2022

Missouri Black Bear Program

Missouri Department of Conservation

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Cover photo: Trail camera photo of research bear 1428 with her yearling cubs taken in March 2017.

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Black Bear Program Mission

The mission of Missouri Department of Conservation's (MDC) Black Bear Program is to use science-based methods to manage a self-sustaining population of black bear (a native species), increase bear awareness, minimize human-bear conflict, and provide recreational opportunities for all Missourians. To enact this mission, the Black Bear Program is guided by three management goals:

Goal 1) Bear Research and Monitoring - Use science-based methods to manage a self-sustaining population of black bear, focusing on research and monitoring, population management, and habitat management.

Goal 2) Education and Outreach - Increase statewide awareness of Missouri's black bear population and management program through coordinated outreach and public education.

Goal 3) Human Bear Conflict - Minimize and address human-bear conflicts.

The Black Bear Program is managed by MDC's Science Branch Black Bear/ Furbearer Biologist in collaboration with many MDC staff, who are responsible for monitoring and managing the state's black bear population and developing annual regulation recommendations based on: annual bear sighting reports, harvest data, hunter surveys, MDC staff surveys, public comments, population models, and ongoing research studies. The conservation of Missouri's Black Bear population along with all other wildlife species is made possible by the one-eighth of one percent Conservation Sales Tax, permit sales, and income generated by fish and wildlife tourism. In addition, conservation efforts would not be possible without the help of a wide range of MDC staff, university researchers, Missouri citizens, and support from local landowners. The bear program would not be able to complete the mission set forth by the MDC without this assistance. **Thank you!!!**
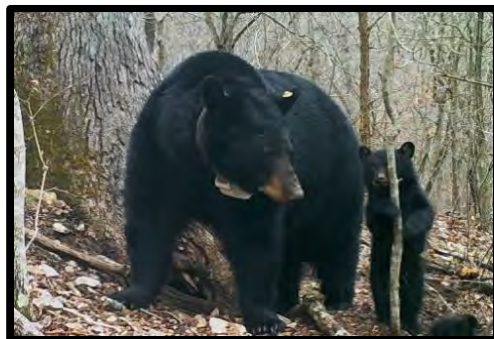
Equal Opportunity to Participate
Equal opportunity to participate in, and benefit from, programs of the Missouri Department of Conservation is available to all individuals without regard to their race, color, nationality, sex, age, or disability. Questions should be directed to the Department of Conservation, PO Box 180, Jefferson City, MO 65102, 573-751-4115 (voice) or 800-735-2966 (TTY), or to the U.S. Fish and Wildlife Service Division of Federal Assistance, 4401 N. Fairfax Drive, Mail Stop: MBSP-4020, Arlington, VA 22203.

Introduction

Black Bear History in Missouri

Black bears were historically abundant in Missouri but became seemingly nonexistent by the early 1900s. Many early county histories contain notes and reports of the remarkable number of bears in all areas of the state. Bears were a staple item for early settlers and were widely used for food as well as for their fat and skins. In fact, bears were more commonly harvested by pioneers and

early travelers than any large mammal, other than deer. However, by the 1830s and 1840s, bears were rare in northern Missouri, and by 1894, bears were reported to be almost extinct in the Ozarks. Bears were still present in southeastern Missouri in the 1920s, however by the 1930s and 1940s few, if any, bears could be found in the state.

The Arkansas Game and Fish Commission initiated a black bear restoration program in 1958. During 1958–1968, 254 black bears were captured in Minnesota and Manitoba, Canada and released in the

Trail camera photo of bear #1009 and her cub #2114

Ozark and Ouachita mountains of western Arkansas. The Arkansas population has expanded in both size and distribution since that time, and thereafter, sightings of black bear began to rise in Missouri, likely from the crossing of bears into the state from Arkansas.

From 1950–1972, there were 54 reported occurrences of bears in 27 Missouri counties. In 1990, a request for sighting information published in the June Conservationist magazine resulted in 55 reports of sightings in 26 counties. Over the last two decades, reports have increased substantially. From 2000–2010, MDC received 512 bear reports in 75 counties. Intensive research studies including Missouri's Black Bear Hair Snare study and collaring study were started in 2010. These studies have allowed for better understanding and tracking of the bear population. From 2011-2020 MDC received 2,766 bear reports in 91 counties. From just 2021-2022, MDC has received 845 bear reports in 80 counties. Overall, black bears have been reported in 106 counties, but it should be noted that reports are not verified and likely include some percent that are misidentified, but in general, the distribution and number of bear reports is steadily increasing, demonstrating that the once lost bear population has been recolonizing the state.

Black Bear Management Plans

To guide the continued conservation and management of Missouri black bear population, a black bear management plan was first developed in 1993 by MDC, in partnership with the Missouri Department of Natural Resources, the National Park Service, and the U.S. Forest Service. As the black bear population continued to grow and management objectives changed, new management plans were developed in 2008 and most recently in 2020. The plans identified critical components of a multifaceted approach to bear management in Missouri with the goal of providing a strategic direction for the MDC bear management program to follow. To stay on top of changes to the bear population and conservation efforts, new management plans will be generated every 10 years. The 2020-2030 Missouri Bear Management Plan can be found on the MDC website Missouri Bear Management Plan (2020-2030).

Trail camera photo from the Missouri Black Bear Research Project. Howell County, 2017.

