CPSM Program

9 October 2021

Overview

The 2021 Central Plains Society of Mammalogists Meeting will be held on 9 October 2021 through Zoom. We have set of exciting talks and posters by students covering shrews, rodents, and carnivores.

The Zoom link is here. You can register for the meeting 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
9:15-11:00	Oral Presentations
11:00-11:10	Posters Lightening Talks
11:10-11:30	Break/Pop-in Posters
11:30-12:30	Keynote Address
12:30-1:00	Break & Board Meeting
1:00-2:00	Members Meeting

Oral Presentations

Time	Presenting Author	Title
9:15am	Nathan J. Proudman	Using non-invasive methods to assess bobcat (*Lynx rufus*) spatial ecology between distinct ecoregions of Oklahoma
9:30am	Miranda K. Theriot	Getting long in the tooth: Investigating age-specific body size trends in masked shrews (*Sorex cinereus*)
9:45am	Tommy M. Herrera	Obscured concordance for Great Plains mammals: Lineage-specific diversification and community assembly through time
10:00am	Kenneth E. Shimer	Comparison of passive detection methods in determining occupancy of coyotes in rangeland in southern Oklahoma
10:15am	Zane M. Siebeneck	Savanna restoration: The short term effects on species in Union Ridge Conservation Area
10:30am	Tommy Galfano	A conservation and taxonomic assessment of the least shrew (*Cryptotis parvus*) through rangewide phylogeographic analyses and population genomics
10:45am	KaLynn D. Branham	Assessment of public perceptions of mesocarnivores in Eastern Oklahoma using human dimensions survey

Poster Presentations

Time	Presenting Author	Title
11:00am	Madison E. Baugh	Observing the effect of lunar light on nocturnal rodents in a mixed-grass plains region
11:05am	Lorelei E. Patrick	Documenting the genetic diversity of Kansas bats

Keynote Address

Complaints, Grievances, and the Evolution of Form, Function and Mode in Some Charismatic Mammals

Dr. John Scheibe, Southeast Missouri State University

I address some common statistical and biological misconceptions in evolutionary biology, including hypothesis testing, Bayesian considerations, sample sizes and the difficulty in identifying adaptation. As examples I use the evolution of locomotor mode in gliding mammals, the relationship between jaw morphology and diet in foxes and the evolutionary fate of polar bears. I present evidence that refutes generally accepted ideas about why flying squirrels glide and argue instead for a more general ecological explanation. For foxes I show that jaw shape reflects diet, but demonstrating adaptation of jaw morphology to diet is difficult. Finally, I explore the shape of dentaries in Polar, Grizzly and Black Bears and show that the allometric trajectory for Polar Bears will not enable them to exploit more omnivorous diets. This implies that selection for small size in Polar Bears will trap them in an evolutionary cul-de-sac.

Abstracts - Oral Presentations

Using non-invasive methods to assess bobcat (*Lynx rufus*) spatial ecology between distinct ecoregions of Oklahoma

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

Oklahoma State University (NJP, WSF), University of Central Oklahoma (MLH, VLJ), Oklahoma Department of Wildlife Conservation (JD)

Bobcats (*Lynx rufus*) are North America's most widely distributed native felid and are found throughout the state of Oklahoma, yet there is a great paucity of contemporary data on bobcat ecology in the state. This project aims to provide a greater understanding of bobcat home ranges (HR), familial HR overlap, resource selection, intersexual competition, and interspecific relationships, between vastly different ecoregions of Oklahoma, using non-invasive techniques. We use a combination of hair-snare devices and camera traps deployed for six weeks Jan-Feb yearly, at three study sites located at different ecoregions of Oklahoma. In addition, we collect scat at our field sites Jan-May. Hair and scat samples are processed genetically to identify depositing species and genotyped to identify individual bobcats, aided by camera photographs (via unique pelage patterns). Items within scats are identified to genus/family for bobcat diet data. Over the course of three field seasons, mammalian hair was found at most cubbies each week, and we obtained 133 bobcat photo observations total across all seasons. We have also obtained >250 scat samples from bobcats and their main competitor, coyotes (*Canis latrans*). Genetic and photographic analyses are ongoing.

Getting long in the tooth: Investigating age-specific body size trends in masked shrews (*Sorex cinereus*)

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

Department of Biology, University of Oklahoma (MKT, HCL); Department of Biology and Wildlife, University of Alaska Fairbanks (LEO)

Climate change over recent decades is associated with varied responses in mammals, including both increases and decreases in body size. However, the mechanisms driving these trends remain poorly understood. A number of factors beyond environmental conditions affect body-size variation, such as population demography (e.g., sex and age class), which many studies overlook despite the changes in size and shape that occur throughout an individual's life. Here, we tested the effects of demographic variables on recent size changes in the masked shrew (*Sorex cinereus*) in Alaska by expanding a study in which the authors reported an increase in average size without rigorously examining demography. We analyzed two external measurements (total length and tail length) and three craniodental dimensions (skull length, skull width, and toothrow length) in 558 specimens collected in Alaska from 1951-1991. On average, overwintered adults—as identified by tooth wear—were significantly larger than juveniles in total length and tail length, with longer but narrower skulls. None of these dimensions were significantly

sexually dimorphic, regardless of age class. All of the measurements, except cranial width, significantly increased over the study period and including age class significantly improved model fit. This study highlights the importance of population-level demographic parameters (such as age structure and sex ratio) in potentially modulating body-size change in response to anthropogenic climate change.

