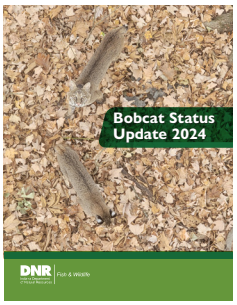
2024 Bobcat Status Update

DNR
Indiana Department of Natural Resources

Fish & Wildlife



Cover photo submitted by Autumn Duvall


Suzy Podgurski

Overview

Bobcats, a species native to Indiana, were thought to no longer exist in the state by the early 1900s. During the 1970s, bobcats were detected again as they naturally expanded back into Indiana. They were never reintroduced to the state. Genetics research shows that Indiana's bobcats, even those in the northern part of the state, primarily expanded from southern states like Kentucky, Arkansas, and Tennessee.

Indiana now has a recorded bobcat sighting in nearly every county, though not every county has an established bobcat population. Having an established population means there are bobcats living and reproducing in an area. Females with young kittens would be an example of an indicator of established bobcat populations. Sightings of young bobcats moving through an area can happen without an established population.

Bobcats are now considered common in southern and west-central Indiana and use forested areas along Indiana's creeks, rivers, and streams to move throughout the state. Indiana DNR has information from survey and research work on bobcats, spanning from the biological aspects of bobcats to the social aspects of bobcat management, such as people's values, opinions, and preferences.

Surveys

Indiana DNR staff have monitored bobcats in Indiana since the 1990s, and those efforts continue today. This work allows DNR staff to track bobcat population trends through time as well as public observations.


Ryan Montgomery

Archer's Index

The Archer's Index is a population trend survey based on observations from volunteers across the state. Volunteer bowhunters sign up to participate and report their hours hunted, the county they hunted in, and species observed while hunting during the October and early November archery season. Volunteers typically report 2,000–3,000 days and 10,000–15,000 hours hunted every year. Since the survey began in 1992, the average bobcat observations on the Archer's Index have increased from an average of under one bobcat seen per 1,000 hours hunted in the 1990s to four bobcats seen per 1,000 hours hunted since 2020.

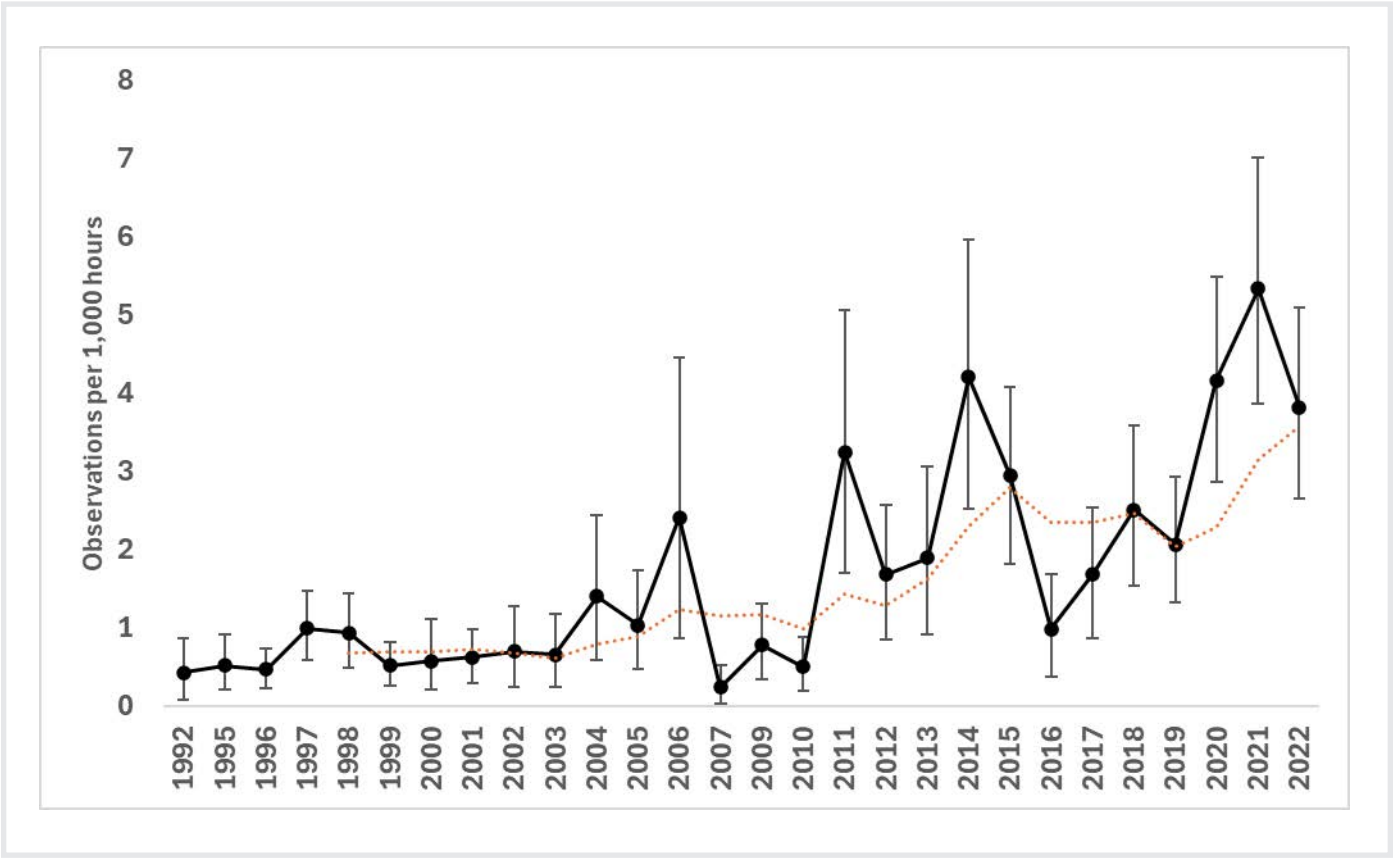


Figure 1. Statewide bobcat observations from 1992-2022 from the Archer's Index, a volunteer-based survey conducted every fall during October and early November in Indiana.