Purpose Statement

This annual report summarizes the efforts completed by the Missouri Department of Conservation Black Bear Program in pursuit of managing a self-sustaining black bear population in Missouri. The scientific study and management of black bears in Missouri are overseen by the Missouri Department of Conservation Black Bear Program, housed within the Game and Regulations Unit of the Science Branch. The black bear program is headed by the State Furbearer and Black Bear Biologist and is advised by an inter-branch Black Bear Working Group. All regulatory actions must be proposed and ultimately approved by the Conservation Commission. The following sections include updates on black bear research, the 2021 harvest season, and other management activities throughout the state.

Questions regarding the content of this report can be directed to Nate Bowersock at Nathaniel.Bowersock@mdc.mo.gov or visit https://mdc.mo.gov/discover-nature/field-guide/american-black-bear.

Using Science to Manage a Self-Sustaining Population

Previous Research

Starting in 2010, research began to further MDC's understanding of the expanding black bear population in Missouri. To estimate the bear population at the time, a hair snare study was conducted. Hair snares are barbed-wire enclosures that are baited with a scent lure to encourage bears to crawl over or under a single strand of barbed-wire, with the goal of collecting hair from bears. The hair samples collected from snares were used to identify unique individual bears with DNA analysis that was later used in population models. From this initial population study, it was estimated there were around 350 bears in Missouri in 2012.

Black bear hair that was caught on a barbed wire hair snare. Image is from MDC Bear Hair Snare project.

Current Research

Survival, Recruitment, and Movement

Due to black bears cryptic nature and the dense forest cover they prefer to inhabit; focal studies of bears can be quite difficult to conduct. Therefore, researchers have found that much can be learned about bears and other wildlife by capturing them and fitting them with radio tracking collars. Starting in 2010, MDC in conjunction with university researchers, started to capture bears using large box traps and fit them with GPS radio tracking collars. When bears are captured, they are chemically immobilized (and sedated) so they can be safely handled by MDC staff. Once a bear is immobilized, a series of biological measurements (i.e., body weight and length) and samples (i.e., hair and blood) are collected. In addition, each bear is marked with both a set of uniquely numbered ear tags and a PIT tag (microchip) so bears can be identified if they are seen or captured again. The long-term research and monitoring objectives of the bear program have been to use data collected from GPS radio collars to study

Trail camera photo of a bear entering a research bear trap.

bear survival, recruitment, and movement rates. As of 2022, 196 black bears (172 female and 24 males) have been collared and the data collected from these animals has helped MDC better understand the ecology of bears in Missouri.

Trapping – In 2022, we captured a total of 26 individual bears (14 females, 10 males, and two were of unknown sex that we released before handling). Nineteen of the 26 bears were recaptures from previous years. Fifteen bears were handled and marked (11 females and four males), and 10

new collars were deployed. The cumulative number of individuals captured increased rapidly in the first half of the season, which ran from the beginning of May to mid-July. However, once the native berries started to ripen in mid-to-late June, our rate of captures decreased.

Denning – To study the recruitment rates (number of young born each year compared to how many survive within a year) of bears, MDC tracked GPS collared females to their dens to count the number of cubs they have each year. If possible, staff attempted to immobilize females so they could enter dens to check the physical condition of both the collared females and their cubs. Cubs found at dens were measured, had genetic samples taken, and marked with PIT tags so they could be identified in the future if recaptured. If dens could not be safely entered, females were left alone, and trail cameras were set up outside of dens to count the number of cubs that emerge. In the following year, MDC staff will try to relocate females to count the number of yearling cubs they have to assess the survival rate of cubs. The survival estimates gained from this study are used in population studies and help assess the overall health of the bear population.

As of 2022, MDC has visited 210 dens, counted 147 cubs, and marked 126 cubs. In 2022, staff located 15 dens, nine of which were worked, and 20 cubs (6 females and 14 males) were marked.

Trail camera photo of a female black bear #1616 and her un-marked yearling outside of their den, March 2021

Bear Mortalities – We responded to a total of 21 confirmed bear mortalities in 2022, four of which were previously marked research bears and the remaining 17 were unmarked bears. Thirteen of the mortalities were caused by vehicle collisions and eight were harvested by hunters. The age range of these dead bears ranged from 1 to 17 years of age (age based on tooth cementum age analysis) with a median age of 5 years and more than half of these bears were males.

Abundance and growth rate estimates - Using the initial population estimate of 350 black bears in 2012 along with data collected from collared bears, such as their annual survival and reproductive rates, a population model is used to track trends in the bear population over time (Figure 1). In 2022, we estimated the black bear population to be approximately 850 black bears in the state with an annual growth rate of 9%, which indicates continual growth of the bear population. The increase in bear numbers is also reflected in the increased number of bear sightings we have received, including increasing sightings of bear outside of the core bear range in southern Missouri.
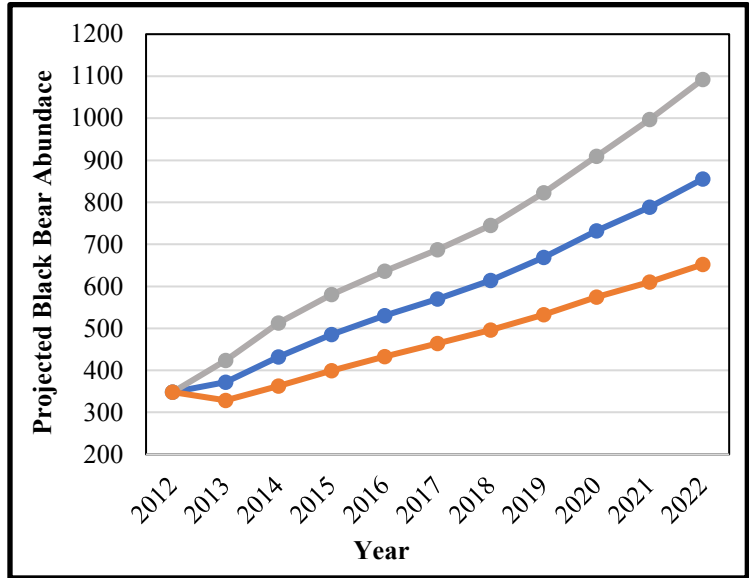

