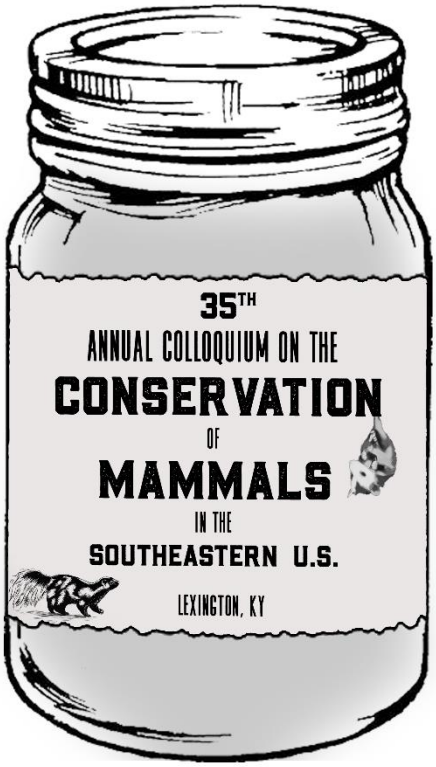
MEETING PROGRAM

SOUTHEASTERN BAT DIVERSITY NETWORK



FEBRUARY 12 – 14, 2025

HILTON LEXINGTON DOWNTOWN

LEXINGTON, KENTUCKY

Table of Contents

MEETING SCHEDULE OVERVIEW 1

EVENT LOCATIONS 5

MEETING INFORMATION 9

PLENARY TALK ABSTRACTS 16

DETAILED MEETING SCHEDULE 20

Wednesday, February 12 20

Thursday, February 13 20

Friday, February 14 22

Poster Presentations 27

ABSTRACTS 29

Oral Presentations 29

Poster Presentations 40

••••• 2025 SPONSORS •••••

Indiana Bat

Bernheim Forest and Arboretum ● Copperhead Consulting
Kentucky Natural Lands Trust ● Stantec
Third Rock Consultants ● Wildlife Acoustics

Gray Bat

Civil & Environmental Consultants ● EDGE Engineering and Science
TTL ● Tennessee Valley Authority ● VHB

Tricolored Bat

Moonlight Conservancy ● SWCA ● Three Oaks Engineering ● WEST

Evening Bat

Davey Resource Group ● ERM

Big Brown Bat

Avinet ● Bat Conservation International ● BioSurvey Group
Boston Harbor Trading Company ● Eastern Kentucky University
Environmental Solutions & Innovations ● Fauna Conservation & Analytics
GAI Consultants ● Keystone Ecological Services ● Lotus Enterprises
Southeast Bat Hub ● Southeastern Cave Conservancy ● Titley Scientific ● Vesper

A big thank you to our 2025 sponsors that help make this meeting possible!

Meeting Schedule Overview

Wednesday, February 12	
3:00pm – 6:00pm	Registration
3:00pm – 6:00pm	Exhibitor Setup
3:00pm – 5:00pm	SBDN Executive Committee Meeting
4:00pm – 5:00pm	North American Beaver Working Group
5:00pm – 6:00pm	Vintage Pour Bourbon Tasting*
6:00pm – 8:00pm	Welcome Social at LexLive*
Thursday, February 13	
7:00am – 8:00am	Continental Breakfast (provided)
7:00am – 5:00pm	Registration
7:00am – 12:00pm	Exhibitor Setup
8:00am – 12:00pm	Working Group Meetings and Workshops
9:00am – 10:00am	Breakfast with a Biologist
12:00pm – 1:30pm	Lunch (on your own)
1:30pm – 4:00pm	Plenary Session/SBDN Business Meeting
4:00pm – 4:30pm	Banding Practices Panel Discussion
6:00pm – 8:00pm	Banquet Dinner (provided)
7:00pm – 10:00pm	Social, Poster Session, Silent Auction
Friday, February 14	
7:00am – 8:00am	Continental Breakfast (provided)
7:00am – 11:00am	Registration
8:00am – 12:00pm	Oral Presentations
12:00pm – 1:30pm	Lunch (on your own)
1:30pm – 3:30pm	Oral Presentations
3:30pm – 4:00pm	Awards, Announcements, Closing Remarks

*Pre-registration required

EST. 2004 **CELEBRATING 21 YEARS!** PAINT LICK, KY

- Natural Resources Inventory
- Avoidance/Mitigation Planning
- Environmental Permitting
- Flora and Fauna Surveys
- Mine Portal Surveys
- Biological Assessments
- Artificial Bat Roosts
- NEPA Documentation
- Cliffline Surveys
- T/E Species Surveys
- Aerial Surveys
- Cave Surveys

COPPERHEAD

ENVIRONMENTAL CONSULTING®

Now Hiring!

Visit **www.copperheadconsulting.com** to apply

Lexington Welcomes

SCAN HERE for local restaurants, bars, and experiences

SCAN HERE for local map

EVENT LOCATIONS

Registration ---------- *Hallway (♦)*

Exhibitors ---------- *Pre-function Area*

Mammal Trivia ---------- *Crimson Clover*

Welcome Social ---------- *LexLive (off-property)*

Breakfast ---------- *Pre-function Area*

Breakfast with a Biologist ---------- *Salon CD*

Working Groups, Workshops ---------- Salons A & B

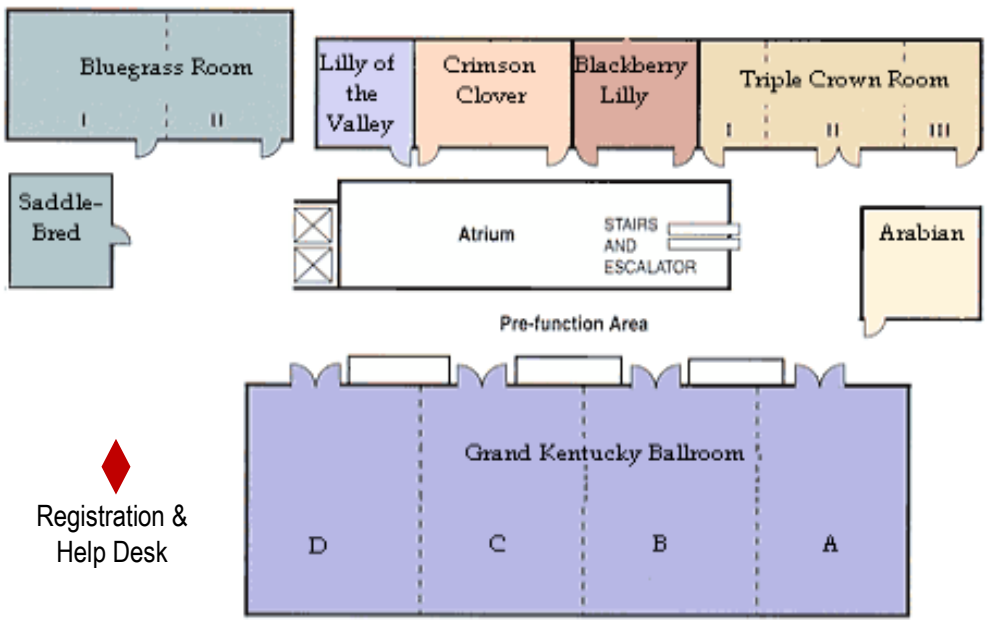
Lunch ---------- *On Your Own*

Plenary Session ---------- *Salon CD*

Breaks ---------- *Pre-function Area*

Poster Session, Banquet & Social ---------- *Grand Kentucky Ballroom*

Oral Presentations ---------- *Salons AB & CD*



Kentucky Natural Lands Trust

KNLT administers the Imperiled Bat Conservation Fund in partnership with the U.S. Fish and Wildlife Service. The Fund has promoted bat and forest conservation across Kentucky and supported important bat research for over 15 years.

KNLT.org

Indiana bat ~ Price Sewell, Copperhead Environmental Consulting

Bernheim
FOREST & ARBORETUM

www.bernheim.org

CONNECTING PEOPLE WITH NATURE

BERNHEIM FOREST AND ARBORETUM IS A 16,340+ ACRE NON-PROFIT LOCATED IN CLERMONT, KENTUCKY, JUST 20 MILES SOUTH OF LOUISVILLE OFF I-65. FOUNDED IN 1929 BY ISAAC WOLFE BERNHEIM, A GERMAN IMMIGRANT AND BOURBON DISTILLER, WE OFFER EXPERIENCES IN NATURE FOR ENTHUSIASTS OF ALL AGES.

SUPPORTING BATS ACROSS HABITATS INCLUDING MATURE FORESTS, WETLANDS, STREAMS, SPRINGS, PRAIRIES, AND GLADES.

PROTECTING AND RESTORING WATER RESOURCES THROUGH PARTNERSHIPS TO IMPROVE STREAMS AND CREATE WETLANDS.

EXPANDING OUR LARGE FOREST TO OVER 16,340 ACRES WITH LAND ACQUISITIONS AND CONSERVATION EASEMENTS.

BRING THE KIDS FOR ADVENTUROUS PLAY IN NATURE AT BERNHEIM'S PLAYCOSYSTEM, A NEW 17-ACRE NATURAL PLAYGROUND.

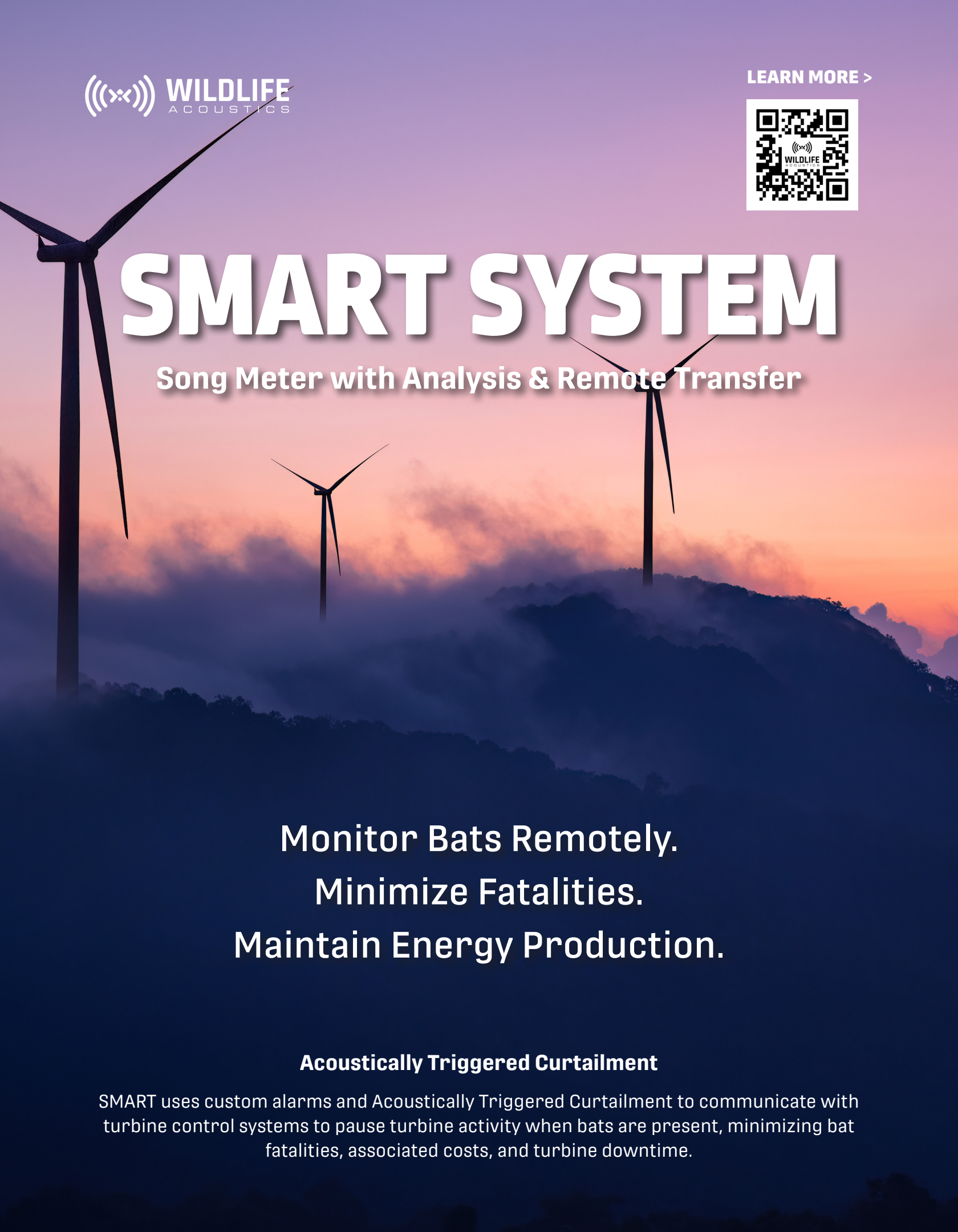
HIKING OPPORTUNITIES TO CONNECT WITH NATURE ON OVER 40 MILES OF TRAILS THAT SHOWCASE BERNHEIM'S HABITATS.

