4	5,658	0.9	5.9	3,936	-0.3	4.1	41.0	67	275.9	0.2	2.0

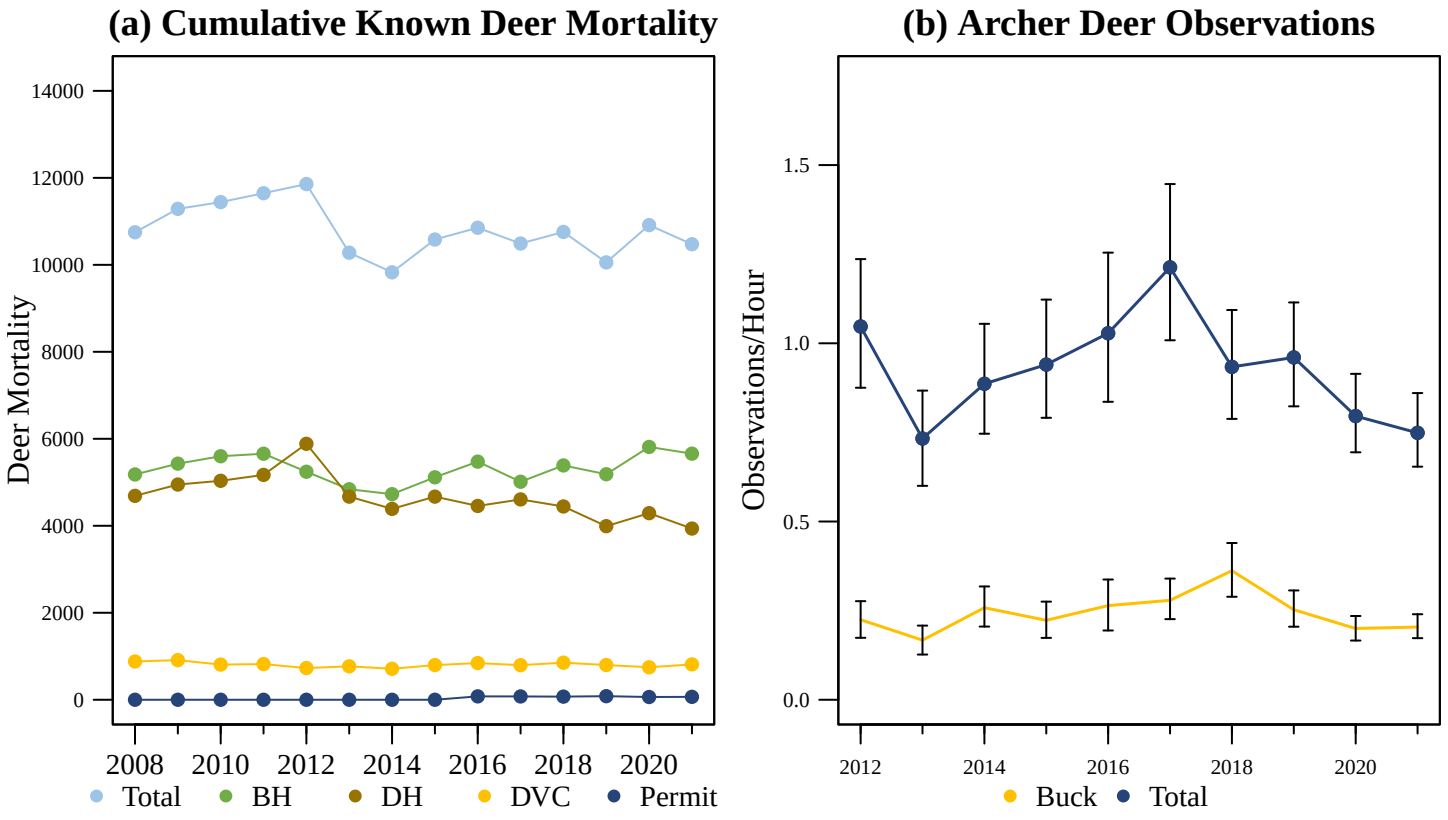

Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 5: Wabash

4/11/2022

Total Square Miles: 2,416
Square Miles of Deer Habitat: 957
Percent Deer Habitat: 40

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	7,573	3,006	4,557	9	1	3,454	3,158	763	143	42	9	2	1	1	0	0
2017	7,115	3,098	4,007	7	3	2,974	3,036	872	157	55	11	7	3	0	0	0
2018	7,379	2,930	4,436	12	1	3,262	3,101	818	166	28	3	1	0	0	0	0
2019	7,083	2,844	4,230	9	0	3,127	3,085	784	76	8	3	0	0	0	0	0
2020	7,784	2,820	4,946	18	0	3,662	3,229	804	73	15	1	0	0	0	0	0
2021	7,554	2,663	4,884	7	0	3,697	3,089	704	58	5	1	0	0	0	0	0

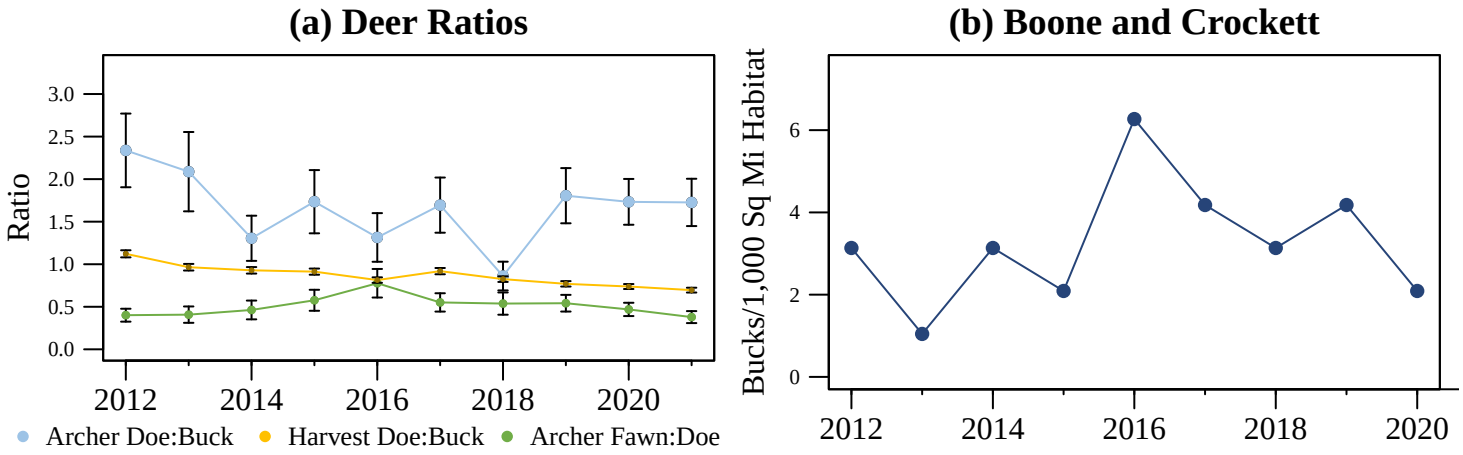

Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

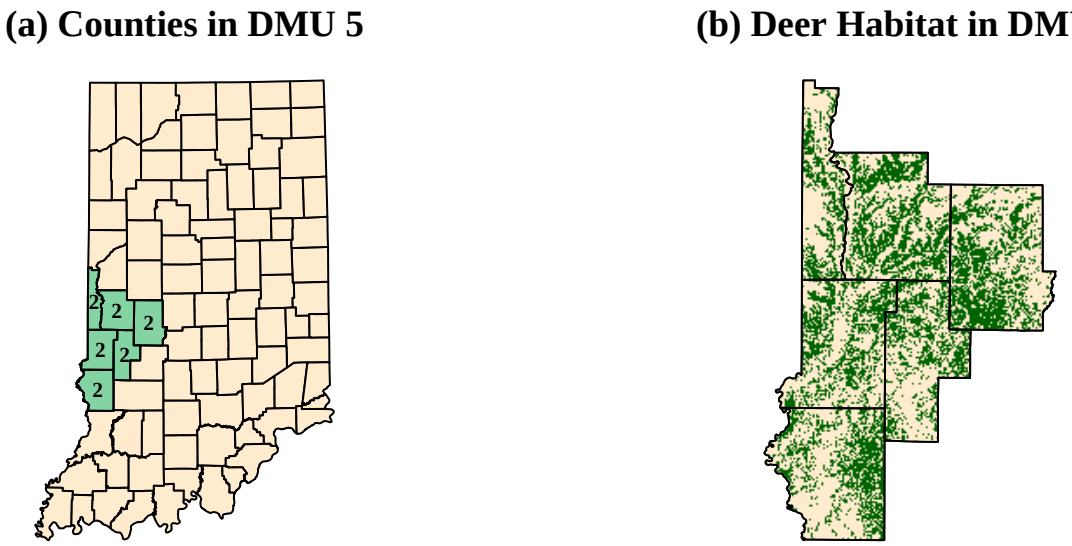

Figure 3. (a) Counties included in DMU 5 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 5.

DMU 5: Wabash

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Deer Management Survey Results

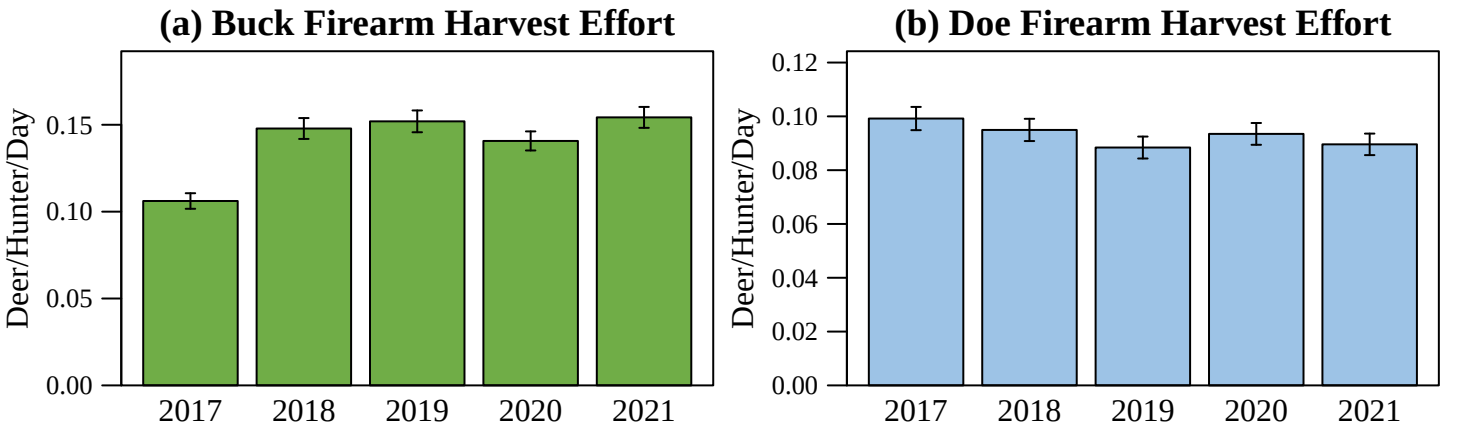

Figure 4. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

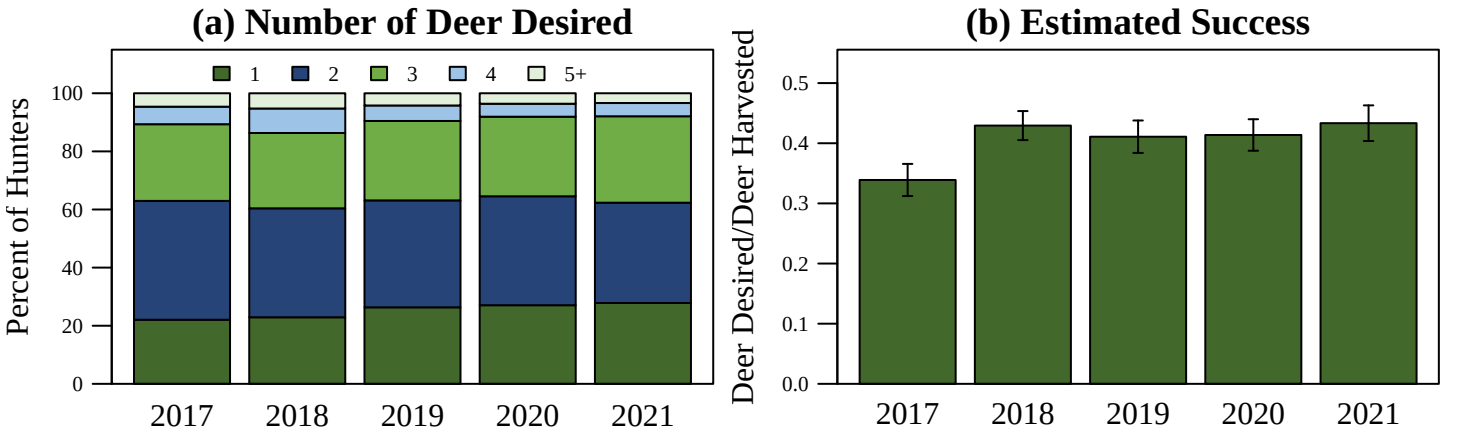

Figure 5. (a) The annual percent of hunters wishing to harvest each number of deer as reported in the deer management survey. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

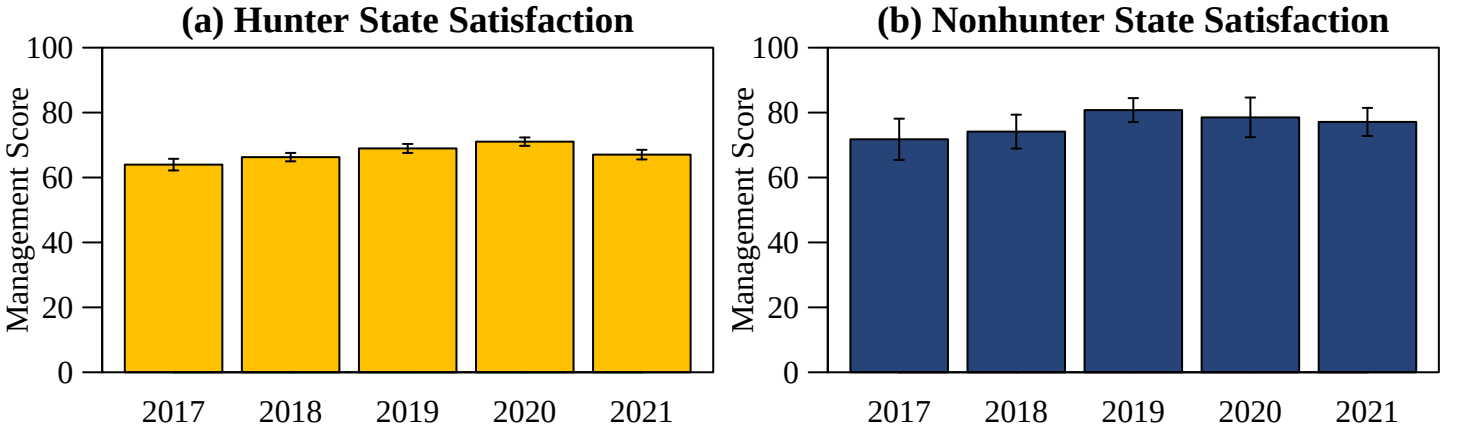

Figure 6. Hunters (a) and nonhunters (b) were asked to score the DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

DMU 5: Wabash

4/11/2022

Deer Management Survey Results

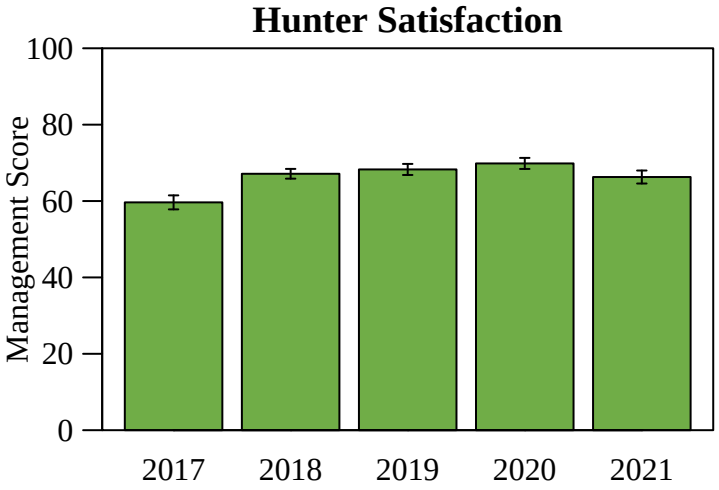

Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 5 where they hunt.

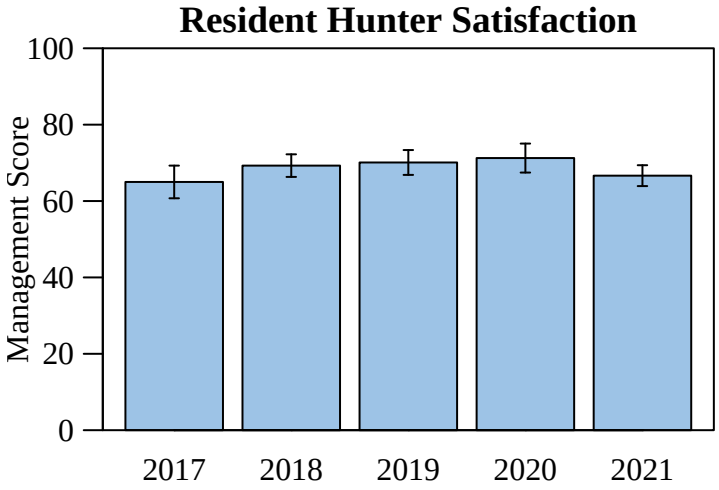

Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 5 where they live.

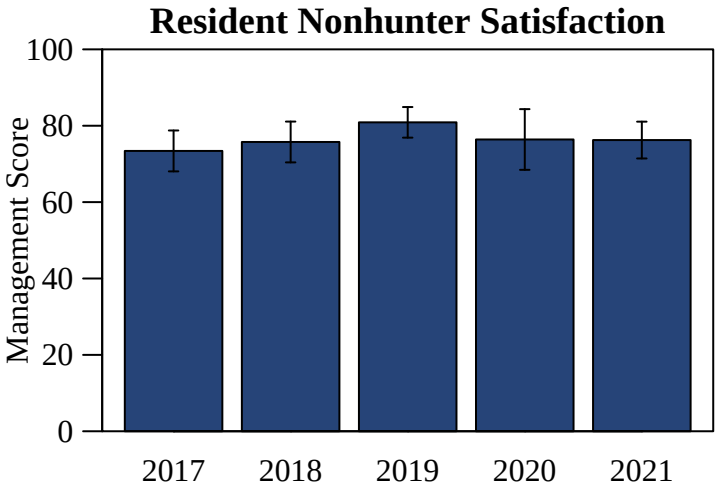

Figure 9. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 5 where they live.

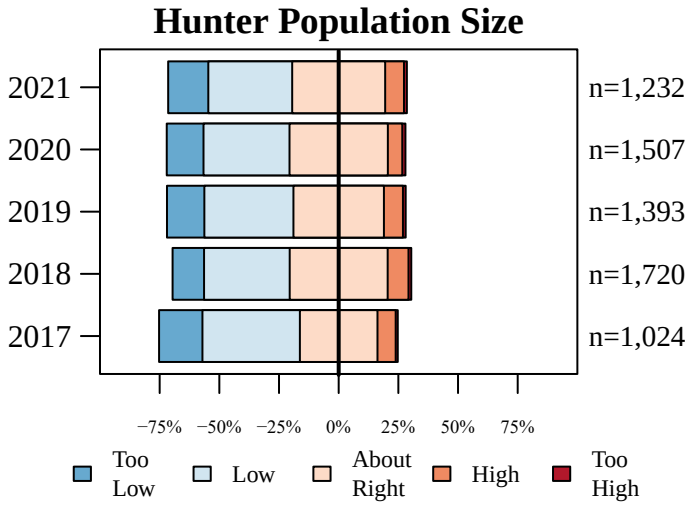

Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 5.

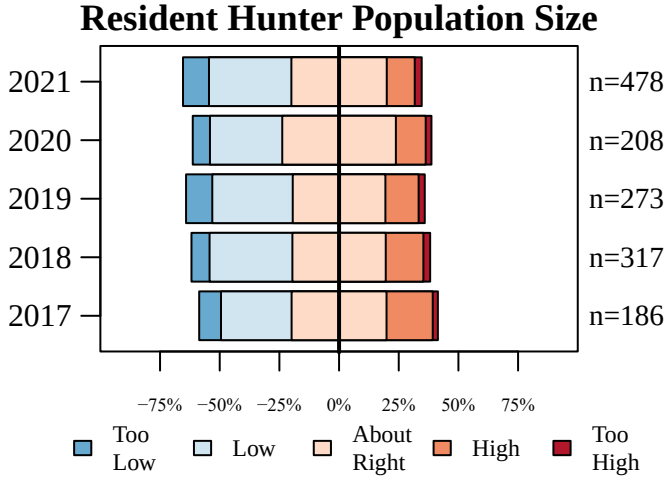

Figure 11. The current size of the deer population described by hunters in the county where they live in DMU 5.

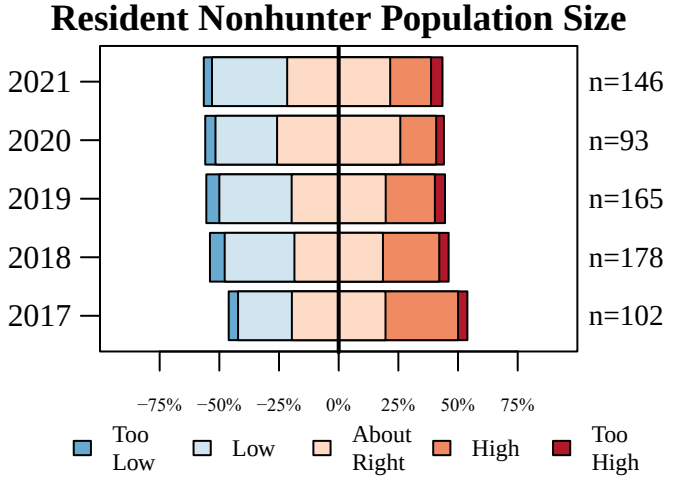

Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 5.

DMU 5: Wabash

4/11/2022

Deer Management Survey Results

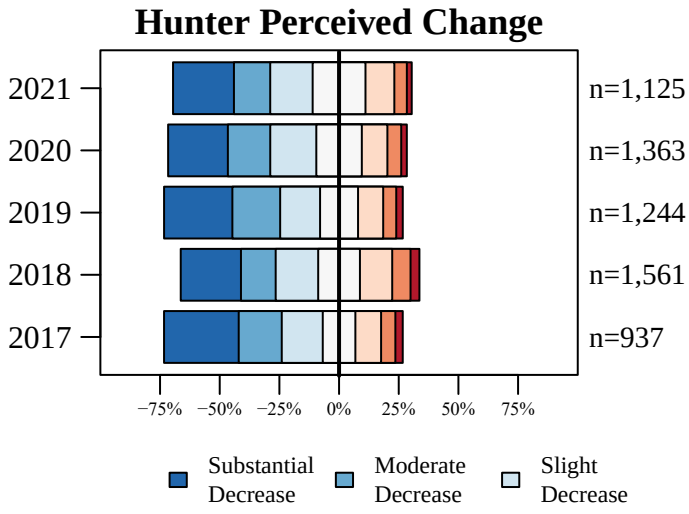

Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 5.

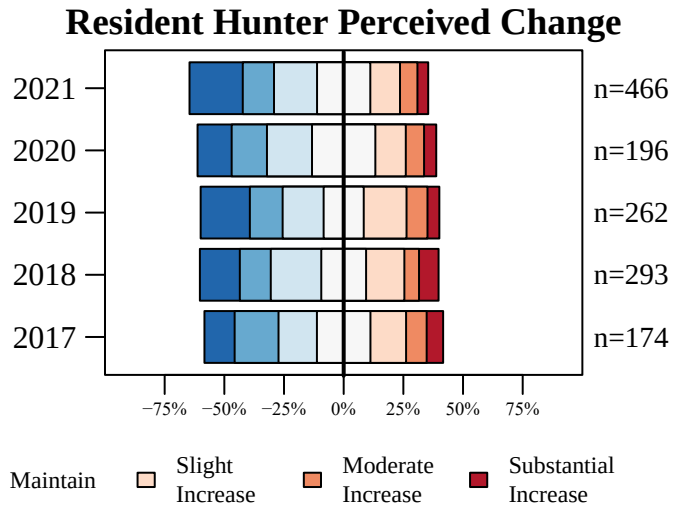

Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 5.

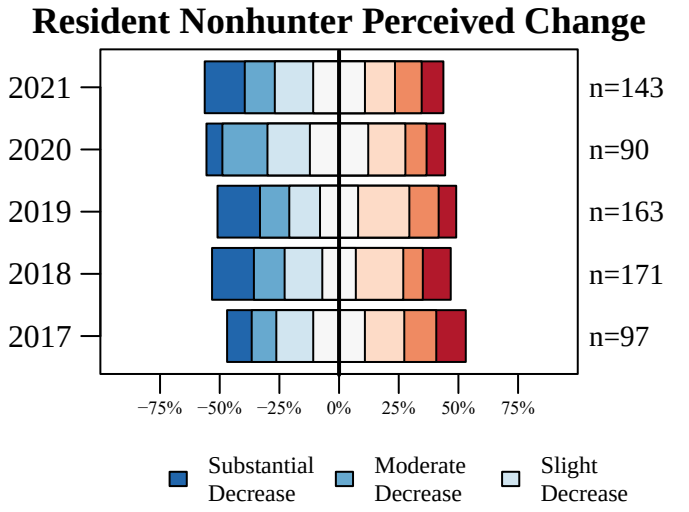

Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 5.

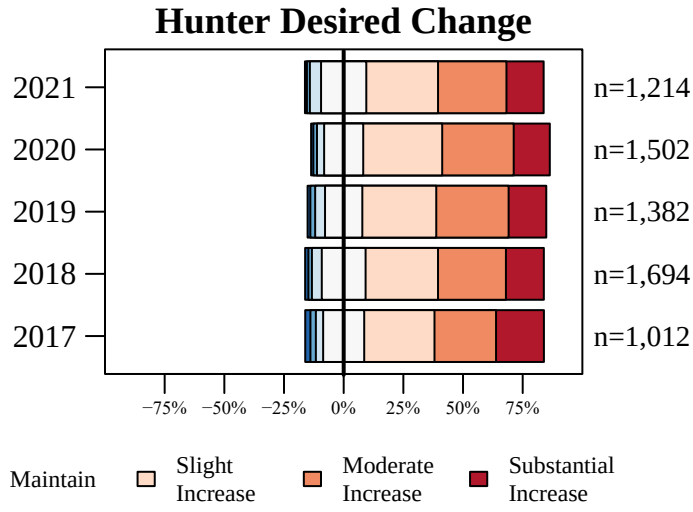

Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 5.

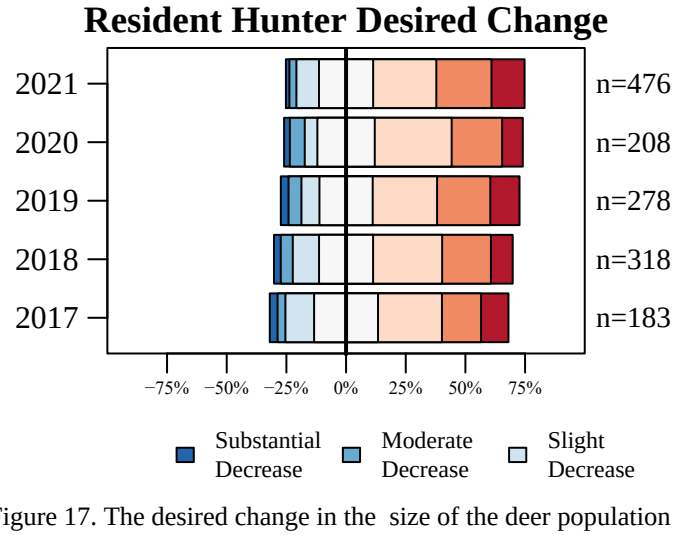

Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 5.

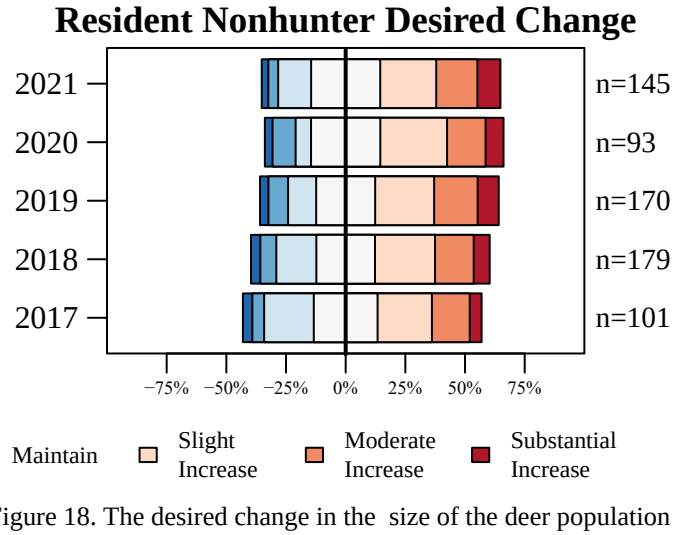

Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 5.

DMU 5: Wabash

4/11/2022

Deer Management Survey Results

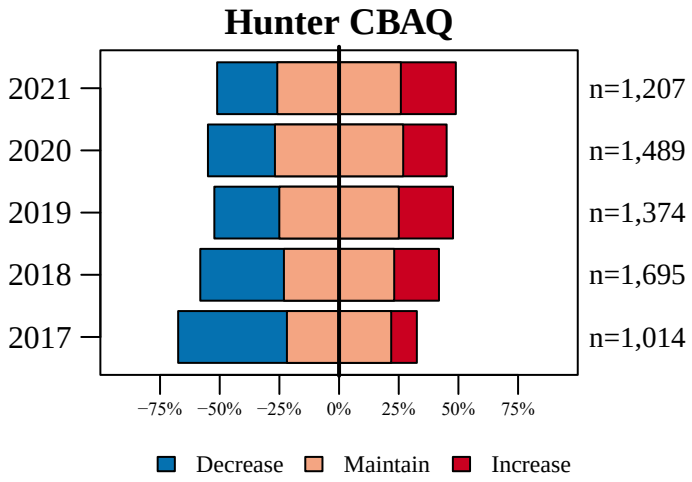

Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 5.

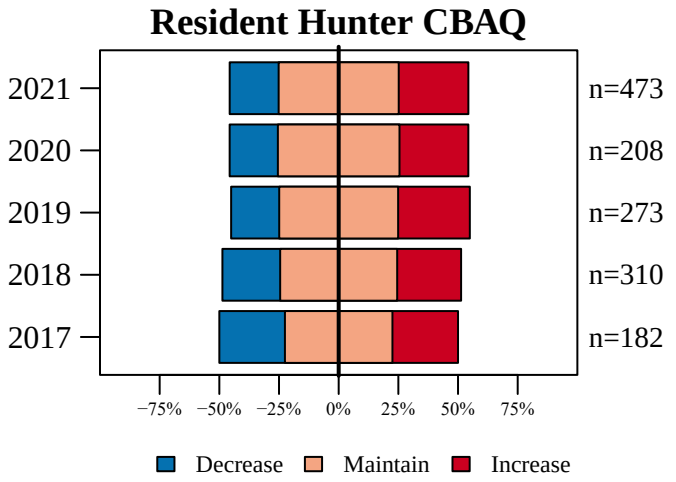

Figure 20. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they live in DMU 5.

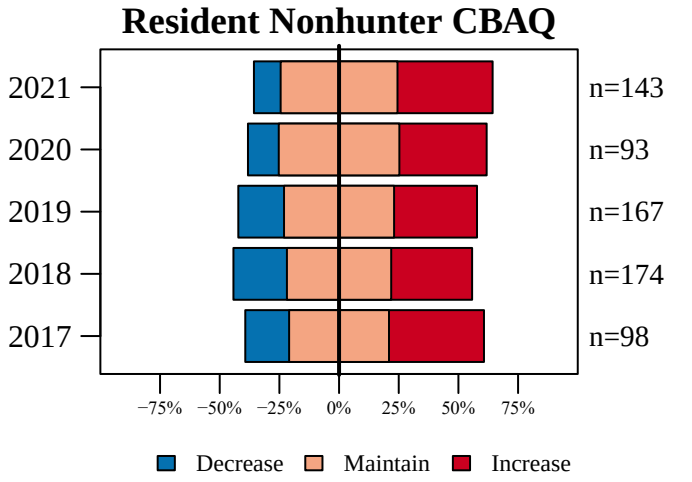

Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 5.