Figure 1. Annual black bear population abundance estimates for Missouri, based on predictive population models. Estimates based on the initial population estimate of 300 bears in 2012 and upper (gray) and lower (orange) limits of population trend lines.

Movement, Dispersal, and Habitat-Use Patterns

Using data from black bears that were collared between 2011 and 2020, research was conducted to assess habitat use and movement patterns of bears in Missouri. These data were then utilized to delineate travel corridors bears might use to disperse across the state. In addition, we used this information to identify areas within the state that would benefit from additional targeted outreach and education as the bear population continues to expand.

Habitat selection and movement patterns Similar to other bear populations, black bears in Missouri were found to select for forested habitats located farther from areas of high human use (Figure 2). However, areas with thicker cover near roads were still used by bears, as potential travel corridors between patches of higher quality forested habitat. In addition, it was found that as land cover for areas used by bears became more heterogeneous (more diverse in plant composition), bears utilized greater space, as the resources bears required were more spread out compared to areas with lower land cover

Figure 2. Black bear habitat suitability map based on the location data collected from collar bears. Gantchoff et al. 2022

diversity. Additionally, it was found that bears ability to move across the landscape is strongly related to the amount of traffic found on different roadways across the state. Specifically, the larger
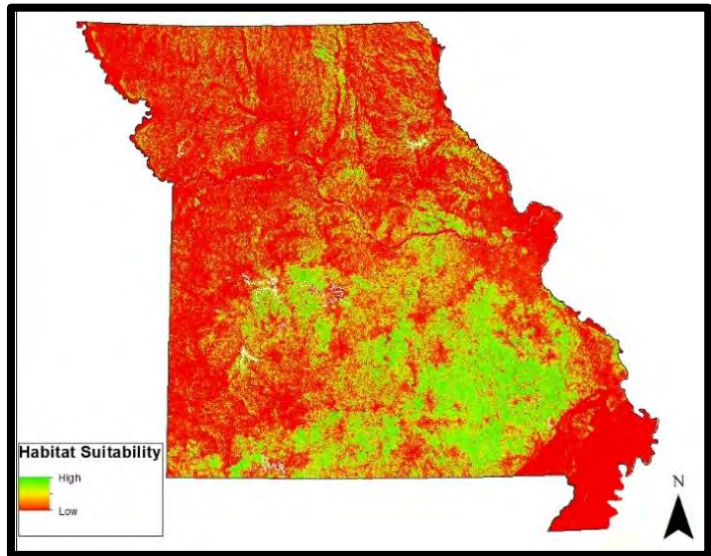
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a road/highway is, the greater the barrier these roads become, limiting bears ability to travel between patches of suitable habitat. This helps explain why more bear dispersal activity is found along and below (south) of I-44, because it is one of the larger, heavily used roadways in the state.

Bear Sightings Reports

The MDC has been collecting reports of bear sightings throughout the state of Missouri since the late 1980s (Figure 3). These reports include in-person sightings, photos captured on remotely triggered cameras, and any evidence of bear activity (e.g., tracks, scat, or damage). Maintaining a record of bear sightings helps the MDC understand trends in bear observations over time.
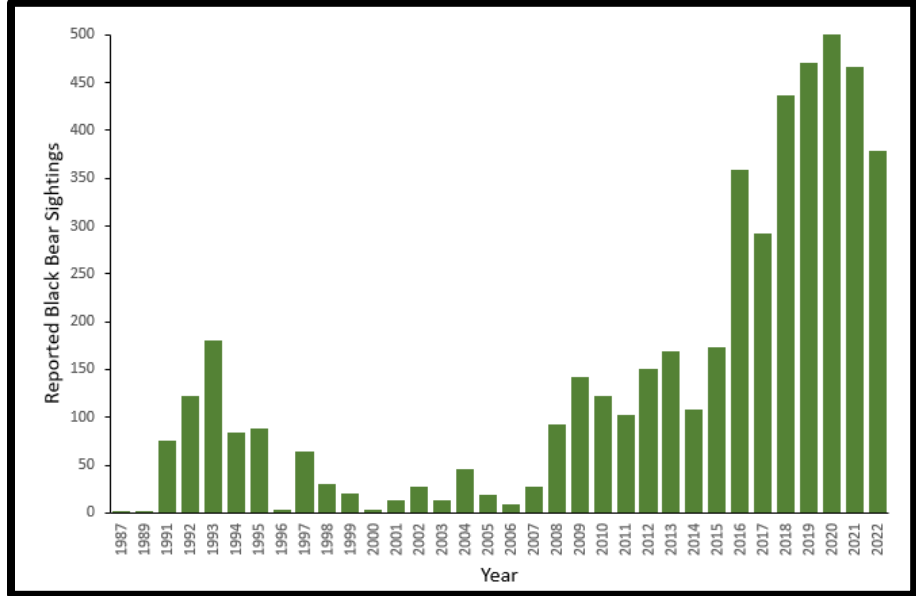
Figure 3. Count of bear sightings reported to MDC since 1987 – 2022.