ARTS IN NATURE PROVIDES CAPTIVATING SCULPTURES SCATTERED THROUGHOUT THE ARBORETUM AND L.A.N.D. SITES.

VISITOR CENTER AND AMENITIES FEATURE A GIFT SHOP AND ISAAC'S CAFÉ USING LOCAL INGREDIENTS.

EDUCATIONAL PROGRAMS AND EVENTS FOR SCHOOLS AND VISITORS ARE DESIGNED TO INSPIRE, EDUCATE, AND ENTERTAIN.

SPECIAL THANKS TO THE NUMEROUS INDIVIDUALS AND AGENCIES THAT SUPPORT BAT AND LAND CONSERVATION AT BERNHEIM, INCLUDING IMPERILED BAT CONSERVATION FUND, KENTUCKY HERITAGE LAND CONSERVATION FUND, U.S. FISH AND WILDLIFE SERVICE, KENTUCKY FISH AND WILDLIFE RESOURCES, COPPERHEAD CONSULTING, KENTUCKY BAT WORKING GROUP, SOUTHEASTERN BAT DIVERSITY NETWORK, AND MORE.


WILDLIFE
ACOUSTICS
LEARN MORE >
SMART SYSTEM
Song Meter with Analysis & Remote Transfer
Monitor Bats Remotely.
Minimize Fatalities.
Maintain Energy Production.
Acoustically Triggered Curtailment
SMART uses custom alarms and Acoustically Triggered Curtailment to communicate with turbine control systems to pause turbine activity when bats are present, minimizing bat fatalities, associated costs, and turbine downtime.

MEETING INFORMATION

REGISTRATION DESK

The registration desk will be staffed throughout the meeting in the hallway near the Grand Kentucky Ballroom. Volunteers at the desk can assist with registration, selling t-shirts, accepting silent auction donations, and answering questions.

MEETING PROGRAM

In efforts to reduce meeting costs and use of resources, the meeting program will be provided in digital format only. A QR code linking the program will be available throughout the conference area. Contact Megan Wallrichs for program corrections.

WELCOME SOCIAL

A welcome social will be held a short walk from the Hilton up to LexLive (301 S. Broadway) from 6:00pm – 8:00pm on Wednesday, February 12. Pre-registration is required. Heavy appetizers and bowling are included in your ticket. An arcade is available for use with the purchase of tickets on site. A cash bar is available (cash and card are accepted).

PRESENTATIONS

Posters: Posters can be mounted in the Kentucky Grand Ballroom on February 13 from 5:00pm – 7:00pm. Easels will have a number corresponding to the presenter's assigned poster number. The poster session will be February 13 from 7:00pm – 10:00pm in the Grand Kentucky Ballroom following the banquet dinner. Presenters are encouraged to stand by their posters from 7:00pm – 9:00pm.

Oral Presentations: Those delivering oral presentations should upload their presentations to the presentation Google Drive link provided in the email to presenters by Thursday, February 13. Presentations on Friday, February 14 will be delivered in Salons AB and CD. Each presentation will have a 15-minute time slot that includes 2 – 3 minutes for questions.

JUDGE INFORMATION

Please pick up judging packets at the registration desk which includes the judge's forms and instructions. See Carrie Allison for any questions or concerns. Please turn in judging forms to Carrie or to someone at the SBDN Registration Desk as soon as possible so that scores can be tabulated after you finish judging each talk. Poster forms should be turned in at the end of the poster session. If you need additional time, please see Carrie.

Refreshments & Meals

Continental breakfasts will be provided on Thursday and Friday from 7:00am – 8:00am in the Pre-function Area. Coffee, water, and lemonade will be available throughout the meeting in the Pre-function Area.

Lunch is on your own. There are several restaurants in the vicinity of the hotel and LexLive is offering $10 lunch specials with your meeting badge.

A dinner banquet included in the cost of registration will be held Thursday, February 13 from 6:00pm – 8:00pm in the Grand Kentucky Ballroom. A cash bar will be available from 5:00pm – 9:00pm in the Pre-function Area (cash or card are accepted). Immediately following the dinner will be the poster session, social, and silent auction until 10:00pm.

Silent Auction

A silent auction will occur Thursday, February 13 from 7:00pm – 10:00pm in the Grand Kentucky Ballroom during the social and poster session. Items can be donated at the registration desk until 6:00pm on Thursday. Last call for bids will be at 9:30pm. Forms of payment include cash, credit card, and check. Proceeds from the auction will fund the SBDN Student Travel Award Program.

Mammal Trivia Challenge

Back by popular demand! The 5th annual Mammal Trivia Challenge will include trivia questions, museum oddities and other interesting museum finds. The challenge requires 2-person teams. All teams of two are welcome to participate, but professional-student pairs will be eligible to win prizes and other pairs (pro-pro or student-student) will be eligible for honorable mentions. Students and professionals looking to find a partner for the Challenge are encouraged to leave their contact information at the registration desk. Contact James Kiser with any questions. The Mammal Trivia Challenge will be held in Crimson Room and will be open during meeting hours. The Challenge will end at 12:00pm on Friday, February 14. Turn in completed answer sheets at the Registration Table. Winners will be announced during the award ceremony on Friday afternoon.

Working Groups

North American Beaver Working Group – Salon A, Wednesday February 12 from 4:00pm – 5:00pm.

State Representative Working Group – Salon A on Thursday February 13 from 8:00am – 10:00am. This working group is for state representatives and attendance is by **invite-only**.

Bats in Transportation Structures – Salon A, Thursday February 13 from 10:00am – 12:00pm.

Eastern Spotted Skunk Cooperative Study Group – Salon B, Thursday February 13 from 10:00am – 12:00pm. The goals of the eastern spotted skunk cooperative study group are to promote the conservation of the eastern spotted skunk across their distribution through (1) enhancing communication about the species, (2) identifying management and resource priorities, and (3) facilitating collaborative planning, funding, outreach, monitoring and research opportunities.

WORKSHOPS

Wildlife Acoustics – Are you SMART about bats on wind farms? Learn about the Wildlife Acoustics SMART (Song Meter with Analysis and Remote Transfer) System and how it can be used for remote monitoring and curtailment at wind farms. We'll discuss examples of real-life installations on wind farms and leave plenty of time for questions. Please meet in Salon B from 8:00am – 9:00am **OR** 9:00am – 10:00am on Thursday February 13.

PARKING

Parking is available onsite at the Hilton Downtown/Lexington and is free if you are staying at the hotel. If you are staying off-site and driving in for the meeting, parking is available in the hotel garage for $5.00/day with a sticker that can be picked up at the SBDN Registration Desk.

SBDN BUSINESS MEETING

This year, the SBDN Business Meeting will occur throughout the plenary session. Agenda topics include a lifetime achievement award presentation, committee reports (Treasury, Membership, DEI, Bat Blitz, Nominations, Bylaws, and Audit committees), and next year's meeting. Voting results for the SBDN executive committee and proposed bylaw amendments will be announced.

BREAKFAST WITH A BIOLOGIST

Students interested in discussing potential career paths in the biology/natural resources career path will have the opportunity to meet various professionals from different fields (USFWS, private consultants, KY Department of Fish and Wildlife, National Parks Service, etc.) in a more formal setting in Salon CD from 9:00 to 10:00 am on Thursday morning. Contact Shane Kelley with any questions.

LEXLIVE
MOVIES • BOWLING • GAMES • SPORTS • DINING • BAR

Just Across From Rupp Arena!

WELCOMES

SOUTHEASTERN BAT DIVERSITY NETWORK

$10.00+

QUICK BITES MENU

"TRADITIONAL" BURGER & FRIES
(LETTUCE, TOMATO, PICKLE & RED ONION)

CHICKEN FINGERS & FRIES

10" PERSONAL PIZZA
- PEPPERONI
- CHEESE
- MARGHERITA

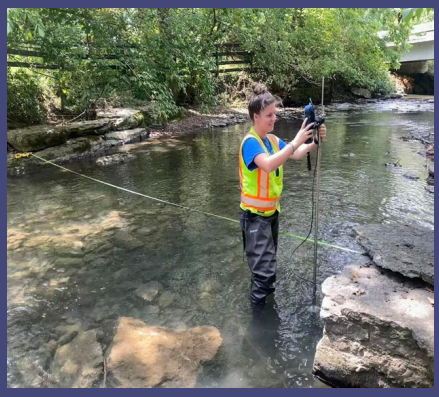
*INCLUDES SOFT DRINKS

VALID 2/13/2025 - 2/14/2025 (OPEN - 3:00 PM)

Price Does Not Include Tax, Gratuity, or ADD-ONS.
Please Show Convention Badge When Ordering.

THIRD ROCK

"CELEBRATING 25 YEARS"



THIRD ROCK CONSULTANTS WAS ESTABLISHED IN 2000 BY MOLLY FOREE CUMMINS, A LICENSED ENVIRONMENTAL ATTORNEY WITH A STRONG BACKGROUND IN ENVIRONMENTAL PLANNING AND DESIGN. THIRD ROCK WAS DESIGNED TO BE DIFFERENT, AND THEREIN LIES OUR STRENGTH. WHAT WE DO AND HOW WE DO IT, MATTERS. OUR SERVICES INCLUDE ECOLOGICAL SURVEYS AND ANALYSES; STREAM AND WETLAND RESTORATION DESIGN AND CONSTRUCTION; ENVIRONMENTAL PLANNING (INCLUDING 401/404 PERMITTING, NEPA DOCUMENTATION, AND FEASIBILITY STUDIES); MS4 PROGRAM MANAGEMENT AND PERMIT MONITORING; EROSION PROTECTION AND SEDIMENT CONTROL PLANNING AND INSPECTION; AND AQUATIC TAXONOMY.

THIRD ROCK IS HOME TO A COLLABORATIVE OF WOMEN AND MEN WITH DIVERSE ENVIRONMENTAL SPECIALTIES AND BACKGROUNDS, BUT UNIQUELY SIMILAR WORK ETHIC, PRIORITIES, AND APPROACH TO LIFE. OUR STAFF INCLUDES ECOLOGISTS, PROFESSIONAL ENGINEERS, PROFESSIONAL GEOLOGISTS, ENVIRONMENTAL PLANNERS, CONSTRUCTION INSPECTORS, TECHNICAL WRITERS, GIS ANALYSTS, AND AUTOCAD TECHNICIANS. AT THIRD ROCK, TRAITS LIKE INTEGRITY, AUTHENTICITY, CREATIVITY, AND COMMON SENSE ARE ENCOURAGED AND REWARDED. RELATIONSHIPS AND LOYALTY MATTER.