Report-A-Mammal

Members of the public help Indiana DNR understand when bobcats may be expanding into new counties by reporting bobcat sightings. In 2020, DNR launched Report-A-Mammal, an online reporting form that collects public observations including date of observation, description of animal, coloration, distance to animal, and an exact location using a built-in map system. DNR staff review all reports that are submitted. A record is marked as "confirmed" if there is photo or video documentation with the report. A report is marked as "credible" if the reporter provides specific details that support the likelihood the identification was reliable, such as specifying a short tail with white and black on it. All other reports are marked as "unconfirmed". Bobcats have been confirmed through this system in most of Indiana's counties (77 of 92), and reports have been submitted from all but four counties in Indiana between the report's launch and mid-2024.

Report-A-Mammal grew out of an old reporting system called the Large Mammal Report. The Large Mammal Report existed from 2015–2020 and collected observations of bobcats as well as species like black bears. There was no built-in map system, so fewer reports had the location of the sighting, and it was less common to receive photos than with the current system. Staff would review reports as they were submitted. "Confirmed" reports were those that had a photo or video. All other reports were marked as "unconfirmed". A few reports would provide GPS coordinate locations, or DNR staff would estimate a location for some reports if a detailed enough description was provided. Most reports only had location specified to the county, so fewer are available to map from the Large Mammal Reporting system.

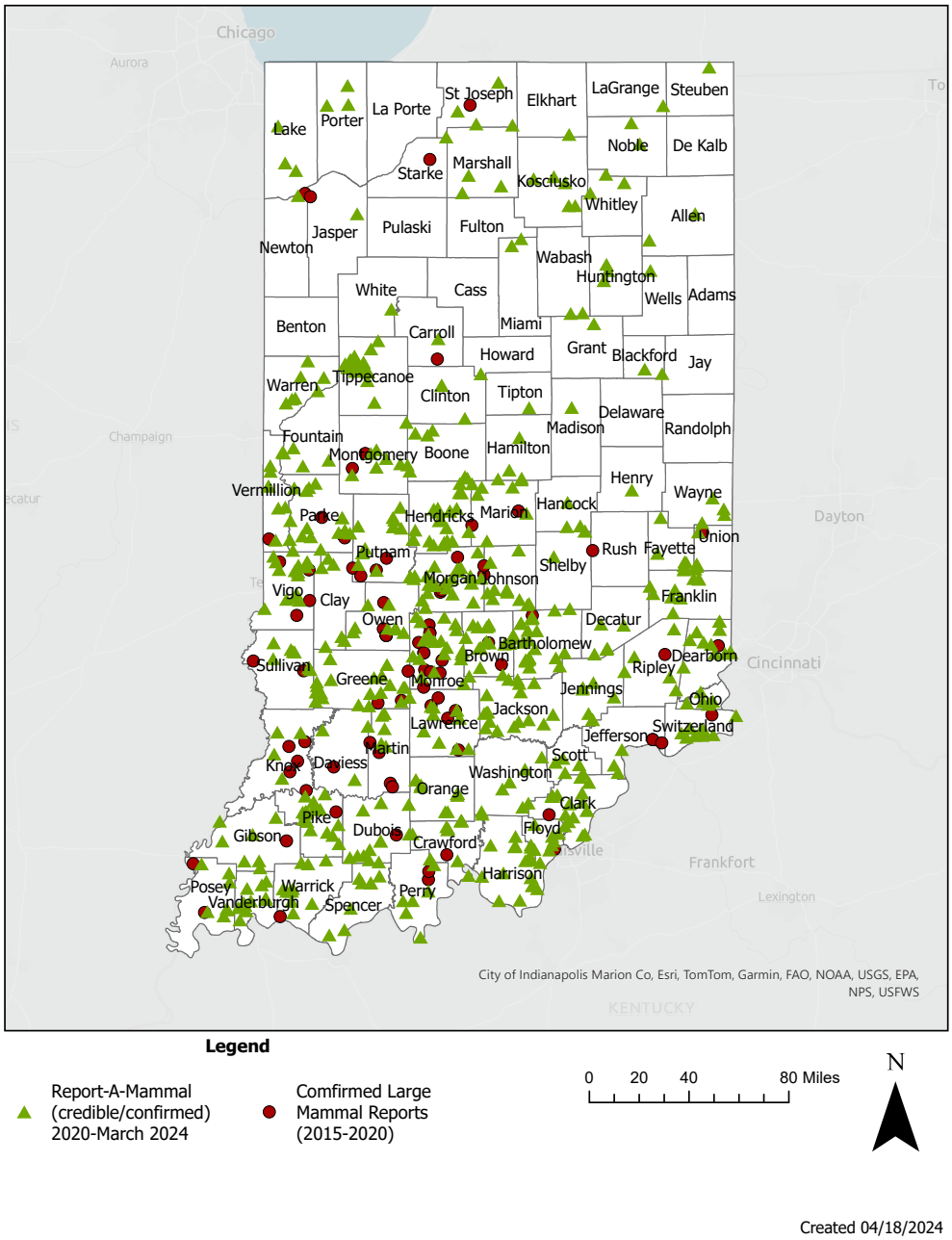


Figure 2. Public reports of bobcats that are "confirmed" or "credible" on the Report-A-Mammal through March of 2024 and "confirmed" from the Large Mammal Report (2015–2020).

Bobcat Mortality Survey

Beginning in 1990, DNR staff would report bobcat mortalities to the DNR furbearer program as part of the Annual Bobcat Mortality Survey. The survey would document cause of death (roadkill, incidentally trapped, or conflict removals), time of year, and county. Roadkill was consistently the largest proportion of mortalities reported. DNR staff collected carcasses, teeth for aging, and reproductive tracts whenever possible, along with the county it was collected from. This survey was ended in 2020 due to the limitations of the data being collected.