These trends are especially useful in tracking human-bear conflicts to focus public outreach and mitigative actions.

Reports are collected through an online reporting system, which can be found at mdc.mo.gov/reportbears. These reports are then cataloged and categorized by Black Bear Program staff. In 2022, the Department received 380 sighting reports from members of the public, MDC staff, and partnering agencies throughout the state. Sightings were reported in 55 (48%) of Missouri counties (Figure 4).
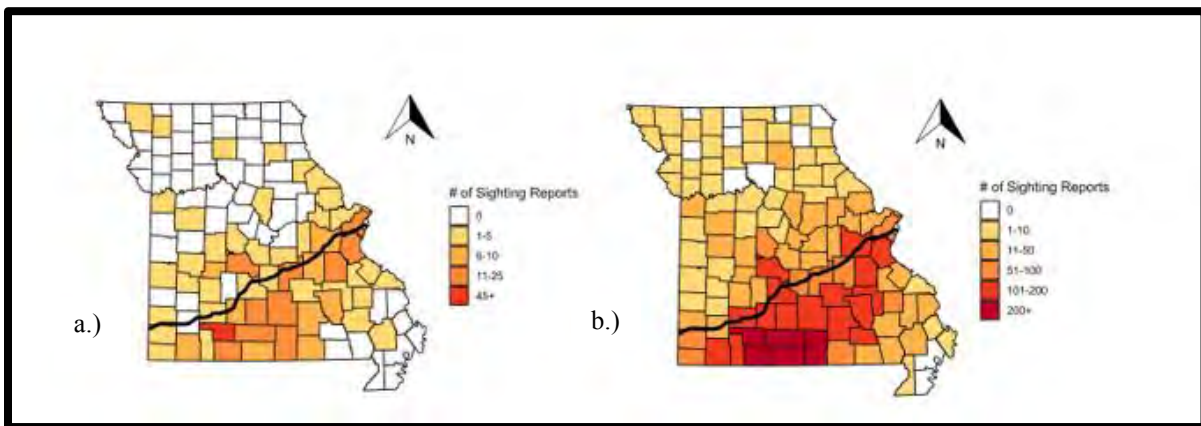
Figure 4. Maps of the black bear sightings by county: (a) bear sightings in Missouri from 2022, (b) bear sightings in Missouri from 1987-2020. The black line that crosses the state from the SW corner to the eastern portion of the central region depicts Interstate 44.

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Human Dimensions

To examine Missouri residents' awareness of the black bear populations and measure their comfort and tolerance level for bears, a human dimensions study was conducted in 2021. The study entailed a scientific, probability-based survey of Missouri residents that was developed cooperatively by Responsive Management and MDC. The survey focused on two sample groups: 1) a random stratified sample of Missouri residents found within three distinct regions of the state, and 2) a random sample of residents that reported seeing or encounter bear sign. The three distinct areas of the state were: **Core Bear Range** - where most bears are found south of I 44, **Expanded Bear Range** - areas outside of the core bear area that still has bears), and **Remainder of State** - where there are a few if any bears (Figure 5). Overall, most Missouri residents knew that bears lived in the state and thought it was important to have bears residing in the state. Those residents that had encountered/ observed a bear, described their experience as being more positive than negative. Interestingly, Missouri residents strongly or moderately agreed that it
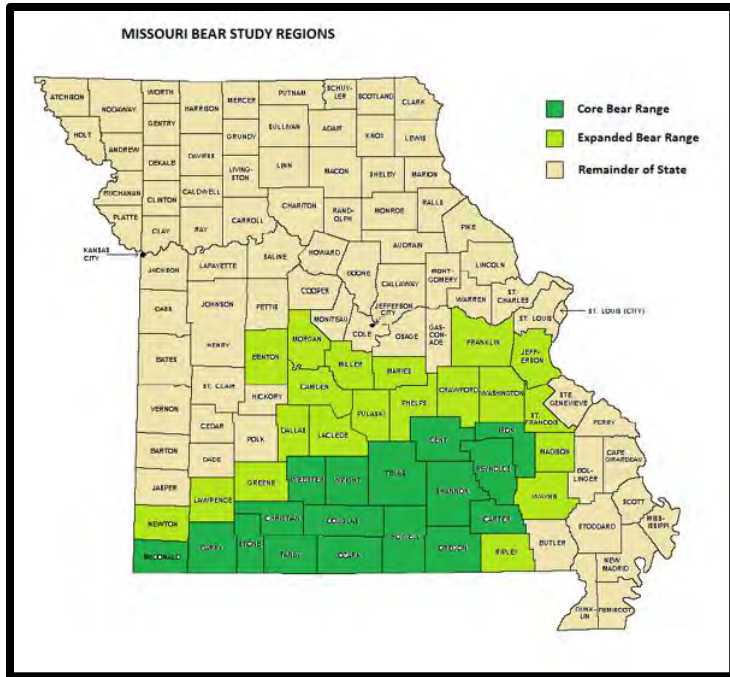

Figure 5. Missouri black bear human dimensions survey regions

was not good to feed bears and agree that properly stored garbage can reduce bear problems, but most residents were against prohibiting or requiring residents to remove bird feeders if they were attracting bears. Finally, most residents believed MDC is doing a good job managing the current bear population.

