CPSM Program

8 October 2022

## Overview

The 2022 Central Plains Society of Mammalogists Meeting will be held on 8 October 2022 at the Ozarks Education Center and by Zoom. We have set of exciting talks and posters by students covering shrews, rodents, and carnivores.

The Zoom link is [here](https://missouristate.zoom.us/meeting/register/tJEud-6qpj8qGtJ6kXYaJhuO6kcCmlYv7PPz). You can [register for the meeting](https://www.centralplainsmammalogists.org/store/c3/Annual_Meeting_Registration.html) to receive the passcode to view and participate.

After registering, you will receive a confirmation email containing information about joining the meeting.

## Schedule

| Time | Activity |
| --- | --- |
| 9:00-9:15 | Announcements |
| 9:15-10:30 | Oral Presentations |
| 10:30-11:00 | Break & Poster set-ups |
| 11:00-12:00 | Keynote Address |
| 12:00-1:00 | Lunch and Board Meeting |
| 1:00-2:00 | Members Meeting |

## Oral Presentations

| Time | Presenting Author | Title |
| --- | --- | --- |
| 9:15am | Nicole D. Mittman | Vertebrate use of Common Muskrat (*Ondatra zibethicus*) structures in the Nebraska Sandhills |
| 9:30am | Miranda K. Theriot | Room to grow? Age as a driver of temporal body-size variation in Canada lynx (*Lynx canadensis*) |
| 9:45am | Michaela Sielaff | Comparing bat activity and insect biomass at McConnell Air Force Base and nearby Wichita parks. |
| 10:00am | Nathan J. Proudman | Efficacy of hair-snare cubbies and methods of hair species identification. |
| 10:15am | Kenneth E. Shimer | Comparison of passive detection methods for determining occupancy of coyotes (*Canis latrans*) in rangeland in south-central Oklahoma |

## Keynote Address

**Nearby Nature: Studying Urban Mammals from the Global to Local Scale**

Dr. Christine Brodsky, Pittsburg State University

Ongoing urbanization and land transformation have driven profound changes in ecosystems worldwide, with mammals responding in a myriad of ways. Particularly, the homogenization of wildlife communities due to widespread anthropogenic changes may reduce biodiversity and urban ecosystem resilience. However, there are benefits of urbanization (e.g., increased resources and survival) for some mammal species, likely supported by corresponding traits that facilitate the exploitation of human-dominated environments. Using data collected throughout multiple studies, I will present trends that we have found in mammal communities globally, nationwide, and locally, across various scales of urbanization. I will also discuss a proposed research agenda to satisfy gaps in our understanding of urban wildlife to address the global biodiversity crisis. By fulfilling these gaps, we may better identify the effects of anthropogenic development on ecosystem functioning, as mediated by species’ traits, which remains a crucial step as urban landscapes continue to expand globally.

## Poster Presentations

|  | Presenting Author | Title |
| --- | --- | --- |
| 1 | Daniel Benson & Jenell de la Peña | Status of the Plains Spotted Skunk (*Spilogale interrupta*) in Kansas |
| 2 | Basant Sharma | Coexisting with tigers (*Panthera tigris tigris*): Factors affecting human-tiger exposure in the Khata corridor, Bardiya, Nepal |
| 3 | T.J. Hafliger | Prion protein geneotypes among Kansas deer provide insight towards susceptibility to chronic wasting disease |
| 4 | Austin Abram | Range update for the nine-banded armadillo (*Dasypus novemcinctus*) |
| 6 | Brendan Mayden | Kansas Mammal Activity Patterns Before and After a Wildlfire |
| 8 | Loryn Smith | Methylation Patterns Across Tissue and Time in Peromyscus leucopus; A Targeted Museum Study |
| 9 | Logan H. Grose | Demographics of a Mexican Free-tailed Bat Maternity Colony in Northern Oklahoma |
| 12 | Bailey A. Kleeberg | Assessing the population of American black bears (*Ursus americanus*) in western Oklahoma |
| 13 | Derek P. Hahn | Population Demography and Survival of Pronghorn (*Antilocapra americana*) in western Oklahoma |
| 15 | Ronie K. Loffelmacher | Effects of Den Type and Reproduction on Temperature Profiles of Black Bear (*Ursus americanus*) Hibernacula |
| 16 | Kieran Payne | Medium and Large Mammal Inventory at Bull Shoals Field Station, 2019―2022 |
| 17 | Sofia Orlando | Small mammal occurrence in prairie patches in southwest Missouri |
| 18 | Emilyn Gilmore | Evaluation of landscape metrics to predict small mammal communities |