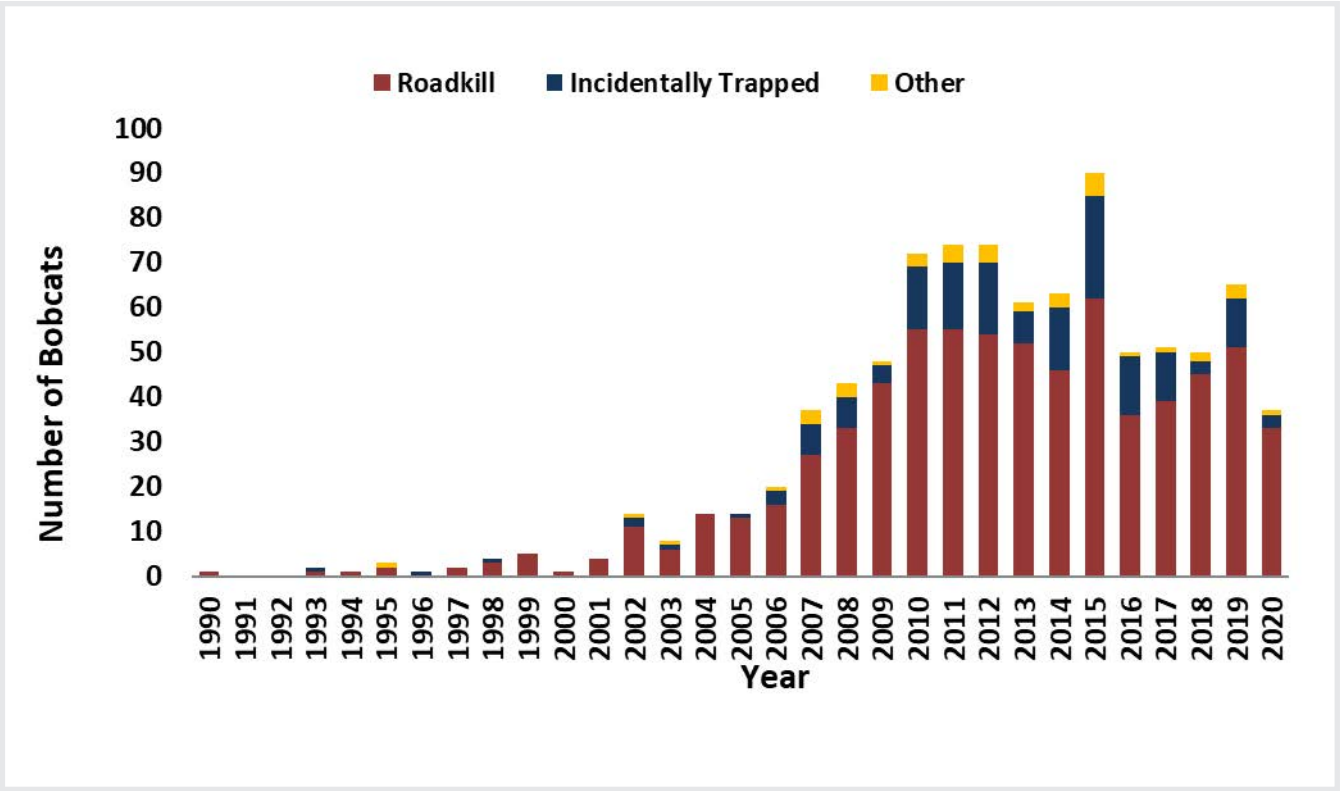


Figure 3. Cause of mortality from the Annual Bobcat Mortality Survey, which ended after 2020. Roadkill was consistently the largest proportion of mortalities for bobcats.

Population Research

In the late 1990s and early 2000s, Indiana DNR placed tracking collars on bobcats. DNR staff captured bobcats in foothold and cage traps in southern Indiana, primarily in Daviess, Greene, Lawrence, and Martin counties. Staff then affixed collars and released the bobcats where they were captured. From this research, DNR collected multiple aspects of bobcat life history, such as bobcat survival from one year to the next and cause-specific mortality, which is specific data on what caused a bobcat to die. After the field work was completed, Purdue University partnered with Indiana DNR to analyze the resulting data from the collaring efforts.

Of the bobcats collared for research that died, roadkill was the No. 1 cause of death, with one in every two bobcats that died being hit by cars (53%). This aligns with the Annual Bobcat Mortality Survey that was conducted by DNR staff until 2020, which also found roadkill to consistently be the main cause of bobcat mortality.

From the collaring work and Purdue's analysis, three of every four (75%) adult bobcats would survive from one year to the next, and 95 of every 100 (95%) subadults (between 1 and 2 years old) survived from one year to the next. Kitten (less than 1 year old) estimates were not calculated from this work.

Also from this collaring work, Purdue University determined bobcat habitat selection and home range size. Bobcats in Indiana preferred forest edges and somewhat avoided agriculture when selecting habitat. Adult, female bobcats needed 9 square miles on average to successfully raise kittens. Males do not pair with only one female, so male home ranges typically overlapped multiple females and were estimated at 91 square miles. These estimates were from a time still relatively early in bobcat recovery, making it likely that these numbers will shift as bobcat populations and densities change through time.

Find the paper: Jones, Landon R., Zollner, Patrick A., Swihart, Robert K., Godollei, Emily, Hudson, Cassie M. and Johnson, Scott A. Survival and Mortality Sources in a Recovering Population of Bobcats Lynx Rufus) in South-central Indiana. American Midland Naturalist. 184(2) : 222-232


Peggy Spence

Find the paper: Jones LR, Johnson SA, Hudson CM, Zollner PA, Swihart RK (2022) Habitat selection in a recovering bobcat (Lynx rufus) population. PLoS ONE 17(8): e0269258. https://doi.org/10.1371/journal.pone.0269258

From the data on habitats and home ranges, Purdue University then mapped the best available bobcat habitat in the state. This is a conservative estimate of bobcat habitat because it is based on populations when they were still emerging in Indiana. Because of competition for resources between individuals, bobcats can select the best quality habitat available in places where there are lower densities of bobcats. When populations were still emerging, bobcats had better opportunity to select the best quality habitats. With bobcat populations becoming established and increasing in Indiana, it is likely that bobcats will start moving into other types of habitats that may be suitable but of lower quality or less desirable over time, which will be an opportunity for further research in the future.