WE HOLD CURRENT CERTIFICATION AS A DISADVANTAGED BUSINESS ENTERPRISE (DBE), SMALL BUSINESS (SB) AND WOMAN-OWNED BUSINESS (WBE) BY VARIOUS FEDERAL, STATE AND LOCAL AGENCIES AND MAINTAIN DOT CONSULTANT PREQUALIFICATION IN KENTUCKY, TENNESSEE, GEORGIA, ILLINOIS, OHIO AND NORTH CAROLINA. OUR CLIENTS RANGE FROM FEDERAL, STATE AND LOCAL AGENCIES INCLUDING THE US ARMY CORPS OF ENGINEERS AND ENVIRONMENTAL PROTECTION AGENCY, TO LARGE AND SMALL CONSULTING ENGINEERING FIRMS, COMMERCIAL AND INDUSTRIAL ENTITIES, ATTORNEYS, AND NATURAL RESOURCE AND ENVIRONMENTAL ADVOCACY GROUPS ACROSS THE SOUTHEASTERN UNITED STATES.

2526 Regency Road, Suite 180
Lexington, KY 40503
859-977-2000

www.thirdrockconsultants.com


Stantec

Civil & Environmental Consultants, Inc.

TTLUSA.COM

PLENARY TALK ABSTRACTS

BAT CONSERVATION IN KENTUCKY

BAT CONSERVATION AT MAMMOTH CAVE NATIONAL PARK, KENTUCKY, WITH A FOCUS ON LONG CAVE

S. C. Thomas, R. S. Toomey III, and C. L. Allison
National Park Service, Cumberland Piedmont Network, Mammoth Cave, KY 42259 (SCT); National Park Service, Mammoth Cave National Park, Mammoth Cave, KY 42259 (RST); National Park Service, Southeast Regional Office, Atlanta, GA 30303 (CLA)

Historically, the roughly 500 caves that lie within Mammoth Cave National Park, including the longest mapped cave system on the planet, and the above-ground acreage provided habitat for immense numbers of bats. Some have even stated that the Historic Entrance area in Mammoth Cave once housed one of the largest hibernating colonies of bats yet identified. However, bat use of the park in the twentieth and twenty-first centuries is extremely different from historic and prehistoric times—both in terms of numbers of individuals and species. Early bat conservation efforts began about a decade before the park's establishment in 1941 and focused on limiting direct human disturbance by installing more-secure doors (with only small holes) at cave entrances. Beginning in the early 1990s, new "bat friendly" angle iron gates were installed on cave entrances, and they largely worked as designed. One highlight is the large response in bat numbers, particularly gray bats (*Myotis grisescens*), to conservation efforts at Long Cave. Since the current gate was installed in 1994 and a large concrete sill that supported an old wall was removed in 2003, the hibernating gray bat population has risen from under 1,000 to an estimated 730,000+ in 2022. The discovery of white-nose syndrome in park bats in 2013 presented new bat conservation challenges and opportunities. Conserving bats at the park includes various efforts ranging from habitat enhancement, to research, to outreach and education. It requires cooperation among federal and non-federal partners alike.

PRESERVING KENTUCKY'S BATS: A HISTORIC AND MODERN PERSPECTIVE ON CONSERVATION AND MONITORING IN THE STATE

M. L. Rogers and J. R. MacGregor
Kentucky Department of Fish and Wildlife Resources, Frankfort, KY 40601

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has been involved in the conservation and management of bats since 1981, building on decades of prior research in the state. KDFWR maintains databases containing historic and current bat data, and this presentation will offer a glimpse into changes in species distribution over time. Early bat conservation efforts in Kentucky involved significant discoveries of caves that serve as winter hibernacula, primarily involving Indiana bats (*Myotis sodalis*) in the

late 1950s. Through the work of Wayne Davis and his students at the University of Kentucky in the 1960s and 70s, understanding of the natural history and biology of bats was greatly increased. Through the 1980s to early 2000s, surveys conducted by KDFWR, the Daniel Boone National Forest, independent researchers, and volunteers expanded knowledge of at-risk bat locations, including caves, rock shelters, mine portals, and bridges. As mist netting efforts drastically increased statewide around the turn of the century, many new summer maternity sites were identified. The first detection of white-nose syndrome in Kentucky in 2011 sparked a surge in research and cemented the need for ongoing seasonal census data to determine the impact of the disease and the persistence of the state's bat populations. Today, a network of agencies, researchers, biologists, and land managers is invested in the conservation and understanding of bats in Kentucky. KDFWR recognizes eleven bat Species of Greatest Conservation Need in the State Wildlife Action Plan and is continuously engaged in conservation efforts. These include seasonal census surveys and emergence counts, cave gating projects, bat blitzes, and research projects on movement and reproductive ecology of Kentucky's most at-risk bat species.

TVA

TENNESSEE VALLEY AUTHORITY

EDGE

ENGINEERING & SCIENCE

15 YEAR ANNIVERSARY!

WEST

SWCA®

ENVIRONMENTAL CONSULTANTS

THREE OAKS ENGINEERING · THREE OAKS ENGINEERING ·

Moonlight Conservancy

Detailed Meeting Schedule

Wednesday, February 12

Time	Activity	Location
3:00pm – 6:00pm	Registration	Hallway
3:00pm – 6:00om	Exhibitor Setup	Pre-function Area
3:00pm – 5:00pm	SBDN Executive Committee Meeting	Arabian Room
4:00pm – 5:00pm	North American Beaver Working Group	Salon A
5:00pm – 6:00pm	Vintage Pour Bourbon Tasting	IYKYK
6:00pm – 8:00pm	Welcome Social	LexLive (off-site)

Thursday, February 13

Time	Activity	Location
7:00am – 8:00am	Continental Breakfast	Pre-function Area
7:00am – 5:00pm	Registration	Hallway
7:00am – 12:00pm	Exhibitors Setup	Pre-function Area
9:00am – 10:00am	Breakfast with a Biologist	Salon CD

Working Group Meetings & Workshops

Time	Working Group	Location
8:00am – 10:00am	State Representative Working Group (Invite Only)	Salon A
8:00am – 9:00am	Wildlife Acoustics Workshop	Salon B
9:00am – 10:00am	Wildlife Acoustics Workshop	Salon B
10:00am – 12:00pm	Bats and Transportation Structures	Salon A
10:00am – 12:00pm	Spotted Skunk Working Group	Salon B

12:00PM – 1:30PM Lunch (on your own)

THURSDAY, FEBRUARY 13

PLENARY SESSION & SBDN BUSINESS MEETING

Grand Kentucky Ballroom – Salon CD
Moderator: Courtney Hayes

Time	Activity	
1:30pm – 1:45pm	Welcome/Business Meeting Opening	*Scott Bergeson*
1:45pm – 2:15pm	Bat Conservation at Mammoth Cave National Park, Kentucky, with a focus on Long Cave	*Carrie Allison*
2:15pm – 2:30pm	*Business Meeting*: Lifetime Achievement and Krusac-Belwood Awards	*Luke Dodd* *Nikki Castleberry*
2:30pm – 3:00pm	*Business Meeting*: Committee Reports	*Committee Leads*
3:00pm – 3:30pm	Preserving Kentucky's Bats: A Historic and Modern Perspective on Conservation and Monitoring in the State	*Michaela Rogers*
3:30pm – 4:00pm	*Business Meeting*: New Business, Future Meetings (NOLA 2026, Joint Meeting 2027)	*Luke Dodd* *Scott Bergeson* *Chuck Battaglia*

EVENING ACTIVITIES – GRAND KENTUCKY BALLROOM

Time	Activity
5:00pm – 9:00pm	Cash Bar
6:00pm – 8:00pm	Banquet Dinner (provided)
7:00pm – 10:00pm	Social, Poster Session, Silent Auction

FRIDAY, FEBRUARY 14

Time	Activity	Location
7:00am – 8:00am	Continental Breakfast (provided)	Pre-function Area
7:00am – 11:00am	Registration	Hallway

MORNING SESSION - STUDENT ORAL PRESENTATIONS

Salon AB
Moderator: Shane Kelley

Time	TITLE, *Presenter*
8:00am – 8:15am	IMPACT OF MANAGEMENT PRACTICES AND HABITAT FEATURES ON BAT ACTIVITY IN EARLY-SUCCESSIONAL HABITAT *C.M. Abramowitz*
8:15am – 8:30am	MISSING THE MAMMALS FOR THE TREES: COMPARATIVE BIOGEOGRAPHY OF THE SKY ISLAND MAMMALS OF THE SOUTHERN APPALACHIANS *K. Cook*
8:30am – 8:45am	DETERMINING NECESSARY LEVEL OF ACOUSTIC SURVEY EFFORT FOR NORTHERN LONG-EARED, LITTLE BROWN, AND TRICOLORED BATS *R.E. Green*
8:45am – 9:00am	SEASONAL BAT DIVERSITY RESPONSES TO STREAMSIDE MANAGEMENT ZONES IN PRIVATE, WORKING FORESTS *R.D. Pourshoushtari*
9:00am – 9:15am	FREE-FLIGHT MANEUVERING KINEMATICS OF TOWNSEND'S BIG-EARED BAT (CORYNORHINUS TOWNSENDII) WHILE HUNTING. *C. Rankin*
9:15am – 9:30am	IMPACTS OF ECOLOGICAL RELEASE AND LAND USE CHANGE ON SOUTHEASTERN BAT COMMUNITIES *D.J. Van Parys*
9:30am – 9:45am	CURATION AND DIGITIZATION OF EASTERN KENTUCKY UNIVERSITY'S MAMMAL COLLECTION *K. Wood*

BREAK
9:45am – 10:00am

Salon AB
Moderator: Lydia Moore

10:00am – 11:00am	BANDING PRACTICES DISCUSSION PANEL *Panel Members: Susan Loeb, Ash Cable, Trina Morris, Tim Carter*
11:00am – 11:15am	STRUCTURE SURVEYS FOR BATS: EMERGING TRENDS IN FREQUENCY OF BAT USE IN NORTH CAROLINA BRIDGES & CULVERTS *C. Knepp*
11:15am – 11:30am	SEASONAL CHANGES IN SHREW MORPHOLOGY: EXPLORATIONS OF SOFT TISSUE AND BRAINCASES *K.M. Gorman*

Friday, February 14

11:30am – 11:45am	USING A MODIFIED AHDRIFT METHOD TO DETECT PLAINS SPOTTED SKUNKS IN LOUISIANA *J. Hogue Manuel*
11:45am – 12:00pm	TEMPORAL AND INTERSPECIFIC COMPARISONS REVEAL SHIFTS IN THE DISTRIBUTIONS OF TWO FLORIDA SKUNK SPECIES *M. Wallrichs*

Lunch (on your own)
12:00pm – 1:30pm

Afternoon Session – Concurrent Oral Presentations

	Salon AB *Moderator: Rebecca Ijames*	Salon CD *Moderator: Carrie Allison*
Time	**TITLE, *Presenter***	**TITLE, *Presenter***
1:30pm – 1:45pm	TIMR: ACOUSTICALLY ACTIVATED SMART CURTAILMENT TO REDUCE BAT FATALITIES *E. Amichai*	TRICOLORED BAT WINTER ACTIVITY AT SOUTHEASTERN SUBTERRANEAN AND ABOVEGROUND HIBERNACULA *A.J. Edelman*
1:45pm – 2:00pm	FALL AND SPRING MIGRATION TRACKING OF INDIANA BATS AND LITTLE BROWN BATS IN PENNSYLVANIA *C. Birdsall*	THE CHALLENGE OF GETTING BATS ON THE INSIDE OUT *A. Levy*
2:00pm – 2:15pm	JAMES CAVE AND COACH CAVE, BAT HIBERNACULA *C. Bishop*	FALL BEHAVIOR OF GRAY BATS SUMMERING IN WEAVER CAVE, CALHOUN COUNTY, AL *W.R. Seiter*
2:15pm – 2:30pm	FLIGHTS OF THE SWAMP BATS: AERIAL TELEMETRY ACROSS EVERGLADES RESTORATION *J. Borkholder*	BAT SIGNALS: TRACKING TRICOLORED BATS TO WINTER ROOST WITH RADIOTELEMETRY *L.M. Smith*
2:30pm – 2:45pm	MICROPLASTICS IN THE GASTROINTESTINAL TRACTS OF BIG BROWN BATS *A.B. Cable*	THE USDA FOREST SERVICE'S BAT CONSERVATION STRATEGY LAUNCHES: AN INTEGRATED ENDANGERD SPECIES ACT 7A1 AND 7A2 APPROACH AT THE SUBCONTINENTAL SCALE *L.B. Wilson*
2:45pm – 3:00pm		NEW RECORDS OF TRICOLORED BAT MATERNITY ROOSTS IN SILVICULTURAL LANDSCAPES *J. Wilson*