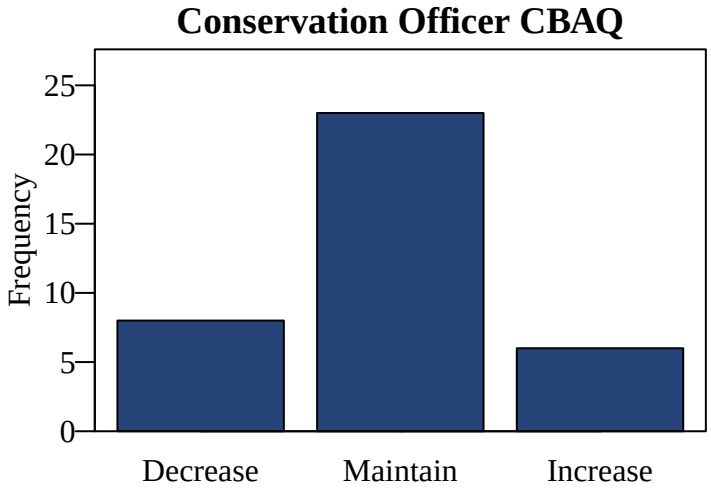

Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 5.

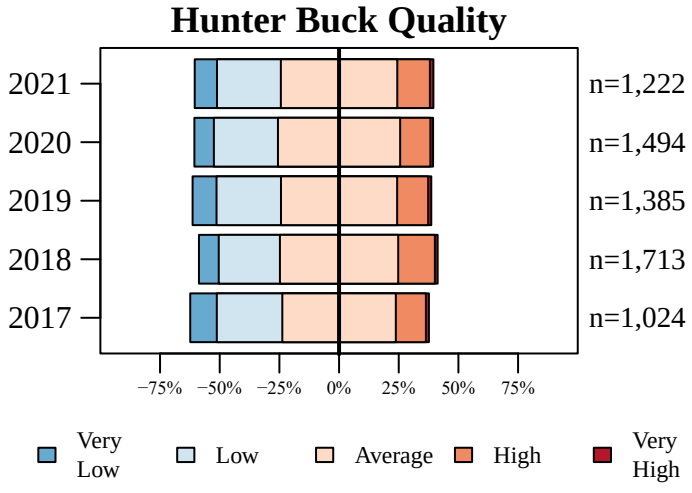

Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 5.

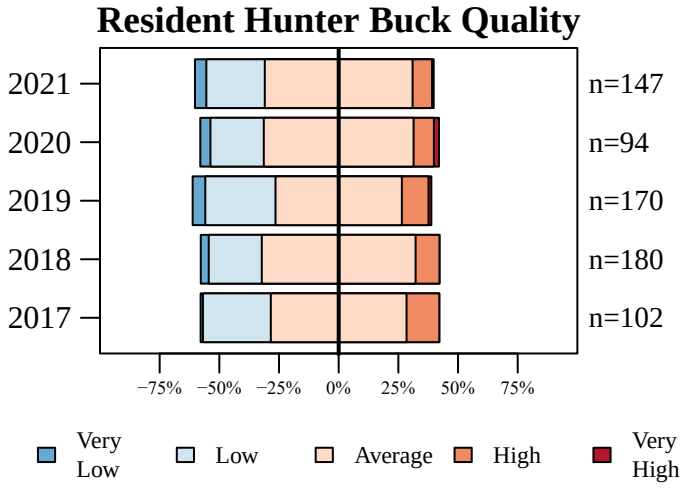

Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 5.

DMU 5: Wabash

4/11/2022

Deer Management Survey Results

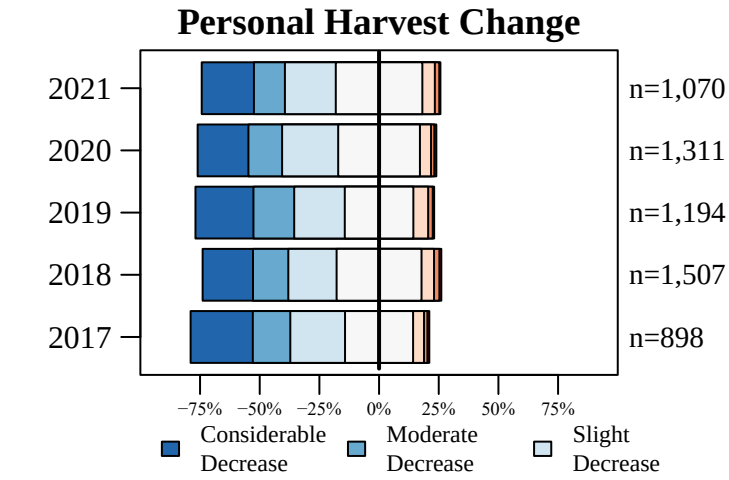

Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 5.

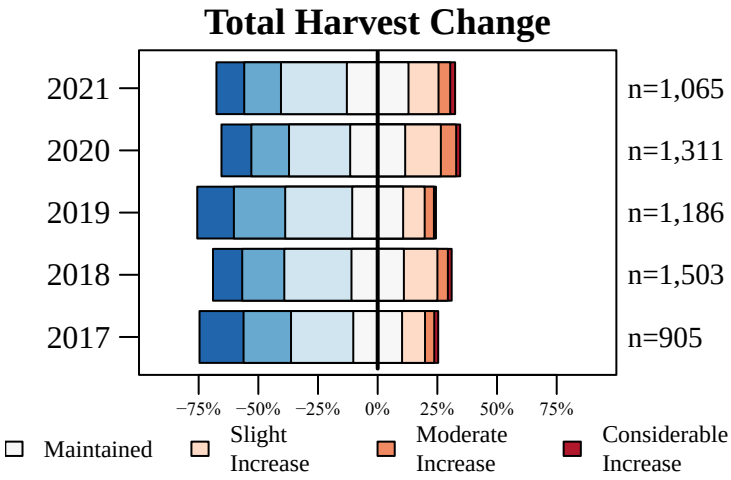

Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 5.

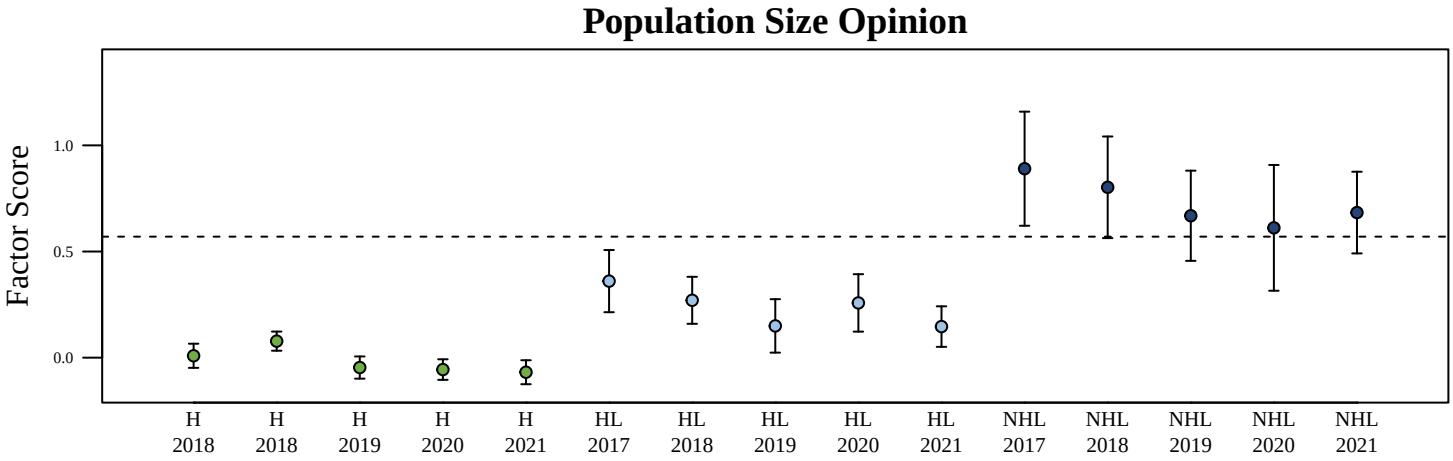

Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

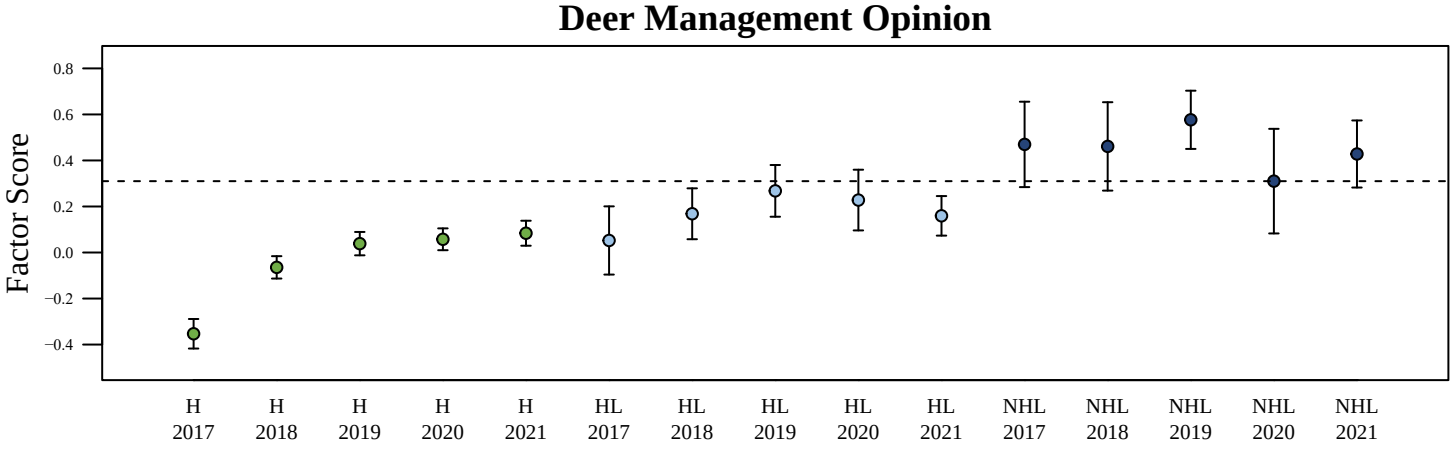

Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

DMU 5: Wabash

4/11/2022

Deer Management Survey Results

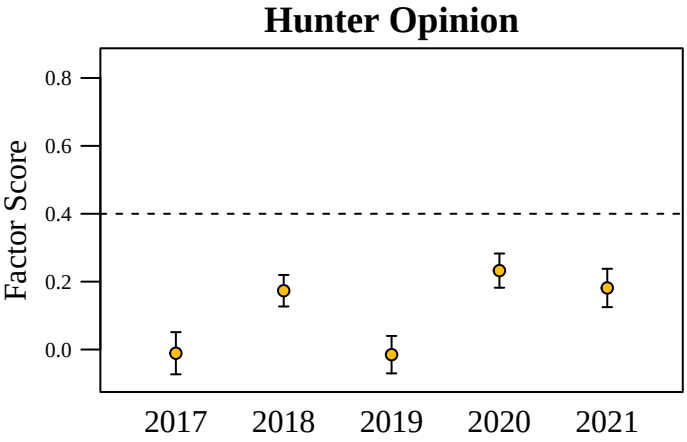

Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

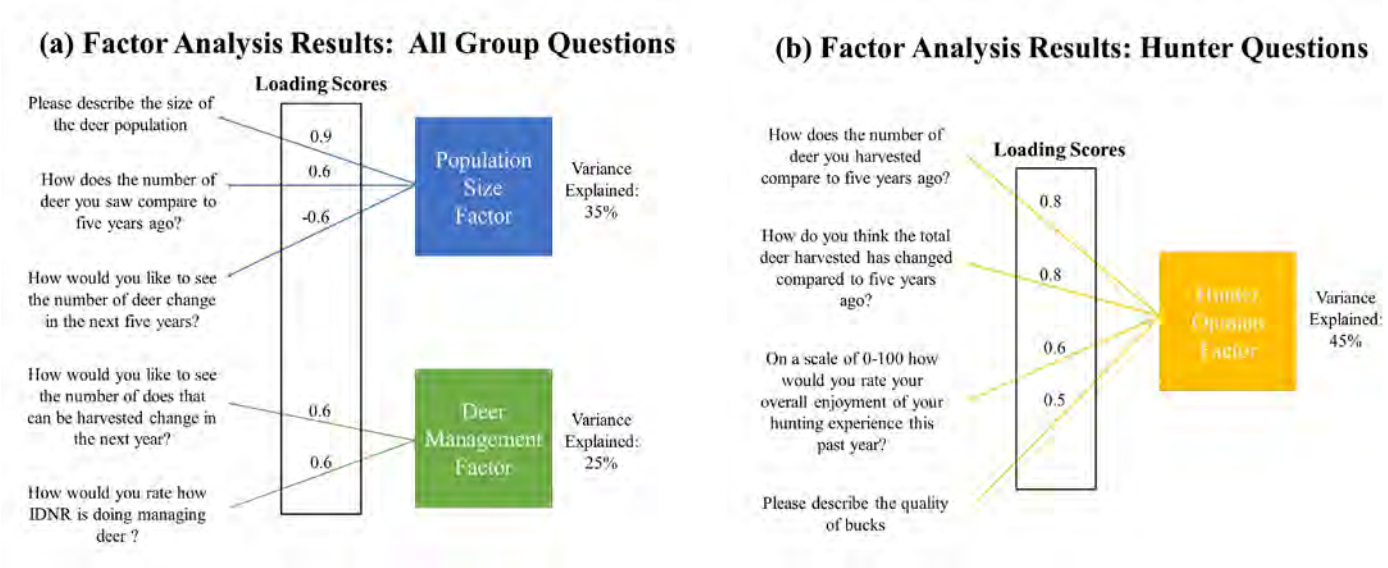

Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: No deer population estimate available for the Wabash Valley DMU. Vigo (21 reports), Sullivan (17 reports), Clay (10 reports), and Putnam (57) all were affected by EHD in 2019.

DMU 6: South

4/11/2022

Total Square Miles: 6,368
Square Miles of Deer Habitat: 4,482
Percent Deer Habitat: 70

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	28,552		14,063		3.1	14,489		3.2	50.7		274.7		4.8
2009	28,970		14,840		3.3	14,130		3.2	48.8		278.6		5.0
2010	28,143	-0.4	14,197	-0.5	3.2	13,946	-0.1	3.1	49.6		263.7	-1.0	5.4
2011	29,468	1.3	14,809	0.9	3.3	14,659	1.4	3.3	49.7		275.0	-0.5	5.7
2012	31,458	3.2	14,485	0.3	3.2	16,973	5.2	3.8	54.0		283.3	0.6	5.6
2013	33,888	3.5	16,201	4.9	3.6	17,687	2.3	3.9	52.2		316.5	5.7	5.3
2014	30,442	0.0	14,599	-0.4	3.3	15,843	0.2	3.5	52.0		293.6	0.5	6.1
2015	32,927	1.0	16,736	2.4	3.7	16,191	0.2	3.6	49.2		332.1	2.3	5.9
2016	30,864	-0.4	16,234	0.8	3.6	14,630	-1.4	3.3	47.4	675	301.0	0.0	5.9
2017	31,315	-0.4	15,475	-0.2	3.5	15,840	-0.4	3.5	50.6	749	335.9	1.6	5.7
2018	27,746	-2.8	14,274	-1.9	3.2	13,472	-2.3	3.0	48.6	722	314.6	-0.1	4.7
2019	26,660	-2.1	14,233	-1.2	3.2	12,427	-2.4	2.8	46.6	612	299.6	-0.9	2.0
2020	26,639	-1.3	14,746	-0.6	3.3	11,893	-1.7	2.7	44.6	360	254.0	-3.7	2.4
2021	25,784	-1.3	14,997	0.0	3.3	10,787	-1.1	2.4	41.8	495	265.5	-1.2	2.4

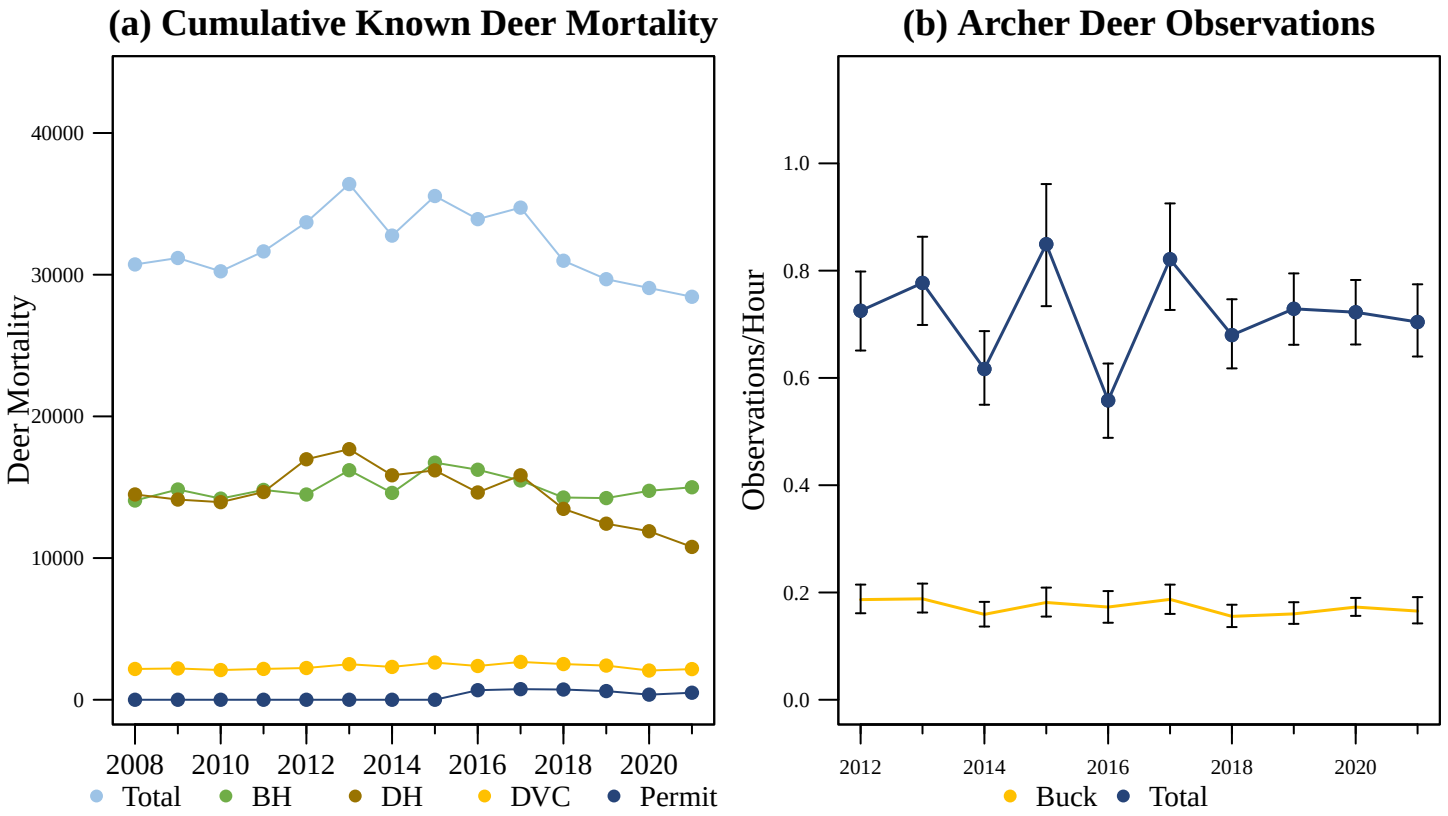

Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 6: South

4/11/2022

Total Square Miles: 6,368
Square Miles of Deer Habitat: 4,482
Percent Deer Habitat: 70

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	23,189	10,040	13,087	60	2	9,839	10,155	2,439	518	163	51	16	5	2	0	1
2017	22,834	10,709	12,071	52	2	8,741	10,404	2,787	614	195	51	25	8	8	1	0
2018	20,707	9,465	11,176	63	3	8,301	9,297	2,429	504	133	33	7	2	0	0	0
2019	20,569	9,206	11,287	74	2	8,422	9,403	2,473	228	36	6	0	0	0	0	0
2020	20,849	8,527	12,255	65	2	9,337	9,106	2,126	240	34	2	4	0	0	0	0
2021	20,504	7,851	12,590	61	1	9,810	8,565	1,923	180	20	5	0	0	1	0	0

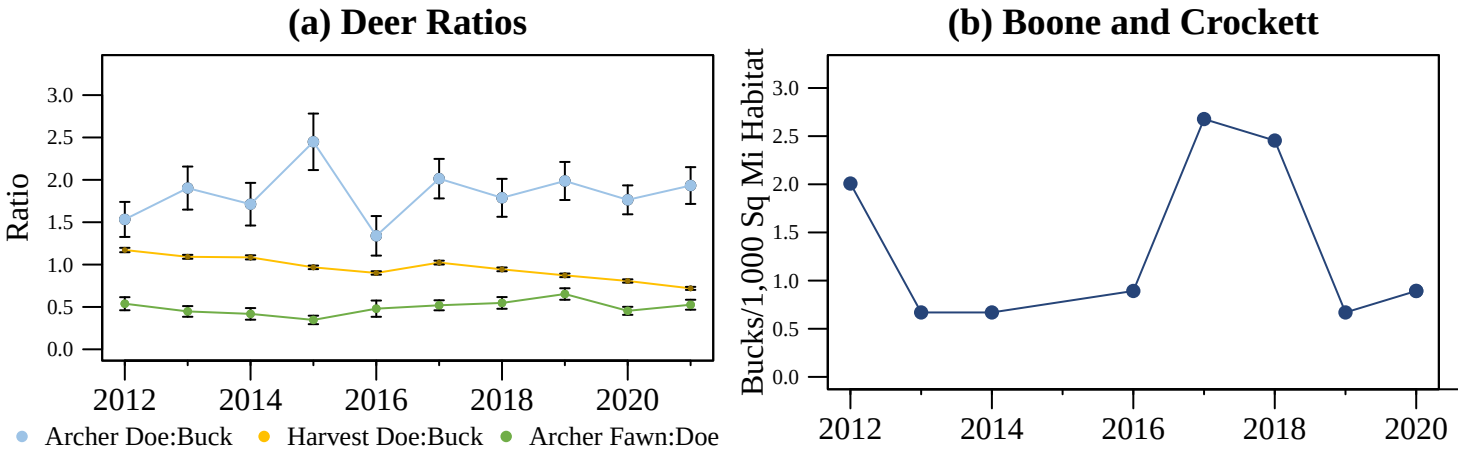

Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

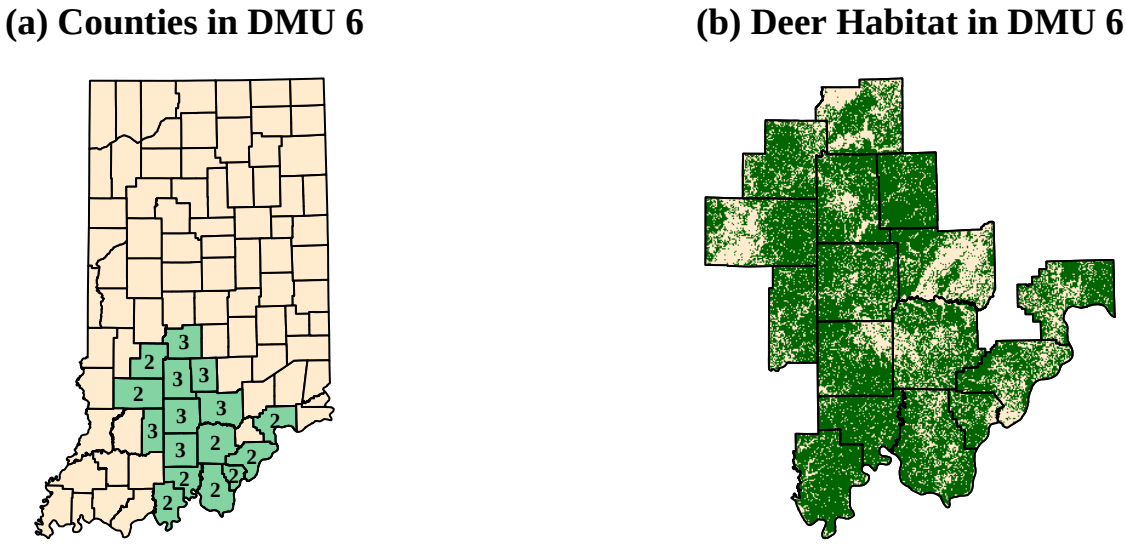

Figure 3. (a) Counties included in DMU 6 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 6.

DMU 6: South

4/11/2022

Deer Management Survey Results

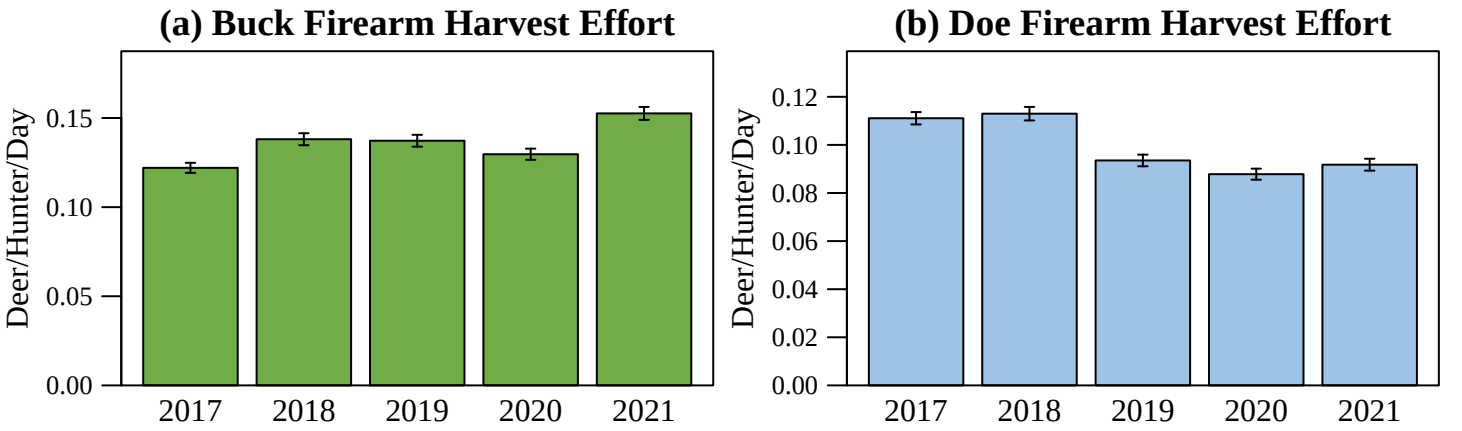

Figure 4. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

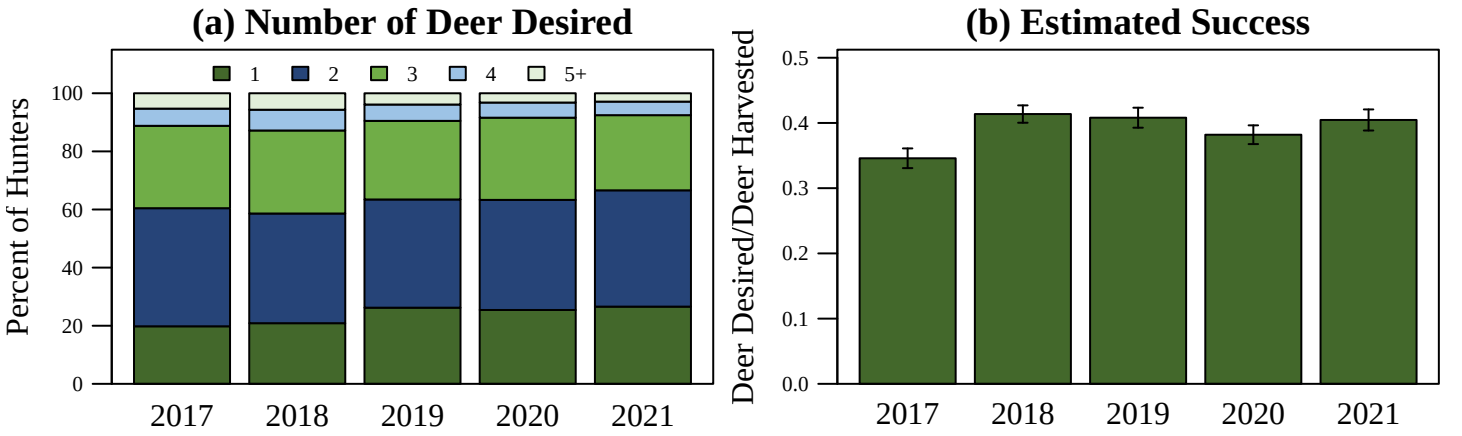

Figure 5. (a) The annual percent of hunters wishing to harvest each number of deer as reported in the deer management survey. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

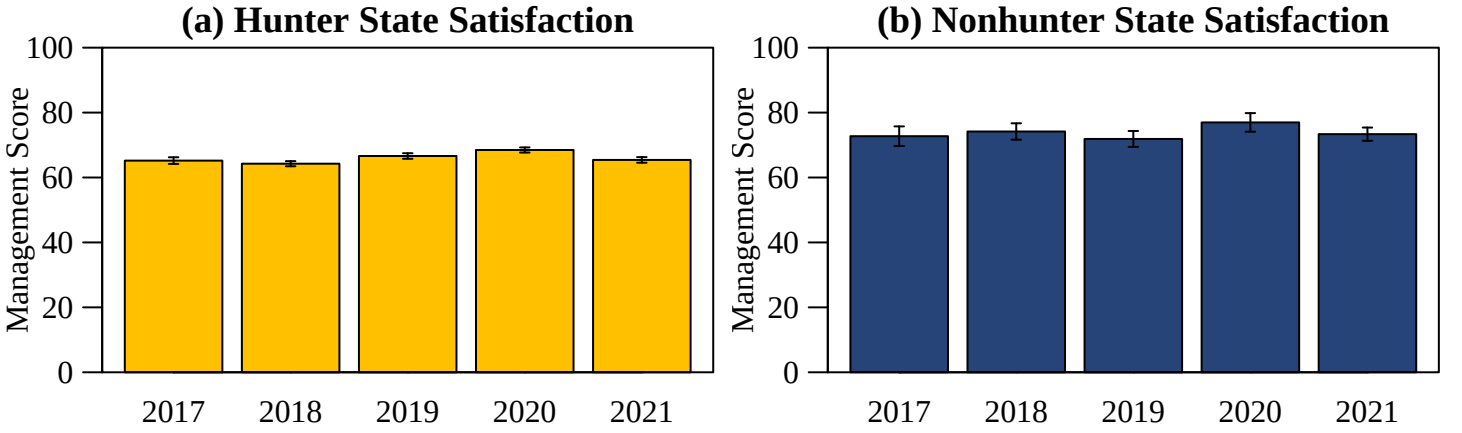

Figure 6. Hunters (a) and nonhunters (b) were asked to score the DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

DMU 6: South

4/11/2022

Deer Management Survey Results

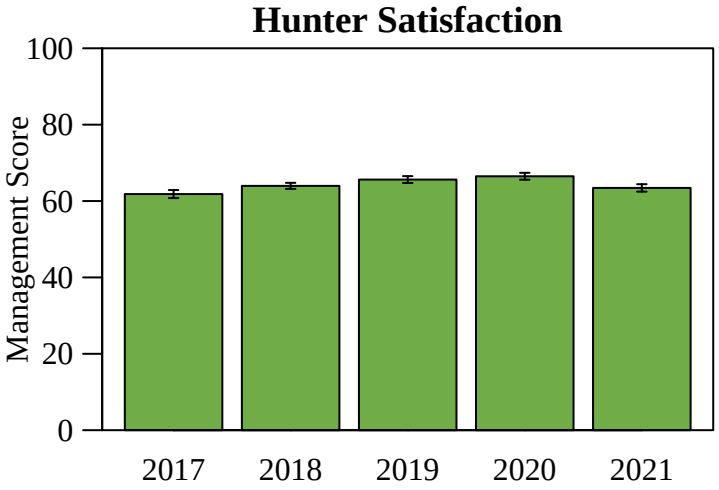

Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 6 where they hunt.

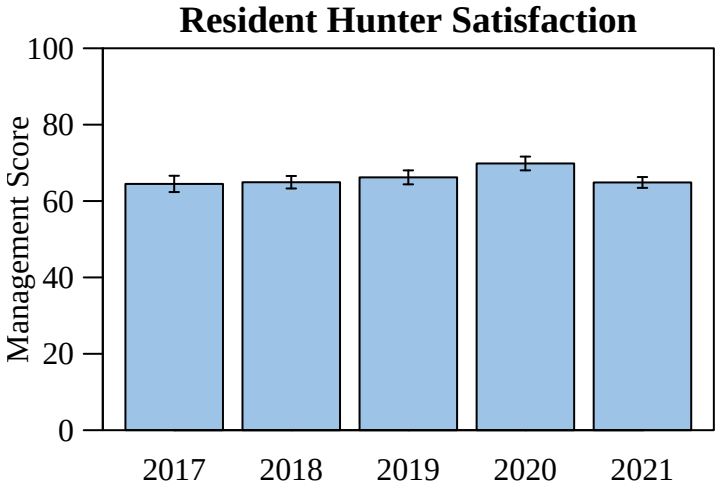

Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 6 where they live.