Targeted outreach and education – Human-bear conflict rates in Missouri were initially low, but as the bear population expanded, conflicts increased 6.5-fold from 2000 to 2020, and 75% involved black bear use of anthropogenic food. To address increases in conflict outreach and education are needed to provide information to the public about how to live responsibly with bears. However, Missouri is a large state and not every community is or will be impacted by bears, therefore, there is a need for targeted outreach and education. Using GPS collar data and conflict report data we examined relationships between habitat suitability and landscape connectivity in relation to community level human-bear conflict occurrences. Based on our results we found a close relationship between conflict and landscape features that predicted potential communities that human-bear conflicts could occur given black bear recolonization. Communities located in areas with quality habitat and landscape connectivity were predicted to experience higher conflict activity. The results of this study will help focus future and current outreach and educational activities to help preemptively mitigate potential human-bear conflicts.

New Research

Population abundance and density distribution - Starting in summer 2022, a new 2-year hair-snare study was started to generate a new population abundance estimate for the states' black bear population. Given that bears have expanded into much of the state since the original hair snare study that focused on surveying bears in the southernmost parts of Missouri, this new study is setting up hair snares throughout much of the current core bear range (most regions found south of the Missouri River). In addition to generating a new abundance estimate, this study will explore questions looking into how landscape features might influence the density distribution of bears to further our understanding of how bears are distributed across the state to help focus future management efforts.

Trail camera picture of collar bear at hair snare, southern Missouri 2022.

Hunting

Missouri held its first-ever black bear hunting season in 2021, which provided 400 hunters the opportunity to harvest a bear. In the month of May, Missouri residents were able to submit applications to be drawn for 1 of 400 Resident Black Bear Hunting Permits (specific to the Black Bear Management Zone (BMZ) numbers listed below). Additionally, at least 10% of permits are awarded to qualifying landowners per BMZ. Unlike other
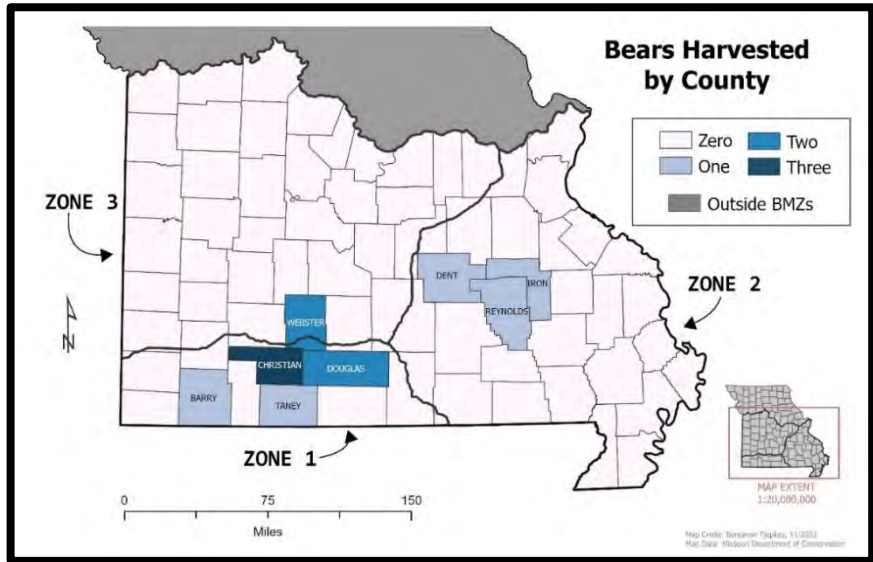

Figure 6. Map of Missouri displaying the bear management zones and counties that bears were harvested in 2021.

landowner related tags offered in Missouri, bear tags allocated to qualifying landowners did not limit landowners to hunting on their own property, but instead allowed them to hunt anywhere within the BMZ their land was located that they applied for. This regulation was established in attempt to help develop a local hunting community within each BMZ. Each BMZ had both a permit

quota (cap on the number of permits issued for that BMZ) and a harvest quota (cap on the number of bears that could be harvested within a specific BMZ). The permit and harvest quotas were as follows: BMZ-1: 20 bears, BMZ-2: 15 bears, and BMZ-3: 5 bears. Several bear hunting education classes were put on before the start of the hunting season to help educate hunters on this new hunting opportunity. Hunters were only allowed to hunt in the BMZ they applied/selected for and could use both firearms and archery equipment to hunt bears but were not allowed to bait or use hounds during the season. For the 2021 season, 6,335 residents (BMZ 1: 2,381, BMZ 2: 2,729, BMZ 3: 1,225) applied for the bear permits. At the end of the season, 12 bears (6 females, 6 males) were harvest, and ranged in age from 1.5 – 7.5 years, and all with firearms (Figure 6). Overall, Missouri had a successful inaugural black bear hunting season.
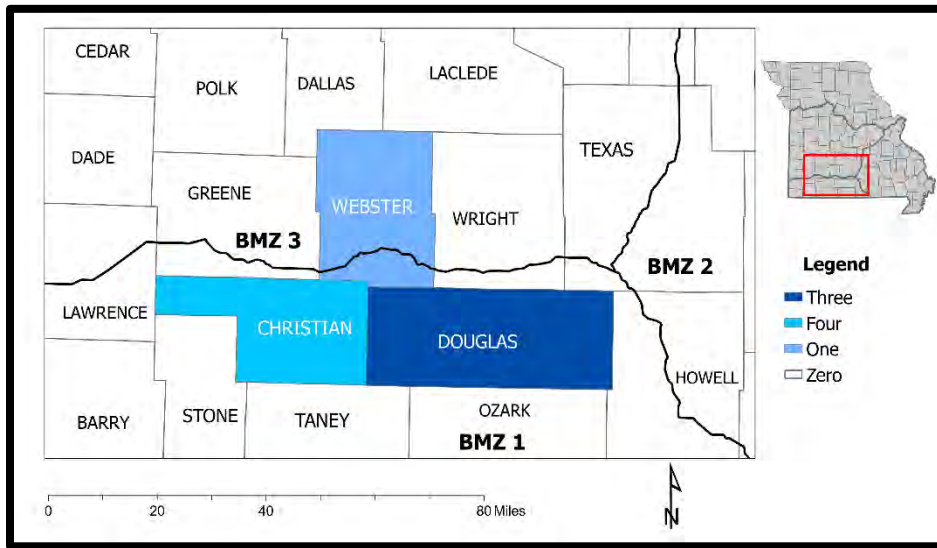