FRIDAY, FEBRUARY 14

3:00pm – 3:30pm	*Awards Ceremony, Announcements, and Closing Remarks*	

Meeting Adjourned

Nashville Office
801 Rep. John Lewis Way South
Suite 206
Nashville, TN 37203

ECOTONE

BioSurvey Group

EKU

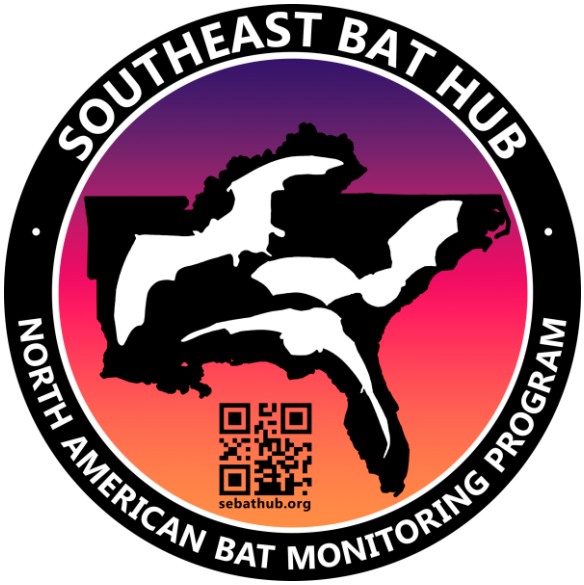
ESI

Environmental Solutions & Innovations, Inc.

fauna
CONSERVATION & ANALYTICS

Bat Surveys and Professional Exclusions

Lotus Enterprises LLC
lotushelpsyou.com



www.vesperbats.com

POSTER PRESENTATIONS (S# = STUDENT POSTER, P# = PROFESSIONAL POSTER)

Poster #	TITLE, *Presenter*
S01	ACOUSTIC SURVEY OF BAT COMMUNITY ON FORT MOORE *K.F. Connelly*
S02	BAT BIODIVERSITY SURVEYS ON PUBLIC LANDS IN NORTHEAST OKLAHOMA: A POST WHITE-NOSE SYNDROME ASSESSMENT *H. Davis*
S03	SEASONAL MICROSTRUCTURAL PLASTICITY IN THE GASTROINTESTINAL TRACTS OF WILD-CAUGHT PEROMYSCUS MANICULATUS *O.S. Chapman*
S04	SMALL VERTEBRATE DIVERSITY ACROSS A RESTORED GRASSLAND MATRIX IN NORTHEASTERN INDIANA *C.J. Dunn*
S05	BAT ACTIVITY IN MINES OF WESTERN NORTH CAROLINA *A.I. Guerrero & N.A. Hammond*
S06	TRICOLORED BAT (*PERIMYOTIS SUBFLAVUS*) GENETIC AND IMMUNOGENETIC POPULATION STRUCTURE: EPIDEMIOLOGICAL IMPLICATIONS *L. Henderson*
S07	A PILOT STUDY OF BAT SPECIES ASSEMBLAGES IN A RAPIDLY URBANIZING LOCALITY *E.C. Holman*
S08	A BATTY SUMMER IN FLORIDA'S NAVAL INSTALLATIONS *S. Jackson & M.A. Drake*
S09	METHODS TESTING & CALIBRATION FOR UAS SURVEYS OF INDIANA WILDLIFE *T.M. Jackson*
S10	LANDSCAPE CHARACTERISTICS THAT SUPPORT BAT ASSEMBLAGE DIVERSITY ALONG A RURAL TO URBAN GRADIENT *K. Larkin*
S11	SURVEYING INDIANA'S SMALL MAMMAL COMMUNITIES USING THE AHDriFT CAMERA TRAP METHOD *L.X. Lee*
S12	WELCOME BACK FRANKS! REINTRODUCING FRANKLIN'S GROUND SQUIRRELS (*POLIOCITELLUS FRANKLINII*) INTO NORTHWESTERN INDIANA *J. Moore*
S13	SEASONAL INTERACTION OF GI TRACT PLASTICITY, GUT MICROBIOME, AND DIET IN NORTH AMERICAN DEER MICE (*PEROMYSCUS MANICULATUS*) *S. Munkh-Orgil*
S14	EVALUATING SMALL MAMMAL COMMUNITY ECOLOGY IN THE SOUTHERN BLUE RIDGE USING AHDRIFT *K. Steen*
S15	SHRINKING SHREWS: EXPLORING DEHNEL'S PHENOMENON IN THE APPENDICULAR SKELETON OF *SOREX CINEREUS* *K.E. Stierman*

S16	COMPARATIVE ANALYSIS OF THERMAL DYNAMICS OF BAT BAG MATERIALS *G.L. Tomboc*
S17	IMPACTS OF HUMIDITY, SUBSTRATE, AND LIGHT ON *PSEUDOGYMNOASCUS DESTRUCTANS* GROWTH *L. Young*
P01	BEWARE THE BOUNCE: THE BENEFIT OF USING THERMAL CAMERAS TO MONITOR HARP TRAPS, MEASURE BAT ACTIVITY, AND CONFIRM CAPTURE SUCCESS RATES *J.E. Alexander & M.R. Evans*
P02	UNCONVENTIONAL ROOST SELECTION FOR BATS WITHIN STRUCTURES *E. Hall*
P03	USING AHDRIFT TO PASSIVE SAMPLE SGCN SPECIES IN MISSISSIPPI *J. Creely*
P04	RECOMMENDATIONS TO PROMOTE INCREASED BAT ACTIVITY IN URBAN REFORESTATION EFFORTS IN THE BLUEGRASS REGION *L.E. Dodd*
P05	DEVELOPMENT OF A POPULATION ESTIMATION TOOL FROM STANDARDIZED GUANO COLLECTION AT ARTIFICIAL ROOSTS USED BY INDIANA BATS IN THE BLUEGRASS REGION *L.E. Dodd*
P06	ASSESSING IMPACTS TO GRAY BAT BRIDGE AND CULVERT ROOSTS FROM HURRICANE HELENE IN NORTH CAROLINA *K.L.C. Etchison*
P07	BAT HABITAT CONSERVATION PLAN FOR LARGE-SCALE VEGETATION MANAGEMENT *S.R. Freeze*
P08	DEVELOPING A TOOL TO IDENTIFY MYOTIS TO SPECIES BASED ON SKULL CHARACTERS *L.J. Gatens*
P09	QUESTION THE MARK: A GLOBAL REVIEW AND ASSESSMENT OF BAT MARKING PRACTICES *S.C. Loeb*
P10	HABITAT DIVERSITY AND ITS ROLE IN TRICOLORED BAT CONSERVATION IN FLORIDA: INSIGHTS FROM STATEWIDE ACOUSTIC MONIORING *M.N. Monarchino*
P11	SBDN BAT BLITZES AS A TOOL FOR DOCUMENTING CHANGING BAT COMMUNITIES AND PROVIDING TRAINING OPPORTUNITIES FOR STUDENTS AND FIELD BIOLOGISTS *K. Morris*
P12	FILLING THE GAPS: FLORIDA BONNETED BAT ROOST SELECTION AND POPULATION STRUCTURE BETWEEN KNOWN POPULATIONS *A.R. Nash*
P13	IMPROVING DEFINITIONS OF TRICOLORED BAT HABITAT WILL FACILITATE SITING/PERMITTING THROUGHOUT THE SPECIES' RANGE *K.R. Hammond & K.E. Torrey*

ABSTRACTS

Abstracts are arranged by oral presentations and poster presentations then by alphabetical order by presenting author.

ORAL PRESENTATIONS

IMPACT OF MANAGEMENT PRACTICES AND HABITAT FEATURES ON BAT ACTIVITY IN EARLY-SUCCESSIONAL HABITAT

Caroline M. Abramowitz*, Susan C. Loeb, and Erin K. Buchholtz
Department of Forestry and Environmental Conservation, Wildlife and Fisheries, Clemson University, Clemson, USA (CMA); United States Department of Agriculture Forest Service, Southern Research Station, Clemson, USA (SCL); U.S. Geological Survey, South Carolina Cooperative Fish and Wildlife Research Unit, Clemson, USA (EKB)

Fields, a type of early successional habitat (ESH), serve as foraging habitat for insectivorous bats, mainly due to their lack of vegetative clutter. Prescribed fire, herbicide treatment, and mechanical vegetation removal may interact with habitat features to impact a field's suitability for bats and their prey. Our objectives were to 1) determine the effect of management practices on bat and insect activity, 2) determine the effects of habitat characteristics on bat and insect activity, and 3) investigate how bat activity relates to insect availability. We deployed acoustic detectors at the edge and interior of 29 fields throughout Big South Fork National River and Recreation Area (BISO) in Tennessee and Kentucky from May to August 2024 and collected data on bat activity, vegetative characteristics, and management activities at each field. Flight-intercept traps were deployed at each detector location to assess nocturnal insect abundance. Total bat activity did not vary between field edges and interiors or among management treatments. However, activity of open-space foraging bat species was higher at field interiors, and clutter-space species were more active at field edges. Open-space foragers were more active in burned fields, however, this was not correlated with vegetation structure. Preliminary analysis of insect data shows no significant difference in total insect abundance or abundance of each order between field edges and interiors, and no significant difference among management types. Our results show that species use of field interior vs field edge varied as expected according to differing foraging habitat affinities. Furthermore, these results suggest that prescribed burning in fields increases activity of open-space foragers, with no effect on clutter or edge space specialists. However, there is room for further exploration into what motivates this preference for burned fields, as insect abundance and vegetative structure did not impact bat activity in our analyses.

TIMR: ACOUSTICALLY ACTIVATED SMART CURTAILMENT TO REDUCE BAT FATALITIES

E. Amichai
Normandeau Associates, Inc., Alachua, FL 32615

Normandeau's turbine-integrated mortality reduction (TIMR℠) system is an acoustically activated smart curtailment system that integrates real-time bat activity and environmental conditions to predict high or low risk conditions and curtail turbines accordingly. TIMR has now been evaluated in two separate studies and was shown to be an effective method for reducing bat fatalities as well as reducing energy production losses. A TIMR system consisting of 4 sensors was installed on 4 turbines controlling 18 and 21 turbines in summer and fall 2021 and 2022 (respectively). TIMR was operational between wind speeds of 3-7 meters/second and compared in terms of bat fatality and energy production to no-treatment turbines and "blanket curtailment"

between wind speeds of 3-5 m/s. Due to the differences in the study designs between the treatments, direct comparisons are difficult, but the results show TIMR reduces fatalities in a similar rate to blanket curtailment, and confers the benefit of increased energy production – especially at higher winds. In addition, TIMR is now deployed commercially at a large wind facility with 23 sensors installed amounting to ~15% of the turbines and controlling the entire site. While the first season has just ended and even preliminary results are not available for sharing, they echo the results of the validation studies. As a pilot season, TIMR was set to control the entire wind farm as one unit. However, analysis of bat activity within a spatio-temporal context shows that dividing the site into biologically relevant zones is likely to confer the same protection to bats while reducing production loss even further. Acoustically activated smart curtailment is a promising approach that, combined with informed siting decisions will help reduce bat fatalities at wind facilities while minimizing energy production loss.