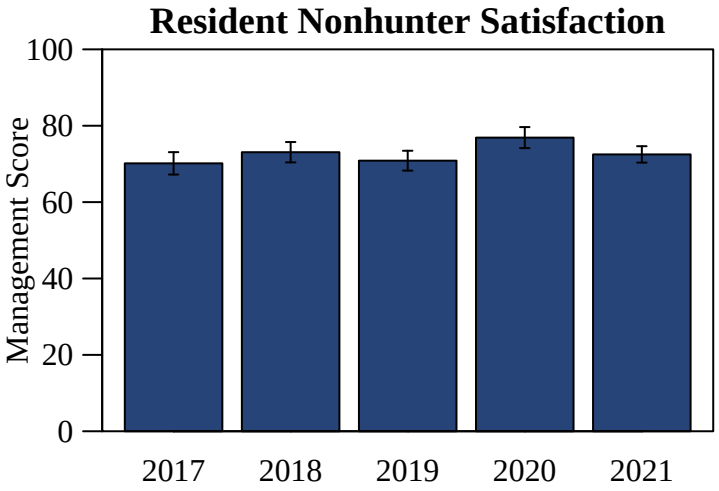

Figure 9. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 6 where they live.

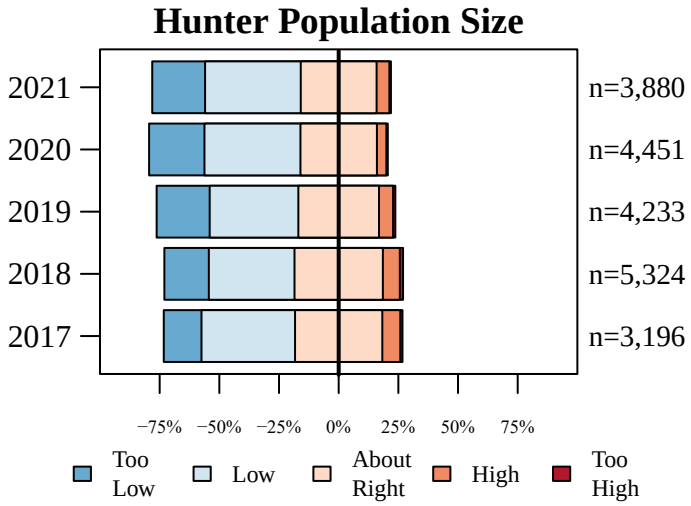

Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 6.

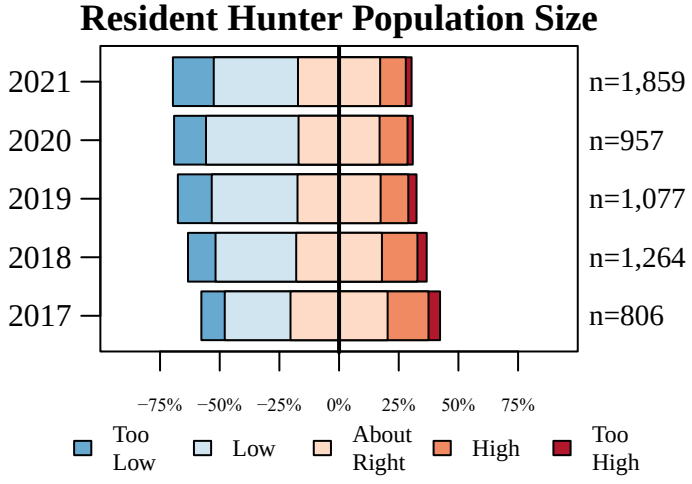

Figure 11. The current size of the deer population described by hunters in the county where they live in DMU 6.

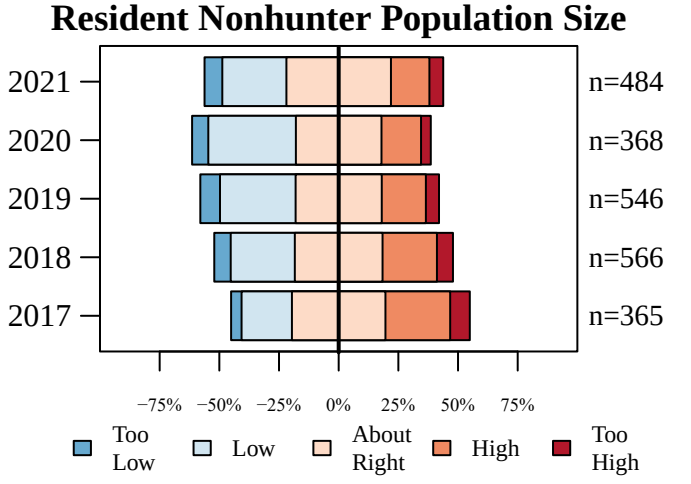

Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 6.

DMU 6: South

4/11/2022

Deer Management Survey Results

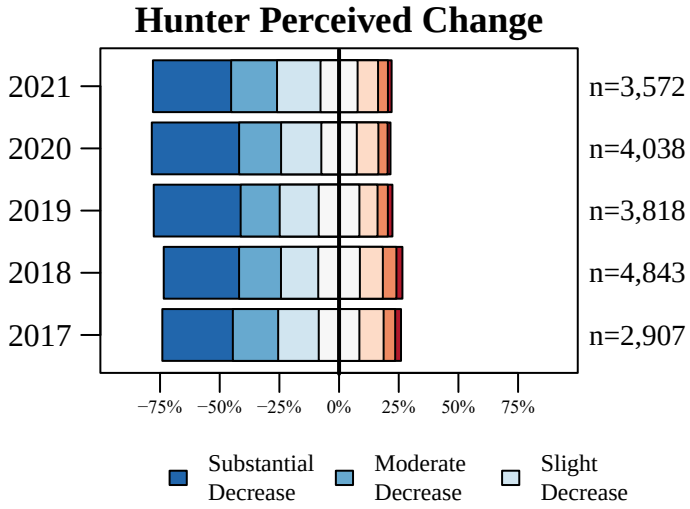

Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 6.

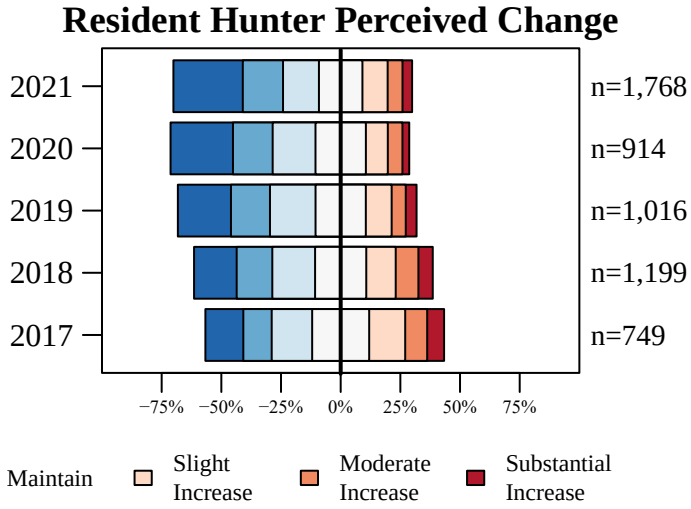

Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 6.

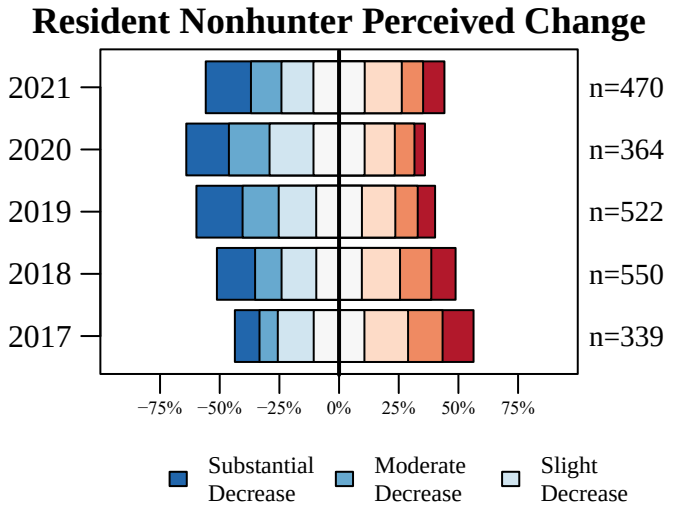

Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 6.

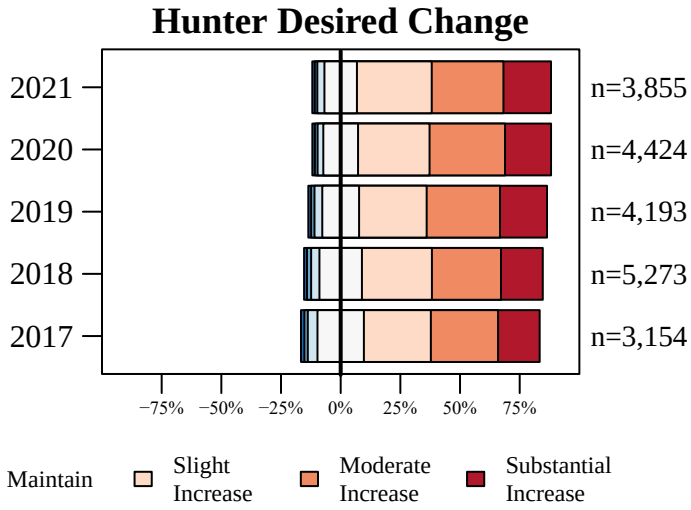

Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 6.

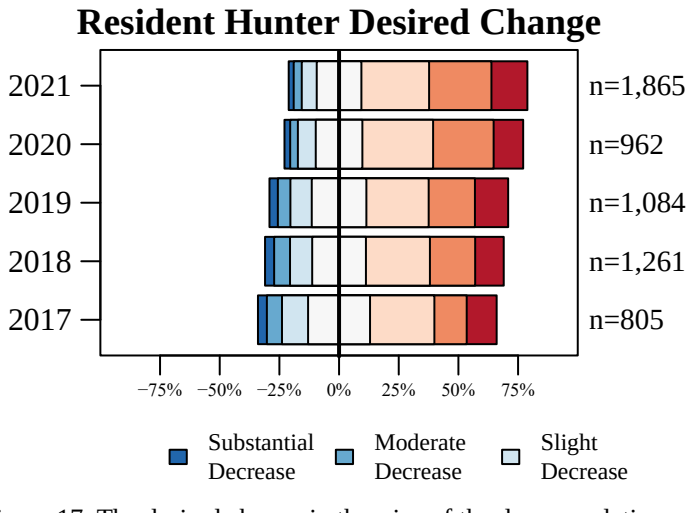

Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 6.

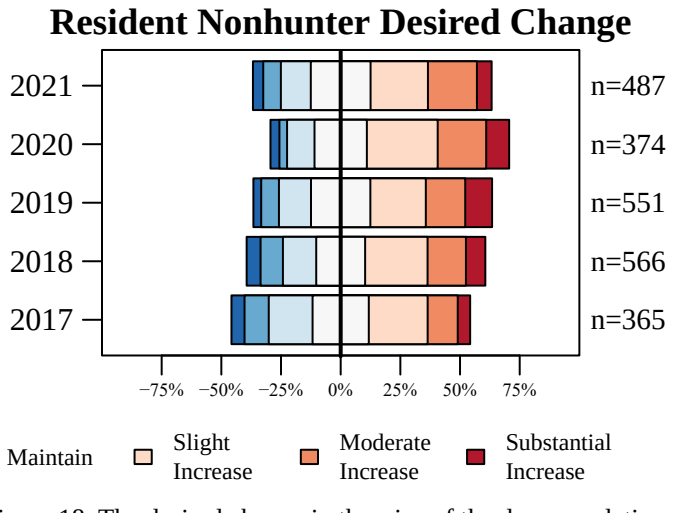

Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 6.

DMU 6: South

4/11/2022

Deer Management Survey Results

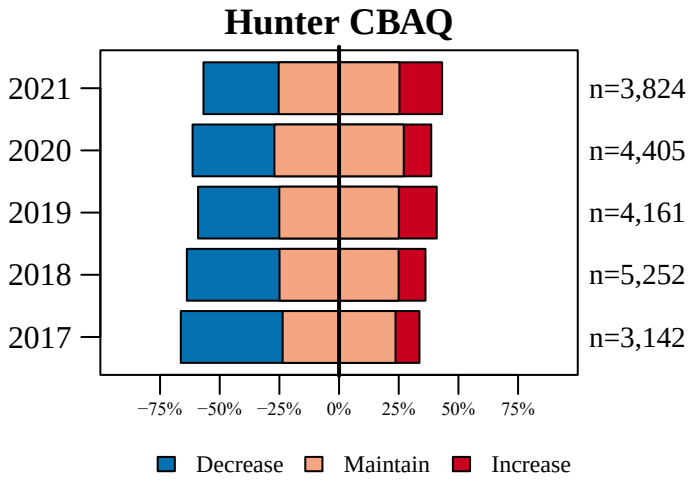

Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 6.

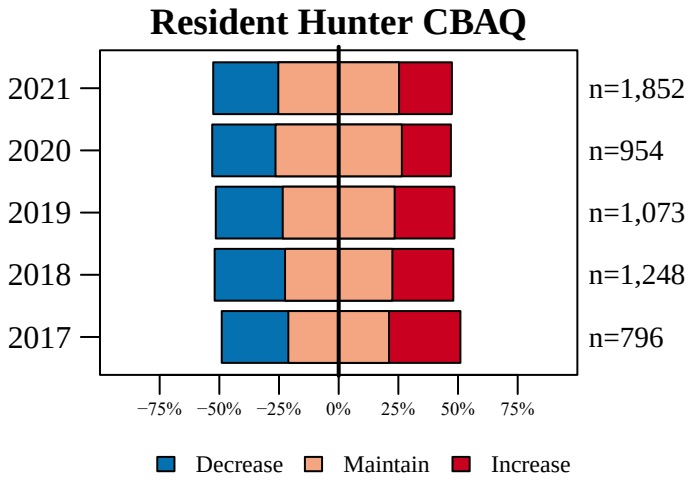

Figure 20. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they live in DMU 6.

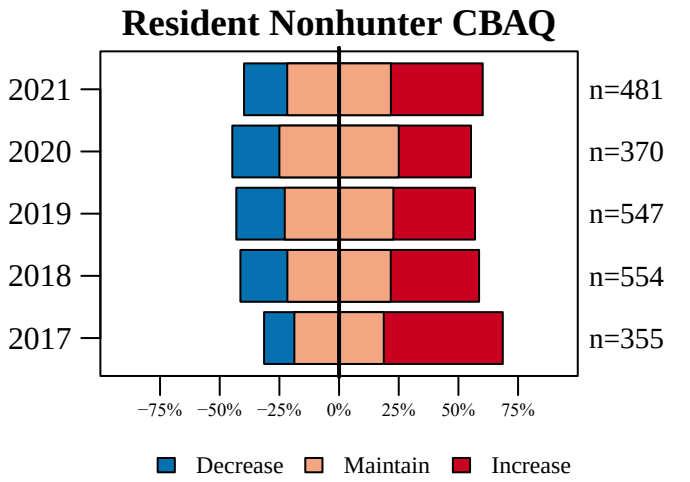

Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 6.

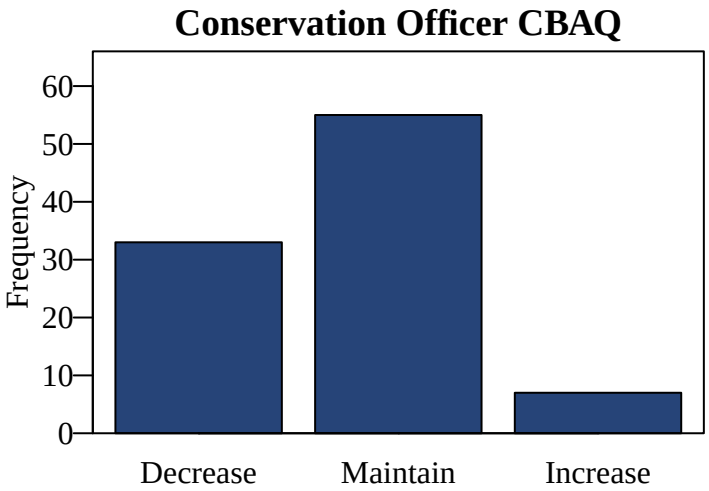

Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 6.

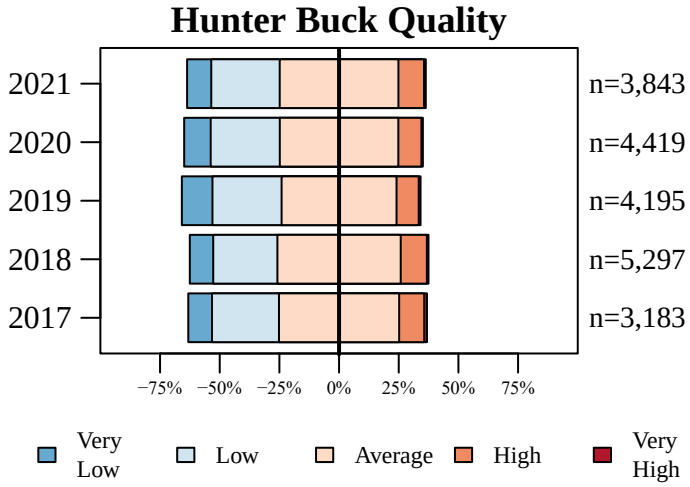

Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 6.

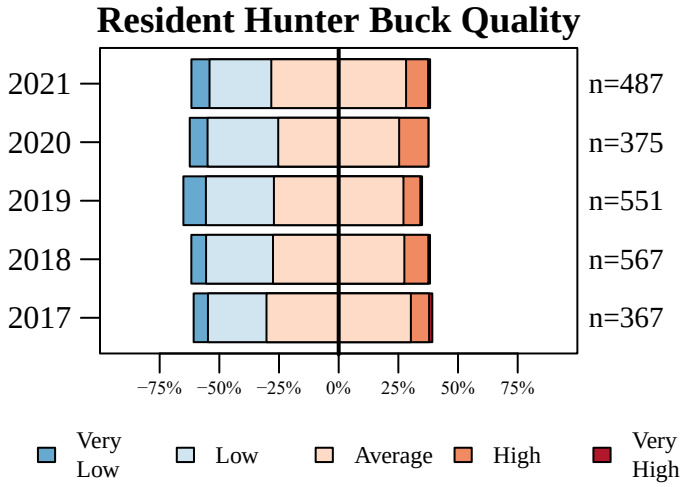

Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 6.

DMU 6: South

4/11/2022

Deer Management Survey Results

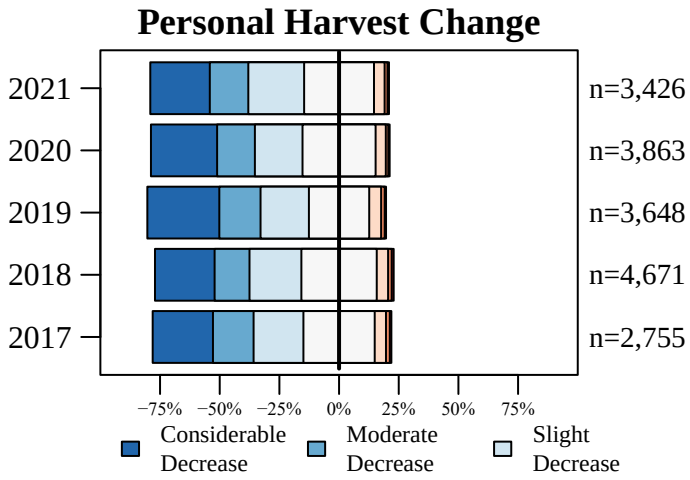

Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 6.

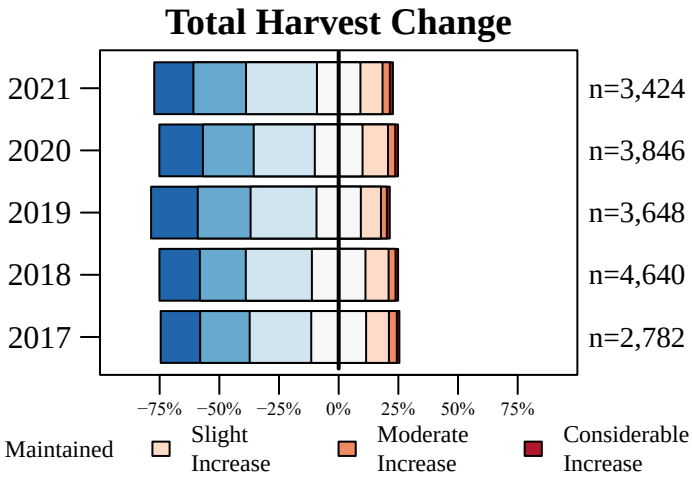

Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 6.

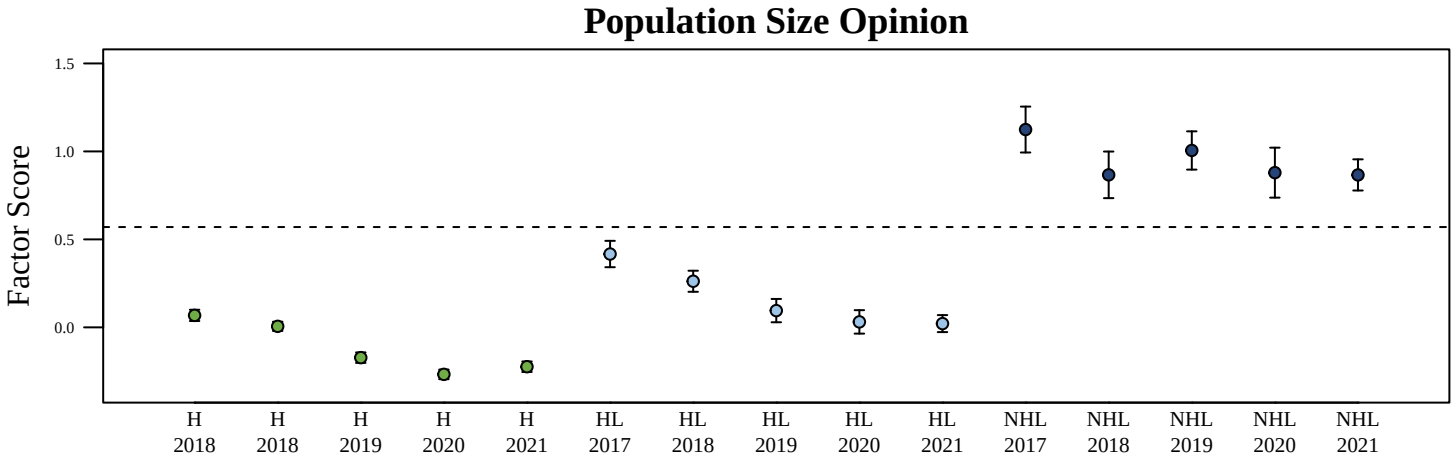

Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

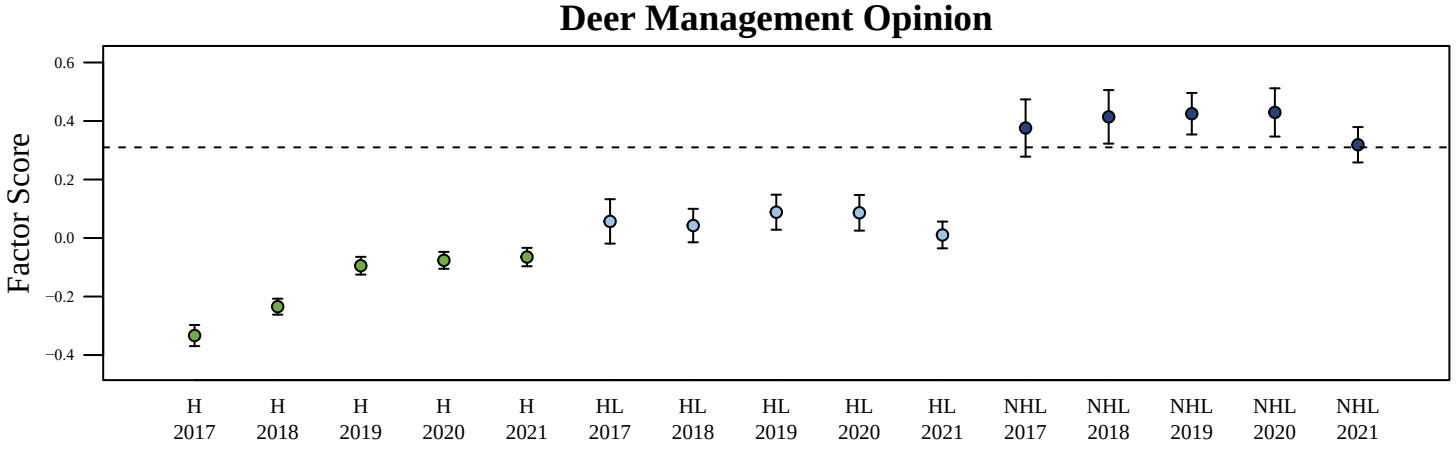

Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

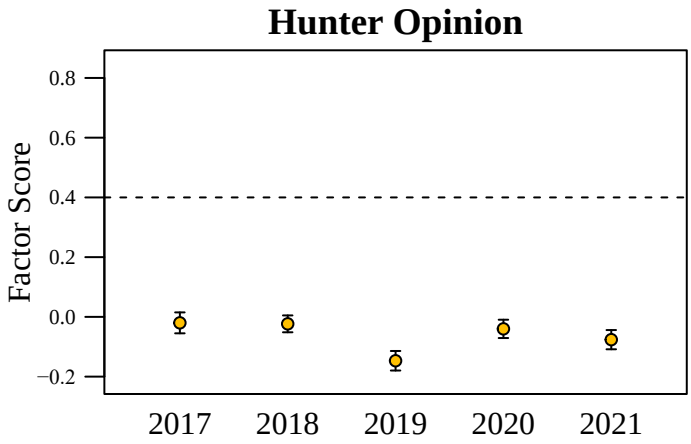

Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

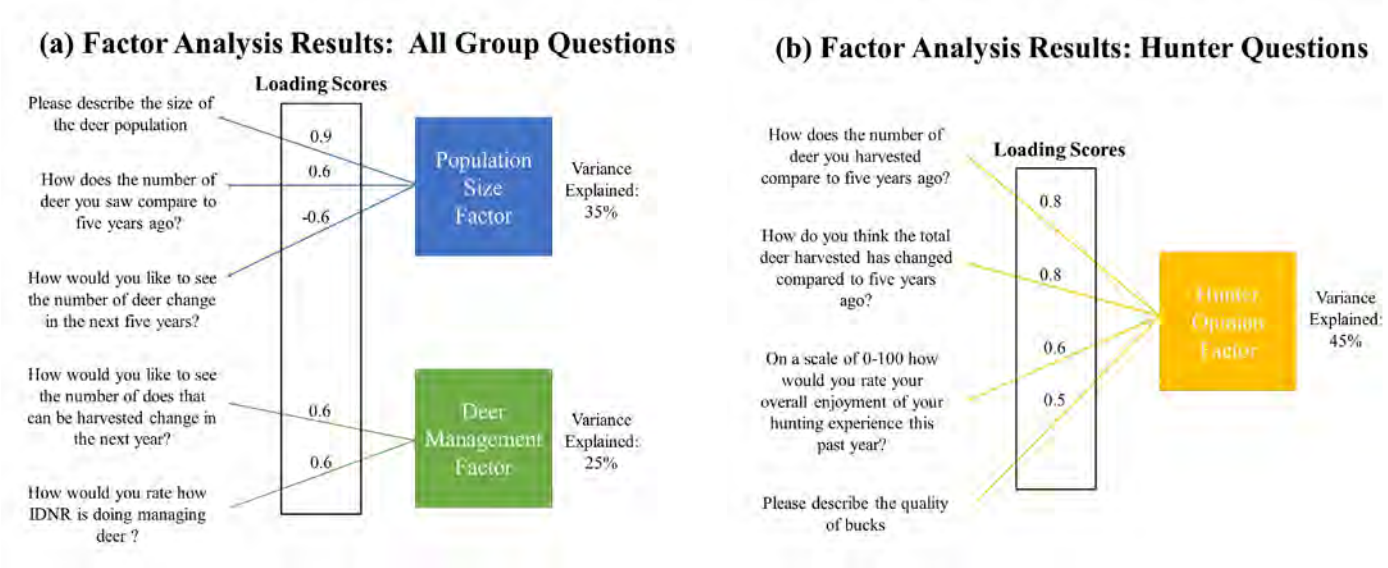

Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: The South DMU was evaluated in 2021 and 19.5 deer/square mile (95% CI 5.3) was observed in woodlots and other areas of concealment and 2.5 deer/square mile (95% CI 1.8) was observed in crop lands, pastures, grasslands, and other areas with no concealment. Therefore, values for deer populations can easily range between these two values based on local habitat conditions, interspersion of areas of woodlots or forests and cropland. On average, 13.0 deer/square mile (95% CI 3.3) were observed. An average value is provided for the Southern DMU because of the highly integrated characteristics of the land in southern Indiana. The estimates were made using data from daytime flights as part of the Purdue Integrated Deer Management project. Because flights were made during the day, most deer were observed in concealed areas. Large portions of the southern DMU have also been recovering from the last EHD occurrence in 2019 with Clark county was the most affected county with 105 reports. Other affected counties (number of reports) included Brown (17), Clark (105), Crawford (52), Floyd (18), Greene (77), Harrison (60), Jackson (20), Jefferson (42), Lawrence (22), Martin (43), Monroe (11), Morgan (15), Orange (21), Owen (73), Perry (55), and Washington (53) counties.