Obscured concordance for Great Plains mammals: Lineage-specific diversification and community assembly through time

Tommy M. Herrera* (MS Student), Nikolitsa T.P. Wooten, Fraser J. Combe, and Andrew G. Hope

Department of Biology, Kansas State University

Although the Great Plains lack major physical biogeographic barriers compared with further east or west, they are located at the epicenter of historic climatic and environmental turnover associated with Pleistocene glacial cycles, which have strongly influenced mammalian diversification and community assembly. We investigate six small mammal species, co-distributed across the Great Plains, using both genetics and distributional modeling to statistically assess (1) the location of refugial centers during the last glacial, (2) shared intraspecific-responses reflected by spatially and temporally coincident genetic breaks, (3) landscape mechanisms driving community assembly in the Great Plains through time, and (4) regional biodiversity hotspots for historic and emerging ecological/evolutionary interactions. We hypothesize that modern communities through the Great Plains reflect shared histories of diversification. We estimated Bayesian phylogenies from mitochondrial-DNA, time-calibrated by mutation rate across species, and niche models at last-glacial and modern timeframes based on BioClim variables. Our results indicate that intra-specific lineages are of the same age across species. Phylogeographic breaks across the southern Great Plains are currently broadly clustered. Concordance among species appears to be obscured at present by a lack of major physiographic barriers, and species-specific differences in post-glacial dispersal ability. Additionally, last glacial model projections indicate that Great Plain's mammals have centers of origin from either east or west refugia. It, therefore, appears as if Great Plain's lineages share a common history that is not supported at the level of species. The southern Great Plains suture zone is evidently an important biogeographic barrier, mixing zone, and center of diversification.

Comparison of passive detection methods in determining occupancy of coyotes in rangeland in southern Oklahoma

Kenneth E. Shimer* (MS Student), Stephen L. Webb, Mike D. Proctor, Vicki L. Jackson

University of Central Oklahoma: Noble Foundation

Passive monitoring devices have had a long-standing influence on how wildlife surveys are conducted, given their low labor investment and cost. The primary and most used example of this is triggered camera traps, particularly in terrestrial mammal surveys. However, autonomous recording units (ARUs) have been growing in popularity for sound-producing terrestrial species. ARUs allows for a broader detection range and are historically used in

surveying marine and air-borne species such as birds and bats. This increase in utilization raised the question of how successful these monitors are compared to the more traditional camera trap in terrestrial environments. To address this question, we compared 29 paired sets of un-baited passive detection devices (1 camera trap, 1 ARU per site) for detection of coyotes (*Canis latrans*), a highly vocal species, within two rangeland sites owned by the Noble Foundation in south-central Oklahoma. We used occupancy models to compare detection binary histories of each method in order to determine detection success. Our preliminary finding suggests that ARUs offer a higher-level detection of coyotes in comparison to camera traps. This study recommends that using or supplementing ARUs within survey protocols increases the potential detection of elusive sound-producing species.

Savanna restoration: The short term effects on species in Union Ridge Conservation Area

Zane M. Siebeneck* (Undergraduate Student), Stephanie A. Fore

Department of Biological Science, Truman State University

Thinning is the first part in a long process of restoring a forest community to its historical savanna community. Whether the trees are removed or left as fallen logs, this thinning may impact animal use of the area. In this study, camera traps were used to study the short-term effects of thinning on mesoanimals in an approximately 350 ha forest at Union Ridge Conservation Area in northern Missouri by comparing data from pre-thinned 2020 and post-thinning 2021 data. In the spring of both years, motion triggered cameras were set up to photograph animals in this forest pre- and post-thinning over the span of approximately six weeks. Photos were analyzed by species across 12 different sites and frequency of capture was calculated using these data. Deer, raccoon, squirrels, and turkey were commonly captured, but no species were found to have frequencies that significantly differed from 2020 to 2021. Observations tended to be highest around the edges of the area and near water sources. While the frequency of captures were not significant in this early study, continued observation is necessary as restoration continues to reveal any significant trends. This data serves as important foundation for further studies.