FALL AND SPRING MIGRATION TRACKING OF INDIANA BATS AND LITTLE BROWN BATS IN PENNSYLVANIA

C. Birdsall and P. Roby
Copperhead Environmental Consulting, Inc. 471 Main St. Paint Lick, KY 40461

A small summer colony of Indiana bats resides in Berks Co., PA but only 4 extant hibernation sites are known in the state. Contrastingly, over 150 summer colonies of little brown bats have been identified, and the hibernating population was >20,000 in the 1980s. With the arrival of white-nose syndrome, the numbers of little brown bats have declined, prompting the Pennsylvania Game Commission to find additional maternity colonies for protection. In fall 2021 and 2022, Indiana bats were radio-tagged from the bat houses in Berks Co., and copious foraging data were collected for these bats. Females migrated before males and were influenced by temperature and barometric pressure: bats were more likely to migrate during warmer temperatures and when the barometric pressure had fallen from the previous day. Radio-tagged bats migrated as early as 10 September, but at least one male was still in the summer range on 5 October. A band recovery in Carter Caves, Kentucky represented the second 678 km (421 mi) migration between this maternity colony and that hibernaculum. In spring 2023 and 2024, little brown bats were caught emerging from various hibernacula in central PA and tracked to roosts. A total of 219 bats were processed: 204 little browns, 9 tricolored bats, 4 small-footed bats, and 2 big brown bats. We have located 39 new roosts housing at least 2,000 little brown bats in central PA. At least 2 roosts were used in both years by bats from different hibernacula. This work has provided important behavior information for Indiana bats in the fall and filled in some spatial gaps for little brown bat summer roosts. Future work includes tracking Indiana bats to hibernacula in the fall and continuing to locate additional summer roosts for little brown bats.

JAMES CAVE AND COACH CAVE, BAT HIBERNACULA

Charles Bishop
National Speleological Society 9355, James Cave Project

James Cave and Coach Cave are critical Indiana and Gray bat hibernacula. They are located on Bald Knob at the edge of the Dripping Springs Escarpment in Edmonson County, Kentucky, just south of Mammoth Cave National Park. The presence of bats has been documented in Coach Cave since the mid-1800s. The caves were commercialized in the early 1960s to attract tourists to the Park Mammoth Resort located on Bald Knob. Gating of the caves and winter disturbance by commercial tour groups had a significant negative impact on the hibernating bats. Winter tours in the caves ended in the early 1980s and all tours were discontinued by the end of the decade. The two caves are distinctively different in character and development. In Coach Cave the bats hibernate close to the entrance on one level of the cave, not far below the elevation of the entrance. In James

Cave there are two hibernaculum areas located deep in the cave, a significant distance from and over a hundred and fifty feet below the entrances. Biannual bat counts have taken place since the 1980s. The numbers from the counts over the past 40 years provide insight as to how the bat populations have been faring. Entrance modifications and the warming climate have impacted the location of the bats within the hibernaculum.

FLIGHTS OF THE SWAMP BATS: AERIAL TELEMETRY ACROSS EVERGLADES RESTORATION

J. Borkholder, E.C. Braun de Torrez, L.P. Nicholson, and K. Christman
Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Gainesville, USA (JB, ECB,LPN, KC); Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, USA (LPN)

Understanding how wetland restoration and changes in hydrology affect wildlife is increasingly urgent but remains understudied, particularly for bats. South Florida has experienced extensive development in areas now slated for hydrologic restoration as part of the Comprehensive Everglades Restoration Plan, the largest hydrologic restoration project in the United States. We previously investigated the effects of hydrological restoration in the Florida Everglades on the endangered Florida bonneted bat (*Eumops floridanus*) using acoustic surveys across a restoration gradient. We found significantly higher activity of *E. floridanus* in the reference and fully hydrologically restored zones and positive responses to several characteristics associated with restoration such as hydroperiod and water depth. To complement this research, we attached break-away VHF collars to 4 males and 3 non-pregnant female *E. floridanus* captured within Fakahatchee Strand Preserve State Park in March 2024, and tracked them to 6 new tree roosts. Like other previously discovered roosts in this area, all new roosts were located within pristine reference sites containing freshwater forested wetlands. To track their nightly foraging movements, Copperhead Environmental Consulting conducted a total of 8 aerial telemetry surveys for an average of 4.6 hours each night. Probability contours were created to represent likely foraging areas and we calculated the proportion of land cover classes within each bat's contour. For all 7 bats, the dominant foraging habitats used were woody wetlands and emerging herbaceous wetlands. Although two bats foraged along remaining canals within the project area, the majority of foraging occurred in natural habitats in adjacent reference areas. We also documented 4 night roost areas within and adjacent to our reference sites. Our results inform immediate management decisions and suggest that hydrological restoration efforts within the Everglades ecosystem will likely benefit this species.

MICROPLASTICS IN THE GASTROINTESTINAL TRACTS OF BIG BROWN BATS

A.B. Cable, E.V. Willcox, L.N. Crowley, C. Leppanen
School of Natural Resources, University of Tennessee, Knoxville, TN 37996

Microplastics are ubiquitous environmental contaminants of increasing concern to aquatic and terrestrial species. Bats are a group of aerial insectivores that consume emergent aquatic and terrestrial insects and forage over many land cover types. Microplastics have been detected in numerous insectivorous bird species and in bats in the Amazon. There are currently no published studies investigating dietary pathways of microplastic exposure in North American insectivorous bats. We extracted, quantified, and characterized microplastics from the gastrointestinal tracts (GITs) of *Eptesicus fuscus* (big brown bats) carcasses collected across Tennessee, USA. We compared microplastic concentrations in GITs to procedural blanks. We used linear regression to investigate the relationship of GIT concentrations with bat body mass. We show that insectivorous bats ingest microplastics and that higher microplastic GIT concentrations are related to lower body mass, potentially indicative of poorer body condition and reduced fat storage. Fat reserves are an important energy resource for bats to survive while migrating, reproducing, hibernating, and surviving diseases such as the non-native fungal

disease white-nose syndrome. This study provides a baseline for understanding microplastic exposure of North American bats and the possible health implications of contact with environmentally relevant concentrations.

MISSING THE MAMMALS FOR THE TREES: COMPARATIVE BIOGEOGRAPHY OF THE SKY ISLAND MAMMALS OF THE SOUTHERN APPALACHIANS

K. Cook*, D. Webster, J. Stowe*, T. Johnson, A.J. Hopkins*, L. Gatens, T. Knowles, J. Krupa, R. Petric, J.R. Burger
University of Kentucky, Lexington, KY (KM, JS, TJ, AJH, JK, JRB); University of North Carolina Wilmington, Wilmington, NC (DW); North Carolina Museum of Natural Sciences, Raleigh, NC (LG); Francis Marion University, Florence, SC (TK); Highlands Biological Station, Highlands, NC (RP)

High-elevation refugia in the southern Appalachians serve as critical habitat for small mammal species that have persisted since the last glacial maximum. Several of these species have a contiguous range in the northeastern United States and Canada, and disjunct populations in the southernmost portion of their ranges. The patchy distribution of high elevation spruce-fir and northern hardwood forests, which forms a "sky island" archipelago along the southern Appalachian mountains, is often used as a surrogate for the distribution of these disjunct mammal populations. We used a species distribution modeling approach to predict past, present, and future distributions of 5 mammal species: *Sorex dispar*, *Microtus chrotorrhinus*, *Synaptomys cooperi, Glaucomys sabrinus coloratus,* and *Sylvilagus obscurus* along the southern Appalachians. We then compared the modeled distribution of suitable habitat to "islands" defined by elevation cutoffs for spruce-fir and northern hardwood forest. This comparison revealed variation in island size, connectivity, and suitability across mammal species and mountaintops. Our comparative approach highlights how species-specific microhabitat requirements (e.g. mesic vs. xeric) and traits (i.e. body size) influence their use of high-elevation habitats, challenging traditional assumptions about forest-type associations in these systems. These findings underscore the importance of species-specific requirements when forecasting distributions and conserving sky island species in the southern Appalachians and elsewhere.

SEASONAL CHANGES IN SHREW MORPHOLOGY: EXPLORATIONS OF SOFT TISSUE AND BRAINCASES

K. M. Gorman, B. McLean, H. Plylar, Z. Isenhour, T.C. Carter, T. McCay, A. Reachmack, and W. M. Ford.
Virginia Polytechnic Institute and State University, Blacksburg, VA, USA (KMG, ZI, and AR); University of North Carolina at Greensboro, Greensboro, NC, USA (BM and HP); Ball State University, Muncie, IN, USA (TCC); Colgate University, Hamilton, NY, USA (TM); U.S. Geological Survey, Virginia Cooperative Fish and Wildlife Research Unit, Virginia Polytechnic Institute and State University, Blacksburg, VA, USA (WMF)

Some members of the family Soricidae (shrews) undergo seasonal morphological changes to maintain homeostasis in response to external temperature variations in temperate and boreal environments. Though this plasticity varies by species and geography, it is known to affect the size of the brain case, brain mass and spine length, as well as the soft tissues and other organ masses. Termed 'Dehnel's phenomenon', this mechanism has not been fully explored in North American species, and most quantitative research on shrews is decades old and/or restricted to northern Europe. For this project, we used ethanol-preserved specimens from the University of Georgia Museum of Natural History, collected in the early 1990s in the Southern Appalachian Mountains of northern Georgia and western North Carolina to look for evidence of Dehnel's phenomenon in North American shrews collected across a 1,000 m elevational gradient and five distinct forest community types. At present, we are comparing dry weights of internal organs (heart, lungs, intestines, kidneys, liver, and brain) to braincase volume using glass beads. Additionally, we are taking femoral length and measuring skulls (length, width,

height, tooth row length, and volume) using computed tomography (CT) scanning. Preliminary results from masked shrews (*Sorex cinereus*) from North Carolina across three seasons and a comparison between analog and digital braincase measurements for one month, supports the presence of Dehnel's phenomenon in this southernmost population of masked shrews in North America.

DETERMINING NECESSARY LEVEL OF ACOUSTIC SURVEY EFFORT FOR NORTHERN LONG-EARED, LITTLE BROWN, AND TRICOLORED BATS

R.E. Green*, M.P. Armstrong, V. Kuczynska, M. Fullerton, K.M. Gorman, J. L. De La Cruz, Z.W. Isenhour, C.P. Blume, A. King, A. Reachmack, W. M. Ford
Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA 24060 (REG, KMG, ZWI, CPB, AK, AR); U.S. Fish and Wildlife Service (MPA, VK, MF); Conservation Management institute, Blacksburg, VA 24060 (JLDLC); U.S. Geological Survey, Virginia Cooperative Fish and Wildlife Research Unit, Blacksburg, VA 24060 (WMF)

Assessing whether a site is occupied by a given species underpins the majority of monitoring and management efforts; yet, detecting rare and cryptic species is often difficult. Particularly for bats, imperfect detection may yield false negatives and lead to uncertainty as to whether a species is present even if not detected. Determining the level of effort (LOE), number of sequential non-detection nights needed to assert absence, may aid in the development of minimum survey requirements and enable managers to direct conservation efforts with greater efficacy. We gathered acoustic data from northern long-eared bats (*Myotis septentrionalis*; MYSE), little brown bats (*M. lucifugus*; MYLU), and tricolored bats (*Perimyotis subflavus*; PESU) from May 15th through August 15th, 2024 at 129 sites across the eastern United States. Environmental variables were used in conjunction with acoustic data to determine the occupancy, detection probability, and LOE for each species. We additionally calculated the latency to detection, i.e., number of survey nights until initial detection, for each species as a comparison. Across our study sites, MYSE had relatively low occupancy and detection probabilities ($\Psi = 0.68$, $\rho = 0.22$) compared with MYLU ($\Psi = 0.89$, $\rho = 0.43$) and PESU ($\Psi = 0.78$, $\rho = 0.41$). This resulted in a noticeably higher number of sequential non-detection nights needed to assert absence with 90% confidence - 11.8 nights compared with 7.6 nights and 6.5 nights needed for MYLU and PESU, respectively. Similarly, MYSE had the highest latency to detection compared with the other two species. For MYSE, initial detection was achieved after approximately 17.5 sequential detection nights, followed by approximately 8 nights for PESU, and dropping to only 2.5 nights for MYLU.