## Abstracts - Oral Presentations

**Vertebrate use of Common Muskrat (*Ondatra zibethicus*) structures in the Nebraska Sandhills**

Nicole D. Mittman\* (Undergraduate Student), Keith Geluso, Mary J. Harner, Carter Kruse

Department of Biology, University of Nebraska at Kearney, Kearney, NE 68849, USA (NDM and KG); Departments of Biology and Communication, University of Nebraska at Kearney, Kearney, NE 68849, USA (MJH); Turner Enterprises (CK)

The Common Muskrat (*Ondatra zibethicus*) is a rodent native to marshes, streams, and ponds of North America. As ecosystem engineers, muskrats are known to have wide-ranging impacts on wetland habitats. For example, muskrats build structures in water using herbaceous vegetation and mud, and although many vertebrate species likely use these structures, little has been reported in the scientific literature. We studied the diversity and frequency of species that used muskrat structures in the Sandhills Region of Nebraska. We reviewed camera trap photographs of muskrat structures on various lakes in the Sandhills from 2019 and 2020 and recorded over 30,000 observations of vertebrates on structures. These observations represent 51 species, including waterfowl, songbirds, raptors, reptiles, mammals, and amphibians. Behaviors exhibited by species at muskrat structures included foraging, basking, preening, resting, copulating, and raising young. Presence of muskrats creates island habitats useful to many wetland species, and their structures may be of particular importance to the life history of turtles and nesting waterfowl. Our results suggest that muskrats may be a keystone species in the Sandhills region, where their structures often exist in the absence of other natural islands, such as trees and rocks. Furthermore, as Common Muskrats are sometimes considered pests or trapped for their pelts, understanding their indirect effects on other vertebrates is critical when manipulating populations.

**Room to grow? Age as a driver of temporal body-size variation in Canada lynx (*Lynx canadensis*)**

Miranda K. Theriot\* (PhD Student), Hayley C. Lanier, Link E. Olson

Sam Noble Oklahoma Museum of Natural History, Department of Biology, University of Oklahoma (MKT); Sam Noble Oklahoma Museum of Natural History, Department of Biology, University of Oklahoma (HCL); University of Alaska Museum, Department of Biology and Wildlife, University of Alaska Fairbanks (LEO)

In mammals, global change over the last century is associated with shifts in average body size over time that are highly variable and context dependent. Understanding the causes and implications of these trends requires simultaneous consideration of multiple potential drivers. For instance, although age can influence individual size throughout life (contrary to the common assumption of constant adult size in mammals), the effects of age distribution in population-level size trends remain understudied. To that end, we evaluated the role of age in body-size variation by reanalyzing and expanding a study on Canada lynx (*Lynx canadensis*) in Alaska, in which the authors reported a decrease in mean size with increasing population density (estimated with harvest data) and over time (1953-2000). Notably, although they only included adults, the authors used age-sensitive skull measurements to represent size. Therefore, for our reanalysis, we obtained ages for the same specimens determined by cementum-layer analysis (accurate to the year). We found a significant positive relationship between age and size in lynx across all skull measurements, even those we predicted to be more constrained throughout life. Moreover, including age resulted in significantly better-fitting models than those described in the original paper, however, year of collection and population density estimates remained significant predictors of body size. These results demonstrate that age is one among many contributors to size variation, underscoring the multifaceted nature of body-size change. Clarifying the prominent drivers of these trends is key to precise classification and management of mammalian responses to global change.

**Comparing bat activity and insect biomass at McConnell Air Force Base and nearby Wichita parks.**

Michaela Sielaff\* (MS Student), Dr. Lorelei Patrick

Fort Hays State Univeristy

Bats are bioindicators of the communities to which they belong, giving researchers insight into the overall health of those ecosystems. Bats are also very adaptable and are capable of tolerating urbanization. Some species, such as *Lasiurus borealis* and *Lasionycteris noctivagans* may even benefit from adjacent industrial and commercial land use, although this is not for all bat species. In 2021, we began acoustic and mist net surveys of bats at McConnell Air Force Base (MAFB) in Wichita, KS. However, no bats were captured or seen during mist net surveys, although some were detected acoustically over a four month period. We also encountered very few insects. These observations lead us to wonder if bat activity differed between MAFB and surrounding Wichita. During the summer of 2022, we again conducted mist net surveys, acoustic surveys, and collected insect biomass at MAFB and expanded our surveys to include nearby Wichita parks. Data collection and analyses are ongoing. In 2022, we recorded 981 calls from Lasiurus borealis on MAFB and 509 calls from Nycticeius humeralis in Wichita. Our surveys occurred over a longer time period than previous acoustic surveys at MAFB, providing a more complete baseline than previous acoustic studies on base and in the greater Wichita area.