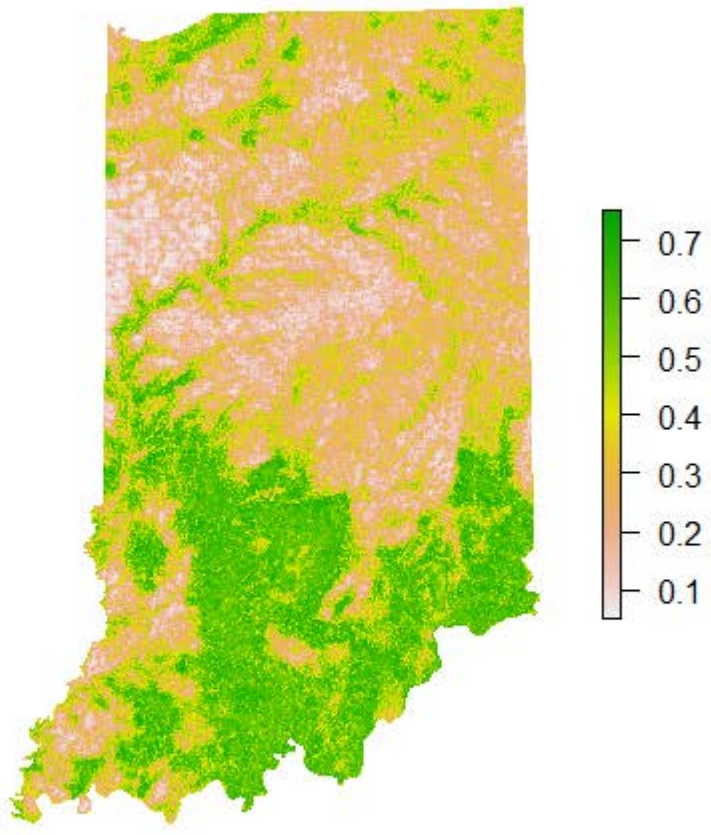


Figure 4. Bobcat habitat suitability map for Indiana, with green areas being more suitable, and white areas being less suitable.

Using data collected by DNR over the years, including many of the surveys and research already described, Purdue University researchers developed an individual-based population model in the program Net Logo. The model incorporates the basic aspects of bobcat life history and simulates bobcat population dynamics in Indiana. It allows staff to incorporate levels of harvest from hunting and trapping to see what sustainable levels of bobcat harvest might look like.

This model is very conservative, as it assumes that adult female bobcats do not have kittens if they don't have 9 square miles of habitat. The model also assumes harvest is additive, meaning existing mortality sources (e.g., roadkill) remain at the same level, and harvest mortality is added to those mortalities. Some harvest will remove bobcats that would have died from other causes, like being hit by cars. For instance, harvest would occur at the most common time for a bobcat to be hit by a car, in the months of November to January. DNR staff run thousands of simulations of the population model at different thresholds to estimate and ensure confidence in sustainable harvest levels.

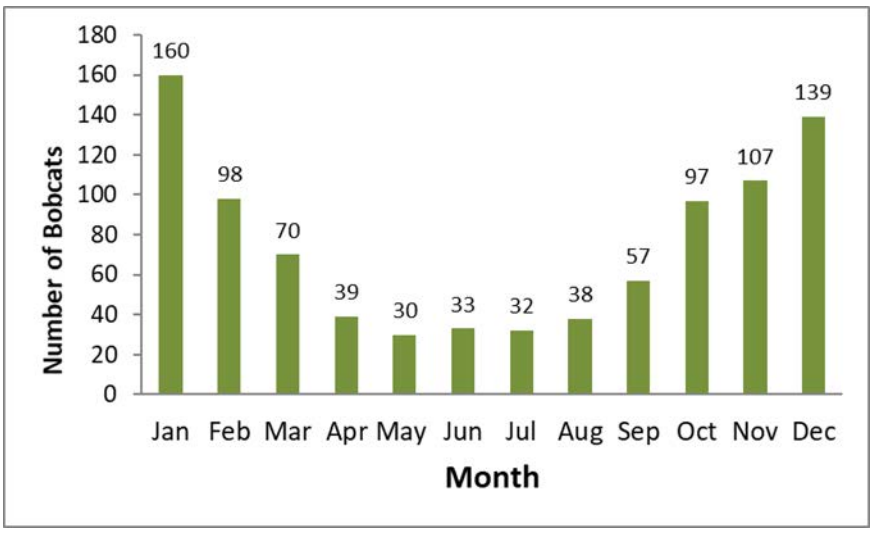


Figure 5. Months when bobcat mortalities were reported on the Annual Bobcat Mortality Survey, which concluded in 2021. The highest number of mortalities were reported in November, December, and January.

Kitten survival is extremely difficult to estimate in the field, but available estimates in past literature put kitten survival at 30%, or three of every 10 kittens born, survive to the next year. However, because DNR doesn't have this information for Indiana specifically, DNR staff run a range of kitten survival levels when simulating the effects of harvest. Kitten survival is another area of future research potential for Indiana.