THE CHALLENGE OF GETTING BATS ON THE INSIDE OUT

A. Levy
VHB *1355 Peachtree Street, NE, Suite 100, Atlanta, GA 30309*

For a project in-progress, we present the case of a Georgia DOT bridge rehabilitation project that required exclusion of a modest colony of Brazilian freetail bats (*Tadarida brasileinsis*), cohabitating with a few big brown bats (*Eptesicus fuscus*) for good measure. Included will be project background, lessons learned from overnight monitoring of a bridge rehabilitation with installed exclusions on an unrelated project, discussion of materials and adaptive management for exclusion given the unique characteristics among structural roosts, as well as the ongoing challenge of humanely evicting bats and maintaining exclusion measures until demolition or rehabilitation commences.

TRICOLORED BAT WINTER ACTIVITY AT SOUTHEASTERN SUBTERRANEAN AND ABOVEGROUND HIBERNACULA

S. C. Loeb, W. C. Bridges, Jr., E. A. Winters, R. L. Brown, J. R. Anderson, M. Ferrari, J. Upton, L. Smith, T. McElroy, A. J. Edelman, and C. T. Cornelison
USDA Forest Service, Southern Research Station, Clemson, SC 29634 (SCL and EAW); Department of Mathematical and Statistical Sciences, Clemson University, Clemson, SC 29634 (WCB); Department of Forestry and Environmental Conservation, Clemson University, Clemson, SC 29634 (RLB); Biology Program, University of West Georgia, Carrollton, GA 30118 (JRA and AJE); Department of Molecular and Cellular Biology, Kennesaw State University, Kennesaw, GA (MF, JU, and CTC); Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Gainesville, FL 32601 (LS); Department of Ecology, Evolution, and Organismal Biology, Kennesaw State University, Kennesaw, GA (TM)

Susceptibility of bats to white-nose syndrome may be influenced by activity outside hibernacula during the winter. We tested the effects of hibernaculum type (aboveground or subterranean) and *Pd* status on winter activity of tricolored bats (*Perimyotis subflavus*) in the southeastern USA along with the effects of ambient temperature, precipitation, and stage of hibernation. We placed acoustic detectors at the entrances of 13 hibernacula during winter 2020-21 and 2021-22. While neither hibernaculum type nor *Pd* status alone predicted probability or level of activity, these factors interacted with temperature, precipitation, and hibernation stage. Activity increased at a greater rate with temperature and time since the onset of hibernation in aboveground and *Pd* negative sites, and decreased at a faster rate in response to precipitation. Our results suggest that tricolored bats using above ground hibernacula such as culverts or bridges may be less susceptible to WNS. However, use of these structures may have other costs such as higher freezing and predation risks.

STRUCTURE SURVEYS FOR BATS: EMERGING TRENDS IN FREQUENCY OF BAT USE IN NORTH CAROLINA BRIDGES & CULVERTS

C. Knepp
Environmental Analysis Unit, North Carolina Department of Transportation 1598 MSC, Raleigh, NC 27699-1598

Habitat assessments for bats in transportation structures are standard practice for the North Carolina Department of Transportation (NCDOT). Several bat species found in transportation structures are federally protected. Therefore, it is important for NCDOT to understand the habitat preferences for these species to help ensure transportation project compliance under the Endangered Species Act. In 2014, NCDOT developed a Standard Operating Procedure for bat surveys on structures and has since developed several workshops and videos for training employees and contractors statewide to ensure consistency in data collection. All data collected is entered into a database managed by NCDOT which helps expand the collective knowledge of bat use within transportation structures in North Carolina. NCDOT reports 20% of NCDOT bridges had evidence of bat use. By region, 16% of bridges in the western part of the state had evidence of bat use and 30% in the eastern part of the state. To better understand culvert use by bats, NCDOT began a multiyear, multi-season study in 2022 to survey across all the size and type combinations of culverts in the NCDOT system. Results indicate that 4% of culverts surveyed statewide had presence of bats (3% in western NC and 6% in eastern NC). Bats prefer large concrete box culverts or medium sized corrugated metal culverts (3'+ high and 60'+ long) and survey results indicate that 30% of these types of culverts were positive for bat use in North Carolina. However, only 9% of culverts in NC have these combinations of characteristics that bats are showing preference towards. Therefore, distributing results over the entire dataset (n=340,000 culverts), results in a <1% estimate of bat presence in culverts statewide. Understanding prevalence and composition of culvert characteristics is essential to making accurate statements about percentages of bat use in structures statewide.

USING A MODIFIED AHDRIFT METHOD TO DETECT PLAINS SPOTTED SKUNKS IN LOUISIANA

J. Manuel and C. Battaglia
Louisiana Department of Wildlife and Fisheries, 200 Dulles Dr. Lafayette, LA 70506

Because of their cryptic nature, plains spotted skunks have largely gone unstudied and unnoticed amongst researchers for decades. However, recent publications analyzing long-term historic harvest records suggest sharp declines in populations. In 2011, it was petitioned for listing under the Endangered Species Act of 1973. In Louisiana, the last confirmed sighting was in Calcasieu parish in 1986. The goal of this project was to construct baited AHDriFT arrays on Cameron Parish prairie habitat in Southwest Louisiana to detect plains spotted skunks. Arrays were installed in November of 2022 at ten locations across two privately owned properties that are managed for coastal prairie and were considered to have favorable habitat features. Arrays were checked every two weeks throughout 2023 and removed in November of 2023. The cameras took a total of 430,589 photos over a total of 6,790 trap nights. Even though no plains spotted skunks were detected during this project, forty-two different species were detected with eight being species of greatest conservation need. The wide range of species detected using this methodology warrants more investigation as a means of surveying communities of small, hard to detect species.

SEASONAL BAT DIVERSITY RESPONSES TO STREAMSIDE MANAGEMENT ZONES IN PRIVATE, WORKING FORESTS

R. D. Pourshoushtari*, A. L. Larsen-Gray, D. U. Greene, E. L. Briggs, K. J. K. Gandhi, and S. B. Castleberry
University of Georgia, Warnell School of Forestry and Natural Resources, Athens, GA, USA (RDP, ELB, KJKG, and SBC); National Council for Air and Stream Improvement, Inc., Blacksburg, VA, USA (ALLG); Weyerhaeuser Company, Environmental Research South, Columbus, MS, USA(DUG)

Privately owned working pine (*Pinus* spp.) forests comprise a large portion of the landscape in the southeastern U.S. State-approved forestry best management practices (BMPs) protect water quality and include maintaining streamside management zones (SMZs). Streamside management zones have been shown to benefit some wildlife species, yet the overall influence of SMZ features and structural characteristics on biodiversity is poorly understood. To better understand the biodiversity value of SMZs, we evaluated how bat communities and species respond to different SMZ and adjacent pine stand features, including stream type, SMZ width, canopy cover, basal area, and pine successional stage. During 2023-2025, we are deploying acoustic detectors in SMZs and adjacent planted pine stands at 27 study sites (nine per year) to collect continuous annual data in the Piedmont and Coastal Plain regions of Georgia. Our preliminary results confirmed the presence of *Eptesicus fuscus*, *Nycticeius humeralis*, and *Perimyotis subflavus*, and three species-groups (*Lasiurus borealis*/*L. seminolus*, *Myotis austroriparius*/*M. septentrionalis*, *L. cinereus*/*Tadarida brasiliensis*) across eight Piedmont sites in summer and winter. Additionally, we detected *Lasionycteris noctivagans*, a long-distant migrant from northern latitudes, during winter sampling sessions. All species and species-groups were detected during winter, but most sites had lower species richness, and most species and species-groups were detected in fewer locations than during summer. Characterizing bat communities within SMZs and the surrounding matrix of pine stands will improve our understanding of bat diversity in working forest landscapes and inform conservation opportunities.

FREE-FLIGHT MANEUVERING KINEMATICS OF TOWNSEND'S BIG-EARED BAT (*CORYNORHINUS TOWNSENDII*) WHILE HUNTING.

C Rankin*, J Håkansson, S Swartz, A Corcoran
University of Colorado Colorado Springs, Colorado Springs, CO (CR, AC); Spoor Environmental Consulting, Oslo, Norway (JH); Brown University, Providence, RI (SS)

Although bat flight has long been studied, most previous research has been performed in a laboratory setting and has largely ignored natural hunting behaviors. This study investigates the flight kinematics of hunting *Corynorhinus townsendii*, a species of bat known for its agile flight capabilities in densely vegetated environments, with high speed videography during free flight. Eighty-seven flight events were analyzed with machine-learning-powered tracking and detailed kinematic analysis, revealing flight speed and roll angle to be strong predictors for turn radius. Significant correlations between wingbeat amplitude and angle of ascent were observed, as well as between stroke plane angle and flight speed. These insights shed light on the intricate mechanisms underlying bat flight, providing valuable contributions to our understanding of natural flight in bats. The observed relationships between flight parameters offer novel perspectives on the dynamics of bat flight and may have implications for studies exploring the ecological and evolutionary adaptations of bats in diverse environments.

FALL BEHAVIOR OF GRAY BATS SUMMERING IN WEAVER CAVE, CALHOUN COUNTY, AL

P. Roby and W. R. Seiter
Copperhead Environmental Consulting, Paint Lick, Kentucky 40461

Locations for summer and winter caves used by the federally endangered gray bat (*Myotis grisescens*) are well known. However, travel between these locations during spring migration has only recently been studied, and fall migration behavior is all but unknown. Gray bats summering in Weaver Cave in Calhoun County, Alabama are documented regularly on Cane Creek as they commute through Fort McClellan's Clark Range Complex. Although there is anecdotal evidence that gray bats move out of their summer colonies earlier than other Myotis species, this timing is not well understood. We radio-tagged 15 female gray bats emerging from Weaver Cave on 20 and 25 August 2024 and tracked them during commuting, foraging, and migration activities. One bat each migrated north to Fern Cave and Sauta Cave, both in the southern part of Jackson County in northern Alabama. However, other radio-tagged bats were still using foraging areas and emerging from Weaver Cave as late as 29 August 2024. Possible future work includes how long into the fall gray bats remain in Weaver Cave. This will provide Ft. McClellan with timing data for managing this endangered species on their lands.

BAT SIGNALS: TRACKING TRICOLORED BATS TO WINTER ROOST WITH RADIOTELEMETRY

L.M. Smith, A. Sylvia, T.J. Doonan, E. Braun
Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Gainesville, FL 32601 (LMS, AS, EB); Habitat and Species Conservation, Florida Fish and Wildlife Conservation Commission, Lake City, FL 32025 (TJD)

Diurnal roosts are critical habitat for bats, serving as essential sites for hibernation, mating, and rearing young. In winter, roost selection is particularly vital because bats rely on torpor to conserve energy amidst resource shortages while still requiring protection from near-freezing temperatures. In subtropical regions where winters

are shorter, milder, and prey is available on most nights, bats may have greater flexibility in roost site selection. We investigated winter roosting behavior of tricolored bats (*Perimyotis subflavus*) in north Florida across three winters (2021-22, 2022-23, and 2023-24) using radiotelemetry. We tracked 50 tricolored bats captured from culverts, small caves, and mist nets to their roost daily until the transmitter died or fell off. Tricolored bats used an average of two roosts during the tracking period, however the number of roosts varied by significantly by roost type. Bats roosting in culverts and caves used fewer roosts for longer durations than tree-roosting bats. For bats roosting in trees, we fit logistic regression models in the Stan computational framework using the brms package in program R to assess roost site selection. The best model for evaluating roost selection of all bats at the tree level was tree species. The probability of a bat selecting a certain tree species was greatest for palms, followed by cypress, and large-leafed deciduous trees. Additionally, tricolored bats selected trees with Spanish moss or dead leaves, in areas with a greater proportion of subcanopy trees and high tree species richness. These findings highlight the importance of conserving diverse forest habitats and retaining structural features like dead foliage and Spanish moss to support tricolored bats. The varied roosting patterns of tricolored bats, including their use of multiple roost types and a wide variety of tree species, underscore the importance of comprehensive monitoring and management efforts to enhance conservation of the species.