**Efficacy of hair-snare cubbies and methods of hair species identification.**

Nathan J. Proudman\* (PhD Student), Michelle L. Haynie, Victoria L. Jackson, Jerrod Davis, and W. Sue Fairbanks

Department of Natural Resource Ecology and Management, Oklahoma State University (NJP, WSF); Department of Biology, University of Central Oklahoma (MLH, VLJ); Oklahoma Department of Wildlife Conservation (JD)

Hair-snares are a comparatively inexpensive, and often effective, method for monitoring rare or elusive carnivores. Traditional hair-snare studies have relied on morphological or genetic identification of hairs to determine depositing species. We assessed the accuracy of these methods in a study aimed at bobcats (*Lynx rufus*) in Oklahoma, using the ‘hair-snare cubby’ design. We deployed 120 cubbies across three study sites for six weeks Jan-Feb over three field seasons (2019-2021), whilst student volunteers deployed >195 hair-snares throughout the state during winter breaks of 2018/19-2020/21. Despite snares returning many hair samples, species identifications based on morphological traits proved unreliable, with accuracy as low as 23%. In addition, genetic identification of hair samples also proved difficult, with many bobcat hairs yielding little to no DNA. Of the 545 DNA samples extracted so far, only 14% have successfully been identified to species, of which 23% were identified as bobcat. This is contrasted by camera traps, which yielded 134 observations of bobcats over 8425 trapping nights, many of which can be identified to individual-level based on distinct pelage patterns. Our findings suggest morphological identification of hairs can be highly inaccurate, whilst genetic analyses of bobcat hair can be fraught with issues. Though hair-snare cubbies have proven an effective tool in some studies, their success may not be universal, and may still be less effective than camera traps when used in the field, especially in species in which individuals can be recognized by natural markings.

**Comparison of passive detection methods for determining occupancy of coyotes (*Canis latrans*) in rangeland in south-central Oklahoma**

Kenneth E. Shimer\* (MS Student), Vicki L. Jackson, Stephen L. Webb

Department of Biology, University of Central Oklahoma(UCO)

Acoustics offers a new form of detection that increases the detection range beyond that of traditional camera trapping. We used a combination of acoustic and camera trapping to model occupancy of two different patches of rangeland in southcentral Oklahoma for coyotes (*Canis latrans*). The main objective of our study was to determine if acoustic data offered a better detection than camera traps at detecting coyotes. We will consider distance from roads, distance from water sources, Rainfall and vegetation type as covariates for occupancy. The first step of this project was to processing the acoustics data and camera data. All recorded acoustic data was analyzed using Kaleidoscope Pro, Raven Pro,and R programs and then was checked manually to determine how affective the programs are at detecting true positives. This also offered the ability to compare different automated detections software. We then created a detection histories for both acoustic data and camera traps and use PRESENCE to model occupancy and detection. These processes were repeated for each collection season to generate a multiple season approach. Once both seasons have been assessed the data was compiled and multiple models were generated. We found that out of the two collection methods the acoustic data showed a higher level of detections with rainfall being one of the main factors affecting acoustic detection. We also found that the R software had a higher success in detecting coyote calls

## Abstracts - Poster Presentations

**Status of the Plains Spotted Skunk (*Spilogale interrupta*) in Kansas**

Daniel Benson & Jenell de la Peña\* (MS Student)