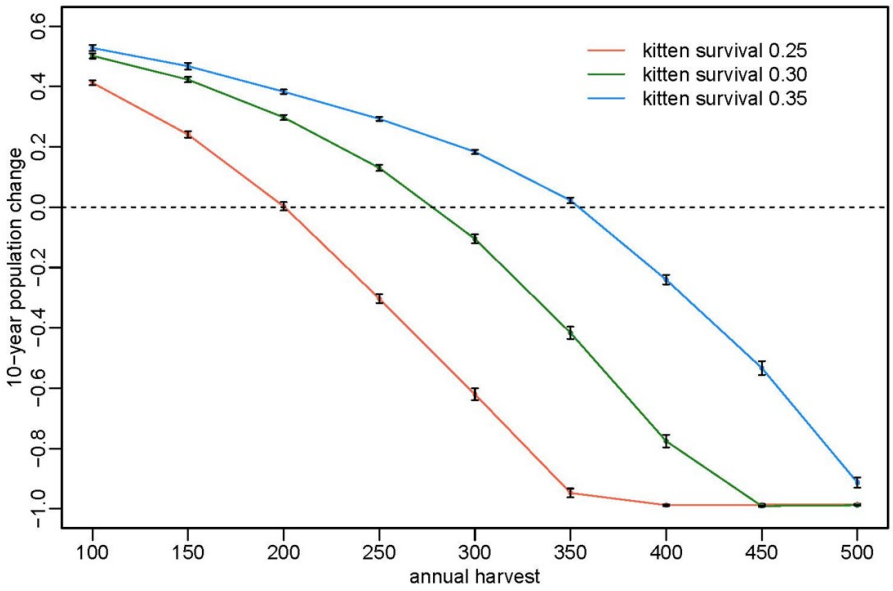


Figure 6. Bobcat harvest simulations from the population model at three different levels of kitten survival. Any points above the dotted line would show a stable to increasing bobcat population. Once the points fall below the line, the data suggests there would be a downward trend in bobcat populations over time.

Purdue University is continuing to collaborate with Indiana DNR on the bobcat population model and is currently assessing which variables most influence the model. For example, does increasing kitten survival 5% greatly change model estimates or does habitat influence the model more? This will help inform any future research efforts Indiana DNR could conduct to improve and build upon the model.

Bobcat Health

Indiana DNR has occasionally collected bobcat carcasses through roadkill, incidentally trapped animals, and conflict removals. Indiana DNR staff have tested tissue samples from these bobcats for various pathogens or contaminants. Bobcats have been screened for heavy metals (including lead), anticoagulants (commonly known as blood thinners, which are found in rodenticides), and diseases. Heavy metal levels (including lead) tested in 47 bobcats in 2023 and 2024 were negligible, causing little concern. From the same 47 bobcats, three had detectable levels of anticoagulants, all the chemical diphacinonea, which is commonly used in rodenticide. Nineteen bobcats were negative for toxoplasmosis, and 16 of 19 bobcats were positive for antibodies to feline panleukopenia virus (feline parvovirus). Bobcat health is another potential future area of bobcat research for Indiana, but this preliminary testing provides baseline information.

Human Perception of Bobcats

Indiana DNR has collected data on how people perceive bobcats. This data includes how licensed trappers perceive bobcat population trends and how licensed trappers and the public perceive aspects of bobcat harvest.

Licensed Hunter and Trapper Perceptions of Bobcats

On the annual licensed trapper survey, respondents are asked about their perceptions of populations for furbearer species. Since 2008, licensed trappers have believed populations of bobcats are increasing. This aligns with DNR survey efforts that showed increases in bobcats over the same time.

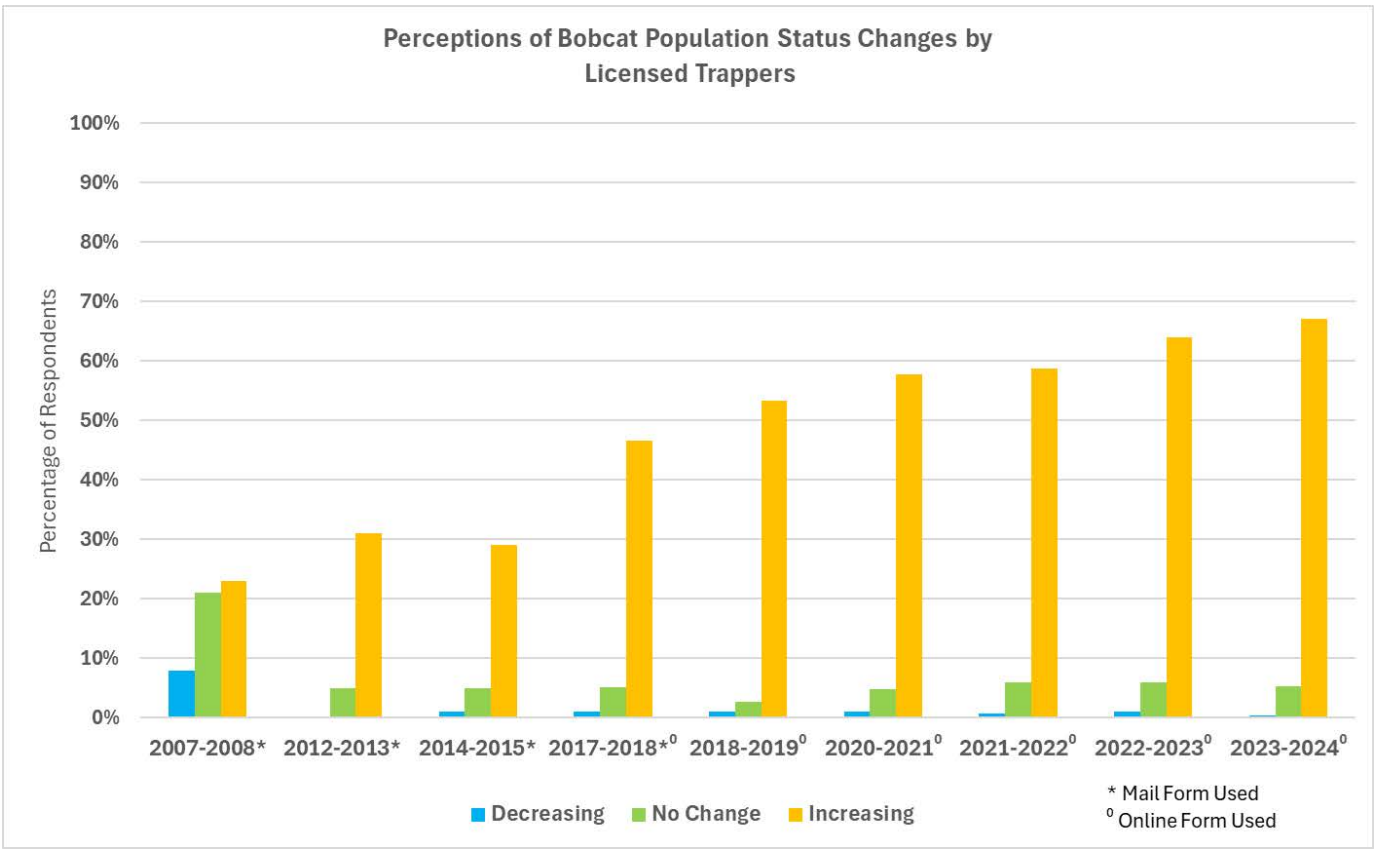


Figure 8. Licensed trapper perceptions of bobcat populations since 2008. From 2007–2015 paper surveys were sent, in 2017–2018 a hybrid of paper and electronic was completed, and from 2018 on, surveys were completed electronically. The remaining proportion of respondents to equal 100% were those who said they were unsure.