IMPACTS OF ECOLOGICAL RELEASE AND LAND USE CHANGE ON SOUTHEASTERN BAT COMMUNITIES

D.J. Van Parys*, S. Williams, G. Zirkle, C.G. Haase
Environmental Division, US Army Fort Campbell, 4718 Polk Road, Fort Campbell, Kentucky 42223, USA (DJV, CGH); Department of Biology, Austin Peay State University, 601 College Street, Clarksville, Tennessee 37044, USA (SW, GZ)

The loss of competitors due to a pathogen is a great model system to study the impacts of ecological release on competitor populations and any resulting trophic cascades. Though there are massive declines in many bat species due to white-nose syndrome (WNS), we have observed increases in non-susceptible bat species which could potentially be from ecological release. Likewise, it may be difficult to distinguish impacts of disease, land use change, and interspecific interactions on population dynamics. This study aims to analyze the shifts in local abundance and spatial occupancy of southeastern bat species differing in WNS susceptibility. Using 25 years of capture data from a southeastern military base, I will determine impacts of land use change and interspecific population densities on 1) yearly capture rates and 2) site specific spatial occupancy. I expect yearly capture rates to decline in WNS-susceptible species after WNS invasion across the study area, and expect to see an increase in capture rates of non-susceptible species at sites that were previously predominantly high capture rate sites for susceptible species. Due to potential impacts of forest management on tree-roosting species, I also expect impacts of surrounding landscape characteristics on both yearly capture rates and spatial occupancy. The results of this study will give us a better understanding of the interspecific relationships of southeastern bat communities.

TEMPORAL AND INTERSPECIFIC COMPARISONS REVEAL SHIFTS IN THE DISTRIBUTIONS OF TWO FLORIDA SKUNK SPECIES

D. Doran-Myers, M. N. Gillikin, M. A. Barrett, K. Nelson Sella, R. Zambrano, M. Wallrichs, T. J. Doonan, E. C. Braun de Torrez

Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, FL 32611, USA (DDM); U.S. Fish and Wildlife Service, Cape Canaveral Space Force Station, FL 32925, USA (MNG); Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Tallahassee, FL 32399, USA (MAB and KNS); Florida Fish and Wildlife Conservation Commission, West Palm Beach, FL 33412, USA (RZ); Environmental Solutions & Innovations Inc., Knoxville, TN 37920, USA (MAW); Florida Fish and Wildlife Conservation Commission, Lake City, FL 32055, USA (TJD); Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Gainesville, FL 32601, USA (ECB)

Understanding the distribution of wildlife species is key to their effective conservation and management. Comparing distributions of similar species can provide valuable insights regarding range overlap and how overlap changes over time. We estimated the geographic distributions of 2 skunk species, the eastern spotted skunk (*Spilogale putorius*) and the striped skunk (*Mephitis mephitis*), in Florida, USA, for historical (1997–2002) and contemporary (2017–2022) periods using opportunistic presence data (e.g., public sightings, camera trap records, live trap records). For each species, we produced range models at 2 levels: a generalized boundary (range extent) using a concave hull and a more detailed delineation (occupied range) using kernel density estimation. We expected spotted skunk range to decline (as it has elsewhere), striped skunk range to remain stable, and both species' ranges to have a relatively high geographic overlap. The contemporary models show spotted skunk range encompassing 26% of Florida land area, primarily in southern and coastal Florida, and striped skunk range encompassing 55% of Florida land area, primarily in northern and interior Florida. Range size for spotted skunk declined by approximately 30% between periods, although range expansion occurred in some localized areas. Range size for striped skunk was stable over time, with some localized contractions and expansions. Considerable temporal shifts occurred in skunk distribution, where only 34% of spotted skunk and 54% of striped skunk occupied range remained spatially constant between periods. Divergent geographic use between the 2 species increased over time, yielding a low range overlap of 23% between their contemporary occupied ranges. Our study fills a spatial data gap in skunk research, can inform state- or species-level conservation decisions for spotted skunk, and supports the need for further research on habitat requirements of skunks in Florida.

NEW RECORDS OF TRICOLORED BAT MATERNITY ROOSTS IN SILVICULTURAL LANDSCAPES

J. Wilson and H. Hollibaugh
SWCA Environmental Consultants, *200 West 22nd Street, Suite 220, Lombard, IL 60148; 10245 W Little York Rd #600, Houston, Texas 77040*

Increasing understanding of tricolored bat (*Perimyotis subflavus*) maternity roost selection is a conservation need for this imperiled bat species. Tricolored bats are known to roost in tree foliage and human-made structures (e.g., culverts, bridges) and less commonly, within clusters of pine needles. However, much knowledge of tricolored bat maternity roost selection to-date has come from studies in hardwood forests in the central and eastern portion of its range, and less is known in portions of the species' range where hardwood forests are scarce. In 2024, we documented two new tricolored maternity roosts within managed silvicultural pine stands in northwestern Louisiana and southeastern Oklahoma. Roosts were in a mature, live loblolly pine (*Pinus taeda*) and a dead blackjack oak (*Quercus marilandica*) in the understory of a mature loblolly pine stand.

To our knowledge, these represent the first confirmed records of the species utilizing silvicultural stands for maternity roosts.

THE USDA FOREST SERVICE'S BAT CONSERVATION STRATEGY LAUNCHES: AN INTEGRATED ENDANGERED SPECIES ACT 7A1 AND 7A2 APPROACH AT THE SUBCONTINENTAL SCALE

L.B. Wilson[1], P. Luensmann[2], T. Davidson[2], C. Mensing[2], M. Hammer[2], W.T. Rankin[3]
USDA Forest Service, Asheville, NC 28801 (LBW); USDA Forest Service, Washington D.C. (PL, TD, CM, and MH); Southern Region of the USDA Forest Service, Atlanta, GA 30309 (WTR)

Responding to landscape-scale needs for the conservation of four bat species affected by white nose syndrome, the Eastern and Southern Regions of the USDA Forest Service, in collaboration with the U.S. Fish & Wildlife Service, have developed a new conservation strategy to inform forest management through a comprehensive, proactive approach to managing bat habitat on 23,000,000 acres of Forest Service-managed lands in the eastern United States. The Strategy considers the needs of four forest-dwelling bat species by fostering a landscape that promotes habitat resilience to potential ecosystem threats. Best available science has been incorporated into the Strategy to identify best management practices to minimize potential impacts to bats during forest management activities, while also maintaining flexibility to meet other land management and resource goals. The new Bat Conservation Strategy serves as the foundation for a new, two-tiered 7(a)(2) consultation process under the Endangered Species Act that provides for efficient review of Forest Service projects that incorporate relevant components from the Strategy. The two-tiered consultation also includes survey and reporting requirements that will help the Forest Service and its partners better understand the impacts of forest management activities on bats and help track bat population changes over time. Through the implementation of these new conservation approaches, the Forest Service is committed to collaborating with partners to enhance bat conservation. This success was made possible by a large interdisciplinary team that worked tirelessly over several years.

CURATION AND DIGITIZATION OF EASTERN KENTUCKY UNIVERSITY'S MAMMAL COLLECTION

K. Wood* and L. E. Dodd
Department of Biological Sciences, Eastern Kentucky University, Richmond, Kentucky 40475

Scientific collections offer a view into natural history not afforded by other means. Locality and collection details as well as morphometric and molecular data provided by specimens in collections can be used for various purposes such as observing evolutionary processes and changes throughout time, understanding shifts in species distributions, use in teaching, and educational outreach efforts. The mammal collection at Eastern Kentucky University (EKU), located in Richmond, Kentucky, began in 1955 with the addition of five white-footed mice (*Peromyscus leucopus*) and currently holds 1,218 records of 92 species from 4 countries. However, many of these specimens lack organization, some are missing essential information (locale, collection data, etc.), and there is a backlog of additional specimens that have yet to be prepared or accessioned. Historically, the mammal collection at EKU has had no true standard operating procedure (SOP), making the storage and use of preexisting specimens for research—and addition of new specimens—a rather difficult and unorganized process. In our efforts, preexisting specimens have begun to be re-accessioned and reorganized, and new specimens have been prepared using traditional skinning and stuffing techniques, skeletal cleaning via a Dermestid beetle colony, and development of a novel freeze-drying technique for preparation of bat specimens.

Resulting products of our study will include: 1) full accessioning of preexisting specimens using a developed SOP, 2) addition of new specimens into the collection, and 3) digitization of a cohesive taxonomic subset of records using the online Consortium of Small Vertebrate Collections portal (CSVC) to make this mammal collection more accessible to researchers beyond EKU.

POSTER PRESENTATIONS

BEWARE THE BOUNCE: THE BENEFIT OF USING THERMAL CAMERAS TO MONITOR HARP TRAPS, MEASURE BAT ACTIVITY, AND CONFIRM CAPTURE SUCCESS RATES

J. E. Alexander, M. R. Evans, and S.T. Samoray
Copperhead Environmental Consulting, Nashville, TN 37216

Technological advancements in bat survey methods, such as the deployment of acoustic lures, may increase bat capture success rates. Thorough testing of these new survey technologies is critical to the development of adequate bat survey guidelines, and such studies may rely heavily on traditional survey methods such as harp trapping. Harp traps use parallel rows of transparent monofilament lines to disrupt the flight path of bats, causing them to tumble into a canvas or plastic bag for collection. These traps are most often used to capture bats at cave entrances and are typically surrounded by exclusion netting to funnel bats into the trap. In a study designed to test the effectiveness of new acoustic lure technology, we deployed acoustic lures and harp traps outside of traditional settings with no exclusion netting. Thermal cameras (Teledyne FLIR Scion) were placed at each harp trap location to record bat activity and behavior. The study took place in Hunting Areas at Fort Knox, KY, between 3 - 10 May and 15 - 31 August 2023. Review of thermal data revealed 489 instances of bats interacting with acoustic lures, and bats physically struck the harp trap strings during 118 of these interactions; however, only 30 bats were ultimately recovered from the harp traps for a capture rate of 6.13%. When used as the sole survey method, harp traps may provide incomplete information on bat activity levels due to the potential for evasion and escape, especially when deployed outside of traditional contexts and settings. Whenever possible, we recommend employing complementary survey methods concurrently to reduce the risk of undetected bats. It may be particularly prescient to use multiple survey methods when testing new technologies intended to bolster bat captures on the landscape.

SEASONAL MICROSTRUCTURAL PLASTICITY IN THE GASTROINTESTINAL TRACTS OF WILD-CAUGHT PEROMYSCUS MANICULATUS

O. S. Chapman* and B.S. McLean
Department of Biology, University of North Carolina at Greensboro, Greensboro, NC, 27412

Some small mammal species exhibit gastrointestinal (GI) plasticity in response to changing diet quality or energetic demand. In wild North American deer mice (*Peromyscus maniculatus*), the total length of the gut can be up to 35% longer during winter months, a hypothesized means of increasing passage time and extracting more energy from poorer-quality food. Further, a seasonal inversion in robustness (mass per mm) of the small and large intestine has been documented; the small intestine was least robust in the winter (when GI tracts were longest) but this flipped during warmer months. This suggests that trade-offs exist between sections of the gut. However, the underlying microstructural changes associated with this potential trade-off are not well understood. We present preliminary results of current work examining both macroscopic and microstructural

seasonal changes in a *P. maniculatus* population in Giles County, Virginia. We did seasonal sampling of 20 adult individuals for 5 seasons. Macroscopic traits were collected, and histological preparations were taken from the small and large intestines. Sections were sliced at a thickness of 5 microns, H&E stained, and imaged at 40X. Gross traits have revealed that the total length of the GI tract was highest in spring and lowest in summer, while both the stomach and cecum were longest in the winter. Future measurements are planned of villi height and width, thickness of the mucosal epithelium, and thickness of the mucosa. We predict that an increase in robustness will be associated with a thicker mucosal epithelium and thicker mucosa, as well as taller, thinner villi. Any change in the microstructure of one section should be compensated for by changes in another section. This work will further our understanding of how individuals achieve macroscopic GI plasticity, a crucial way that they cope with rapidly changing environments and resource availability.