Department of Biological Science, Pittsburg State University

The plains spotted skunk (*Spilogale interrupta*; formerly *Spilogale putorius interrupta*) once commonly occurred throughout the Central Plains of the United States. Subsequent to the early 1940s, the species has experienced severe declines across its range, particularly in Kansas. The last confirmed sighting of the species occurred in Gray County, KS in 2020, with limited sightings statewide throughout the early 2000s. Due to this species’ precipitous population decline, it is currently under review for listing under the Endangered Species Act. Our objectives are to determine the presence, current distribution, and describe associated habitats of the plains spotted skunk in Kansas. We are currently conducting a camera trap study throughout 18 Kansas counties with the goal of surveying 600 locations, particularly targeting spotted skunk critical habitats as identified by the Kansas Department of Wildlife and Parks. Cameras are baited with sardines and deployed for a 4-week period. We surveyed 117 camera locations (3500 trap nights) during our preliminary survey in the winter and summer of 2022; yet, we did not detect a spotted skunk. However, we successfully detected two species of conservation concern listed under the Kansas’ State Wildlife Action Plan (SWAP): grey fox (*Urocyon cinereoargenteus*) and the southern flying squirrel (*Glaucomys volans*). Camera trapping efforts will continue until summer of 2024. Data collected from this study will assist state wildlife managers in developing future research and management plans in the state of Kansas.

**Coexisting with tigers (*Panthera tigris tigris*): Factors affecting human-tiger exposure in the Khata corridor, Bardiya, Nepal**

Basant Sharma\*, Dinesh Neupane

Division of Biology, Kansas State University (BS); Faculty of Science, Health and Technology, Nepal Open University (BS and DN); The Resources Himalaya Foundation (DN)

The Khata corridor forest, which serves as a border crossing for wildlife between Nepal and India, is one of the highest incidence areas in Nepal for human-wildlife conflict. In recent years, the population of tigers (*Panthera tigris tigris*) in this region has increased, along with incidents of tiger attacks on humans and livestock. The goal of this research was to determine whether human-tiger conflict was predominantly due to tigers entering human settlements or due to people spending more time in the forest. The study was conducted in four settlements, Pattharbhuji, Dalla, Thakurdwara, and Neulapur, through direct field visits and household surveys (N=177). Statistical analyses of survey results included binary logistic and multinomial regressions. The probability of sighting a tiger was statistically highest in Pattharbhuji, particularly in proximity to nearby forest boundaries, water resources, and grazing land. Tiger encounters were significantly higher among people that frequently visited the forest corridor, among households located nearer to the forest edge, and in areas of human habitation without organized benefits from tiger-led tourism. There was no significant chance of sighting tigers near to or within human settlements. These findings suggest that human activities within forested habitats are the primary cause of conflict in the region. Human dependency on forests is increasing despite legal prohibitions for use of forest products, leading to increasing human-tiger conflict, especially as tiger numbers increase. Coexistence with tigers will mainly rely on reducing human dependency on forests by promoting alternate income-generating activities and formulating equitable benefit sharing mechanism from eco-tourism.

**Prion protein geneotypes among Kansas deer provide insight towards susceptibility to chronic wasting disease**

T.J. Hafliger\* (Undergraduate Student), AG Hope

Division of Biology, Kansas State University (KSU)

Chronic wasting disease (CWD) is a prion disease affecting cervid species that is rapidly spreading across North America. Relative susceptibility to CWD has been linked to genotypic variation of the prion protein gene (PRNP). The recent emergence and spread of CWD across the state of Kansas has highlighted the need to investigate PRNP gene diversity in both white-tailed deer (*Odocoileus virginianus*) and mule deer (*Odocoileus hemionus*). This study was designed to understand the spatial distribution of CWD resistance across Kansas, particularly considering ongoing decline of mule deer coupled with expansion of white-tailed deer. We extracted genomic DNA of hunter-harvested white-tailed deer (n=200) and mule deer (n=100) and sequenced 771bp of exon 3 of the PRNP gene. We provide updated information on both PRNP genotypes, coupled with infection status from immune-histocompatibility testing for CWD within Kansas. Our results identify spatial heterogeneity in the prevalence of ‘reduced susceptibility’ genotypes and identify variants previously reported elsewhere that are consistent with high susceptibility within Kansas. Sustained surveillance of herd susceptibility to CWD across cervid species is increasingly applicable with modern molecular methods for guiding applied wildlife management. This is especially important for CWD infected regions where multiple deer species interact, coupled with high hunting pressure and associated risks for human pathogen transmission.