DMU 7: Muscatatuck

4/11/2022

Total Square Miles: 1,410
Square Miles of Deer Habitat: 824
Percent Deer Habitat: 58

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	7,275		3,568		4.3	3,707		4.5	51.0		239.3		5.8
2009	7,794		3,828		4.6	3,966		4.8	50.9		239.0		6.0
2010	7,970	1.5	3,890	1.4	4.7	4,080	1.7	5.0	51.2		256.3	0.6	6.0
2011	7,747	0.7	3,790	0.7	4.6	3,957	0.7	4.8	51.1		275.5	2.0	7.0
2012	8,797	1.9	3,948	0.9	4.8	4,849	3.0	5.9	55.1		248.7	-0.2	8.0
2013	8,185	0.5	3,895	0.6	4.7	4,290	0.4	5.2	52.4		272.8	1.4	7.0
2014	7,639	-1.1	3,643	-3.7	4.4	3,996	-0.6	4.8	52.3		275.4	1.1	7.0
2015	8,380	0.7	4,219	3.2	5.1	4,161	-0.2	5.0	49.7		315.3	4.0	7.0
2016	7,641	-1.1	4,040	0.7	4.9	3,601	-1.8	4.4	47.1	117	339.5	2.6	7.0
2017	7,323	-1.6	3,602	-1.6	4.4	3,721	-1.0	4.5	50.8	138	370.3	2.2	7.0
2018	6,878	-2.2	3,462	-1.6	4.2	3,416	-1.9	4.1	49.7	81	318.7	0.1	4.0
2019	6,841	-1.3	3,589	-0.6	4.4	3,252	-1.8	3.9	47.5	169	314.2	-0.3	2.0
2020	6,510	-1.4	3,351	-1.3	4.1	3,159	-1.4	3.8	48.5	87	307.6	-1.0	2.5
2021	6,577	-1.0	3,745	0.5	4.5	2,832	-1.2	3.4	43.1	65	382.3	2.1	2.0

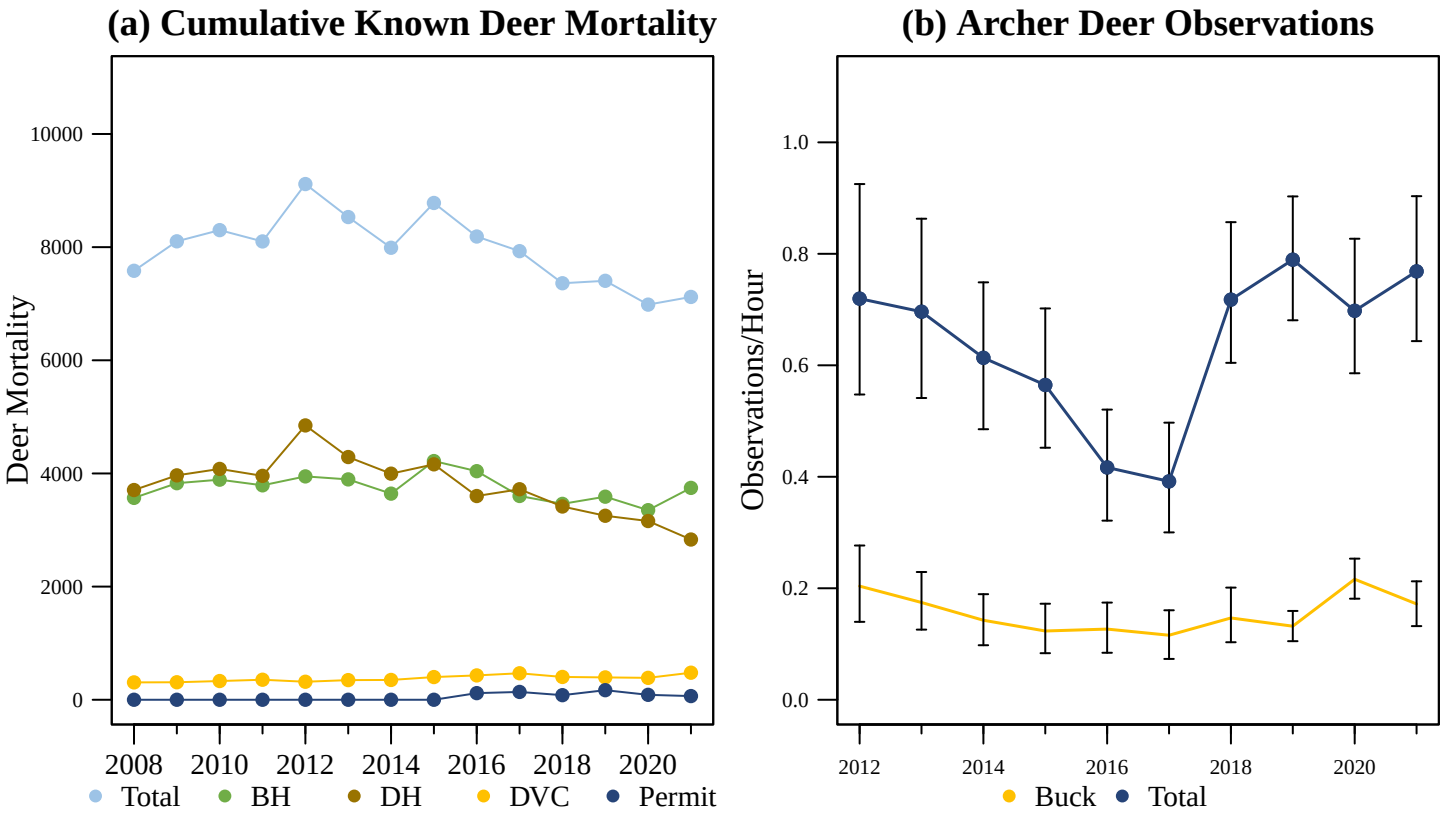

Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 7: Muscatatuck

4/11/2022

Total Square Miles: 1,410
Square Miles of Deer Habitat: 824
Percent Deer Habitat: 58

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	5,548	2,428	3,051	69	0	2,288	2,388	652	161	36	14	5	2	0	1	1
2017	5,280	2,566	2,699	15	0	2,014	2,367	638	159	61	25	11	2	2	1	0
2018	5,010	2,408	2,589	13	0	1,864	2,290	648	162	39	7	0	0	0	0	0
2019	5,230	2,415	2,802	11	2	2,041	2,474	626	71	18	0	0	0	0	0	0
2020	4,906	2,264	2,629	12	1	1,916	2,252	631	91	13	3	0	0	0	0	0
2021	5,186	2,141	3,034	11	0	2,303	2,289	558	30	5	0	1	0	0	0	0

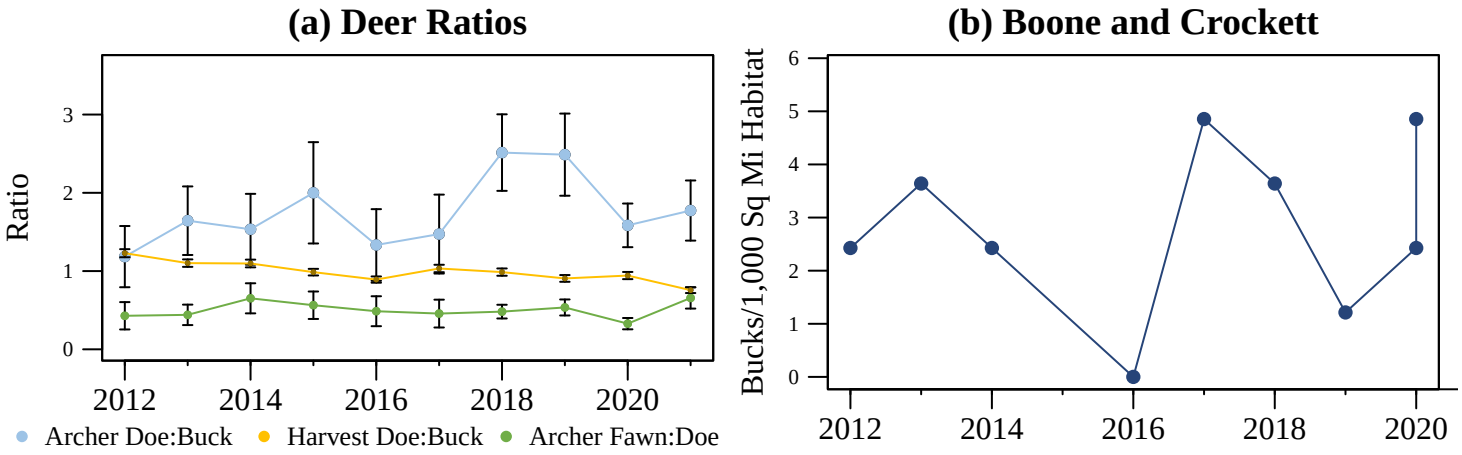

Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

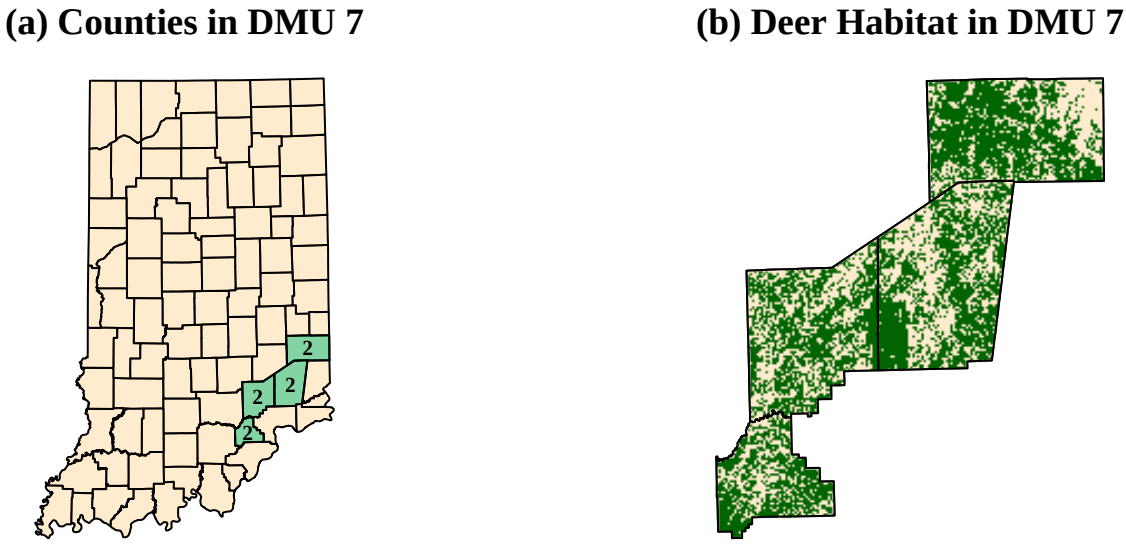

Figure 3. (a) Counties included in DMU 7 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 7.

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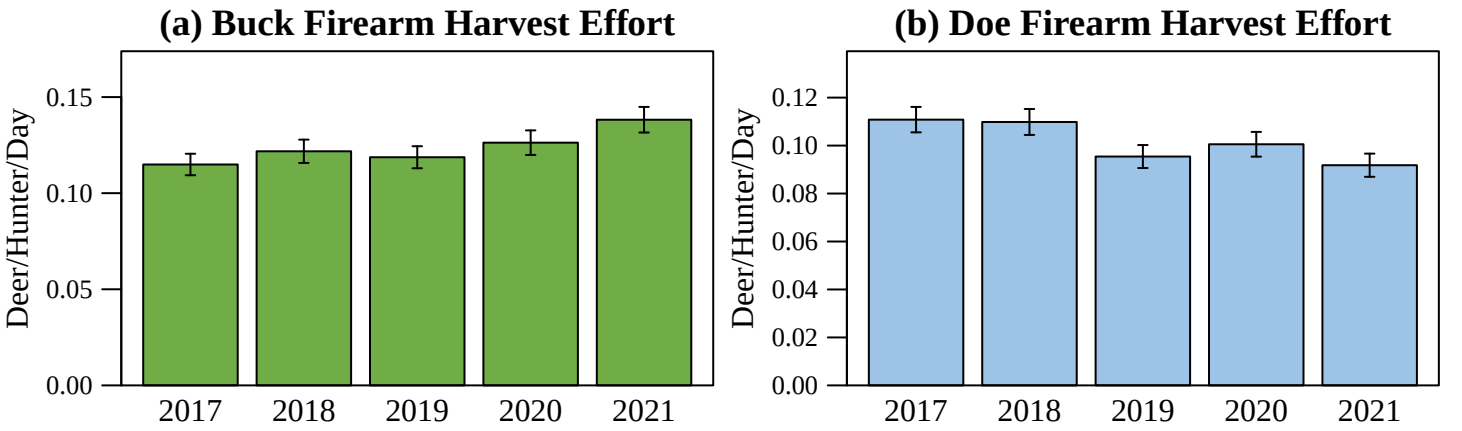

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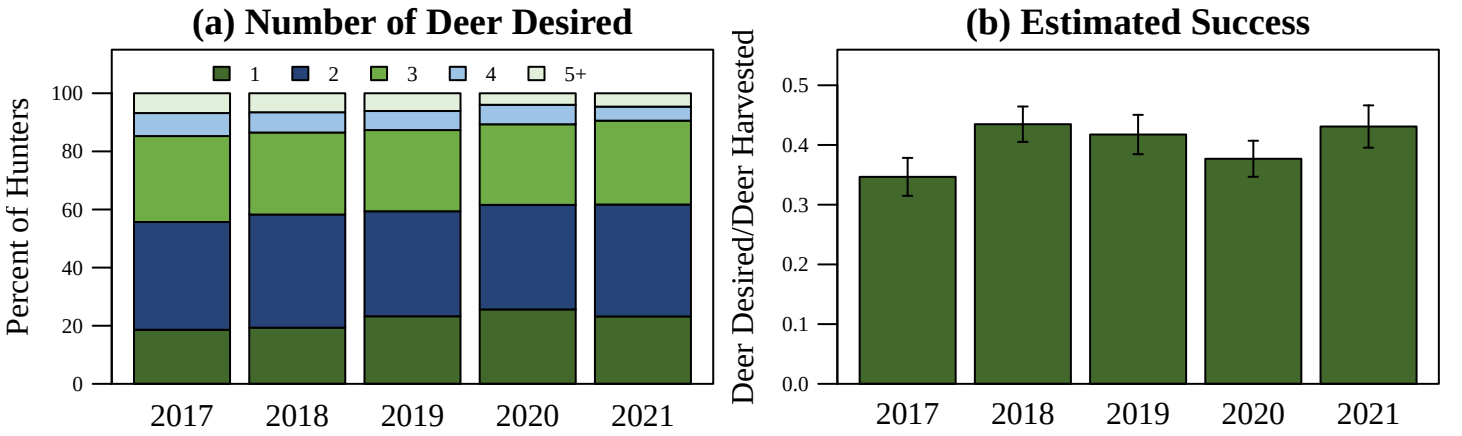

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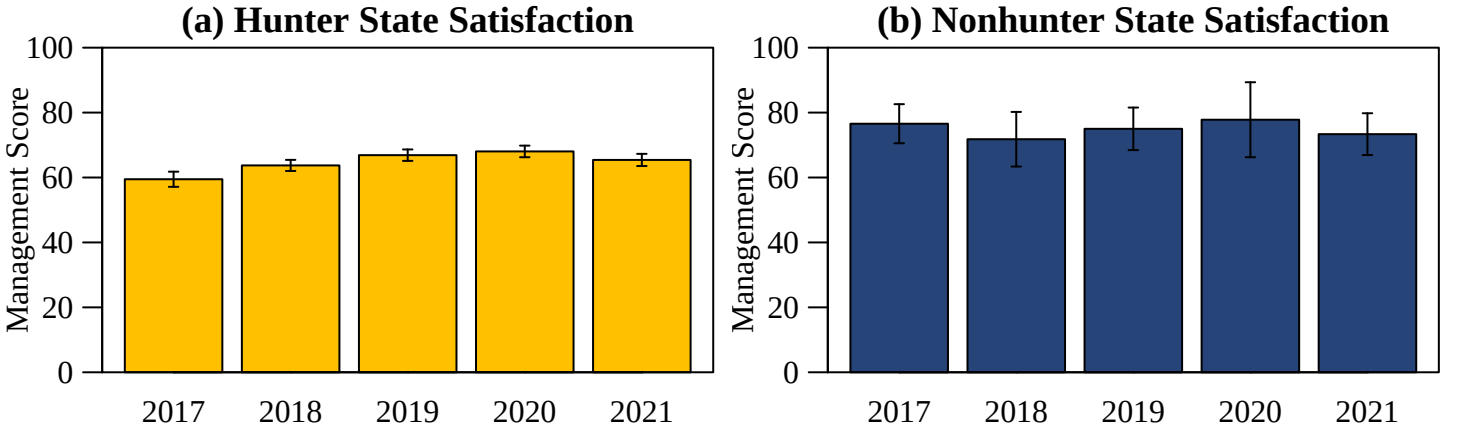

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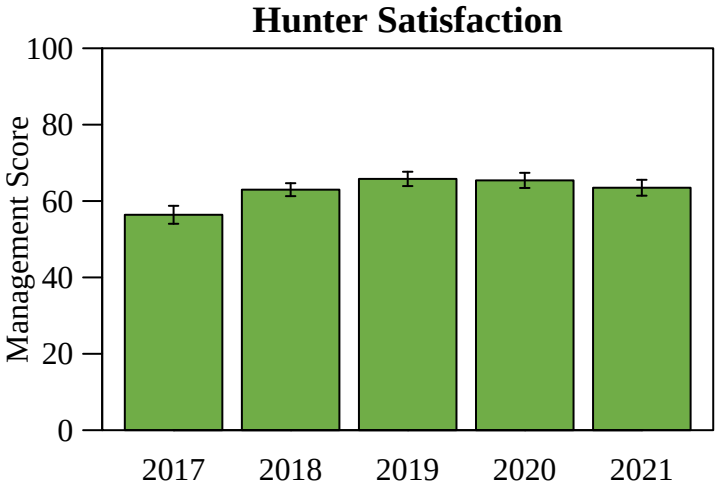

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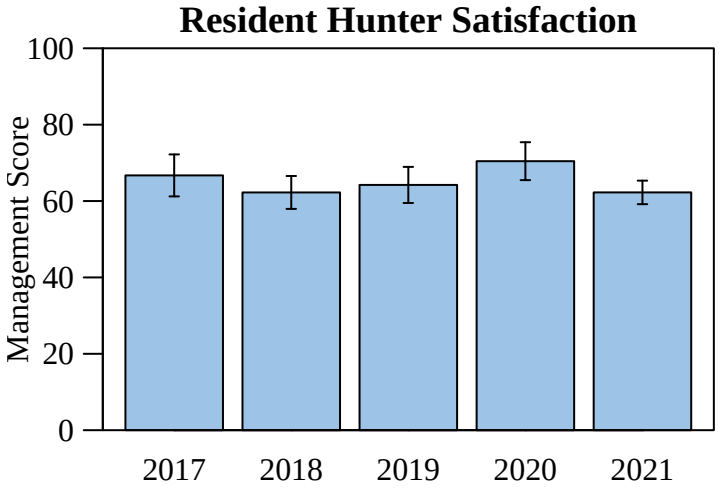
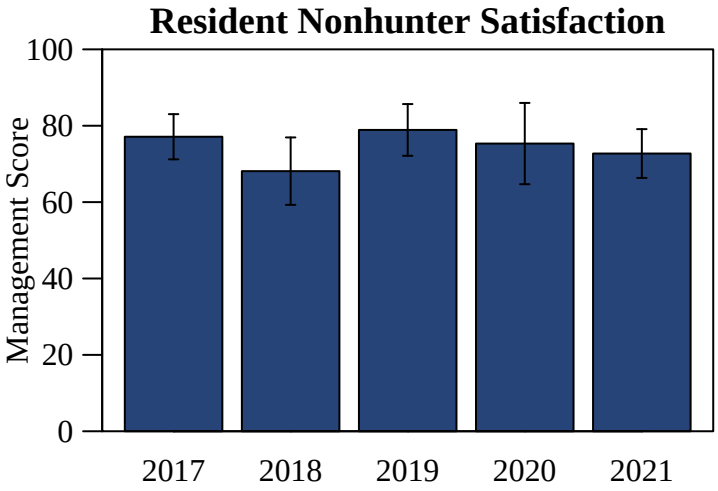


Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 7 where they live.



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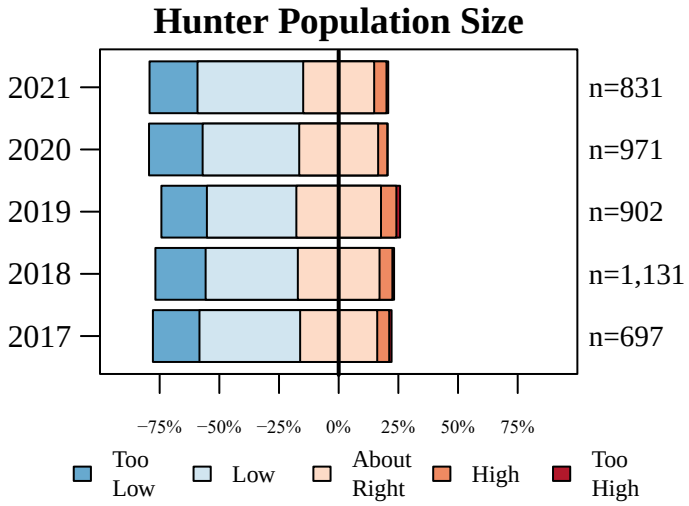

Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 7.

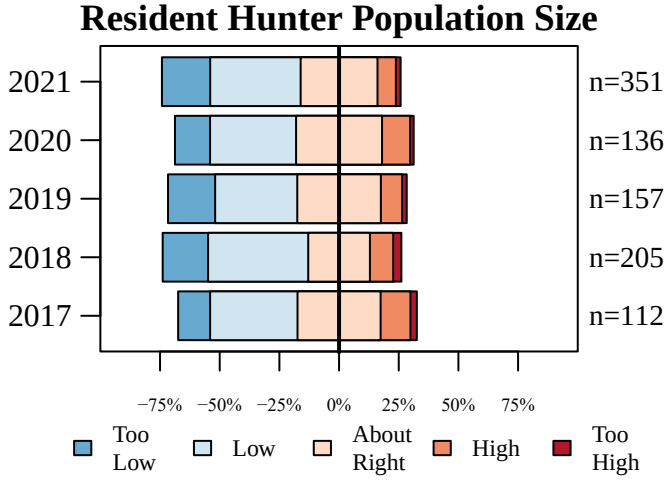

Figure 11. The current size of the deer population described by hunters in the county where they live in DMU 7.

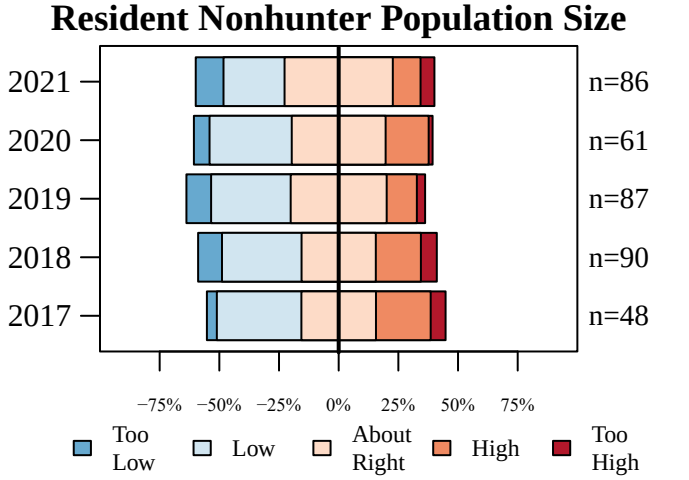

Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 7.

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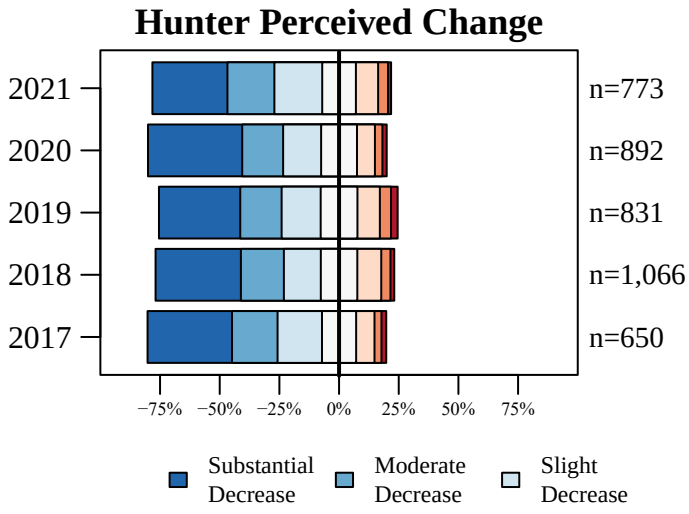

Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 7.

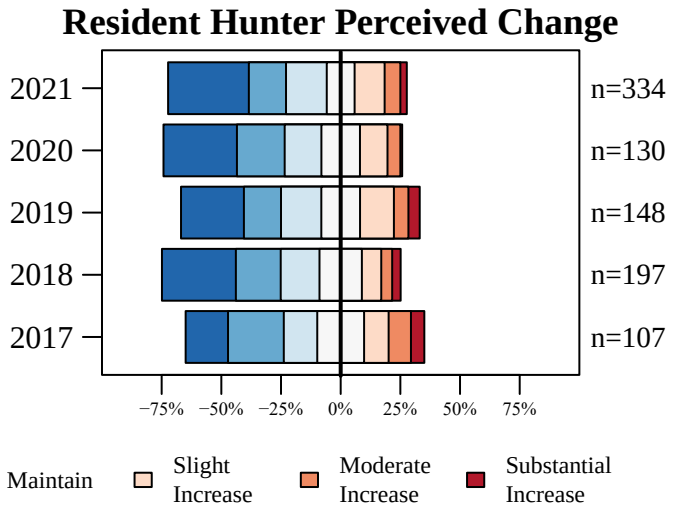

Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 7.

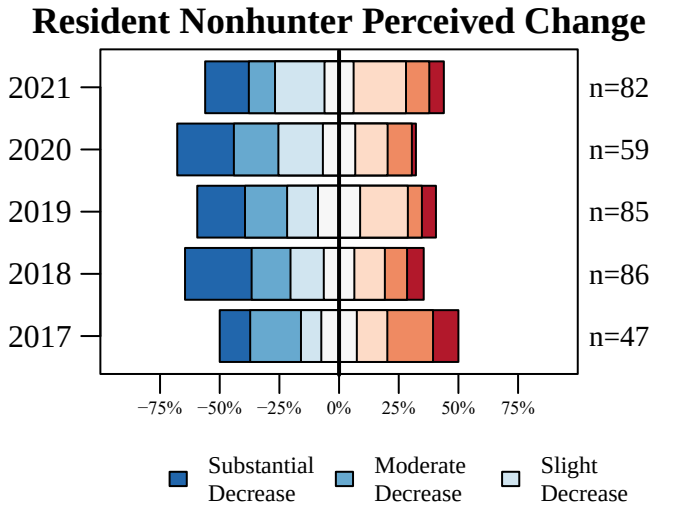

Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 7.

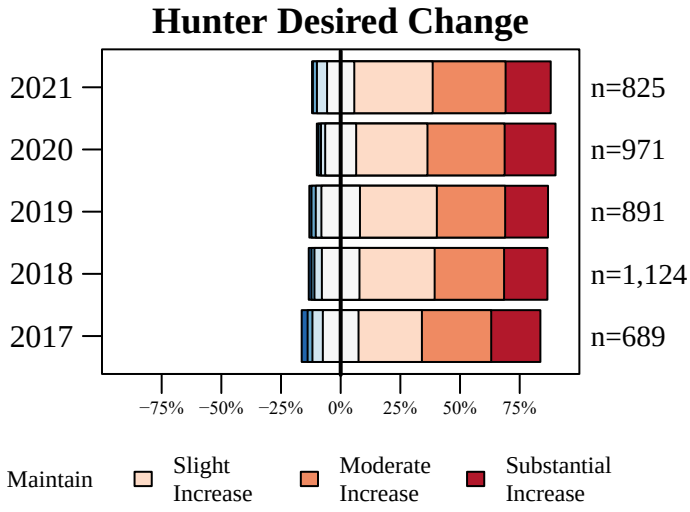

Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 7.

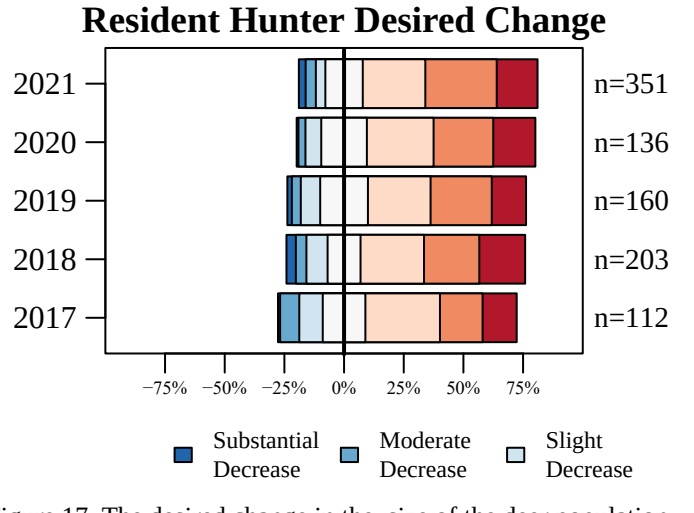

Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 7.

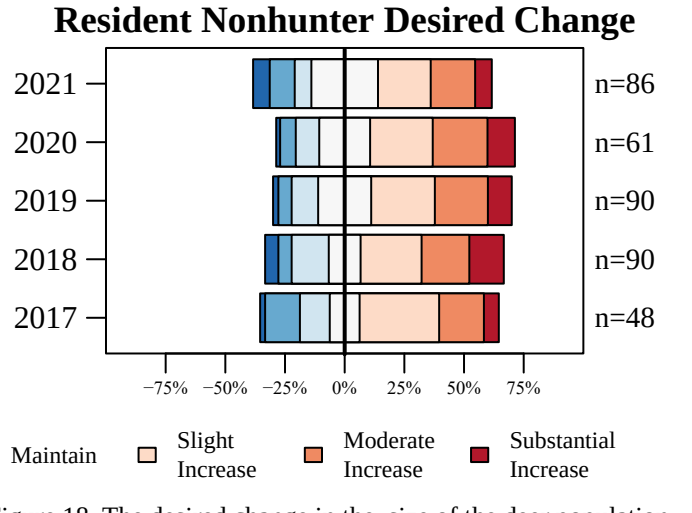

Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 7.

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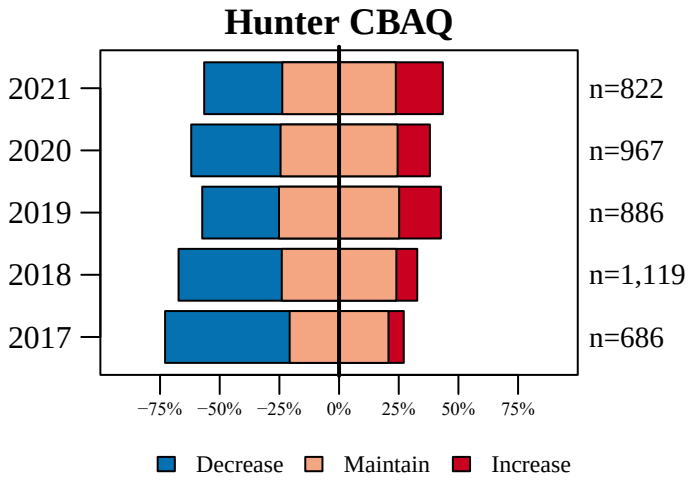

Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 7.

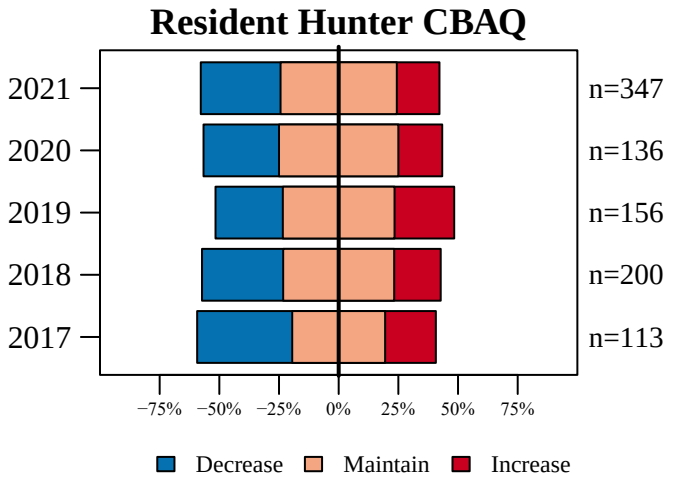

Figure 20. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they live in DMU 7.

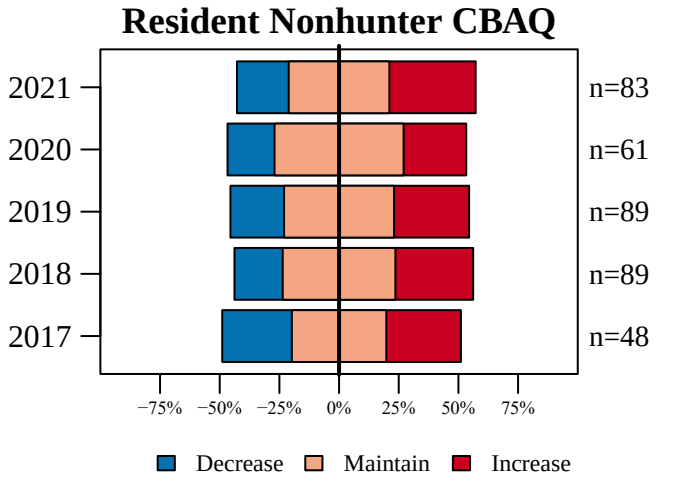

Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 7.

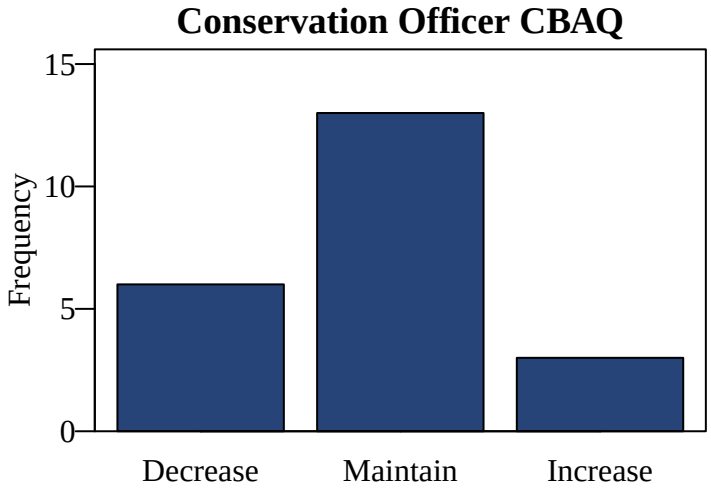

Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 7.

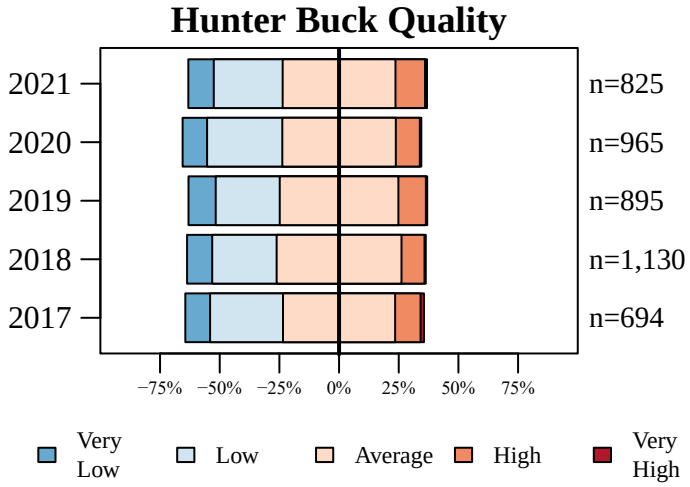

Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 7.

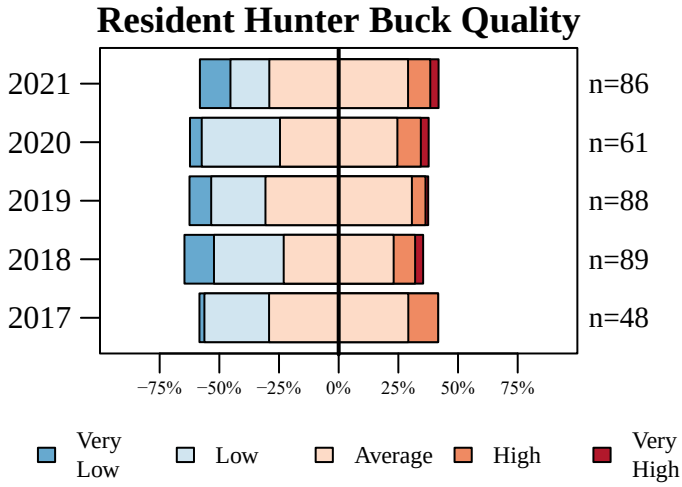

Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 7.