Figure 7. Map of Missouri displaying the bear management zones and counties that bears were harvested in 2022.

In 2022, a total of 5,881 (BMZ 1: 2,218, BMZ 2: 2,382, BMZ 3: 1,281) individuals applied for a bear permit, and at the end of the season a total of 8 bears (4 females, 4 males) were harvested (Figure 7). Two of the bears harvested in this season were with archery equipment, while the rest of the bears were harvested with firearms. The age range of harvest animals was 1.5 to 14.5 years and three of the four females harvested were marked individuals that had been tracked previously as part of MDC research studies. Harvest decreased slightly this season, likely due to an above average acorn crop that resulted in lower-than-average bear movements, leading to fewer hunter-bear interactions.

Following each hunting season, a post season survey was sent out to all hunters that were drawn for the 2021 and 2022 seasons to assess overall effort and satisfaction. Questions included asking hunters about where they hunted, if they were able to find bear sign before or during the bear season, did hunters see bears while hunting, overall hunter satisfaction with the newly established hunting season, and more. Of the hunters that responded to the survey, more than half of hunters attended a bear hunting class in 2021, compared to 2022 where less than half of responding hunters

attending a bear hunting class. In both years, over half of hunters found bear sign before going out hunting, but fewer hunters in 2022 saw a bear during the hunting season compared to 2021. Overall, hunters were satisfied with their hunting experience in 2021, but in 2022 hunter satisfaction declined (Figure 8). In addition, in both years when asked what would have made their hunting experience better, hunters most common

Figure 8. Post hunting survey results regarding hunter satisfaction with the bear hunting experience from the 2021 and 2022 hunting seasons.

responses were having harvested a bear or seeing a bear while hunting (Figure 9). The changes seen in hunter satisfaction is likely related to the above-average acorn crop and the lack of bear movement during the hunting season.
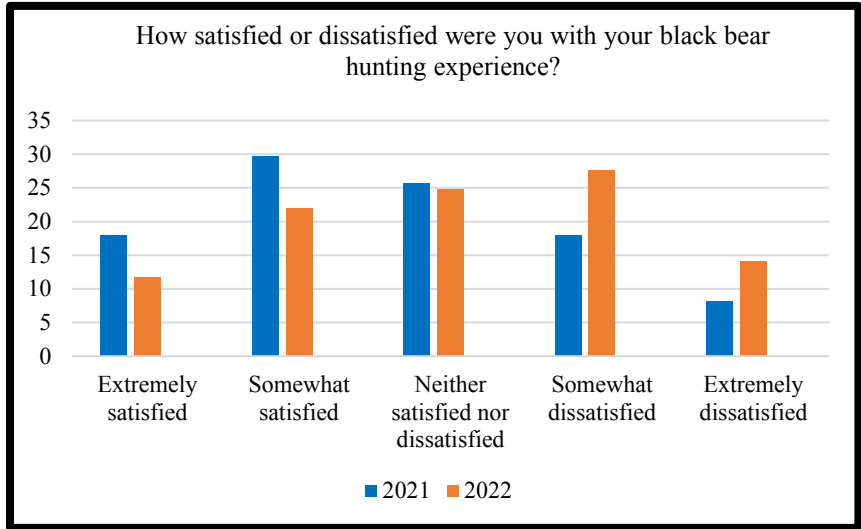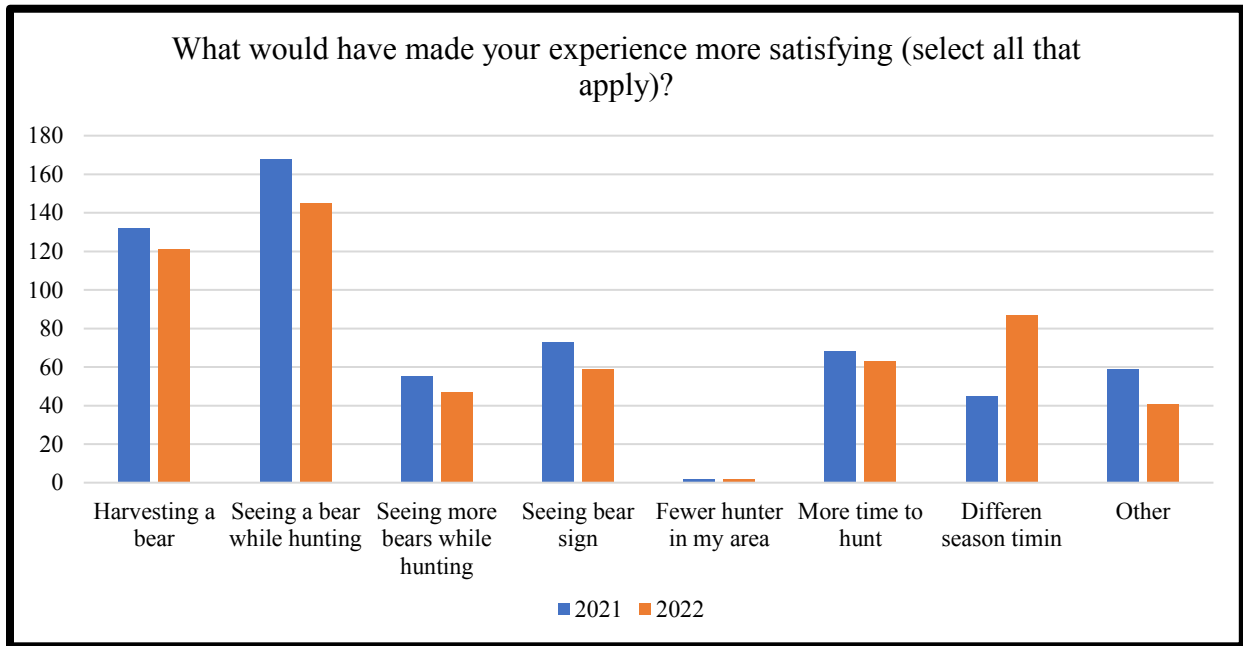