**Range update for the nine-banded armadillo (*Dasypus novemcinctus*)**

Austin Abram\* (Undergraduate Student), Christine Rega-Brodsky, Daniel Benson, Jenell de la Peña

Department of Biological Science, Pittsburg State University

Nine-banded armadillos (*Dasypus novemcinctus*) have slowly expanded their range northward over the last 150 years, now occupying a third of the United States. The armadillo’s range expansion is limited by average winter temperatures and annual precipitation; however, climate change and anthropogenic landscape changes could create more suitable habitats for this species. We are utilizing two sources of data to update the range for nine-banded armadillos: annual nationwide Snapshot USA data and data from an ongoing Kansas spotted skunk (*Spilogale interrupta*) survey. We used passive camera traps for Snapshot USA, surveying over 1,450 locations across two years (104,734 trap nights) during the fall of 2019 and 2020, and found armadillos at 9% Snapshot locations. For a more intensive look at the armadillo range in Kansas, we surveyed 117 baited camera locations (3,500 trap nights) in the winter and summer of 2022. Armadillos were found at most camera trap locations in Kansas; however, we are still currently processing the data to determine occupancy and their distribution across the state. We hope that data collected from this study will assist state wildlife managers in developing future research and management plans for this species as it becomes newly introduced across most of the central and northern United States.

**Kansas Mammal Activity Patterns Before and After a Wildlfire**

Brendan Mayden\* (Undergraduate Student), Caleb Hinck and Dr. Lorelei Patrick

Fort Hays State University

Abstract: In 2019 Mammalogy students at Fort Hays State University, began surveying mammal activity using five trail cams deployed on a working ranch near Hays, Kansas. These trail cams were placed along trails or near water. Each site is checked approximately monthly, during which the batteries and memory cards are replaced, and it is re-baited with sardines. In December 2021, a wildfire swept through the area, driven by 80 mph winds, burning around four of the five trail cams. This study compares mammal activity post-fire to activity before the blaze. We used Camelot platform to automatically identify pictures containing wildlife, then manually identified the mammal species. Unsurprisingly, mammal activity decreased – but did not cease – in the months immediately after the fire. Coyotes and racoons were among the first mammals to reappear. We will present additional data from the first nine post-burn months of this ongoing study.

**Methylation Patterns Across Tissue and Time in *Peromyscus leucopus*; A Targeted Museum Study**

Loryn Smith\* (MS Student), Dr. Lorelei Patrick, Dr. Nicholas Stewart

Department of Biological Science, Fort Hays State University

Museum specimens are a vital data source for many types of studies. One relatively new use for specimens includes studying methylation patterns. Methylation patterns are a form of epigenetics or the study of how gene expression changes without alteration of the genetic code. Methylation patterns can inhibit gene expression by inhibiting transcription factors from binding to DNA. These patterns have been examined in many mammals including *Peromyscus leucopus*, the white-footed mouse. However, the focus has previously been on overall epigenetic patterns. Few studies have investigated whether methylation patterns differ across tissue types and across time. In this study, we compare methylation across muscle, liver, skin, and nasal bones from museum specimens collected in 2022, 2018, 2014, and 2008. We are targeting a region of the genome with known CpG islands and using bisulfite sequencing to detect methylation differences. We hypothesize that there will be differences in methylation patterns between the tissues and a potential for there to be a difference through time due to degradation. It is important to know the differences between the tissues so when methylation studies are being done researchers know which tissues to pick if there is a difference and if degradation has taken place.

**Demographics of a Mexican Free-tailed Bat Maternity Colony in Northern Oklahoma**

Logan H. Grose\* (Undergraduate Student), Keith Geluso, Carter Kruse

Department of Biology, University of Nebraska at Kearney; Turner Enterprises, Inc.

The Mexican Free-tailed Bat (*Tadarida brasiliensis mexicana*) is a migratory bat species that roosts in large maternity colonies across the southern United States. However, some “maternity colonies” contain a significant number of adult males. The northernmost maternity colony in the Great Plains is located at Merrihew Cave in north-central Oklahoma. In an ongoing study, we surveyed the population to determine sex and reproductive ratios as well as age distribution at this site. We captured bats in large hoop nets as individuals exited the cave. We sampled bats throughout the outflight on 24 June and 13 August 2022, with > 400 captures per night. In June, 90% were adult females with 10% adult males. Of those females, 87.5% were pregnant, 10.3% lactating, and 2.2% non-reproductive. We did not detect any patterns of when different cohorts exited the cave. In August, the adult sex ratio was similar with 91% adult females and 9% adult males, and of adult females, 21.3% were lactating, 71.3% were post-lactating, and 7.4% were non-reproductive. In August, 32.2% of individuals were flying young. Exodus of flying young peaked during the middle of the outflight, and adult males became more numerous as the outflight continued. These data demonstrate that Merrihew Cave is a maternity colony with a high percentage of reproductive adult females and few adult males when compared to other “maternity colonies,” such as the population at Carlsbad Caverns National Park. Establishing a baseline of colony demographics across the species distribution will aid in prioritizing conservation sites if *T. brasiliensis* becomes a species of concern, as bats in general continue to face novel threats.