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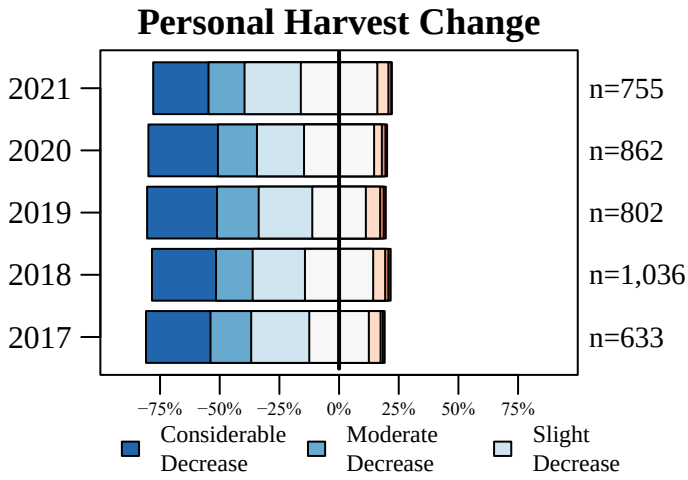

Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 7.

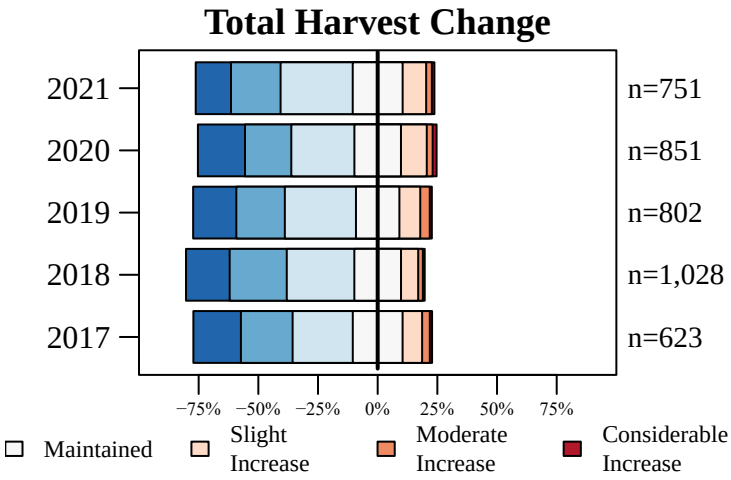

Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 7.

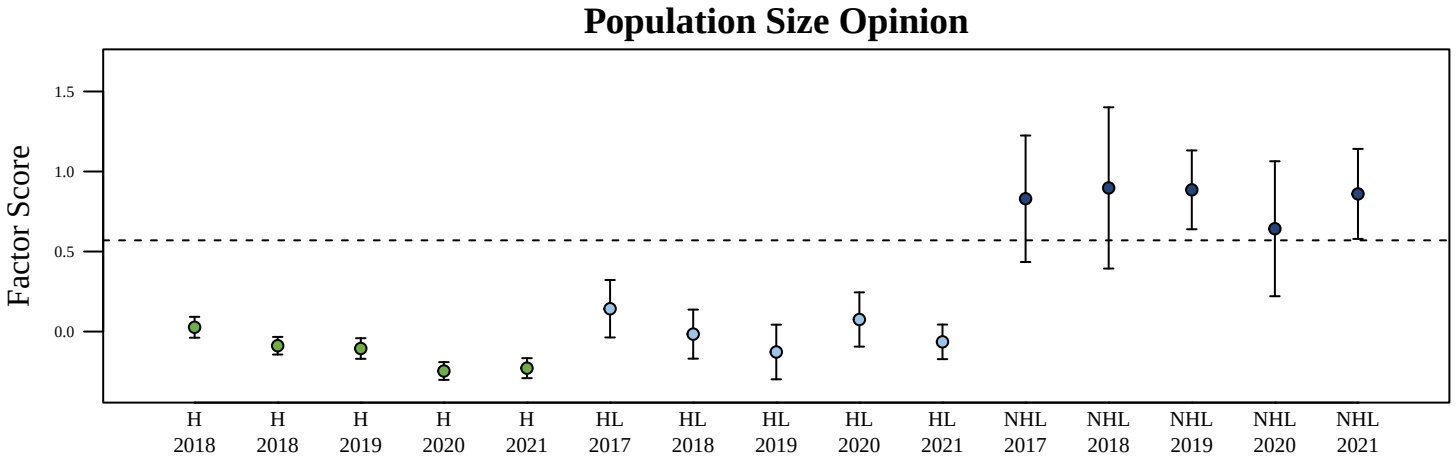

Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

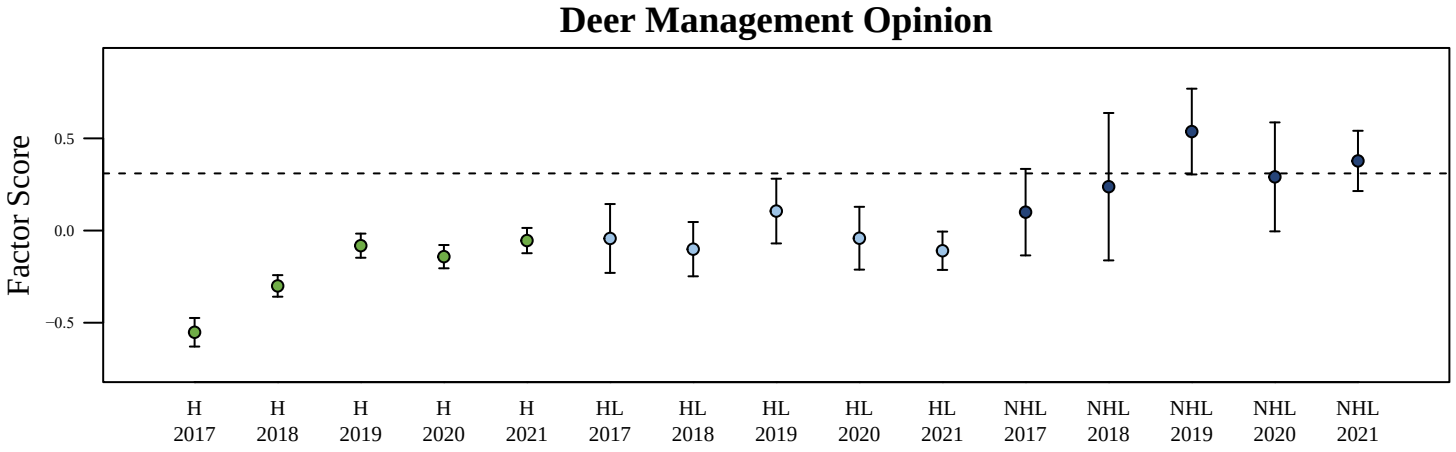

Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

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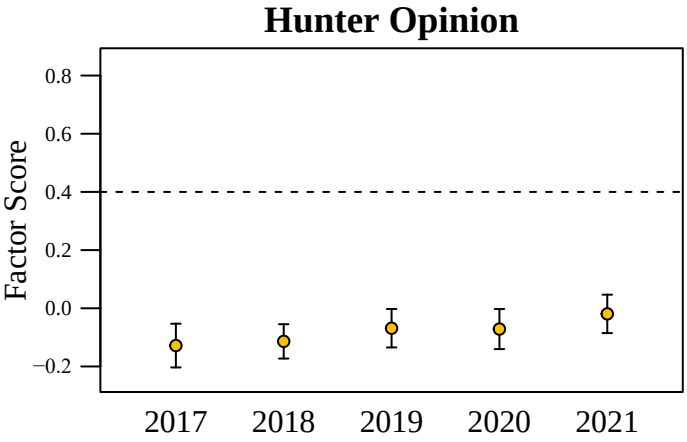


Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

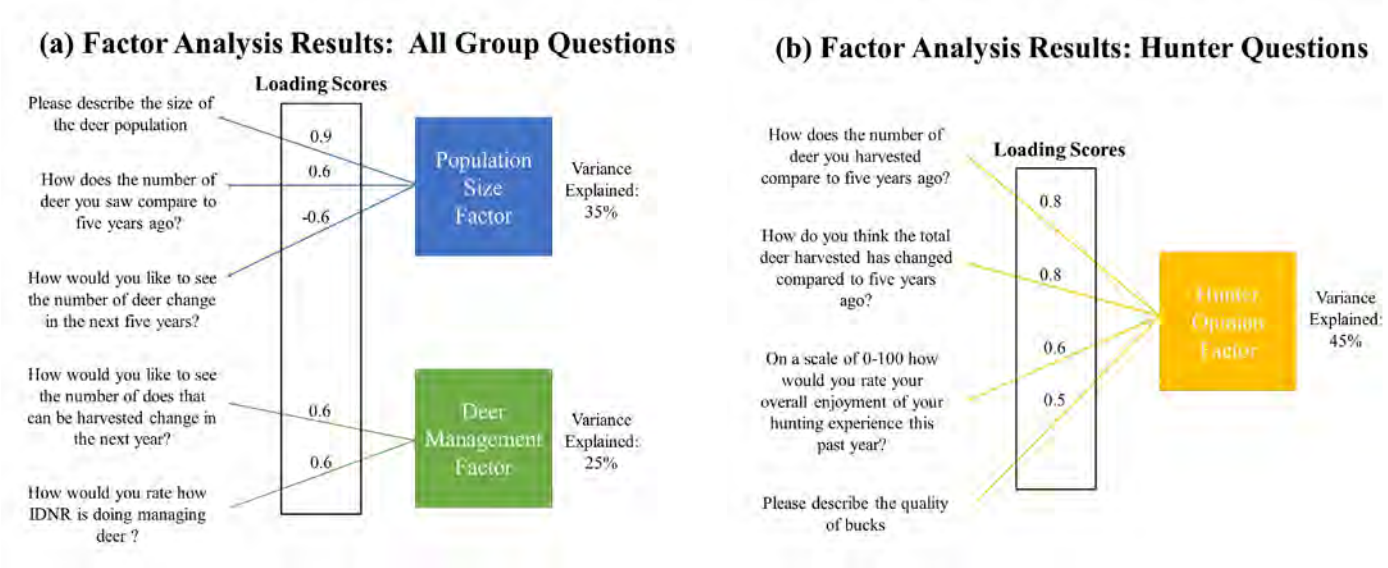


Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: No deer population estimate available for the Muscatatuck DMU. Franklin (8), Jennings (51), Ripley (7), and Scott (37) were affected by EHD in 2019, with additional isolated reports from Franklin County also in 2020.

DMU 8: Dearborn

4/11/2022

Total Square Miles: 618
Square Miles of Deer Habitat: 504
Percent Deer Habitat: 82

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	6,438		2,805		5.6	3,633		7.2	56.4		556.6		8.0
2009	7,264		3,444		6.8	3,820		7.6	52.6		567.6		8.0
2010	7,333	1.6	3,403	1.3	6.8	3,930	1.9	7.8	53.6		614.9	0.3	8.0
2011	7,323	1.0	3,353	0.8	6.7	3,970	1.4	7.9	54.2		511.7	-1.7	8.0
2012	7,849	2.1	3,333	0.5	6.6	4,516	5.2	9.0	57.5		486.7	-1.5	8.0
2013	6,226	-2.0	2,789	-1.8	5.5	3,437	-1.6	6.8	55.2		512.5	-0.7	8.0
2014	6,077	-1.9	2,733	-2.0	5.4	3,344	-1.5	6.6	55.0		462.9	-1.5	6.7
2015	6,023	-1.2	3,108	0.0	6.2	2,915	-2.0	5.8	48.4		540.3	0.4	5.3
2016	5,514	-1.4	2,965	-0.3	5.9	2,549	-1.8	5.1	46.2	175	424.9	-2.7	4.0
2017	5,205	-1.3	2,537	-1.8	5.0	2,668	-0.9	5.3	51.3	130	438.6	-1.1	4.0
2018	4,684	-2.6	2,353	-2.2	4.7	2,331	-1.6	4.6	49.8	174	415.6	-1.2	3.3
2019	4,733	-1.3	2,586	-0.5	5.1	2,147	-1.6	4.3	45.4	127	499.3	0.9	2.0
2020	4,921	-0.6	2,549	-0.5	5.1	2,372	-0.5	4.7	48.2	107	409.6	-1.0	2.0
2021	4,452	-1.6	2,478	-0.5	4.9	1,974	-0.2	3.9	44.3	102	429.3	-0.2	2.0

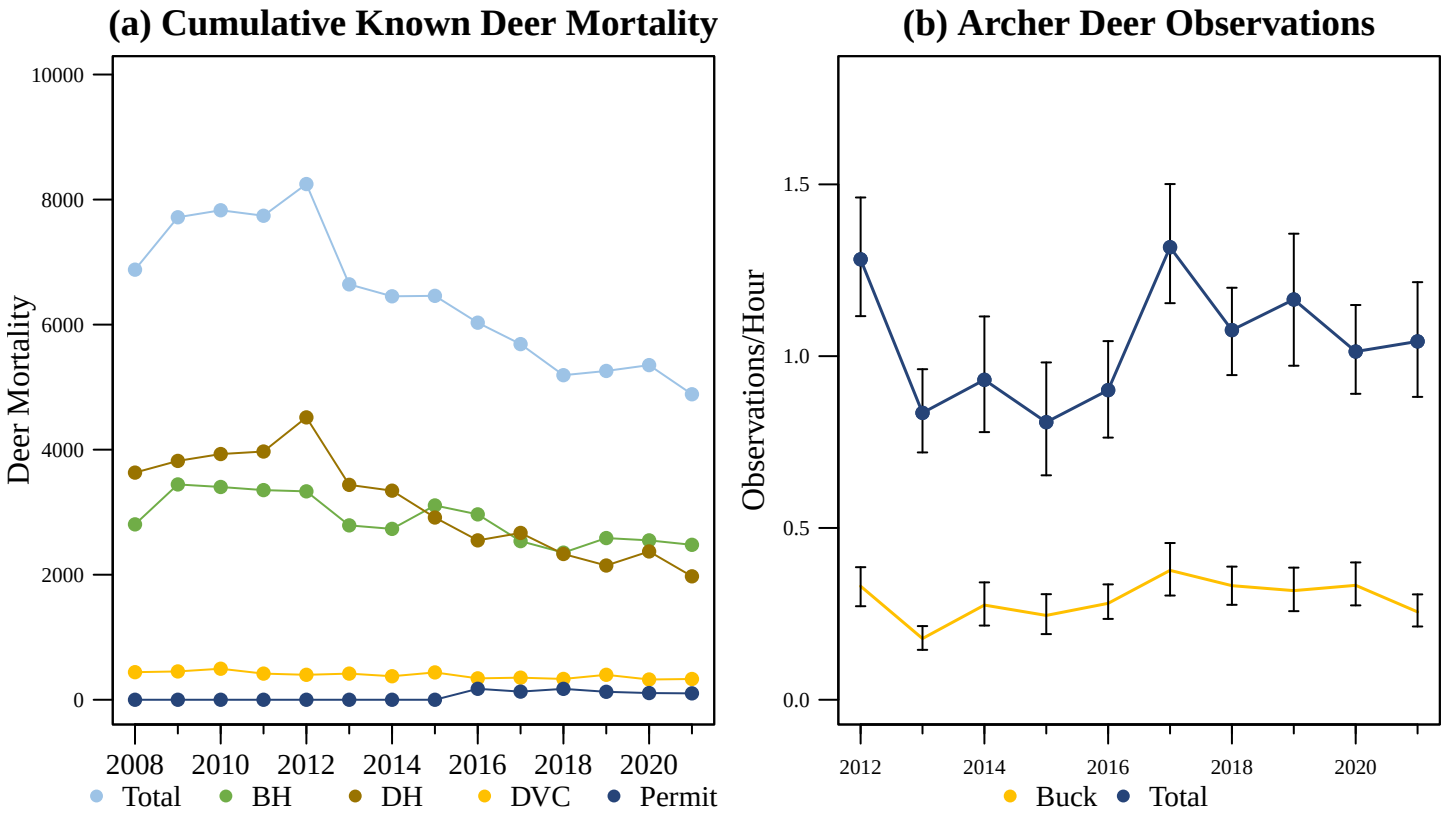


Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

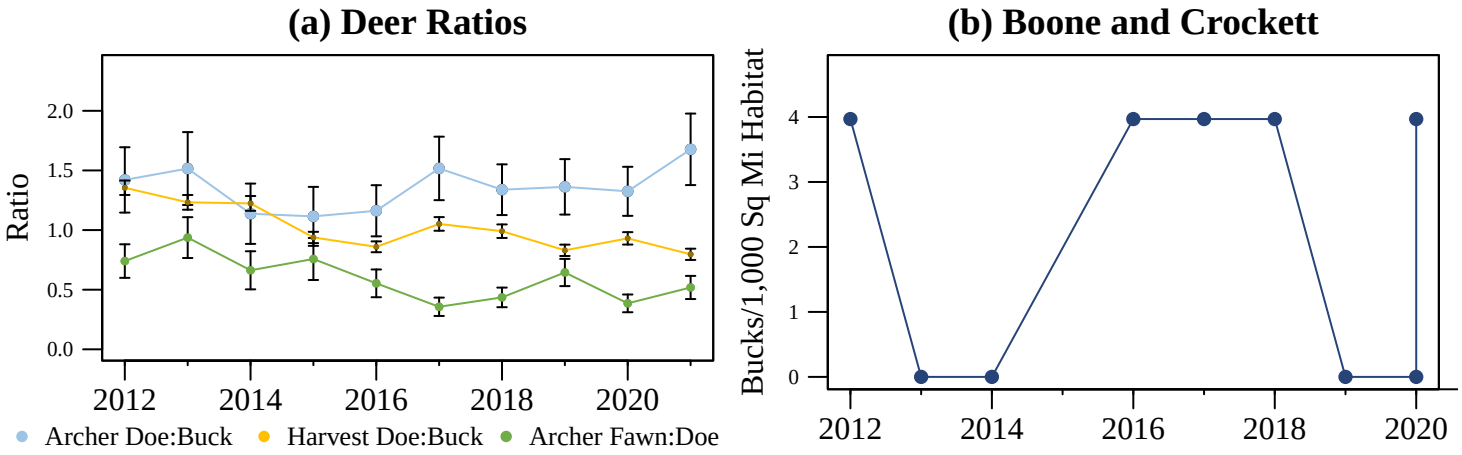
DMU 8: Dearborn

4/11/2022

Total Square Miles: 618
Square Miles of Deer Habitat: 504
Percent Deer Habitat: 82

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	4,164	1,739	2,389	36	0	1,847	1,740	452	94	29	1	1	0	0	0	0
2017	3,772	1,787	1,979	6	0	1,467	1,634	486	141	37	5	2	0	0	0	0
2018	3,425	1,550	1,868	7	0	1,354	1,514	421	107	24	4	0	0	0	1	0
2019	3,619	1,459	2,151	9	0	1,595	1,560	412	34	14	3	0	1	0	0	0
2020	3,710	1,594	2,098	18	0	1,543	1,646	441	66	10	3	1	0	0	0	0
2021	3,454	1,327	2,108	19	0	1,592	1,468	358	28	4	2	2	0	0	0	0



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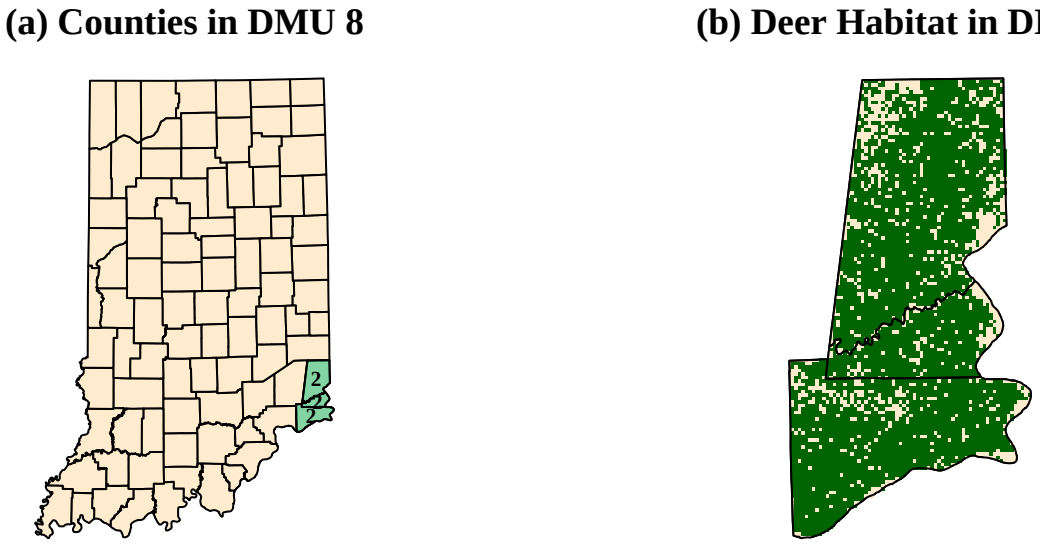

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DMU 8: Dearborn

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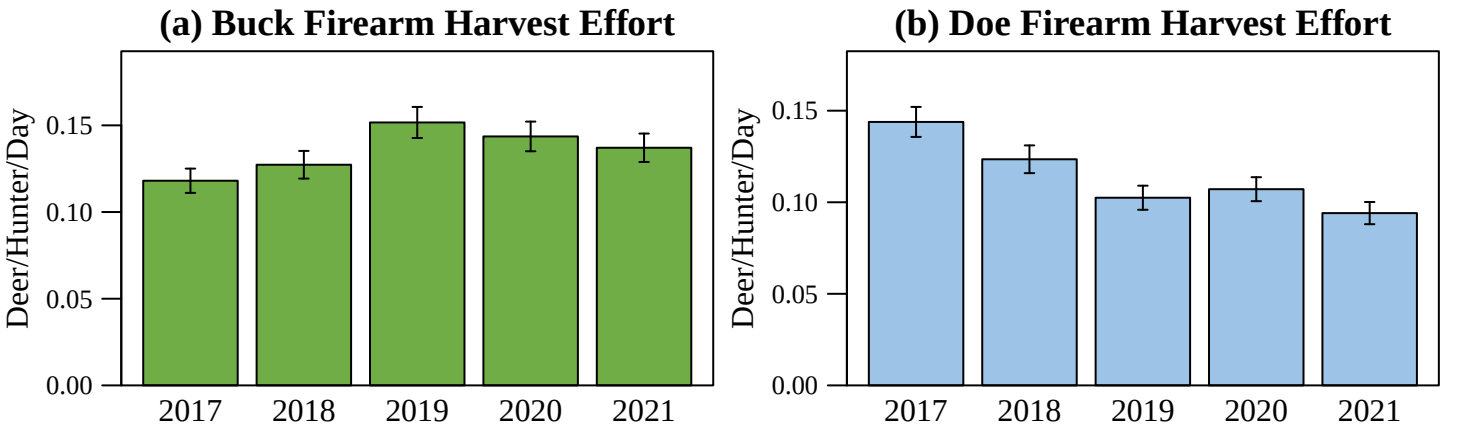
Deer Management Survey Results



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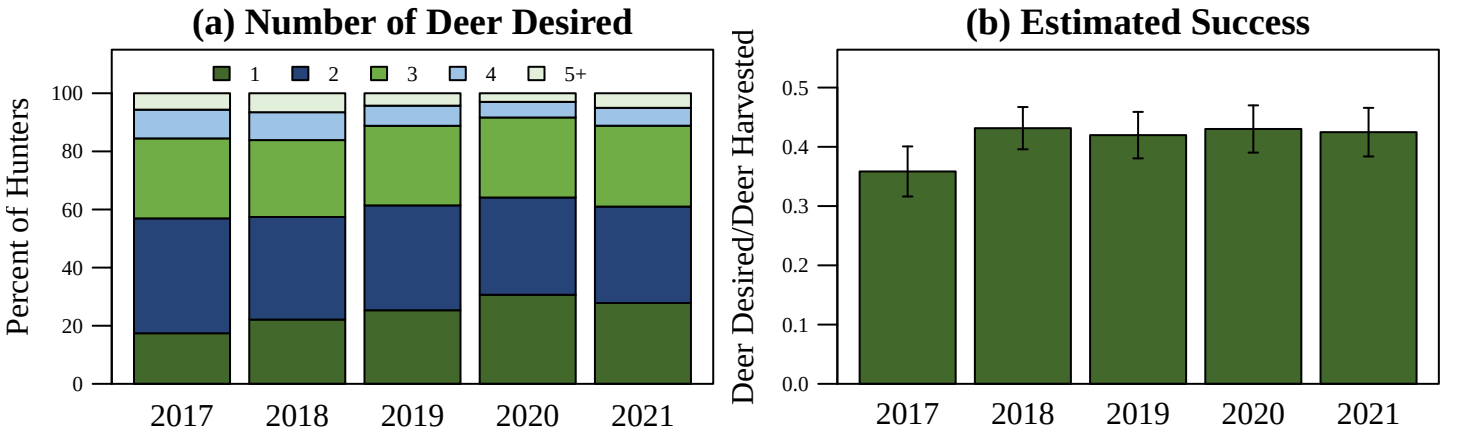

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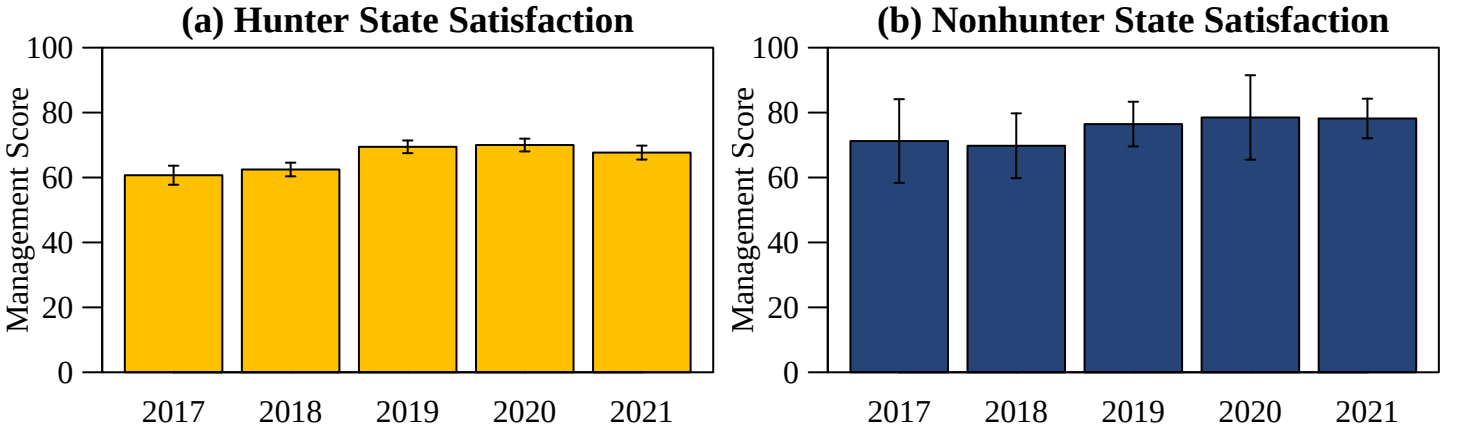

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DMU 8: Dearborn

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Deer Management Survey Results

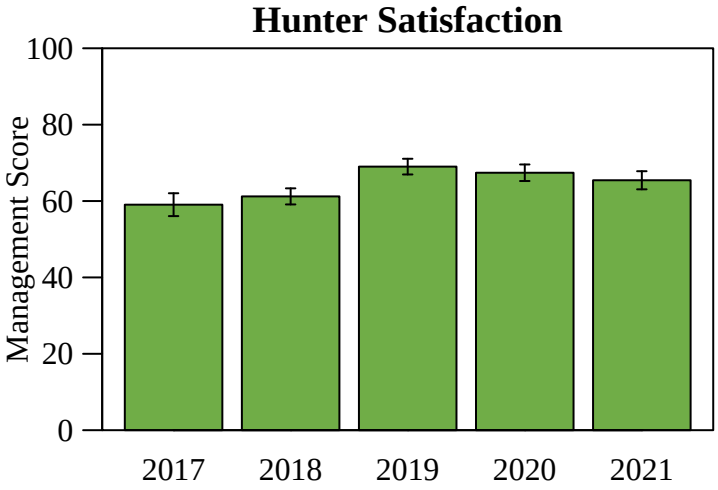

Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 8 where they hunt.

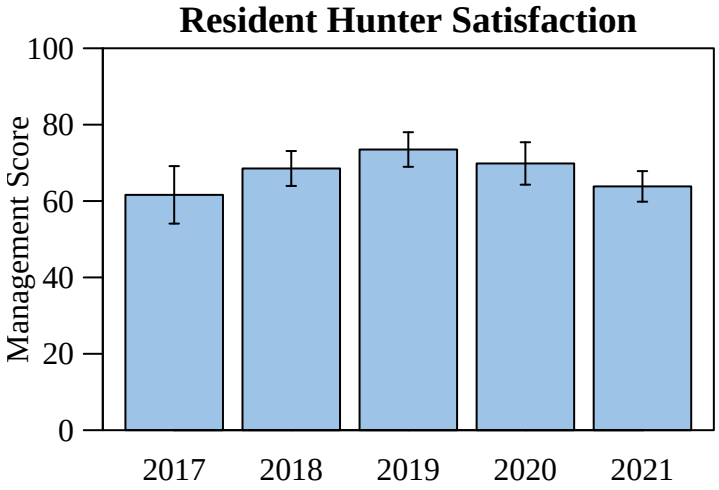

Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 8 where they live.

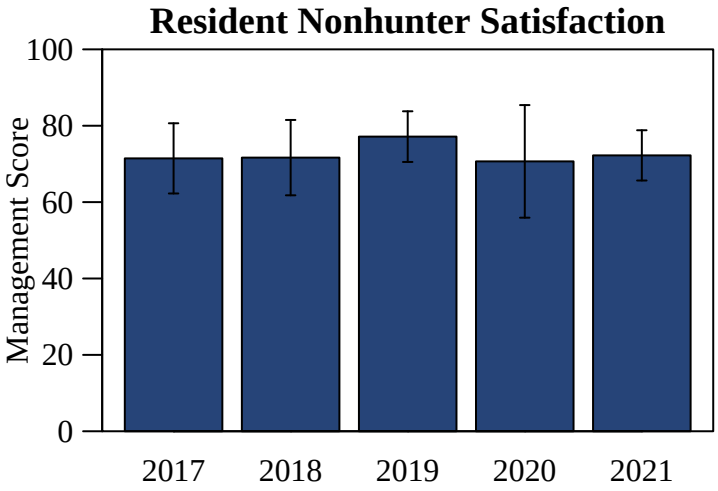

Figure 9. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 8 where they live.

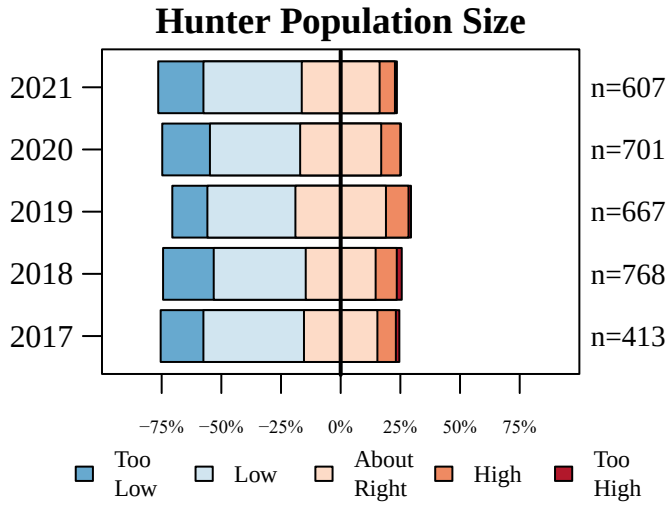

Figure 10. The current size of the deer population described by hunters in the county where they hunt in DMU 8.

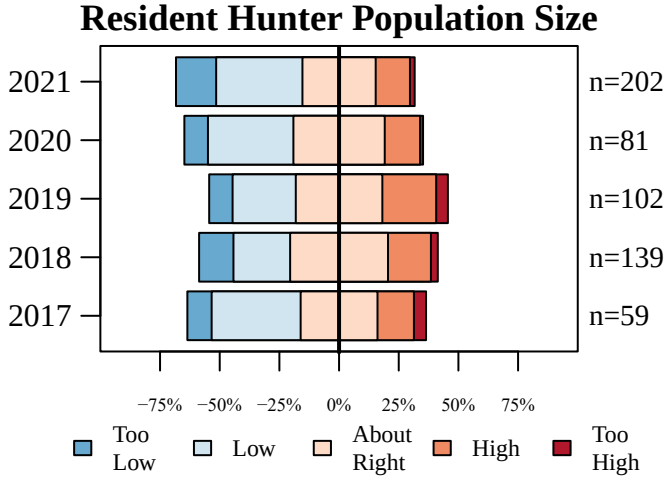

Figure 11. The current size of the deer population described by hunters in the county where they live in DMU 8.