A conservation and taxonomic assessment of the least shrew (*Cryptotis parvus*) through rangewide phylogeographic analyses and population genomics

Tommy Galfano* (MS Student), Andrew Hope

Kansas State University

Least shrews (*Cryptotis parvus*) are broadly distributed across central and eastern North America, but are locally rare, and little is yet known about their evolutionary history. New populations occurring peripheral to the recognized distribution of *C. parvus* have been repeatedly discovered since the 1980's, progressively extending the known range of this species westward. It is hypothesized that populations in New Mexico represent two distinct taxa. With a reliance on declining mesic grassland habitats, least shrews are listed as threatened within New Mexico, but this listing requires additional genetic data to qualify

existing relationships, including genetic diversity, connectivity, and refined systematic relationships. Northern lineages are hypothesized to be westward expansions coincident with anthropogenic land-use changes while southern populations are hypothesized to represent a relictual lineage of *C. berlandieri*, a species recognized to be distributed throughout southern Texas and Mexico. To test this, we performed a rangewide phylogeographic study, using Cytochrome-B data (n=106) and reduced representation genome sequencing (~10,000 loci; n=64), to assess systematic relationships and investigate genetic diversity of NM populations compared with other clades. Both mitochondrial and nuclear data indicate populations in Florida are highly divergent and are indicative of a cryptic species. Phylogenomic analyses of nuclear data also indicates that southern NM populations constitute a distinct and endemic intra-specific taxon of *C. parvus* reflecting both long-term isolation and adaptive divergence. Our results highlight a complex and extended history of diversification of least shrews.

Assessment of public perceptions of mesocarnivores in Eastern Oklahoma using human dimensions survey

KaLynn D. Branham* (MS Student), V.L. Jackson

Department of Biology, University of Central Oklahoma

Human dimensions is an important element that provides a basis for both citizen involvement and societal input used better understand the wildlife of an area and best ways to manage that wildlife. Citizen science also provides an opportunity for researchers to gather data remotely from individuals who are familiar with the area. We utilized this method to gather information that contributes to making better and more up to date management decisions for eastern spotted skunks in addition to these other fur bearing mesocarnivore species in the area, identifying various stakeholders in the area, and understanding recreational land use. We conducted this research through mailing post cards to random addresses in Choctaw, Haskell, Latimer, LeFlore, McCurtain, Pushmataha, and Sequoyah counties. These post cards include information and a like to an online survey that is broken into 3 sections. The first section was intended to gather basic demographic information, outdoor activities, and living situation (urban/suburban/rural). The respondents were asked whether or not they have a hunting license and if they are a trapper. The second section included a list of mesocarnivores identifying them by common name along with photos and questions assessing public perception of each one of them. The final section seeks to determine if respondent has encountered an eastern spotted skunk, and provided the respondent with the option to record the details of the observations. Results from our study will provide valuable information for a species of conservation concern while simultaneously gathering data for harvested species that are sometimes overlooked. We anticipate that this information will be useful in making more informed and efficient wildlife management decisions in eastern Oklahoma.

Abstracts - Poster Presentations

Observing the effect of lunar light on nocturnal rodents in a mixed-grass plains region

Madison E. Baugh* (Undergraduate Student), Dr. Vicki L. Jackson University of Central Oklahoma

The overall predation risk, foraging techniques, and habitat preferences of nocturnal rodents can be altered by the brightness of a particular moon phase. We will measure the variation in lunar emissions and observe the consequential changes in nocturnal rodent behavior using camera traps. There is little recent literature to support the notion that moonlight directly influences the nocturnal activities of rodents. We will be the first to use camera trapping as a mode of data collection for nocturnal rodent activity in a mixed-grass plains region. Our study will contribute to two prominent databases: eMammal Snapshot USA and the UCO Natural History Museum. Capturing evidence of nocturnal strategies such as predator avoidance, foraging, and habitat preferences will be a key component of the project. We will also record any daytime activity. Each camera trap will record the percent lunar emission. Rodent activity will be recorded via motion-activated RECONYX camera traps that will take a series of 5 pictures when triggered. Each camera trap will be deployed and baited with peanut butter oats monthly to capture 6 months of lunar cycles and rodent behavior. We expect that if there is an increase in the percent emission of lunar light, then there will be a decrease in the nocturnal activities of rodents.

Documenting the genetic diversity of Kansas bats

Lorelei E. Patrick*, Lilly B. Duncan, Michaela G. Sielaff, and Chloe L. Million

Department of Biological Sciences, Fort Hays State University

Bats provide essential ecosystem services wherever they occur. In Kansas, they consume economically and ecologically important insects. Although bats have been surveyed throughout Kansas, to date almost no one has investigated their genetic diversity in this state. Here, we report on our preliminary results documenting the genetic diversity of Kansas bats, which is part of a larger project to monitor roosts and document bat diets. We are building a reference database of Kansas bat sequences using bat-specific mini-barcodes (~180 base pairs) from two regions of the 16S mitochondrial gene and ~600 base pairs from CO1. So far, we have extracted and amplified DNA from a total of 70 tissue samples from 13 bat species collected by the Sternberg Museum and Kansas Department of Wildlife and Parks (KDWP) 2019 bat surveys. The resulting sequences confirmed field identifications for most species. However, the Yuma Myotis (*Myotis yumanensis*) sample from Morton County collected by KDWP in 2019 was in fact a Cave Myotis (*Myotis velifer*), as was a sample from Stanton County collected by the Sternberg. Many bat samples from Kansas had unique haplotypes compared to conspecifics available on public databases.