**Assessing the population of American black bears (*Ursus americanus*) in western Oklahoma**

Bailey A. Kleeberg\* (MS Student), W. Sue Fairbanks, Robert C. Lonsinger

Oklahoma State University, Stillwater, OK, USA; U.S. Geological Survey, Oklahoma Cooperative Fish and Wildlife Research Unit, Stillwater, OK, USA

American black bear (*Ursus americanus*) sightings have increased in the panhandle of western Oklahoma prompting an assessment of the bear population in the area. We are conducting a non-invasive study to evaluate black bear space use and genetic connectivity with potential source populations. We are using camera traps to estimate occupancy of black bears and identify environmental factors influencing patterns of use. We are deploying hair snares to assess genetic connectivity, minimum number known alive and sex ratio. During an initial field season in summer 2022, we sampled 80 sites with cameras and deployed 31 hair snares near camera-based bear detections. These efforts resulted in detections of black bears at 19 camera sites (naïve occupancy = 23.75%), and the collection of 144 hair samples for genetic analyses. Our camera traps also resulted in the detection of cubs at two sites. The data gathered from this project will be used to better inform the management decisions regarding black bears in western Oklahoma by the Oklahoma Department of Wildlife Conservation.

**Population Demography and Survival of Pronghorn (*Antilocapra americana*) in western Oklahoma**

Derek P. Hahn\* (MS Student), Robert C. Lonsinger, M. Colter Chitwood, Matthew T. Turnley, Marlin M. Dart, Levi J. Heffelfinger, Evan P. Tanner, Michael J. Cherry, Randy W. DeYoung, George Wang, W. Sue Fairbanks

Oklahoma State University, Stillwater, OK, USA; U.S. Geological Survey, Oklahoma Cooperative Fish and Wildlife Research Unit, Stillwater, OK, USA, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville, Kingsvillle, Texas, USA, East Central University, Ada, OK, USA

Pronghorns (*Antilocapra american*a) in the panhandle of western Oklahoma are suspected to be in decline. To evaluate the status and potential drivers of the pronghorn population, we are investigating pronghorn recruitment, survival, and cause-specific mortality. We captured adult pronghorns (20M:80F) in February 2022 with netguns from helicopters and fit GPS collars. Starting in May 2022, Collared females were monitored using clustering software to identify potential parturition events with the objective of visually locating fawns <5 days old. We captured and fit fawns with neolink collars prior to release at the capture location. We successfully captured and collared 36 fawns (15M:21F). At the end of August 2022, only 4 (11.1%) fawns remained alive (1M:3F) and the leading cause of fawn mortality was predation. The data collected during this initial field season will aid Oklahoma Department of Wildlife Conservation in future management decisions.

**Effects of Den Type and Reproduction on Temperature Profiles of Black Bear (*Ursus americanus*) Hibernacula**

Ronie K. Loffelmacher\* (Undergraduate Student), Jacob M. Humm, Courtney N. Dotterweich, W. Sue Fairbanks

Department of Natural Resource Ecology and Management Oklahoma State University (OSU); McNair Scholars Program, Oklahoma State University (OSU)

Over the last 30 years, climate change has caused detriment to many ecosystems and habits of wildlife across the globe, decreasing population size and threatening species with extinction. While Black Bears (*Ursus americanus*) are not widespread across Oklahoma like they historically were, they have been recolonizing the state since the 1980’s and have become an important component of ecosystems in eastern Oklahoma. Black bear emergence hibernation is, in part, related to ambient temperature. However, the actual temperature experienced by a hibernating bear likely depends on the den type it uses for hibernation. My study, in progress, investigates the difference in temperature profiles of bears with different reproductive status and den type. Reproductive status is classified as non-reproductive male/female, female with cubs, or female with yearlings and den type is classified as standing hollow tree, hollow downed tree, cave, rock pile, ground nest, brush pile, or excavated. My study is part of a larger study using collars and telemetry data in eastern Oklahoma. I use Thermochron iButtons that have been programed to take a reading every hour and are strategically placed inside the hibernaculum away from the bears so that their body heat does not interfere with data collection, and on a structure immediately outside the hibernaculum to access the temperature profile of each den compared to ambient temperature. We collected the Thermochron iButtons after the bears left their dens in late April/early May and are currently analyzing data using generalized liner mixed models. The results of this study will increase our understanding of hibernation behavior and help predict effects of climate change on black bear hibernation.