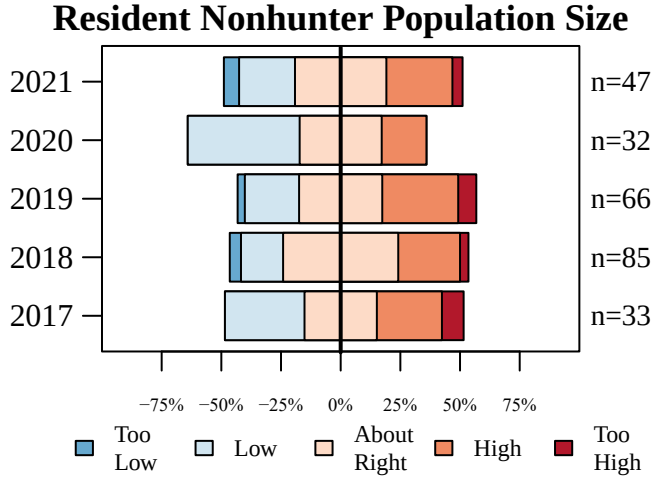

Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 8.

DMU 8: Dearborn

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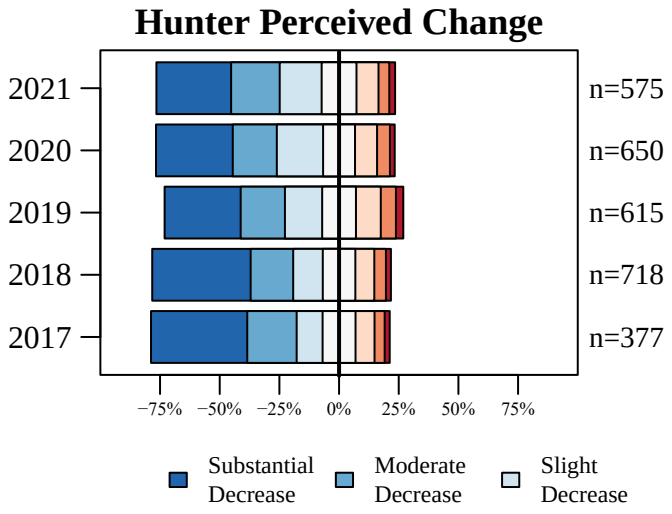

Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 8.

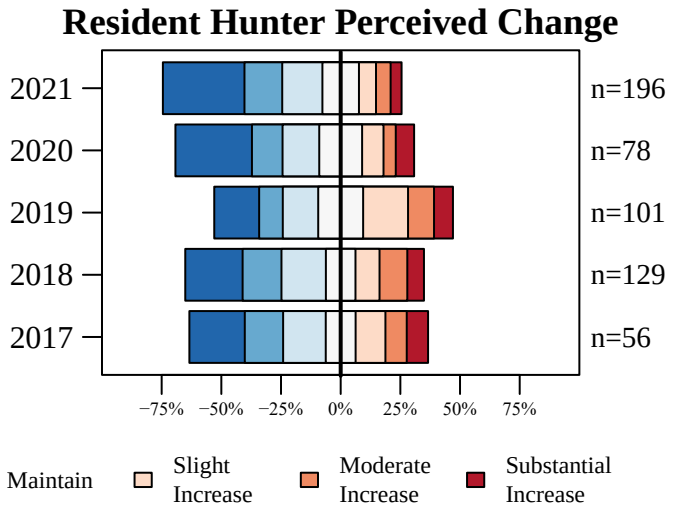

Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 8.

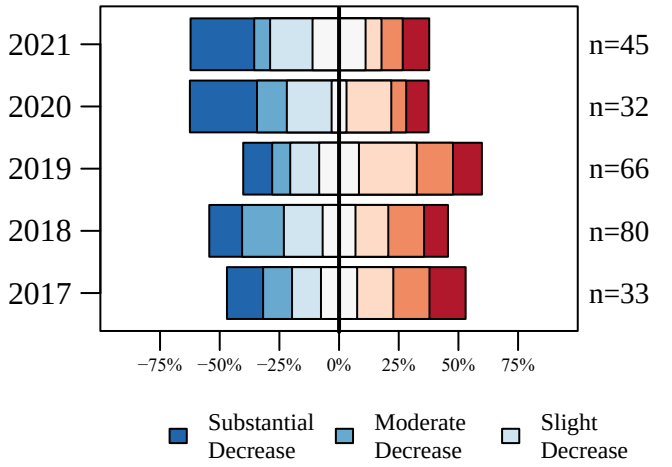

Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 8.

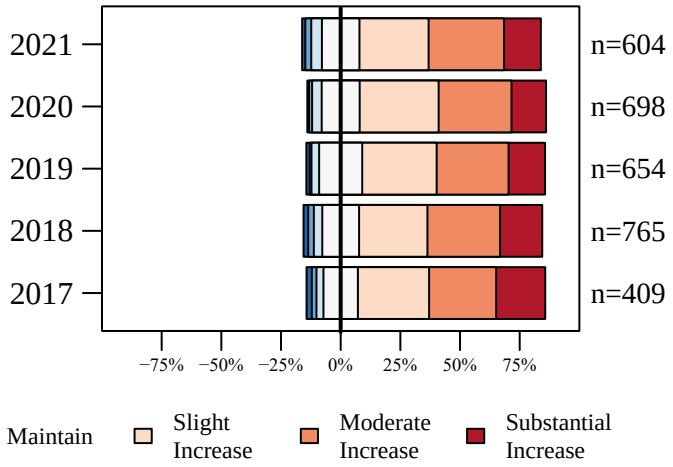

Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 8.

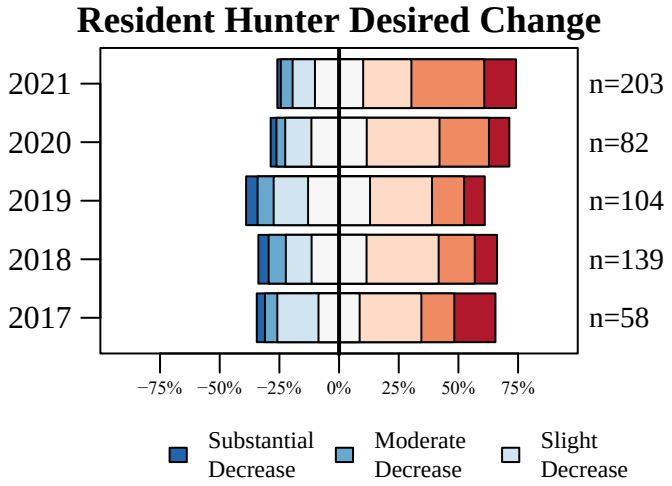

Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 8.

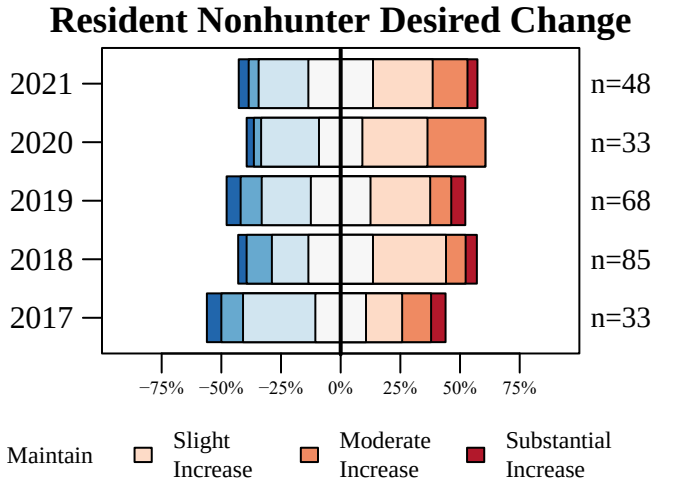

Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 8.

DMU 8: Dearborn

4/11/2022

Deer Management Survey Results

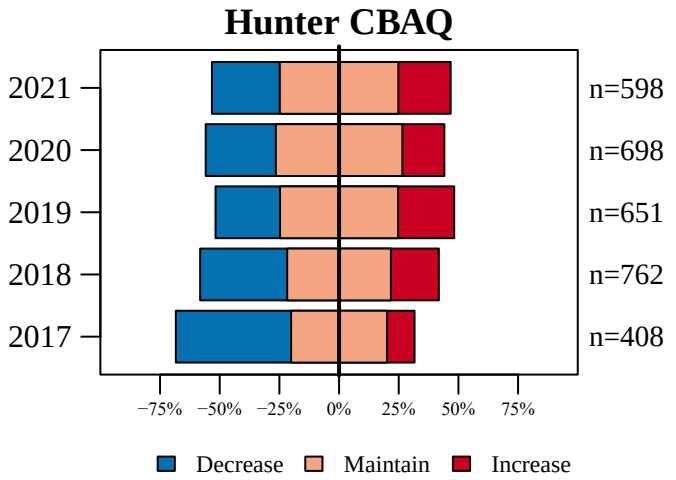

Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 8.

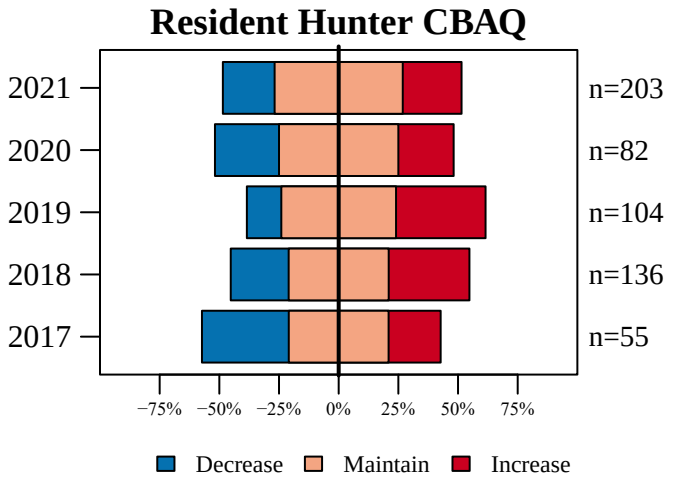

Figure 20. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they live in DMU 8.

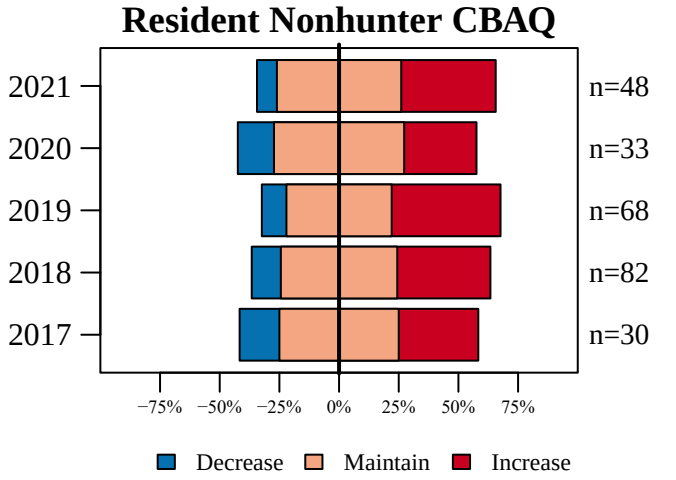

Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 8.

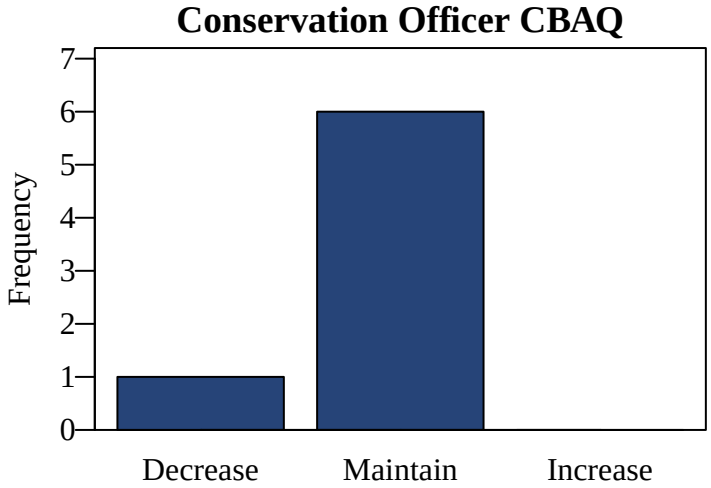

Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 8.

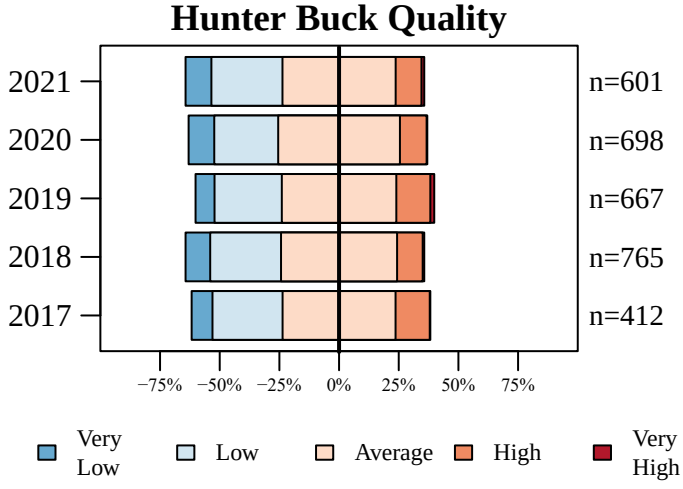

Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 8.

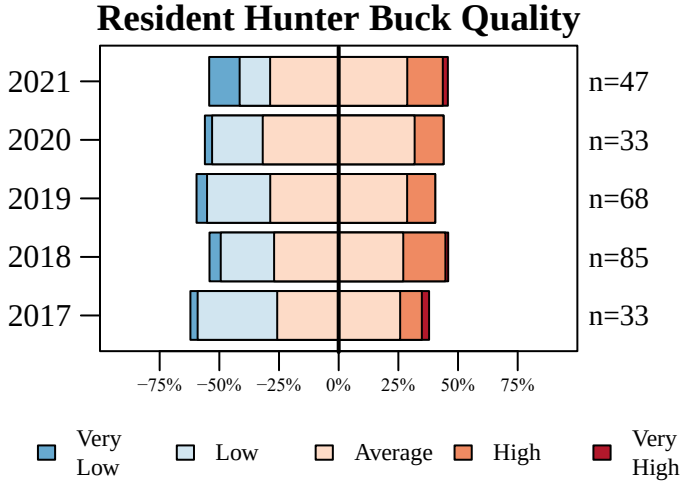

Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 8.

DMU 8: Dearborn

4/11/2022

Deer Management Survey Results

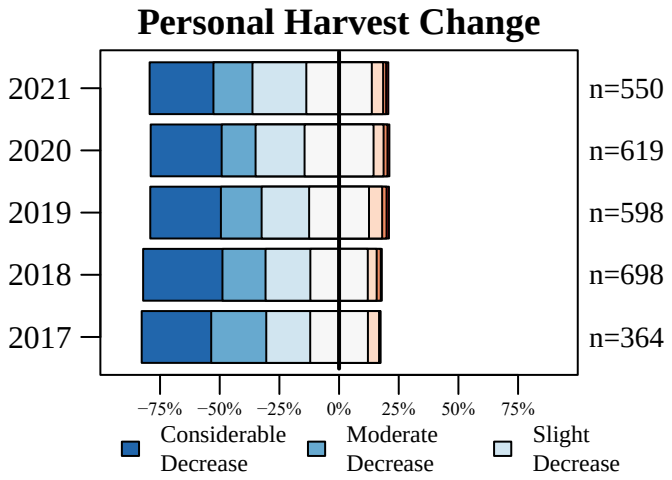

Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 8.

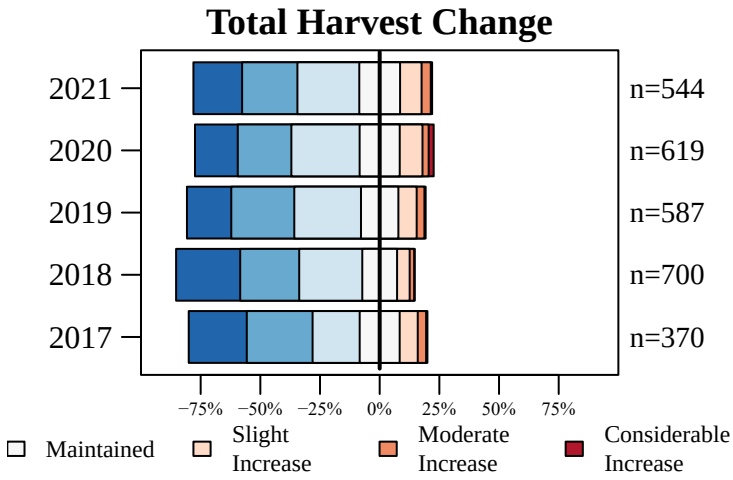

Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 8.

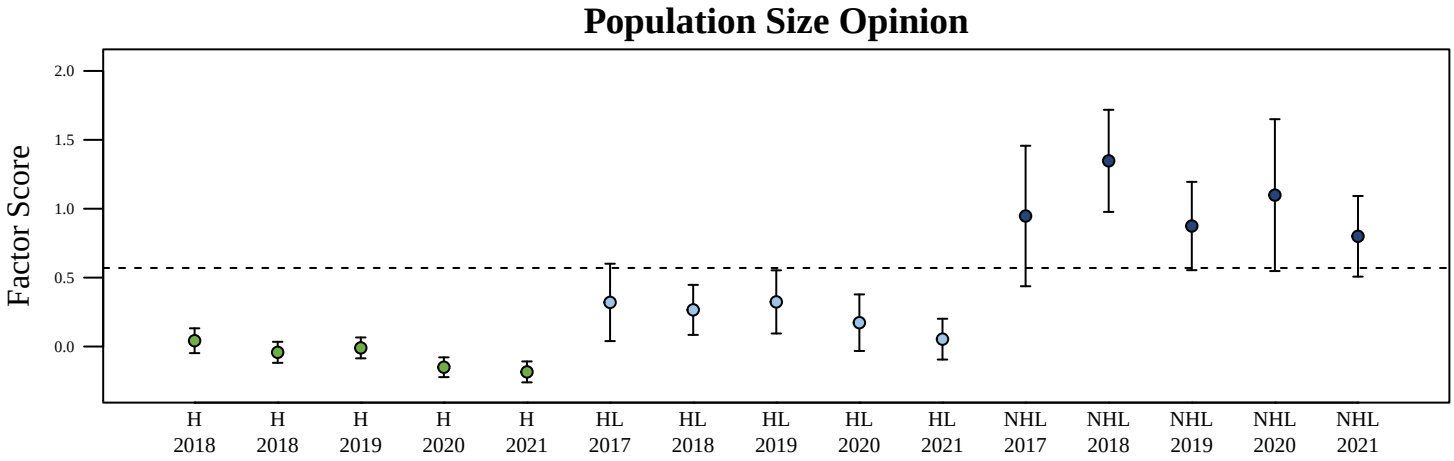

Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

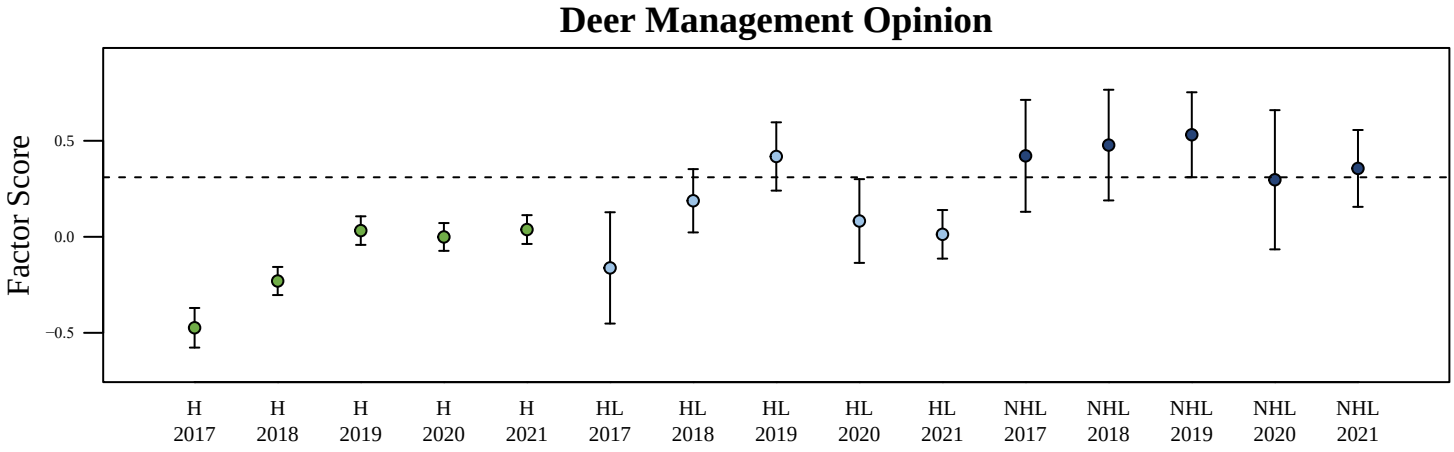

Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

DMU 8: Dearborn

4/11/2022

Deer Management Survey Results

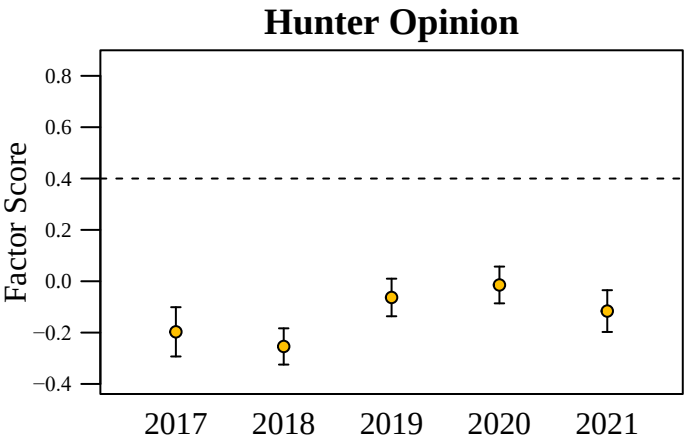

Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

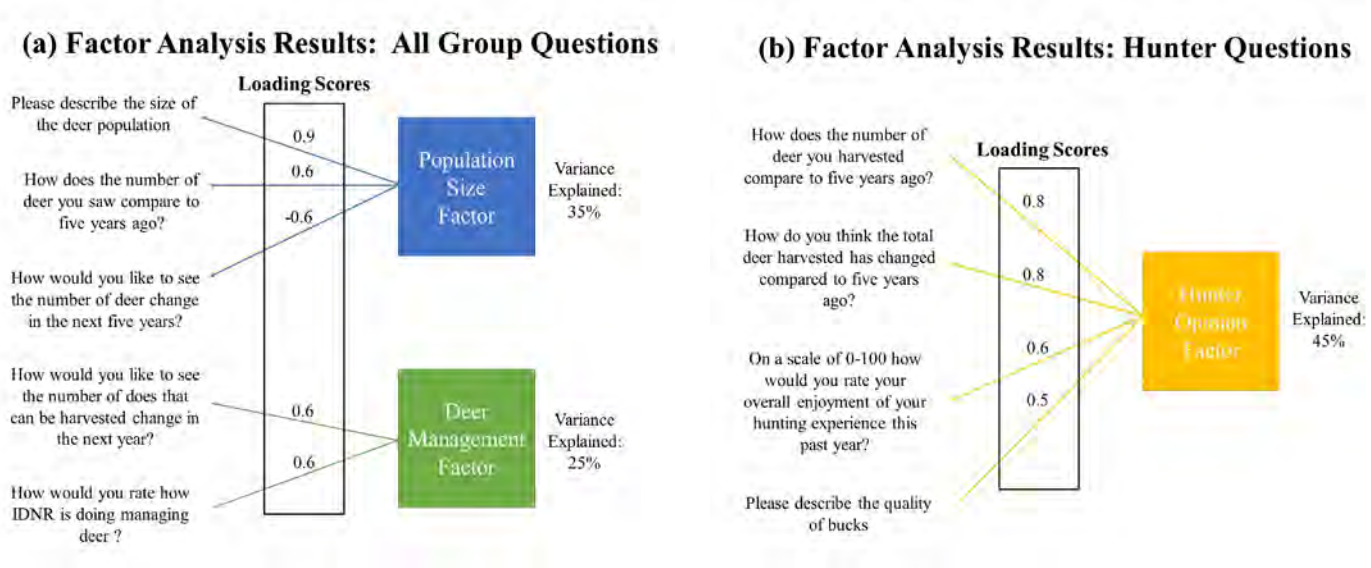

Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: No deer population estimate available for the Dearborn DMU. Dearborn (16), Ohio (5), and Switzerland (23) counties were only lightly affected by EHD in 2019.

DMU 9: Southwest

4/11/2022

Total Square Miles: 3,682
Square Miles of Deer Habitat: 1,305
Percent Deer Habitat: 35

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	12,210		6,151		4.7	6,059		4.6	49.6		209.7		4.6
2009	11,818		6,178		4.7	5,640		4.3	47.7		226.3		4.8
2010	11,780	-0.5	6,075	-0.5	4.7	5,705	-0.6	4.4	48.4		219.0	0.0	4.7
2011	11,747	-0.3	6,019	-0.3	4.6	5,728	-0.3	4.4	48.8		238.5	2.1	4.7
2012	12,409	1.6	5,802	-0.9	4.4	6,607	4.0	5.1	53.2		224.7	0.0	4.7
2013	12,172	0.6	5,888	-1.0	4.5	6,284	0.8	4.8	51.6		260.3	3.5	4.4
2014	11,929	-0.2	5,891	-0.7	4.5	6,038	0.1	4.6	50.6		265.0	1.9	3.9
2015	11,589	-1.5	5,883	-0.5	4.5	5,706	-1.0	4.4	49.2		276.0	1.7	3.9
2016	10,822	-3.5	5,706	-2.4	4.4	5,116	-2.5	3.9	47.3	107	219.0	-1.6	3.6
2017	10,657	-1.8	5,474	-4.5	4.2	5,183	-1.3	4.0	48.6	128	232.4	-0.6	2.6
2018	10,377	-1.6	5,531	-1.3	4.2	4,846	-1.6	3.7	46.7	65	231.7	-0.8	2.0
2019	10,725	-0.5	5,859	0.8	4.5	4,866	-1.1	3.7	45.4	81	224.2	-0.8	1.8
2020	11,927	2.4	6,348	3.5	4.9	5,579	1.3	4.3	46.8	94	199.5	-1.6	2.0
2021	10,787	-0.2	5,905	0.3	4.5	4,882	1.5	3.7	45.3	96	207.3	-1.0	2.0

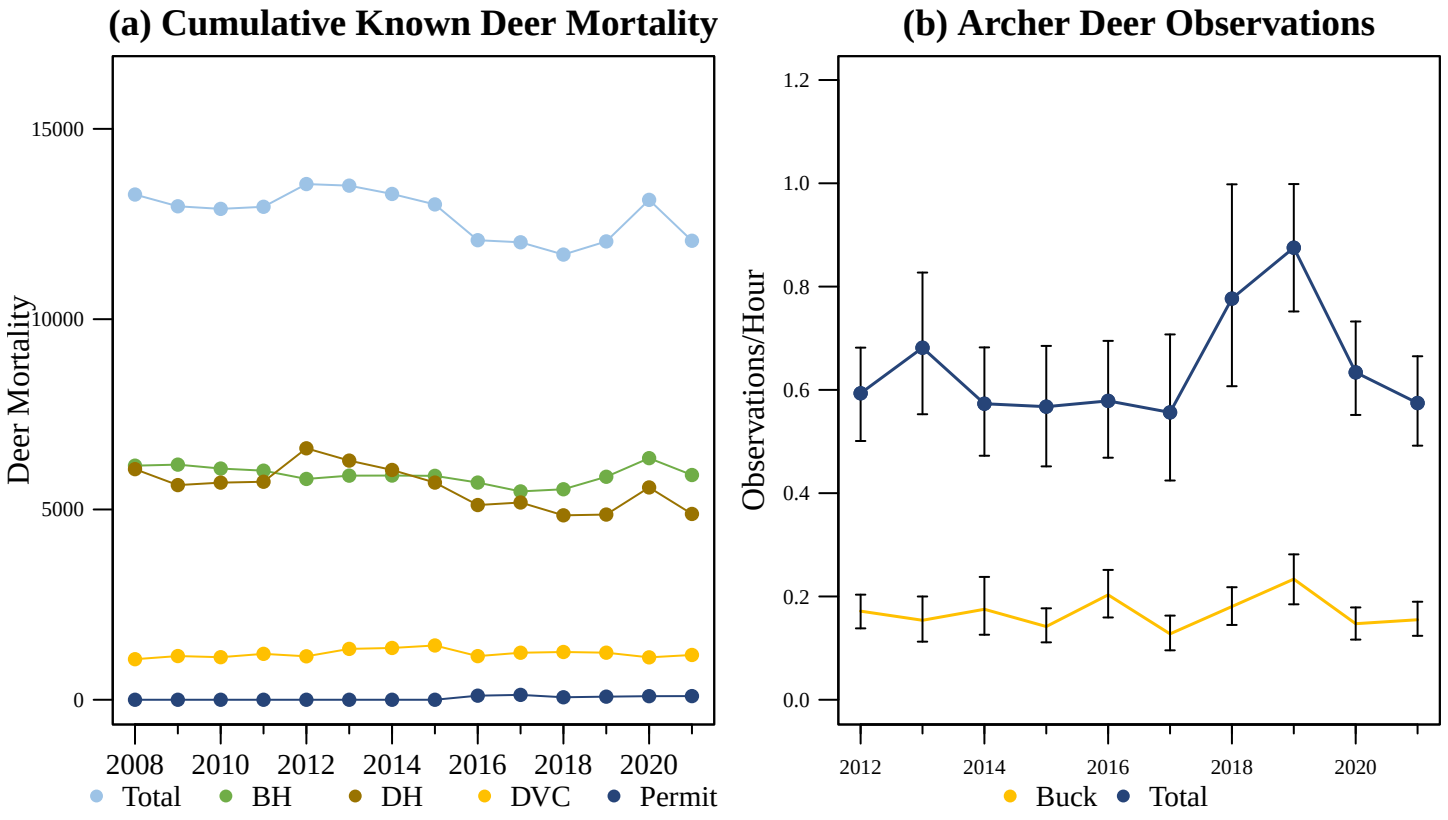

Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Total deer and buck observations per hour based on the Archer's Index.

DMU 9: Southwest

4/11/2022

Total Square Miles: 3,682
Square Miles of Deer Habitat: 1,305
Percent Deer Habitat: 35

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	8,489	3,705	4,765	18	0	3,649	3,852	832	127	25	4	0	0	0	0	0
2017	8,305	3,903	4,386	16	0	3,260	4,030	864	129	18	2	2	0	0	0	0
2018	8,218	3,624	4,572	21	1	3,459	3,866	797	86	9	0	1	0	0	0	0
2019	8,359	3,462	4,870	27	0	3,569	3,869	851	57	10	0	2	1	0	0	0
2020	9,192	3,906	5,254	29	2	3,785	4,331	975	85	13	2	1	0	0	0	0
2021	8,523	3,515	4,986	22	0	3,725	3,913	823	52	8	2	0	0	0	0	0

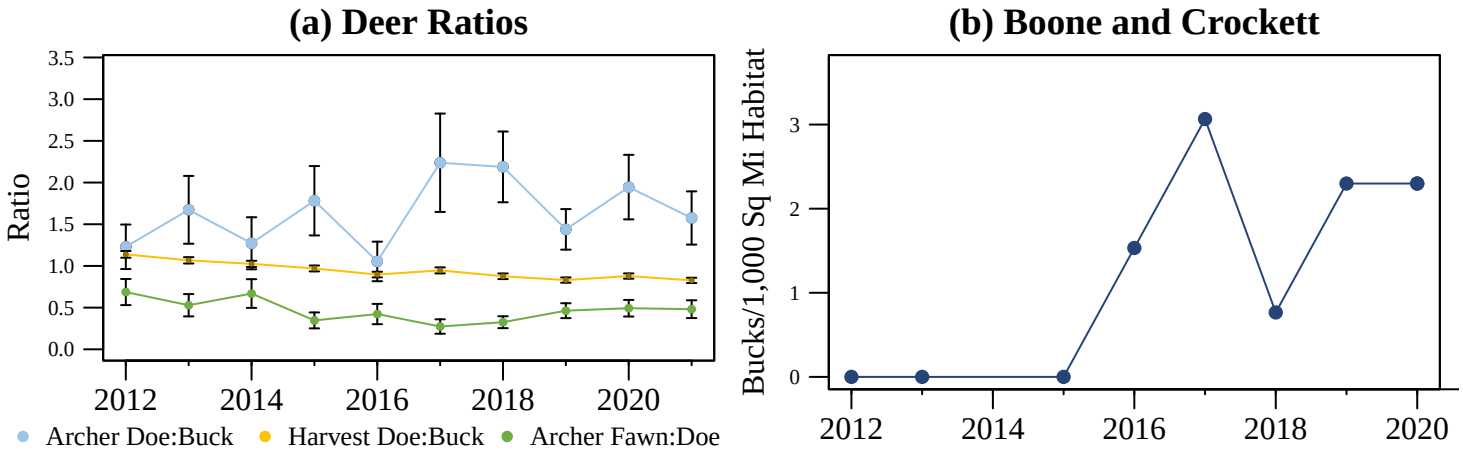

Figure 2. (a) Annual doe:buck ratios and fawn:doe ratios based on the Archer's Index and harvest records. (b) The number of Boone and Crockett bucks (minimum 160 score) per 1,000 square miles of deer habitat.