Figure 9. Post hunting survey results regarding what would have made bear hunters hunting experience better from the 2021 and 2022 hunting seasons.

Increasing Public Awareness

Outreach and Public Engagement
We continued to engage the public to increase their awareness of our ever growing and expanding black bear population, through a series of educational programs, news articles, radio interviews, and podcast. Our hope is that as more people become aware that Missouri is bear country, citizens can learn how to live responsibly with bears.

Black Bear Hunting and Ecology Classes
Hunters who were successful in drawing a 2021 or 2022 bear hunting permit and members of the public interested in learning more about Missouri's black bear season were invited to attend a basic training class (Black Bear Hunting: Basics). This was a virtual program hosted by MDC instructors. Attendees learned about wildlife identification, habits and habitats, regulations, safety, hunting strategies, equipment, and game care. Furthermore, MDC also held a more in-depth training class (Black Bear Hunting Beyond the Basics) that was only for permitted bear hunters. This class touched on the same topics but expanded on a number of hunting related topics.

Podcasts/News Articles
The black bear program and MDC were featured in several news articles, radio interviews and podcasts focused on the inaugural black bear hunt in 2021. The Black Bear Program was also featured in the February 2021 *Missouri Conservationist* article, "Missouri Black Bears: A Species Returns and Science Leads the Way in Managing Its Survival." This article covered multiple topics from the different subjects such as current black bear research, the amazing ecological return of bears to Missouri, the importance of using citizen science sighting data to track range expansion, how best to inform bear management decisions, a historical overview of bears in the state, and lastly, how to co-exist with bears. In 2022, several additional news articles and podcast interviews were conducted to review the results of the 2021 hunting season and chat about future black bear research and management plans.

2021

- The573 Podcast: Black Bear Hunting in Missouri with Laura Conlee
- Blood Origins Podcast: Missouri Black Bears || The Science Behind Missouri's First Black Bear Season with Laura Conlee
- Bears Of Burden Podcast: Bear hunting with Laura Conlee
- KHMO radio interview: Missouri's First Bear Hunting Season

2022

- Beast of Burden. Bear hunting with Nate Bowersock
- KCUR NPR. Bear hunting with Nate Bowersock
- Show Me Today Missouir.net podcast: Bear hunter/ Be Bear Aware with Nate Bowersock
- Blood Origins Podcast: Bear hunting with Nate Bowersock
- KBIA NPR radio interview: Bear hunting with Nate Bowersock

Be Bear Aware & BearWise

As the bear population started to grow and expand across the state, MDC saw a need to begin intensive educational and outreach actives to help Missourians learn how to live in newly recolonized bear country, which led to the development of the Be Bear Aware program. The Be Bear Aware program (found on the MDC website: https://mdc.mo.gov/wildlife/wildlife-facts/be-bear-aware) provides information about what to do if you were to encounter a bear in the wild or near your place of residence. In addition, the program provides suggestions on how to properly secure food items, such as bird or animal feed, to reduce conflict with bears.

Be Bear Aware Tips…

1) Don't feed bears – intentionally or accidentally. A fed bear is a dead bear – when bears lose their fear of people (often by receiving food), they may become bold in search of food. Bears that exhibit bold behavior are often euthanized. Therefore, it's important to remove or secure food attractants, such as bird feeders, garbage, pet food, and grills/smokers. If you are camping or hiking in bear country, be bear aware. Store food in secure containers, keep a clean camp and keep cooking and sleeping areas separate.

2) If you see a bear, enjoy the encounter from a distance, give the bear room to escape and never run. Bears retreat up trees when they feel threatened. If you see a bear up a tree, leave the area and let the bear come down when it is ready. Bears may explore tree stands out of curiosity or attraction to cover scents or food. If you are hunting and a bear approaches the base of your tree stand, immediately alert the bear of your presence – make noise, stand up to be more visible.

3) Bear attacks on humans are extremely rare but can occur. Being Bear Aware helps keep you safe.