**Medium and Large Mammal Inventory at Bull Shoals Field Station, 2019―2022**

Kieran Payne\* (MS Student), Sean P. Maher

Missouri State University

We conducted camera-trap surveys within Bulls Shoals Field Station to assess mammal presence and determine whether there are differences in occurrence. Deployments occurred on the Drury-Mincy Conservation Area (DMCA), managed by the Missouri Department of Conservation, and recently acquired property on the opposite shore of Bull Shoals Lake, which has had little to no management. Part of the management of DMCA includes regular burning on the majority of the Drury section and designated planted food plots for game species. Cameras were deployed in DMCA as part of SnapShot USA in 2019, 2020, and 2021, as well as the summer of 2021, and 2022; cameras were set in the new property for the first time in summer 2022. We detected 12 species of mammal at DMCA, with the most frequent species including Odocolieus virginiana and Sciurus carolinensis. Interestingly, we also detected S. niger in some deployments, including those where S. carolinensis individuals were detected. Carnivore species were not detected frequently, though we observed multiple individuals of *Canis latrans*, *Procyon lotor*, and *Lynx rufus*; we detected one individual of *Ursus americanus* and *Mephitis mephitis* and failed to detect *Vulpes vulpes*. Additional species detected with some regularity include *Sylvilagus floridanus*, *Dayspus novemcinctus*, and *Didelphis virigiania*. Initially results suggest that there is a little difference in species richness among sites, but the new property has relatively fewer detections.

**Small mammal occurrence in prairie patches in southwest Missouri**

Sofia Orlando\* (MS Student), Sean P. Maher

Missouri State University

In ecology, a metacommunity represents a group of species occurring in a set of connected habitat patches, where occurrence is only partly mediated by patch properties. Insights from small mammal communities provide information on the health and suitability of a particular patch. Studies on prairie patches in southwest Missouri revealed apparent isolation and area had insignificant effect on small mammal occupancy, suggesting there was an unknown catalyst for species composition. To further assess patterns in species composition, small mammal sampling was completed across 15 prairie patches. Sherman live traps were used to capture 207 individuals. 14 out of the 15 prairie patches yielded usable catch data. 7 distinct species were documented, with Peromyscus maniculatus and *Microtus orchrogaster* being the most abundant across all sites. Vegetation and other environmental data were collected to evaluate within patch dynamics. Analysis of these variables, in combination with mammal data, may provide a more robust understanding of species composition patterns across time and space. These data will help to uncover the possible mechanism behind the community makeup and could potentially describe relationships between the flora and fauna in these patches. Overall, an estimate can be made of how suitable each prairie is for their specific biota which is crucial for biodiversity maintenance in endangered ecosystems. This is especially important as prairie is one of the most imperiled ecosystems in the country due to fragmentation, woody encroachment, and destruction. Small mammals may act as an indicator of patch health and inform future conservation practices.

**Evaluation of landscape metrics to predict small mammal communities**

Emilyn Gilmore\* (Undergraduate Student), Sean P. Maher

Missouri State University

Landscape ecology is the study of how landscape impacts biodiversity and the changes landscape can have on the entire ecosystem. Changes in chemical levels, ancient remnants of glaciation and anthropogenic changes such as fragmentation are examples of possible landscape effects on biodiversity. For this study, we measured landscape properties to assess prairie habitats and examined differences between sites and how those may influence small mammal communities. Using QGIS, we determined the landscape of selected prairies and a 1km buffer around the prairie. We then took this buffer and calculated several landscape metrics using R. We calculated for total area, number of patches, percent landcover and total edge. Each of the metrics was done for agriculture, forests, grasslands and development. We then compared this data to known mammal capture data for the sites. The data indicated that there is no visible correlation between species diversity or richness when agriculture or any other metric increases besides grasslands. We have no data to suggest if they are high quality prairie and we do not know how isolation of the prairie impacts the data.