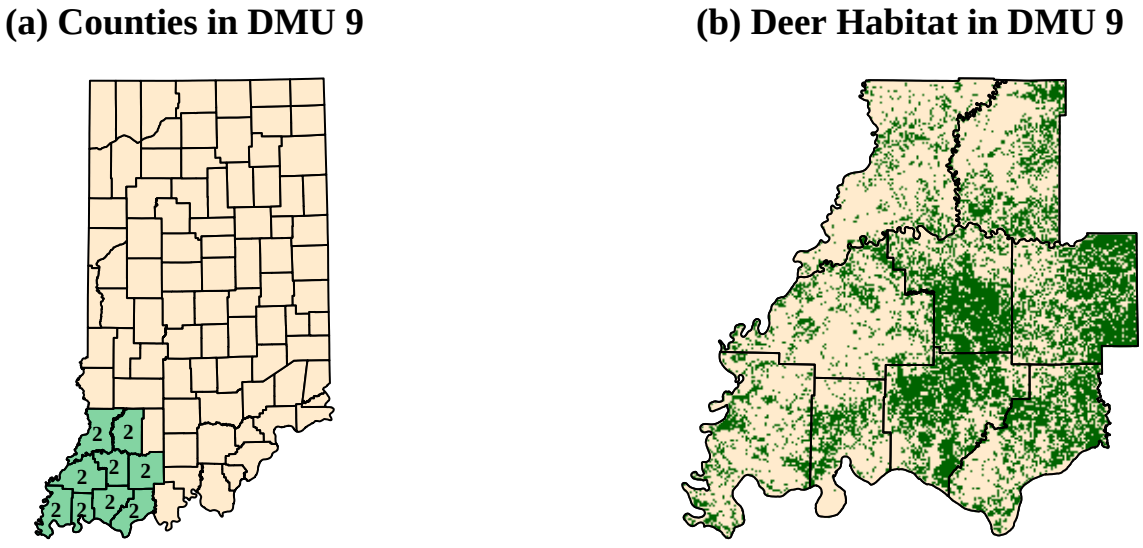

Figure 3. (a) Counties included in DMU 9 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 9.

DMU 9: Southwest

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Deer Management Survey Results

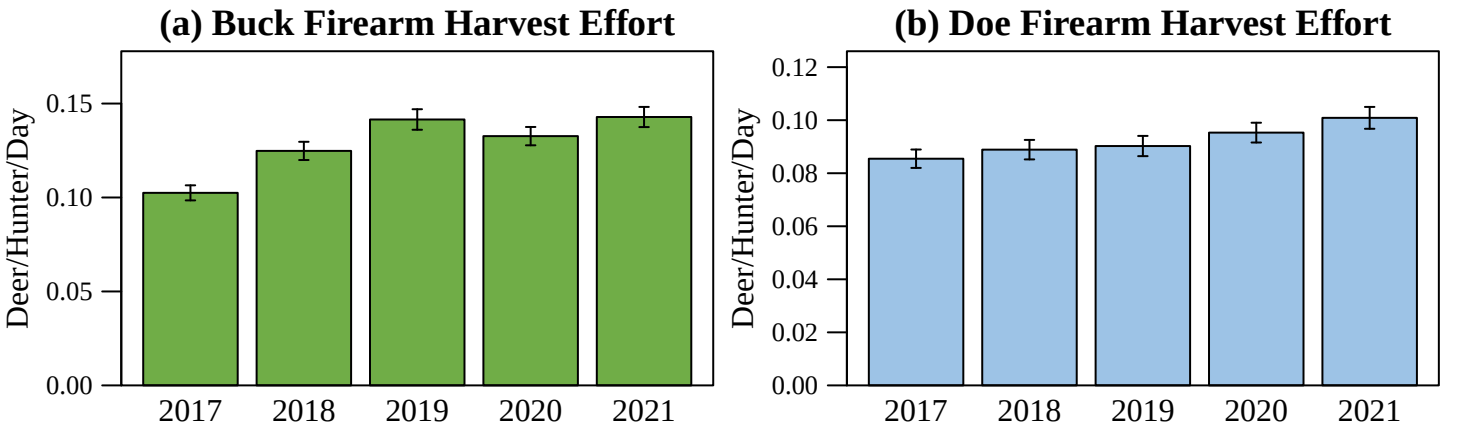


Figure 4. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

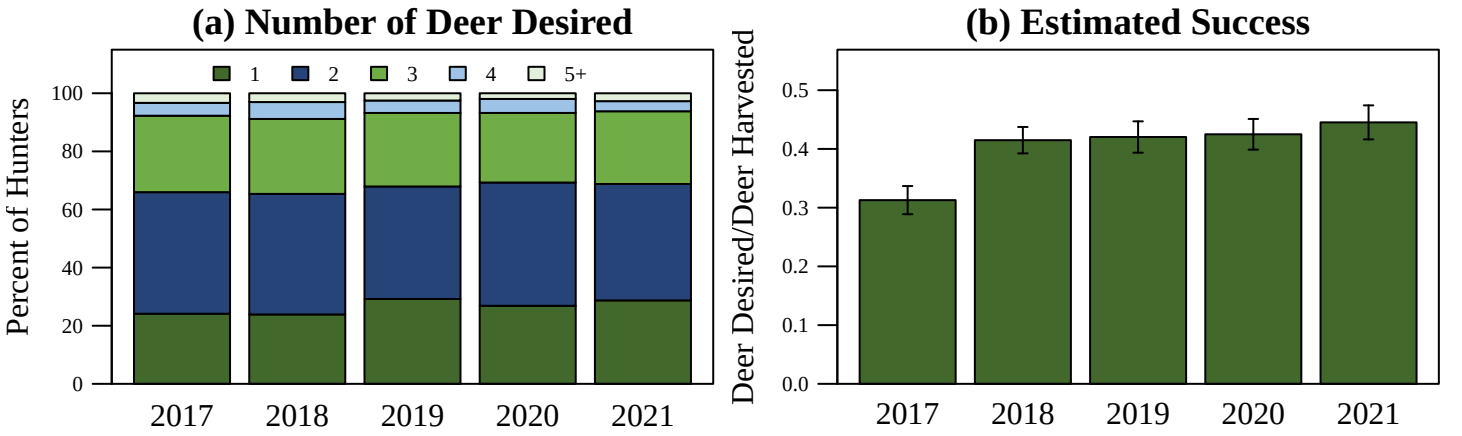


Figure 5. (a) The annual percent of hunters wishing to harvest each number of deer as reported in the deer management survey. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

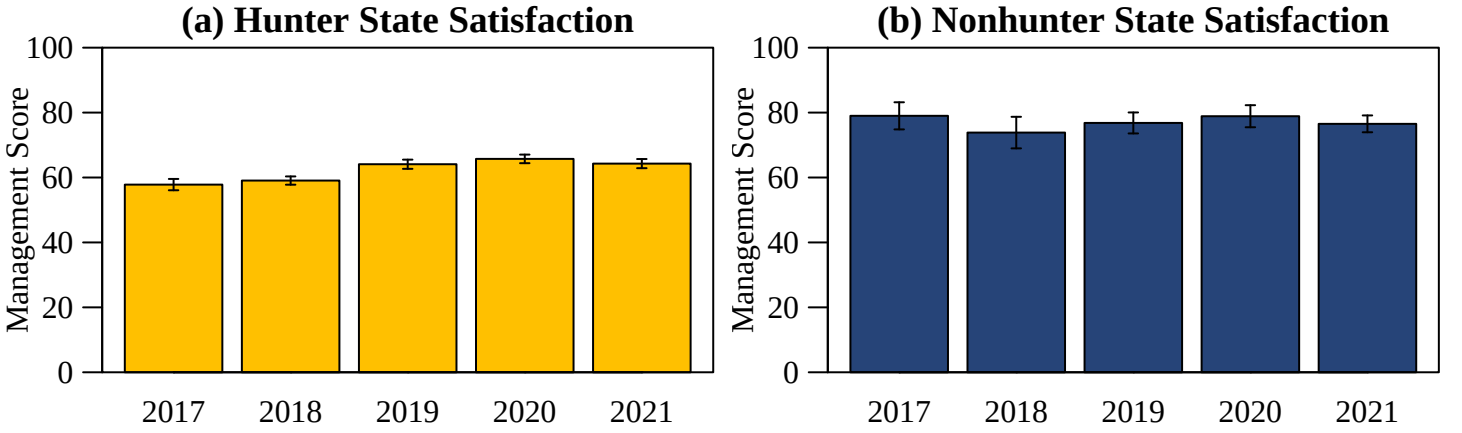


Figure 6. Hunters (a) and nonhunters (b) were asked to score the DNR's statewide deer management on a scale of 0 (poor) to 100 (excellent).

DMU 9: Southwest

4/11/2022

Deer Management Survey Results

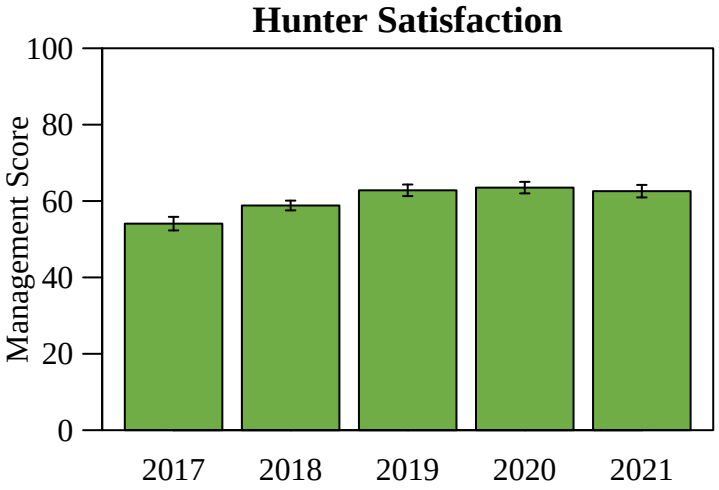


Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 9 where they hunt.

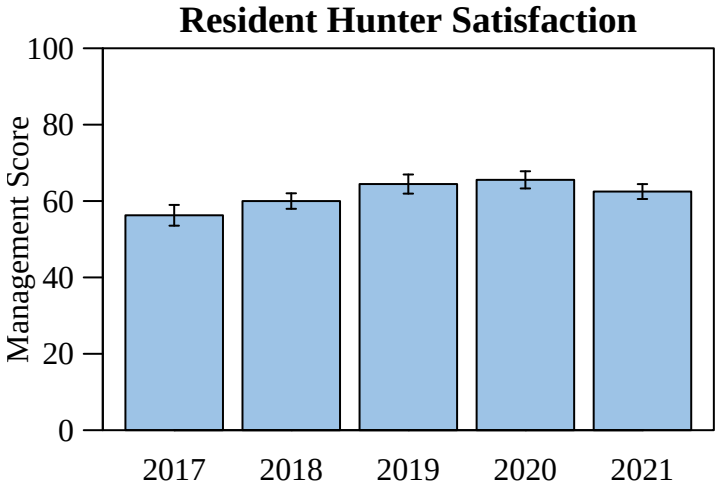
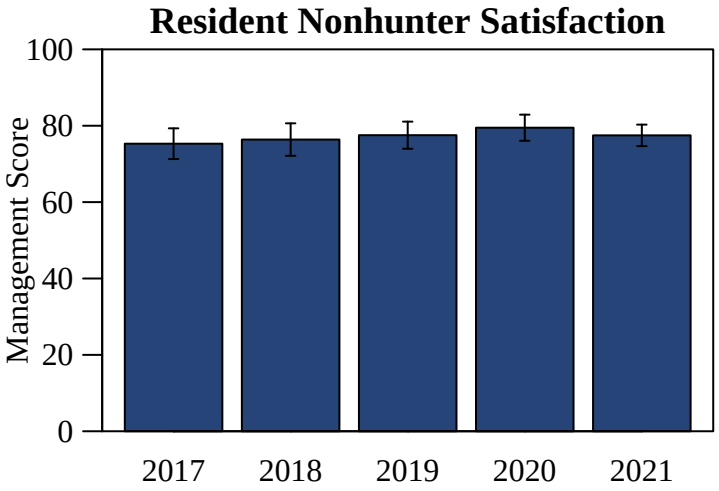


Figure 8. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 9 where they live.



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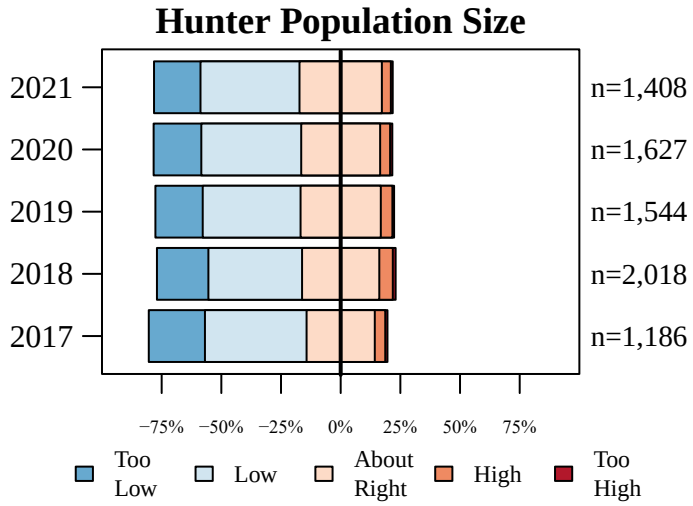

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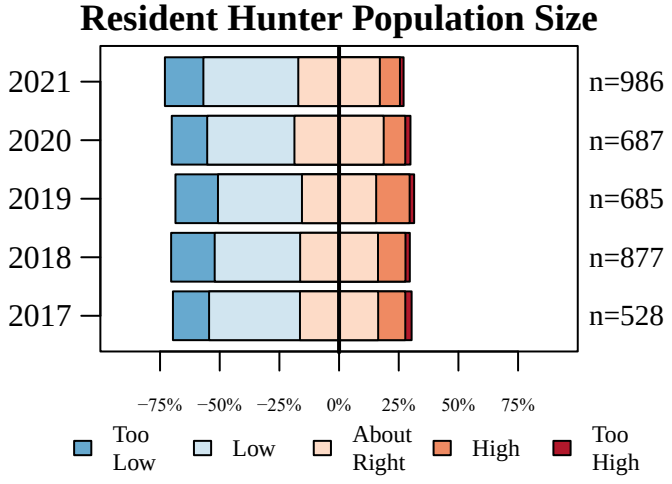

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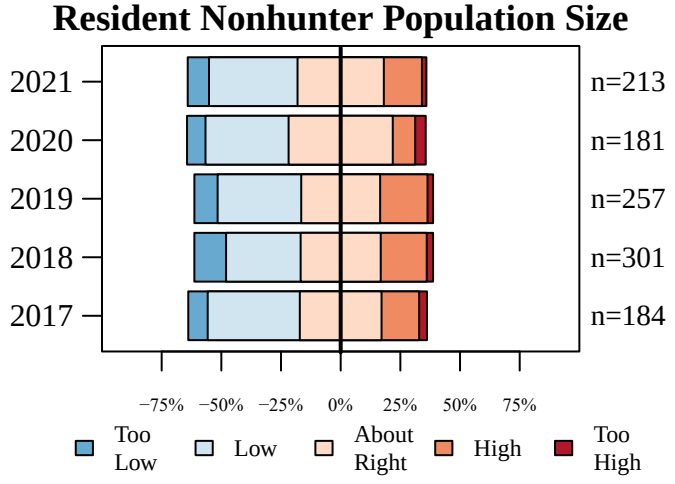

Figure 12. The current size of the deer population described by nonhunters in the county where they live in DMU 9.

DMU 9: Southwest

4/11/2022

Deer Management Survey Results

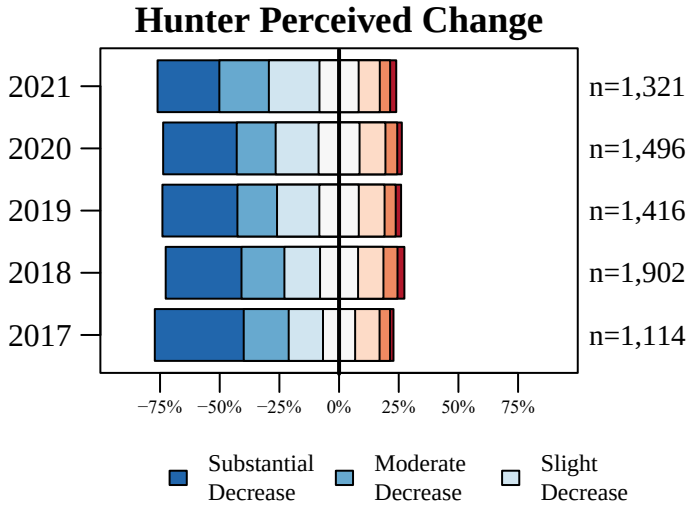

Figure 13. The number of deer seen compared to five years ago described by hunters in the county where they hunt in DMU 9.

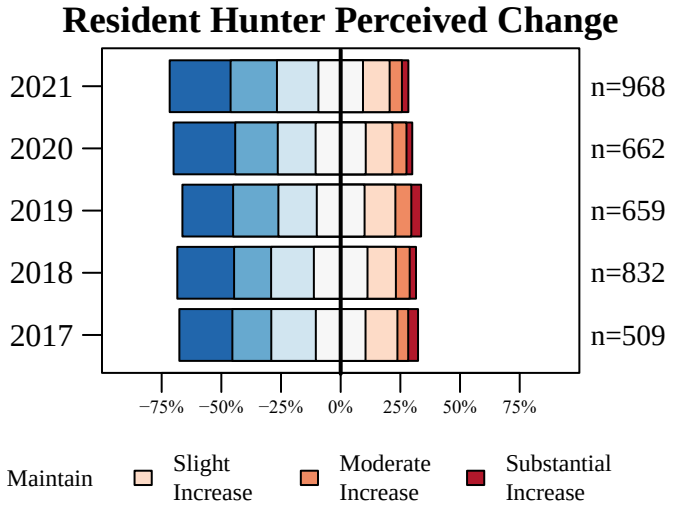

Figure 14. The number of deer seen compared to five years ago described by hunters in the county where they live in DMU 9.

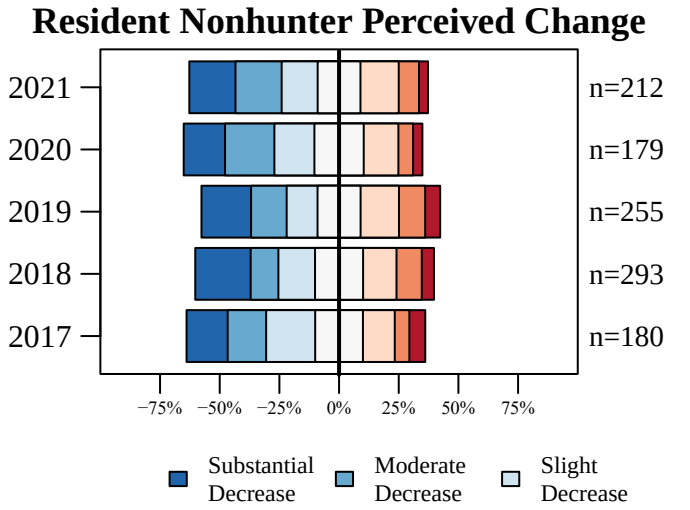

Figure 15. The number of deer seen compared to five years ago described by nonhunters in the county where they live in DMU 9.

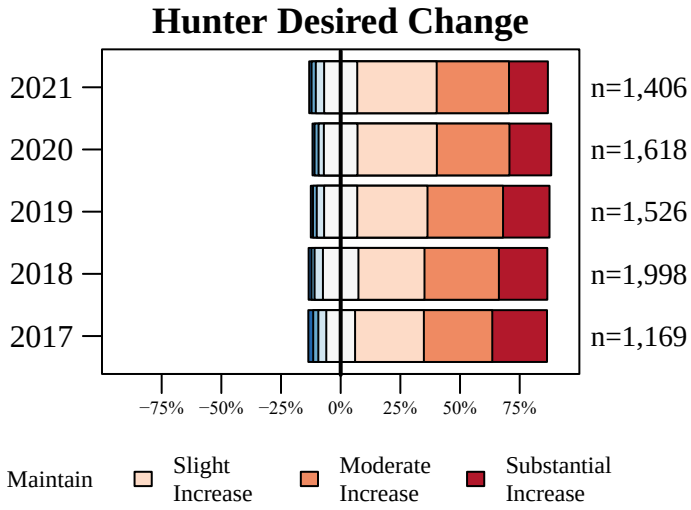

Figure 16. The desired change in the size of the deer population described by hunters in the county where they hunt in DMU 9.

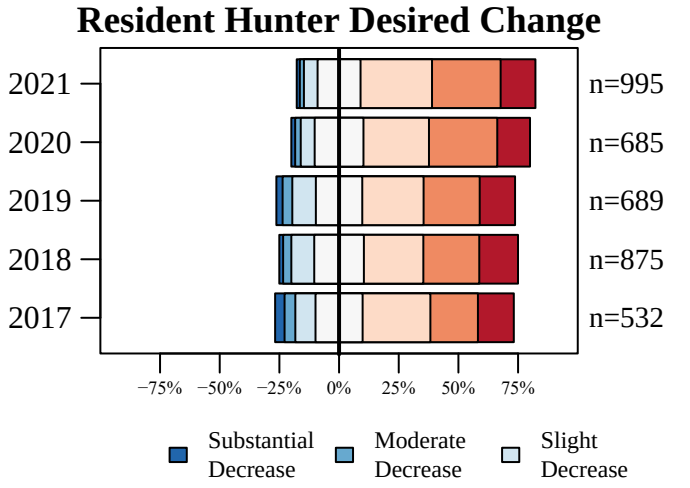

Figure 17. The desired change in the size of the deer population described by hunters in the county where they live in DMU 9.

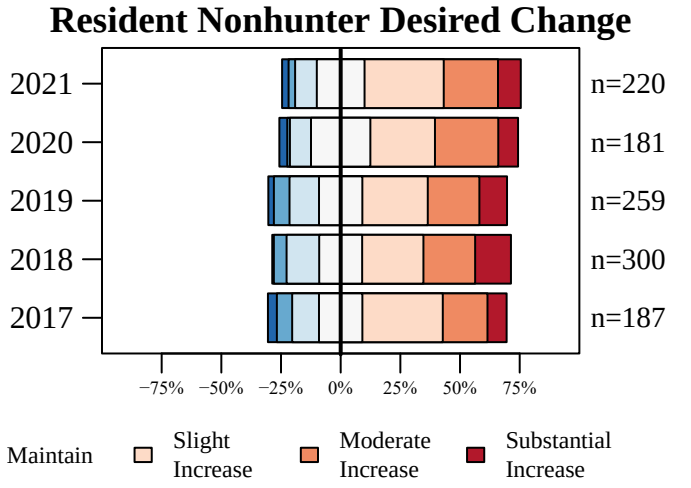

Figure 18. The desired change in the size of the deer population described by nonhunters in the county where they live in DMU 9.

DMU 9: Southwest

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Deer Management Survey Results

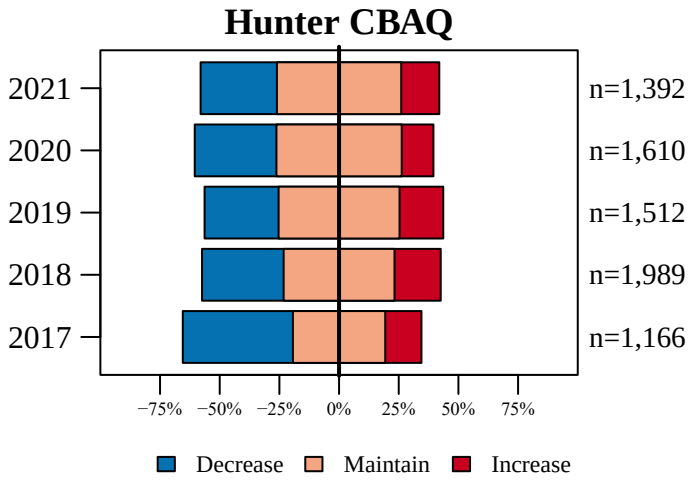

Figure 19. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they hunt in DMU 9.

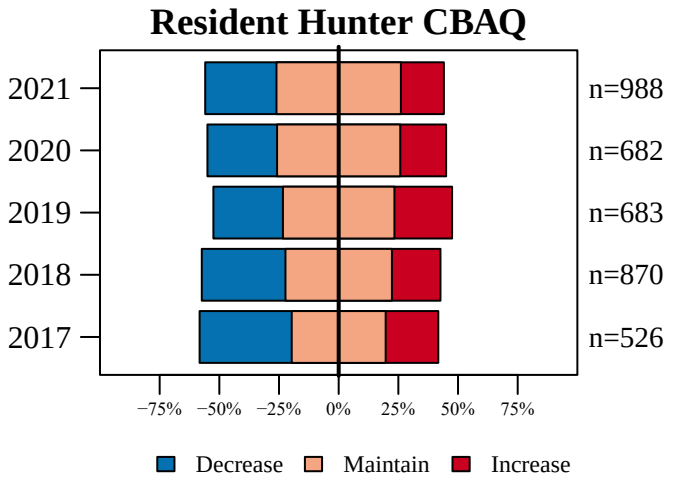

Figure 20. Opinion on how the County Bonus Antlerless Quota should change from hunters in the county where they live in DMU 9.

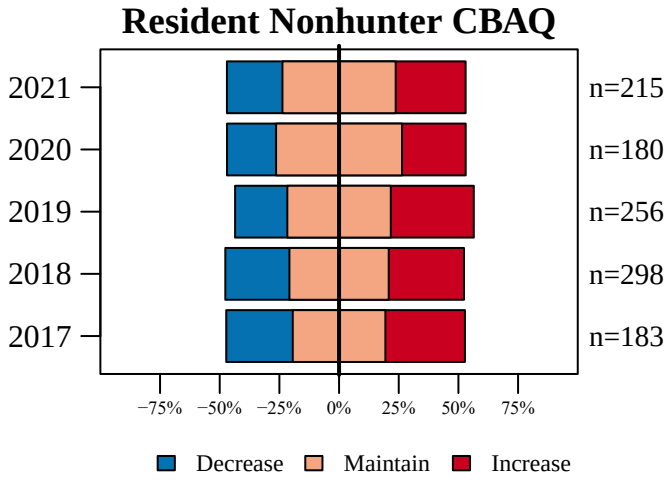

Figure 21. Opinion on how the County Bonus Antlerless Quota should change from nonhunters in the county where they live in DMU 9.

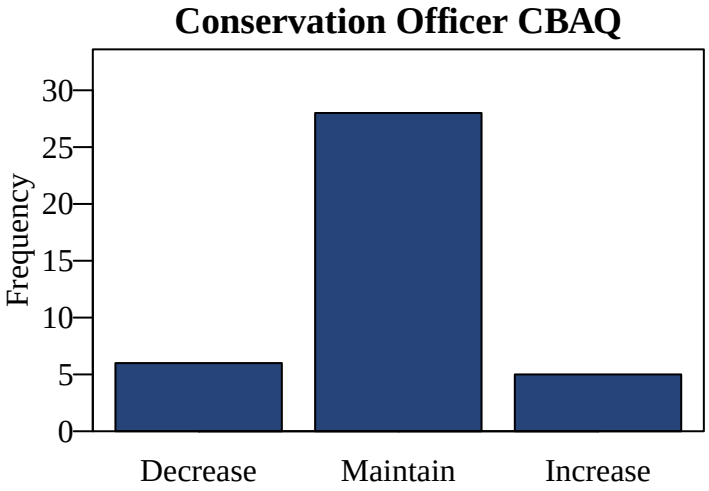

Figure 22. Conservation officers were asked how the County Bonus Antlerless Quota should change in the county where they patrol in DMU 9.

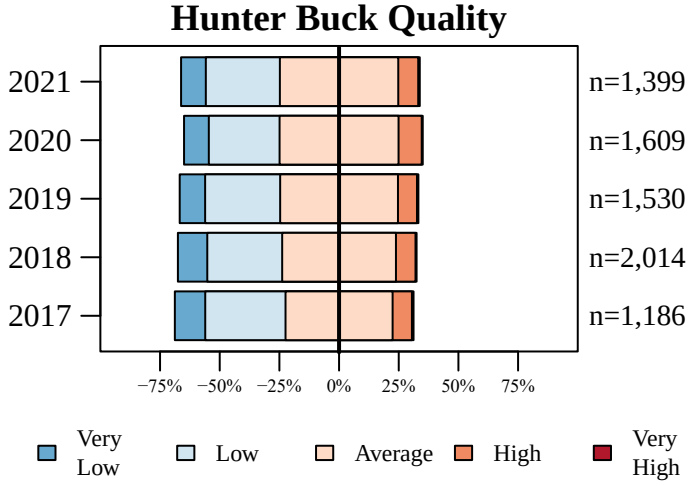

Figure 23. Hunters describe the quality of bucks in the county where they hunt in DMU 9.

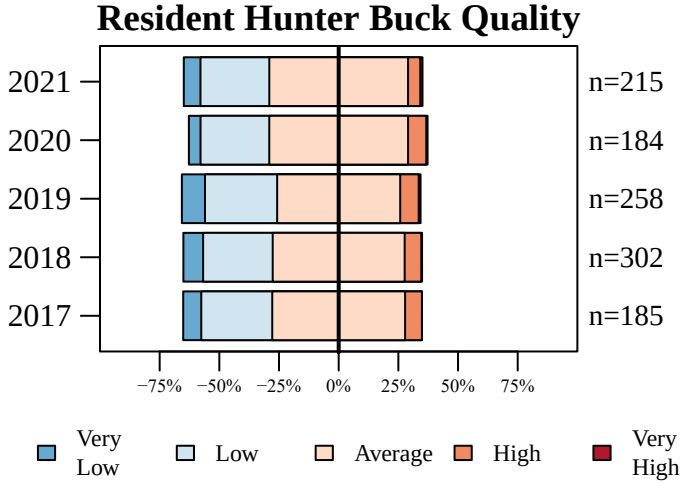

Figure 24. Hunters describe the quality of bucks in the county where they live in DMU 9.

DMU 9: Southwest

4/11/2022

Deer Management Survey Results

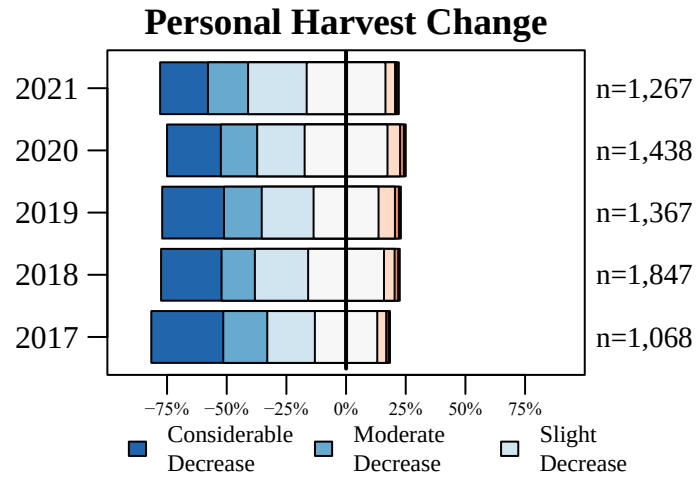

Figure 25. Opinion of hunters on how their personal number of harvested deer has changed over the last five years in a county in DMU 9.

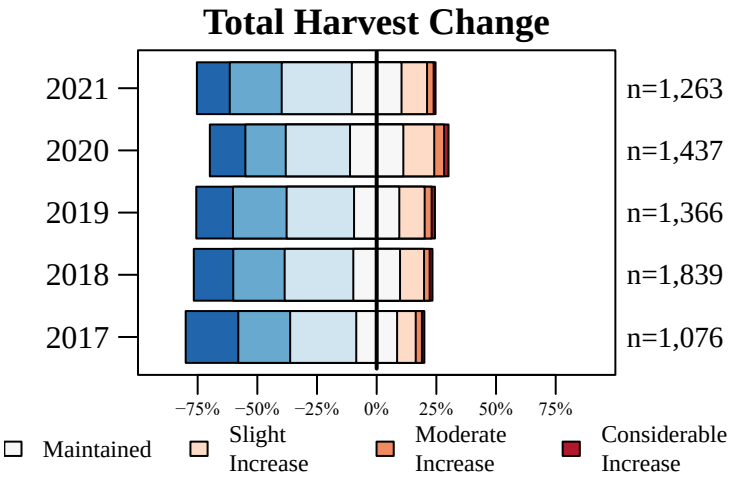

Figure 26. Opinion of hunters on how the total number of harvested deer has changed over the last five years in a county in DMU 9.