As part of economics work conducted in collaboration with Purdue University, licensed furbearer hunters and trappers were sent a survey in fall of 2021 containing a variety of hunting and trapping related questions. Two questions asked about perceptions of a potential bobcat season. Licensed hunters and trappers agreed that Indiana should create a bobcat hunting and a bobcat trapping season.

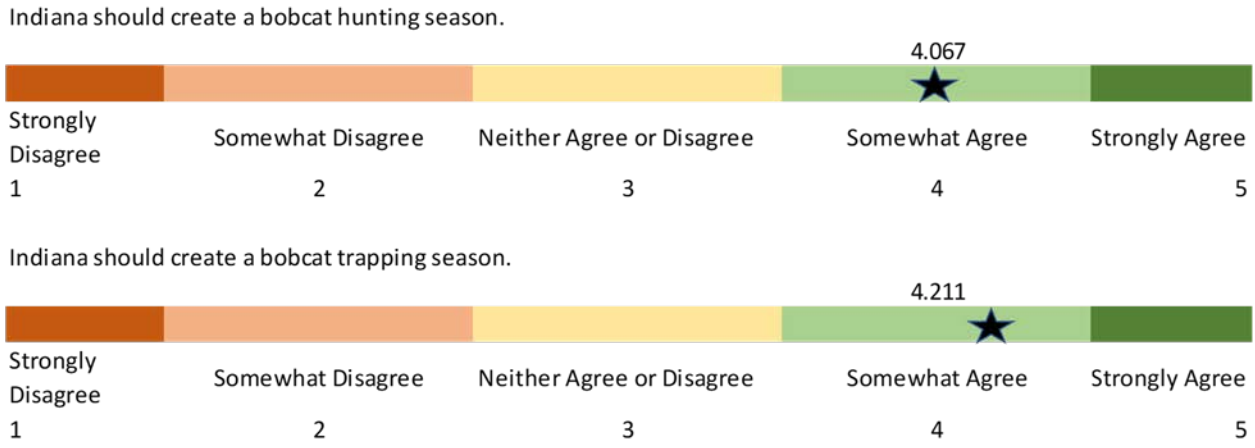


Figure 9. Trapper agreement with the questions "Indiana should create a bobcat hunting season" and "Indiana should create a bobcat trapping season" from 2021 survey work in coordination with Purdue University.

General Public Perceptions of Bobcats

In further economics research with Purdue, randomly selected Indiana residents were sent a survey in spring of 2023. The survey included questions about bobcats in which respondents were asked about their perceptions of a potential season. Respondents neither agreed nor disagreed that Indiana should create a bobcat hunting and bobcat trapping season. About 23% of respondents wanted more information before providing an opinion.

Research about regulated trapping shows that details about a season, such as quotas, bag limits, or season length, will increase people's acceptance. Simply asking about creating a season without any details should result in a more conservative estimate of the public's perception of the activity. As such, Indiana DNR and Purdue researchers intentionally phrased this question in a conservative manner that gave no details on a season to ensure we were obtaining a conservative estimate of perceptions. This result showed that the public was neutral overall, but if provided details about a season, the results would likely change.

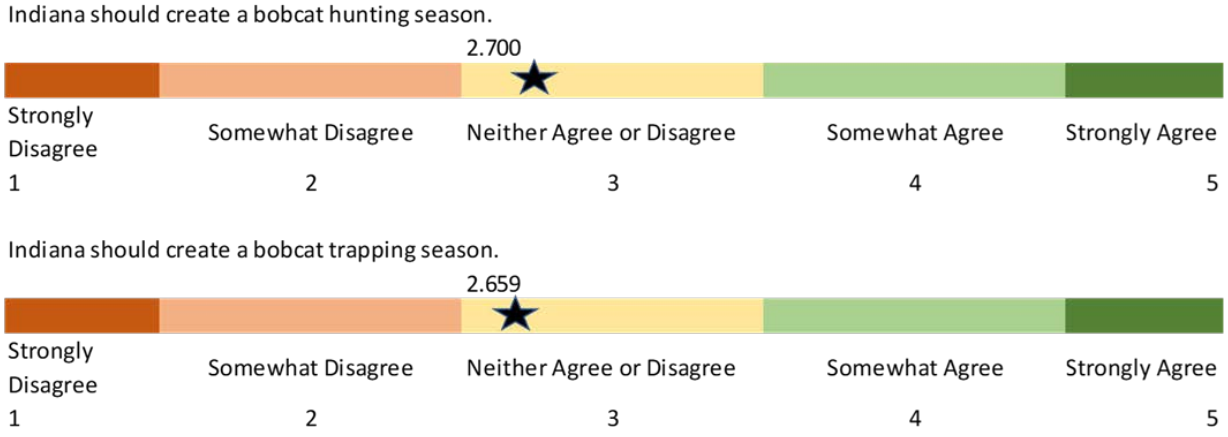


Figure 10. General public agreement with the questions "Indiana should create a bobcat hunting season" and "Indiana should create a bobcat trapping season" from 2022 survey work in coordination with Purdue University.

Economic Value of Bobcats

Economics research with Purdue has also calculated the monetary value of bobcats to people. One effort determined licensed hunters' and trappers' willingness to pay for a theoretical bobcat license at different harvest levels. Willingness-to-pay varied by quota and bag limits being proposed and ranged from $13.50 to $41.