BearWise

More recently, MDC has become a BearWise state (bearwise.org), meaning the state is starting to utilize information developed by BearWise to help continue to educate the public. BearWise is a nation-wide education effort developed by black bear biologists and supported by state wildlife agencies, such as MDC, that provides sound information and smart solutions that help people, neighborhoods, and communities prevent conflicts with black bears and keep bears wild. BearWise shares ways to prevent conflicts and encourages community initiatives to keep bears wild. You can learn more about this program at bearwise.org.

If you see a bear in Missouri or find bear sign, we encourage the public to report these sightings to MDC at mdc.mo.gov/reportbears. In addition, if you are regularly seeing bear activity on your property or are experience conflict with a bear, it is important to contact your MDC Regional Office, local Conservation Agent, or regional Damage Biologist.

Addressing and Mitigating Stakeholder Conflicts

A trail camera photo of a black bear attempting to access an unsecured dumpster in southern Missouri.

Black bears are an important species in Missouri for their intrinsic value and their contributions to local biological diversity. However, sometimes bears may be considered a problem by some members of the public when involved in human-bear conflicts. These interactions are likely to increase over time as the black bear population and their geographic distribution expands. For the continuation of our healthy bear population and assuring public safety, it is imperative to deploy a comprehensive strategy addressing and mitigating human-bear conflicts across their range.

Bear Wildlife Damage Response

MDC's Wildlife Damage Management Program employs a team of Wildlife Damage Biologists/ Human-Wildlife Interaction Specialists that provide technical information and assistance with wildlife damage prevention and control. These damage biologists use flyers, door hangers, and one-on-one interactions to address prevention issues. Human bear conflicts are most common outside the bear hibernation periods and typically peak in the early summer. Since 2010, damage biologists have responded to a long list of conflict issues such as food storage issues of trash or animal feed to property damage of beehives and livestock holding pens (Figure 9).
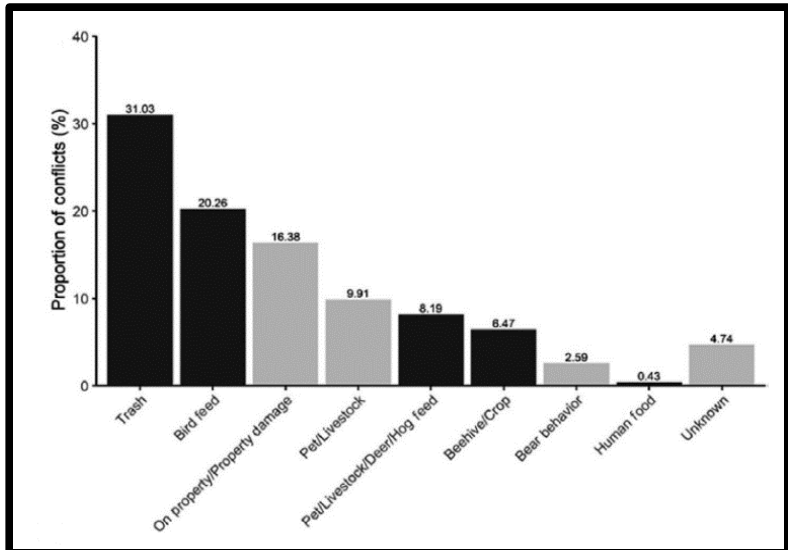

Figure 9. The proportion of reported bear–community conflicts from 1991 – 2020 in Missouri related to food (black bars) or direct interactions with property, pets or livestock, various bear behaviors such as aggression, curiosity, or denning, and causes unknown (grey bars). Boudreau et al. 2021

In 2022, we continued to see an increase in conflict situations, with trash storage and property damage being the most common issues (Figure 10). To help deal with these issues, damage biologists regularly recommend removing any food attracts from areas of conflict and to securing trash cans and other attracts through with electric fencing. These resolutions help mitigate many conflict issues.
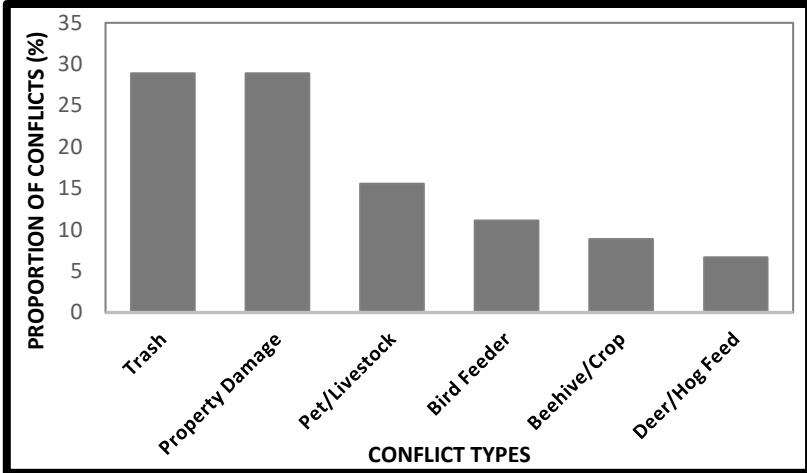

Figure 10. The proportion of reported bear–community conflicts in 2022 in Missouri related to sources of food or direct interactions with property, pets or livestock, various bear behaviors such as aggression, curiosity, or denning, and causes unknown.

Acknowledgements and Publications

Acknowledgments

Publications (from 2010-present)

From the research conducted starting in 2010, more than 21 peer reviewed publications were published in scientific journals. We hope to continue to share our results of future studies in scientific publications as these studies are completed.

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