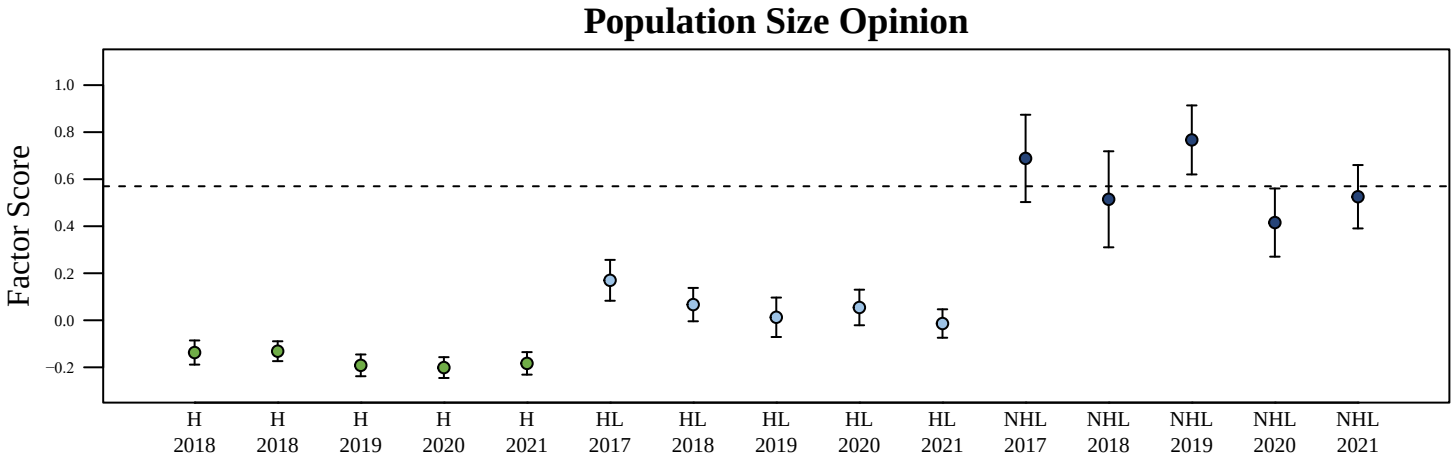

Figure 27. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

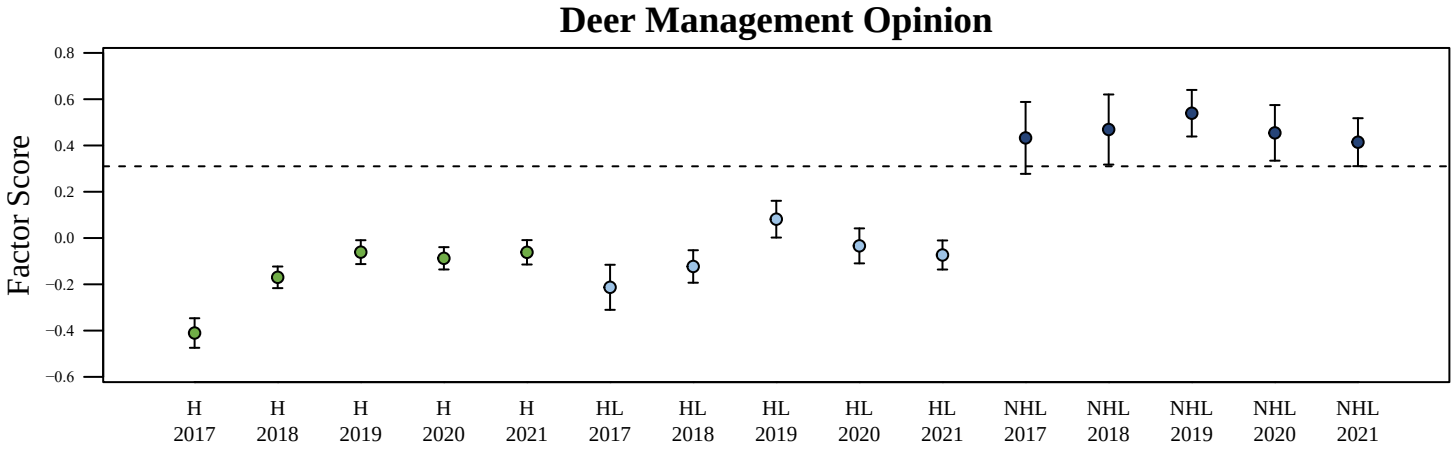

Figure 28. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

DMU 9: Southwest

4/11/2022

Deer Management Survey Results

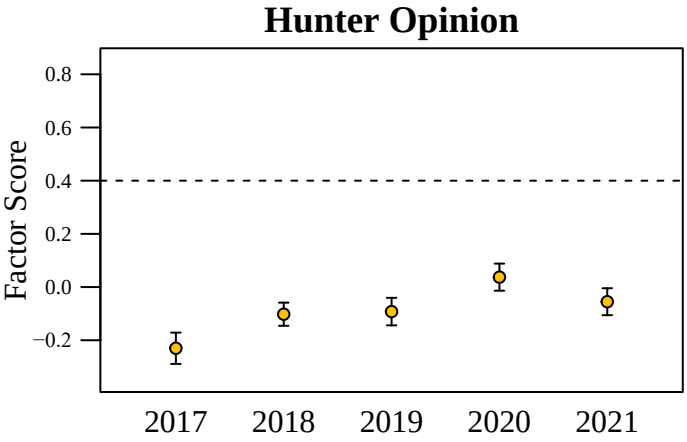

Figure 29. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

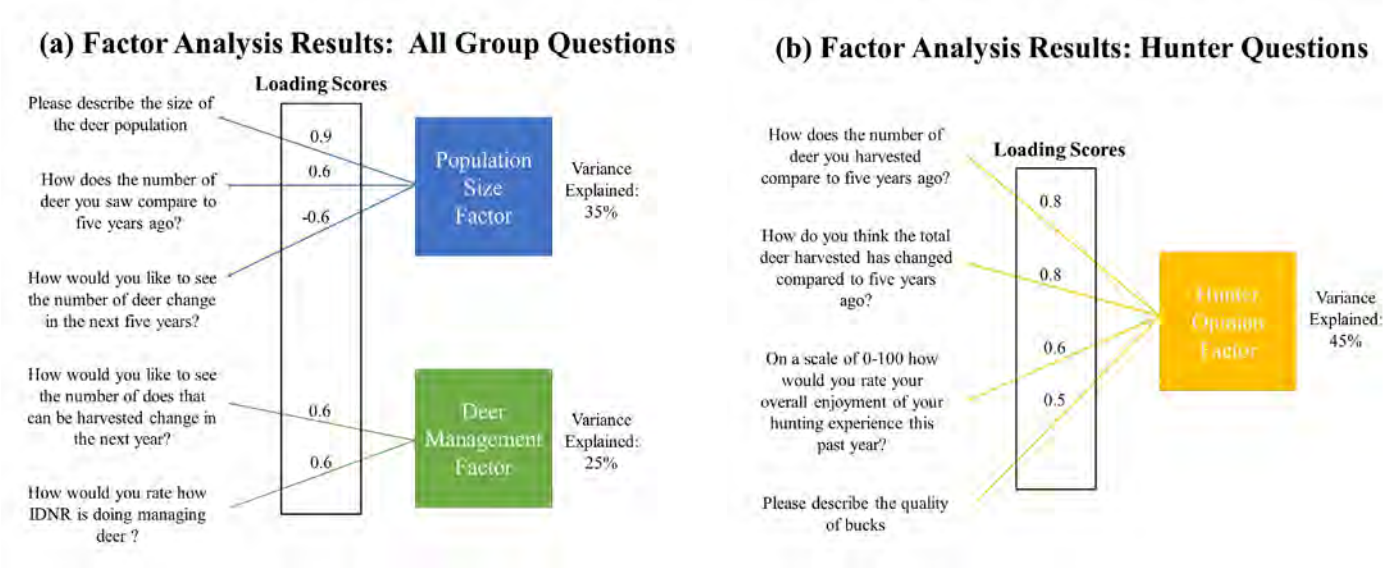

Figure 30. Results from two factor analyses used to develop the population opinion (a), management opinion (a), and hunter opinion (b) scores. Higher loading scores indicate a stronger correlation between the orignal question and the derived factor. These figures are included to help interpret Figure 27, Figure 28, and Figure 29.

Notes: No deer population estimate available for the Southwest DMU. Daviess (12), Dubois (27), Gibson (14), Knox (3), Pike (12), Posey (2), Spencer (12), Vanderburgh (1) and Warrick (8) counties were only lightly affected by EHD in 2019.

DMU 10: Urban

4/11/2022

Total Square Miles: 403
Square Miles of Deer Habitat: 42
Percent Deer Habitat: 10

Table 1. Total harvest, buck harvest, and doe harvest (error < 1 percent). Damage permits are issued by DNR to landowners to control deer damage. Deer vehicle collisions (DVC) and miles traveled are reported by the Indiana Department of Transportation. Mean CBAQ is the average county bonus antlerless quota of all counties in the DMU. The trend in total harvest, buck harvest, doe harvest, and DVCs are in standard deviations (SD) and are equivalent to effect size. A change greater than 2 SD is considered both a large and statistically significant effect size.

Year	Total	Total Trend in SD	Buck Harvest	Buck Trend in SD	Buck Harvest per SQ MI Habitat	Doe Harvest	Doe Trend in SD	Doe Harvest per SQ MI Habitat	% Doe in Harvest	Damage Permit Deer Taken	DVC per Billion Miles Traveled	DVC Trend in SD	Mean CBAQ
2008	328		192		4.6	136		3.2	41.5		11.4		8
2009	351		224		5.3	127		3.0	36.2		12.4		8
2010	352	1.0	191	0.2	4.5	161	2.1	3.8	45.7		11.6	-0.4	8
2011	375	1.4	207	0.5	4.9	168	1.8	4.0	44.8		12.2	0.3	8
2012	501	7.5	179	-1.9	4.3	322	8.1	7.7	64.3		9.0	-2.1	8
2013	510	1.9	203	0.3	4.8	307	1.6	7.3	60.2		11.2	-0.1	8
2014	469	0.6	166	-2.0	4.0	303	1.0	7.2	64.6		9.5	-1.3	8
2015	444	0.0	167	-1.3	4.0	277	0.3	6.6	62.4		10.5	-0.1	8
2016	416	-0.8	166	-0.9	4.0	250	-0.4	6.0	60.1	3	9.8	-0.5	8
2017	448	-0.5	187	0.7	4.5	261	-1.1	6.2	58.3	174	11.0	1.2	8
2018	435	-0.6	170	-0.5	4.0	265	-0.6	6.3	60.9	123	10.0	-0.5	3
2019	444	0.1	196	2.8	4.7	248	-1.1	5.9	55.9	100	7.6	-4.3	2
2020	493	4.3	196	1.4	4.7	297	3.1	7.1	60.2		8.7	-0.8	2
2021	428	-0.7	174	-0.6	4.1	254	1.7	6.0	59.3	94	9.5	0.1	2

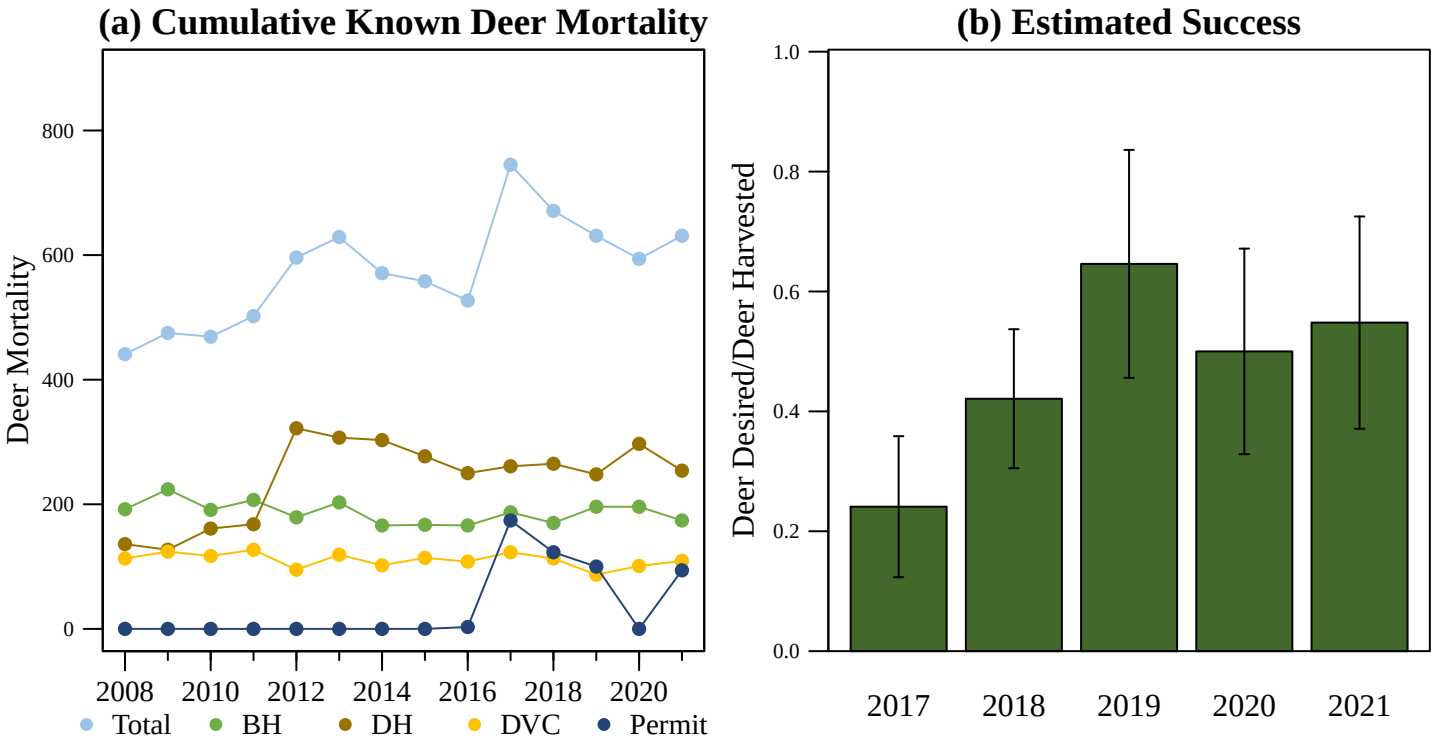

Figure 1. (a) The total known annual deer mortality based on buck harvests (BH), doe harvests (DH), deer vehicle collisions (DVC), and deer permit takes. (b) Success rate is estimated from the deer management survey as the Number of Harvested Deer/Number of Deer Desired (reported only; does not account for attempts that were not made). Larger values (i.e. taller bars) indicate greater success.

DMU 10: Urban

4/11/2022

Total Square Miles: 403
Square Miles of Deer Habitat: 42
Percent Deer Habitat: 10

Table 2. Estimated number of antlered (A) and antlerless (AL) deer harvested per hunter. Estimated totals may not match exactly with total number of deer harvested. Reporting errors are examined and investigated as they are located; therefore, subsequent reports may contain corrected totals.

Year	Total Hunters	0 A	1 A	2 A	3 A	0 AL	1 AL	2 AL	3 AL	4 AL	5 AL	6 AL	7 AL	8 AL	9 AL	10 AL
2016	313	182	127	4	0	71	211	24	6	1	0	0	0	0	0	0
2017	316	187	120	9	0	65	206	35	8	0	2	0	0	0	0	0
2018	303	179	120	4	0	63	188	40	10	1	1	0	0	0	0	0
2019	311	186	112	13	0	64	198	40	8	1	0	0	0	0	0	0
2020	337	190	140	7	0	64	227	32	8	6	0	0	0	0	0	0
2021	311	171	134	6	0	63	220	22	6	0	0	0	0	0	0	0

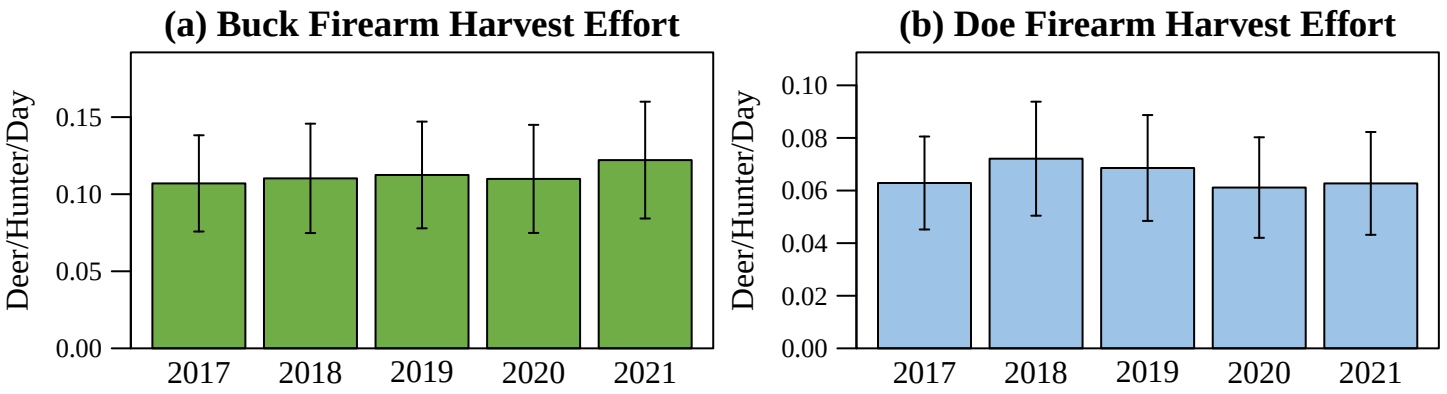

Figure 2. Firearm harvest effort is the number of bucks (a) and does (b) killed by firearms per hunter divided by the mean number of days hunted per hunter during the firearm season based on data reported in the deer management survey. Larger values (i.e taller bars) indicate less effort required to harvest a deer.

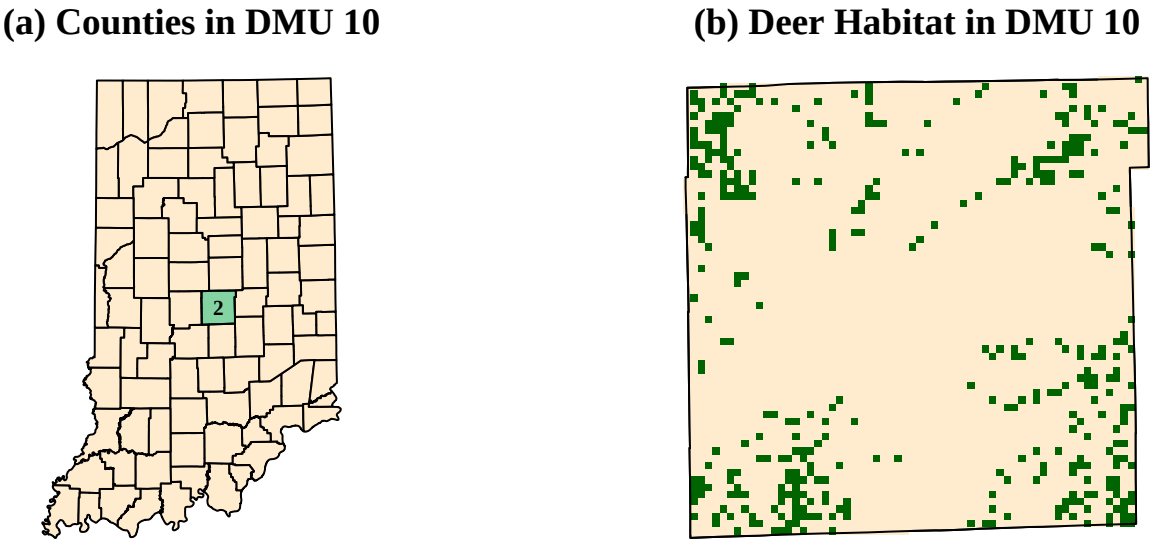

Figure 3. (a) Counties included in DMU 10 for summarizing harvest and deer management survey statistics. Labels are the 2021 county bonus anterless quotas. (b) Green represents the land use types classified as deer habitat in DMU 10.

DMU 10: Urban

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Deer Management Survey Results

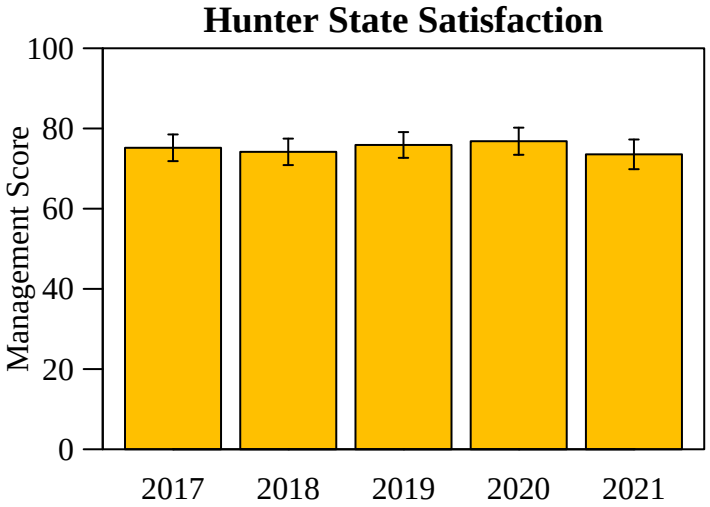


Figure 4. Hunters were asked to score the DNR's state deer management on a scale of 0 (poor) to 100 (excellent).

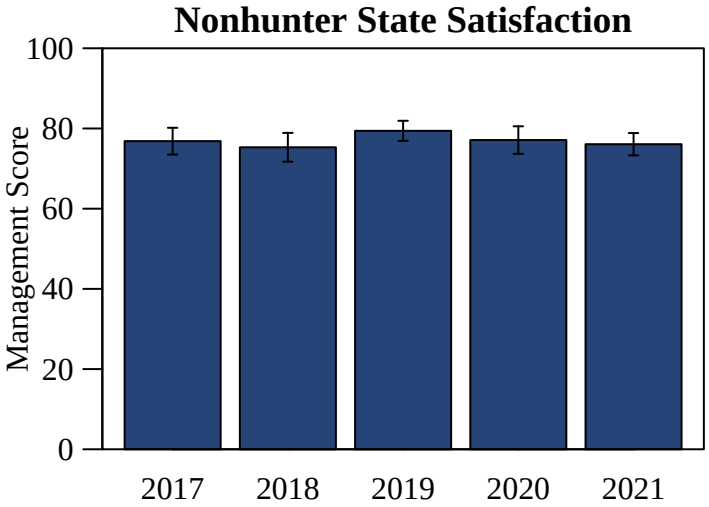


Figure 5. Nonhunters were asked to score the DNR's state deer management on a scale of 0 (poor) to 100 (excellent).

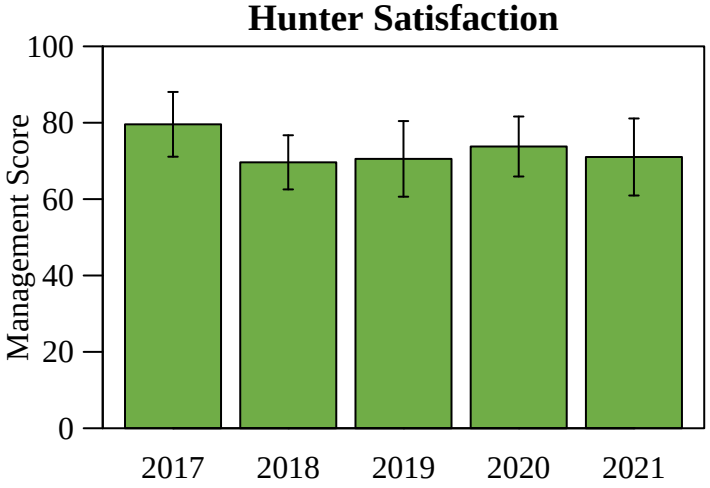


Figure 6. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 10 where they hunt.

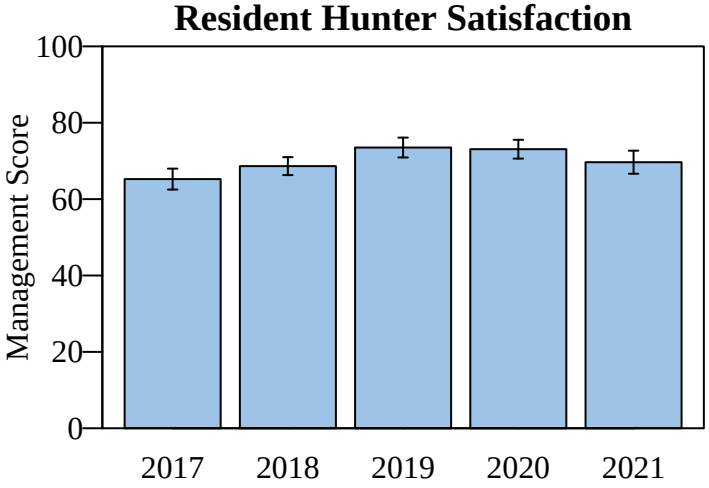


Figure 7. Hunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 10 where they live.

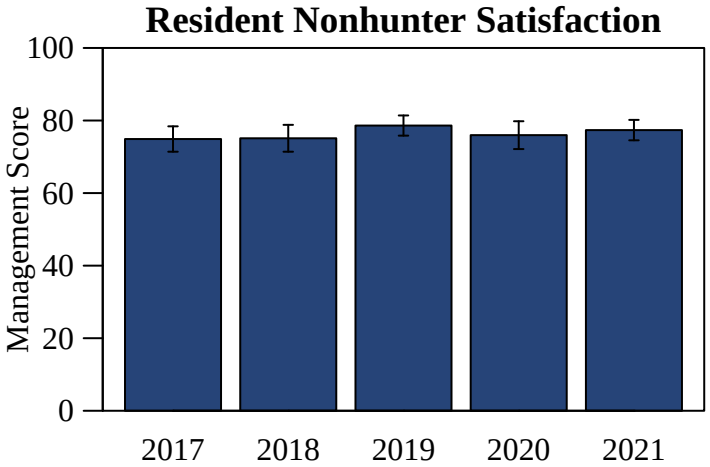


Figure 8. Nonhunters were asked to score the DNR's county deer management on a scale of 0 (poor) to 100 (excellent) for the county in DMU 10 where they live.

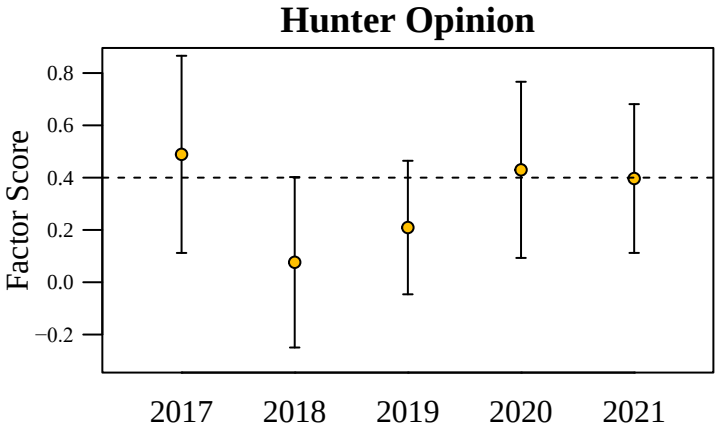


Figure 9. Hunter opinon scores over five years of the deer management survey. The score was aggregated using factor analysis of questions asked only to hunters. The dashed line represents the score if all questions are answered neutrally.

DMU 10: Urban

4/11/2022

Deer Management Survey Results

Population Size Opinion

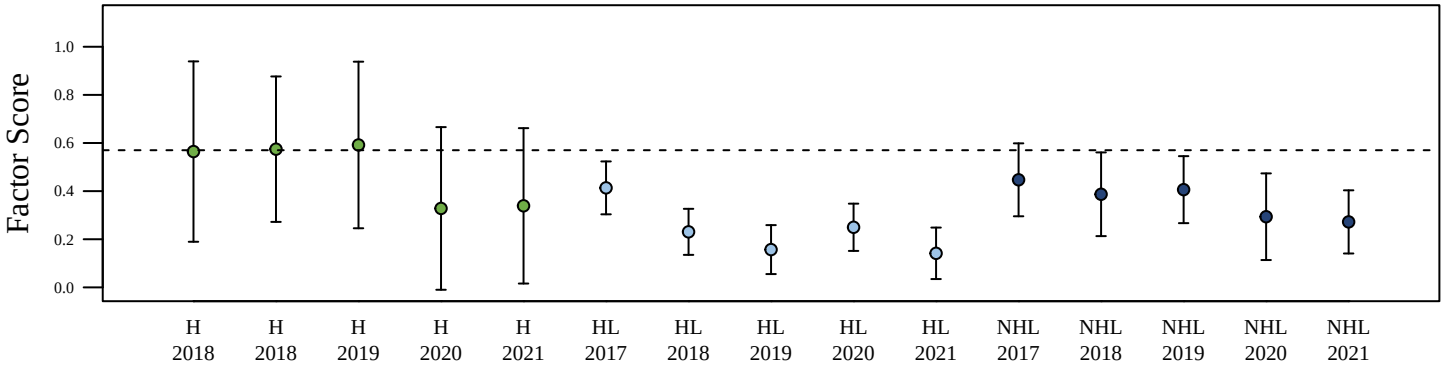


Figure 10. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer population size. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

Deer Management Opinion

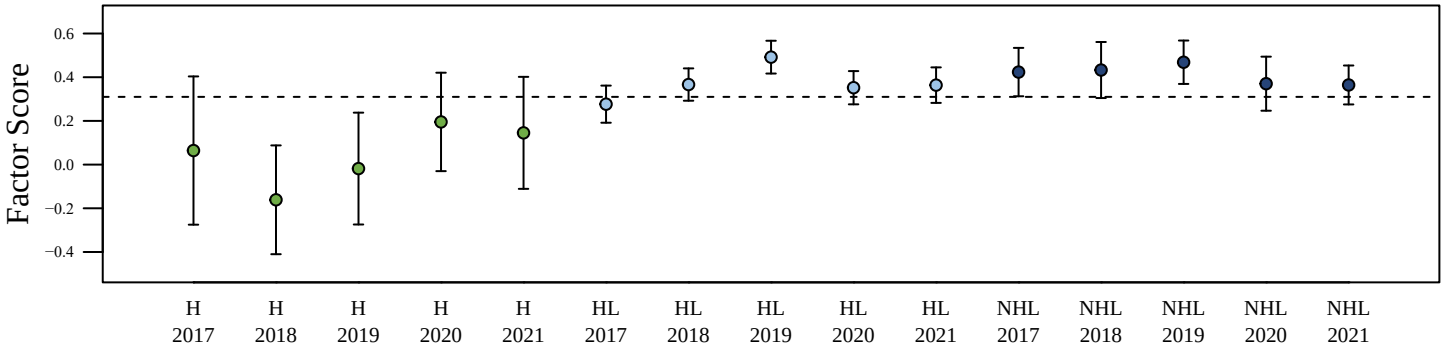
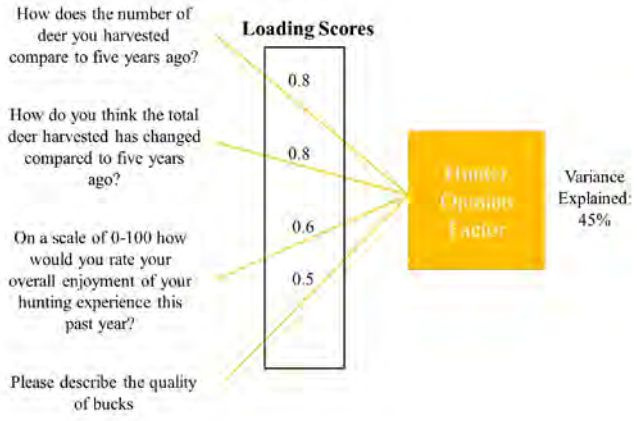
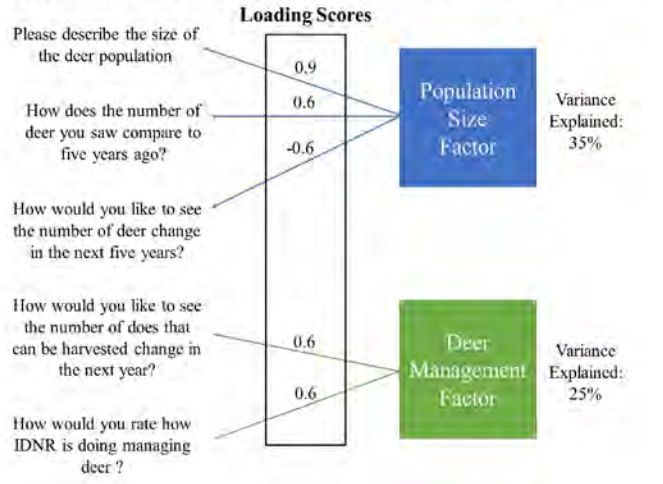


Figure 11. The opinion of nonhunters (NHL) and hunters in the county where they live (HL) and hunters in the county where they hunt (H) on deer management. The score was aggregated using factor analysis of questions asked to all participants. The dashed line represents the score if all questions are answered neutrally.

(a) Factor Analysis Results: Hunter Questions



(b) Factor Analysis Results: All Group Questions



Notes: No deer population estimate available for the Urban DMU.