Purdue researchers also looked at the value of bobcats to the public for recreational viewing. This estimate combines the intrinsic value of a bobcat to people and the viewing value of seeing a bobcat. They calculated the estimated value for different types of outdoor recreationists. The values ranged from $22.73 to $41.30, with the average amongst groups of $31.85.

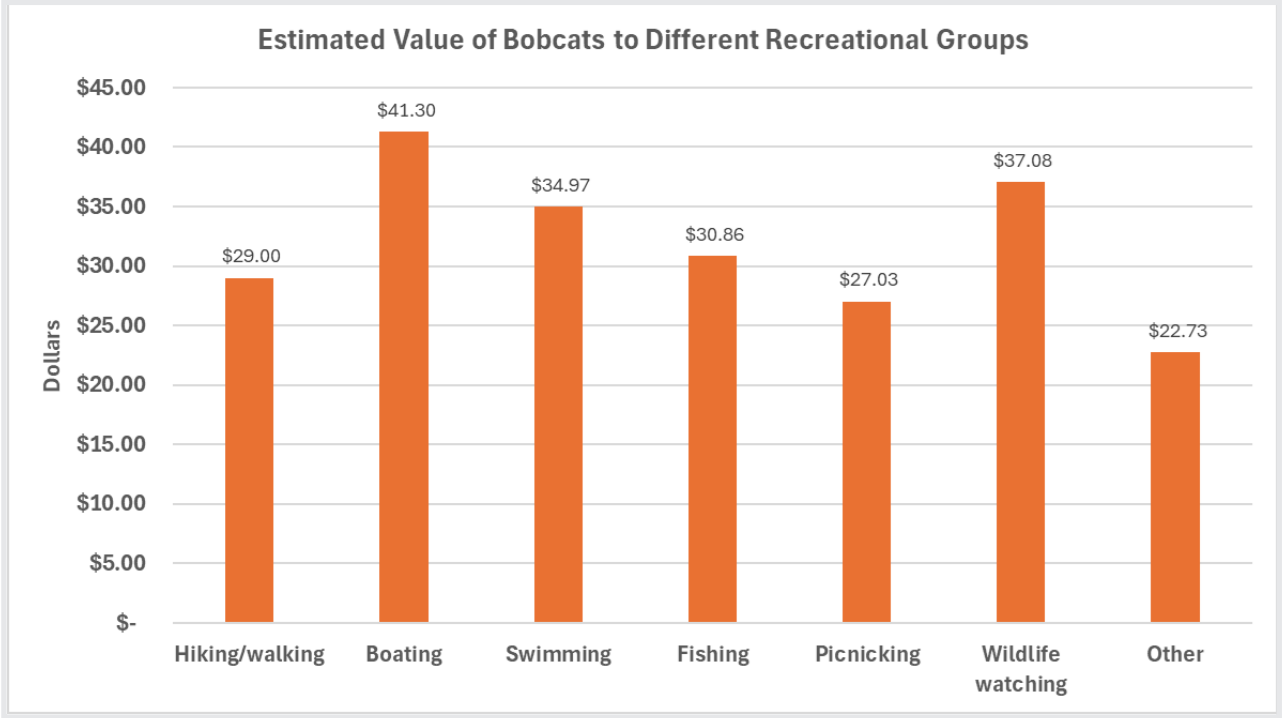


Figure 11. Value of bobcats to different recreational groups in Indiana, from Purdue University research in 2022.

Bobcat Conflicts

Conflicts between bobcats and people happen occasionally in Indiana. If bobcats are causing damage, a person can request a nuisance wild animal control permit to remove that bobcat, either through lethal removal or relocation within the county of capture. The most common types of conflicts reported are bobcats eating domestic poultry such as chickens and ducks; however, not everyone who has bobcat-related damage requests a permit to remove the bobcat. Around 20-25 permits were issued from 2020-2022. A high of 39 permits were issued in 2023, and permits exceeded 25 for 2024. Not every permit results in a bobcat being removed. Currently, permits are more likely to be issued in southern Indiana where there are larger bobcat populations, although conflicts and permit numbers do not directly correlate to bobcat population size.

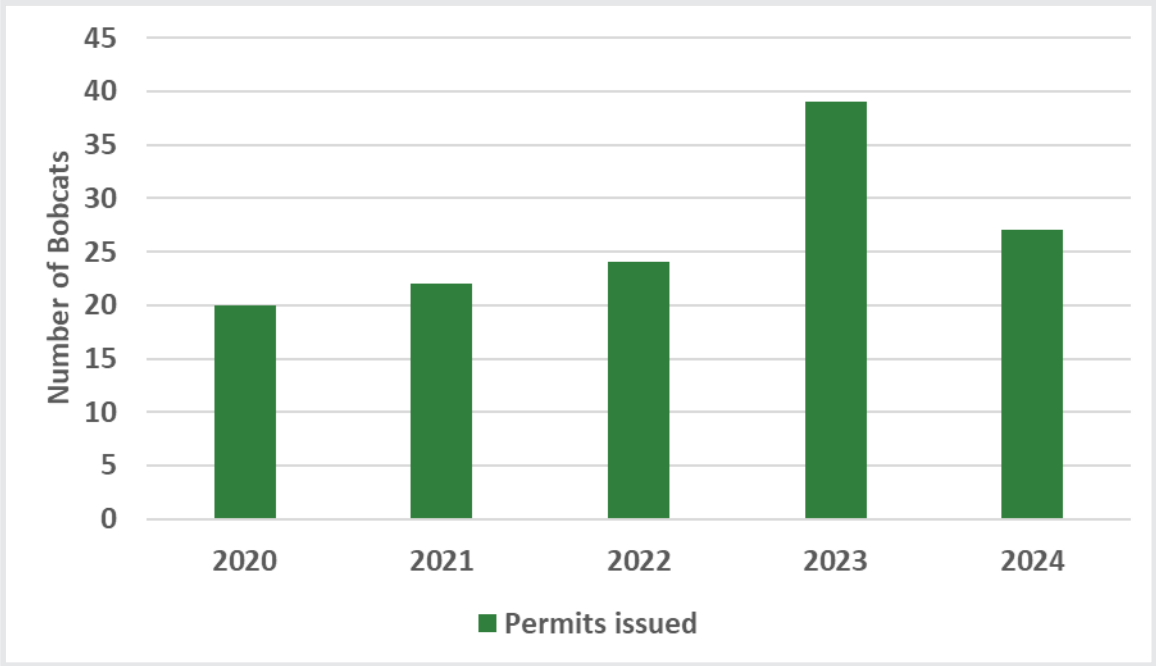


Figure 12. Nuisance wild animal control permits issued for bobcats since 2018.

Summary

Indiana DNR knows more about bobcats than it does about almost any other furbearer and has collected data on home ranges, habitat use, mortality, age, reproduction, public observations, baseline health screening, long-term population trends, and human perceptions. This information has allowed Indiana DNR to have a strong picture of bobcats in Indiana. But, as with all wildlife work, there is always more to do. There are opportunities for better understanding bobcat health factors, zoonotic diseases, and investigating improvements to the population model over time. These improvements include getting updated home range estimates as bobcat populations continue to expand.

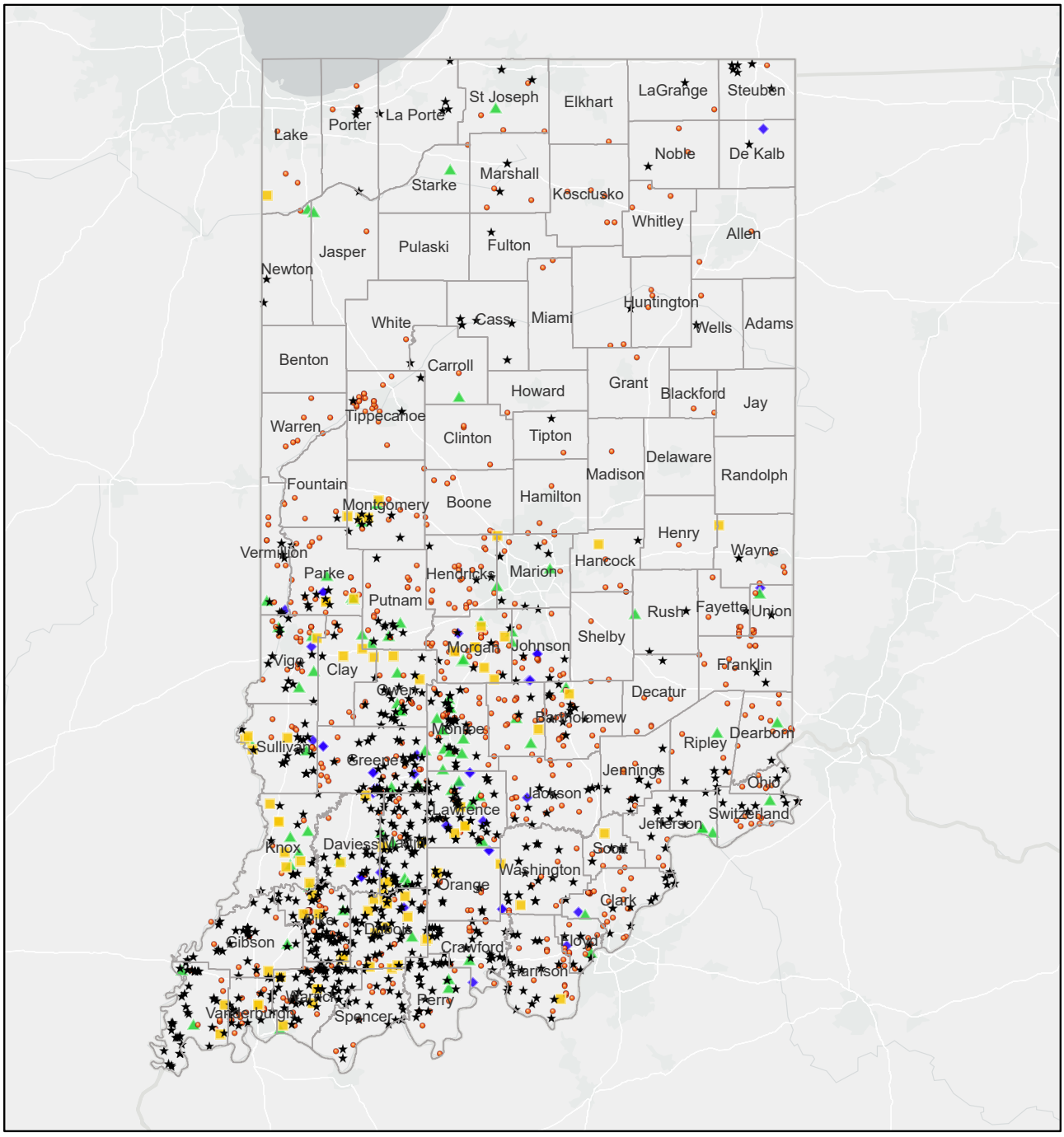
Indiana DNR continues to collect data about bobcats in Indiana. Work on the bobcat population model is ongoing in collaboration with Purdue University, and Indiana DNR continues to collect public observations to understand patterns of expansion, monitor trends with the Archer's Index, and screen bobcat health when samples are available.

You can read more about bobcats at on.IN.gov/bobcats

See current external research in-progress for a variety of furbearers at on.IN.gov/furbearers

Contribute to bobcat management by reporting bobcat sightings at on.IN.gov/report-a-mammal

Bobcat Records 2024



4/18/2024

1:3,150,000

0 20 40 80 mi

0 30 60 120 km

- Counties
- Bobcat Records 1970-2017
- Bobcat Records_post2017
- Report-A-Mammal (credible/confirmed) 2020-2024
- Confirmed Large Mammal Report bobcats 2015-2020
- Snapshot Indiana detections 2015-2020

City of Indianapolis Marion Co, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, NPS, USFWS

Figure 7. All bobcat records in various DNR databases as of late March 2024. This map includes bobcat records from mortality reports, trail cameras, observations pre-online reports, collaring work, Snapshot Indiana, Large Mammal Reports (confirmed), and Report-A-Mammal (confirmed and credible).