ACOUSTIC SURVEY OF BAT COMMUNITY ON FORT MOORE

J. E. Fantle-Lepczyk, R. Gitzen, and K. F. Connelly*

College Forestry, Wildlife and Environment, Auburn University, Auburn, AL 36849

Bats are declining at an unprecedented rate in the United States, due to disease, habitat destruction, and invasive species, amongst other threats. In response to the need for increased understanding of the bat community, Fort Moore asked researchers at Auburn University to provide an acoustic survey of bats on the installation in the summer of 2023. The soon-to-be Endangered Species Act listed tricolored bat (*Perimyotis subflavus*) was a particular focus as populations have declined by >90% throughout portions of its range. Presence/absence of bats on Fort Moore was assessed via two methods: passive acoustic monitoring of 47 sites across the installation and two mobile survey routes. 2,147,494 file sequences were recorded across 1,274 site-survey nights and were initially analyzed through automatic identification by Kaleidoscope. Confirmation by expert vetters showed the auto-id results had a significant error rate. On average, we detected 5.5 species at each site (range 1-8). An additional five species were provisionally detected across the installation, four of which are federally protected or under review for listing. Tricolored bats were one of the most common, making up ~25% of all auto identified calls, and we confirmed their presence at 45 passive monitoring sites and on both mobile survey routes. Overall, Fort Moore appears to have a suitable community of bats using the installation, with a particularly high frequency of tricolored bats.

USING AHDRIFT TO PASSIVE SAMPLE SGCN SPECIES IN MISSISSIPPI

K. Cross and J. Creely
Mississippi Museum of Natural Science, Mississippi Department of Wildlife, Fisheries, and Parks, Jackson, MS 39202

Adapted-Hunt Drift Fence Technique (AHDriFT) is a passive sampling method that has been successful in detecting several small Species of Greatest Conservation Need (SGCN). Our array consists of a drift fence with two invert buckets at each end. The buckets have been modified with two openings at the ground to allow passage through as well as a no-glo game camera adhered to the top. From 2022-2023, we deployed three arrays each at Charles Ray Nix Wildlife Management Area (WMA), Canemount WMA, and Black Prairie WMA. From 2023-2024, we deployed three arrays each at Holly Springs National Forest, Marion County WMA, and Dead Dog Bog. We documented 24 species of mammals, 20 species of herpetofauna, and six species of birds. We were successful in detecting two SGCN, Long-tailed Weasel (*Neogale frenata*) and Southeastern Shrew (*Sorex longirostris*). AHDriFT is a cost effective, low maintenance survey methodology suitable for surveys of small mammals and herpetofauna.

BAT BIODIVERSITY SURVEYS ON PUBLIC LANDS IN NORTHEAST OKLAHOMA: A POST WHITE-NOSE SYNDROME ASSESSMENT

H. Davis* and E.A. Burba
Northeastern State University, Department of Biological Sciences, Tahlequah, OK 74464

Numerous bat surveys were conducted across eastern Oklahoma in the mid-1990s to assess bat biodiversity and distribution. White-nose syndrome (WNS) has since caused marked population declines of many bat species across the eastern half of the United States, but the impacts on Oklahoma bat populations are not well understood since WNS was first detected in Oklahoma (2014). To help assess white-nose impacts, new surveys were conducted at nine wildlife management areas in northeastern Oklahoma to evaluate current population status. Each forest site was surveyed for three consecutive nights using at least 9 mist nets (minimum of 27 net nights) and two acoustic detectors. Cave sites were surveyed with a single harp trap and an acoustic detector. Results represent the first year of a four-year survey effort. Protected bat species known to occur in Oklahoma include the Indiana bat, (*Myotis sodalis*), gray bat (*M. grisecens*), northern long-eared bat (*M. septentrionalis*), Ozark big-eared bat (*Corynorhinus townsendii ingens*), and tricolored bat (*Perimyotis subflavus*). Notable findings of the new surveys include the absence of northern long-eared bat captures, reduced numbers of tricolored bats, and expanded territory of Seminole bats *(Lasiursus seminolus*) and gray bats into Sequoyah County.

DEVELOPMENT OF A POPULATION ESTIMATION TOOL FROM STANDARDIZED GUANO COLLECTION AT ARTIFICIAL ROOSTS USED BY INDIANA BATS IN THE BLUEGRASS REGION

L.E. Dodd
Department of Biological Sciences, Eastern Kentucky University, Richmond, Kentucky 40475

Artificial roosts have been fixtures at Veterans Memorial Wildlife Management Area (VMWMA) in Scott County, Kentucky, for nearly a decade. Building on past work at this site, emergence counts and guano collections were performed at rocket boxes used by Indiana bats (*Myotis sodalis*) during the 2022 field season, and were used to create a tool for estimating population patterns from 2023 guano collection. Data for model development consisted of emergence counts paired with guano collections occurring on the same date and were aligned with precipitation data. As expected, emergence data correlated with the weights of guano collected. Considering skew of data, modeling efforts considered log-transformed variants so as to increase model fit. Multiple linear regression models were then developed for AIC selection. Given guano collection is admittedly a rough predictor, the dataset for model development had instances of ‘no guano but bats still counted’ (i.e., a y-intercept >0). To address this, the candidate model set included a variant with the y-intercept fixed to zero. The best-fitting models were log-adjusted values for guano weight on a per night basis that also accounted for precipitation. The model incorporating a fixed-intercept had less support than the model without that requirement, but both variants had strong support (AICc ≤2). A total of 199 guano collections at bark-mimic structures then occurred in 2023 (the rocket boxes were removed in consultation with state and federal agencies prior to arrival of bats). Models developed here were used to generate per-roost population estimates in 2023. The estimator used at VMWMA should be applicable in varied contexts. However, the estimator must be recognized as a coarse tool, as bats can and do switch roosts, whereas guano data used for population estimation was collected at weekly intervals.

RECOMMENDATIONS TO PROMOTE INCREASED BAT ACTIVITY IN URBAN REFORESTATION EFFORTS IN THE BLUEGRASS REGION

G.M. Collier and L.E. Dodd
Department of Biological Sciences, Eastern Kentucky University, Richmond, Kentucky 40475

Urbanization has led to major forest loss and negatively impacts ecosystem services. Urban reforestation efforts, such as Reforest the Bluegrass (RTB) in the Lexington-Fayette metropolitan area of Kentucky, have been implemented to address these negative effects, and to create habitat for forest-dependent wildlife such as bats. Our research focused on assessing differences in bat activity across a 20-year chronosequence of RTB sites. Acoustic detectors were deployed across 10 different-aged plantings at 60 randomly-defined detector locations. Each planting was surveyed across 8 sampling periods from May – August 2023. Each recording session spanned ca. 7 consecutive nights, yielding a total of 417 detector nights. Bat activity was assessed according to phonic groups of species sharing similar echolocation characteristics. Bat activity was greater at the edges rather than the interiors of plantings across all phonic groups. Generally, bat activity was greater at plantings exceeding BDN 10 years in age, plantings within 100 m of riparian areas, and at plantings with a perimeter-to-area ratio of 420 m/ha or smaller for all phonic groups, except hoary bats (*Lasiurus cinereus*) which exhibited habitat affinities counter to this. AIC model selection suggested that while various factors influence activity across phonic groups, bat activity was generally greater at plantings with larger-diameter trees. Bat activity was negatively associated with greater canopy cover across most phonic groups. These data suggest most bat species were associated with the edges of older plantings with less canopy cover and those located near riparian areas. Results of this study provides city planners and resource managers with guidance for future planting strategies to improve habitat for bats in urban and exurban environments in the Bluegrass region.

SMALL VERTEBRATE DIVERSITY ACROSS A RESTORED GRASSLAND MATRIX IN NORTHEASTERN INDIANA

C.J. Dunn*, K.L. Pratt, T.L. Proctor, C.E. Barlow, and S.M. Bergeson
Purdue University Fort Wayne, Fort Wayne, IN 46805 (CJD, TLP, SMB); Ivy Tech Community College, Fort Wayne, IN 46805 (KLP, CEB); University of Hawai'i at Mānoa, Honolulu, HI 96822 (TLP)

Community surveys can provide insights into ecosystem health, offering valuable information to conservationists and land managers. LC Nature Park is a recently restored natural area that has yet to have its vertebrate community surveyed. The park (81ha) is made up of various land cover types that are managed in different ways. To monitor patterns of small terrestrial vertebrate diversity on the property, we surveyed, using AHDriFT camera trap systems (camera traps within inverted buckets at either side of a drift-fence) to survey three types of landcover (i.e., exposed grassland, wetland forest, and restored forest). We deployed one AHDriFT system per land cover type between May 2023–April 2024, checking the systems and downloaded data monthly. We identified animals within images to the lowest possible taxonomic level and calculated weekly and overall species richness observed at each site. Average weekly species richness was 1.5 times greater in the wetland forest (2.8 ± 0.3 species; total richness = 17; $t = 2.64$) compared to the exposed grassland (1.9 ± 0.2 species; total richness = 10; $p = 0.03$). However, the restored forest (2.2 ± 0.2; total richness = 10) was similar to both other sites ($t = 1.85$, $p = 0.16$; $t = -0.83$, $p = 0.68$). The common shrew (*Sorex cinereus*) was observed more frequently in the restored forest while deer mice (*Peromyscus spp.*), voles (*Microtus spp.*), and the northern short-tailed shrew (*Blarina brevecauda*) were more frequent in the in the wetland forest ($p < 0.05$). Eastern garter snakes (*Thamnophis sirtalis*), meadow jumping mice (*Zapus hudsonius*), and western harvest mice (*Reithrodontomys megalotis*) were observed in all three sites in equal amounts ($p > 0.05$). State, federal,

and IUCN threatened species were not observed at the sites. Overall, this data suggests that the diversity of small vertebrate species varies with variation in land cover even within a small natural area.

ASSESSING IMPACTS TO GRAY BAT BRIDGE AND CULVERT ROOSTS FROM HURRICANE HELENE IN NORTH CAROLINA

K.L.C. Etchison, J.A. Weber, and E.C. Pierce
North Carolina Wildlife Resources Commission, Asheville, NC 28805

The North Carolina Wildlife Resources Commission (NCWRC) began assessing impacts to bats from Hurricane Helene in November 2024. Helene caused widespread tree blowdowns, over 1,900 landslides, and unprecedented flooding throughout western NC. Determining effects to bats will be a long-term effort due to the scope and severity of the storm. The NCWRC's first objective in this effort was to visit bridge and culvert roosts used by gray bats (*Myotis grisescens*) to determine how high floodwaters rose. In NC, gray bats have been observed roosting at a total of 40 bridges and 8 culverts and all 48 roosts occur in western NC. Post-Helene assessments were made for all roosts in the severely impacted area, which resulted in surveys at 39 bridges and all 8 culverts. Over half of the roosts were completely flooded (n=24), which included two of the three primary bridge roosts and the most important culvert roost for NC gray bats. Additionally, 9% of roosts (n=4) were classified as indeterminate because there was not enough evidence to determine if flooding reached areas where bats roost, though floodwaters were very high at these roosts. Forty percent of roosts showed no evidence of flooding in the areas where bats roost (n=19). Based on previous surveys near the date of the storm, 1,200-1,685 gray bats could have been roosting in areas that completely flooded. The NCWRC will continue post-Helene assessments in 2025 through bridge and culvert roost surveys and acoustic monitoring.

BAT HABITAT CONSERVATION PLAN FOR LARGE-SCALE VEGETATION MANAGEMENT

Samuel R. Freeze
ICF, Environment and Planning Division, Reston, VA, 20190

Duke Energy operates and maintains energy production and transmission facilities in seven states: Florida, Indiana, Kentucky, Ohio, North Carolina, South Carolina, and Tennessee. Maintenance includes pruning and removing vegetation along hundreds of thousands of miles of rights-of-way (ROWs) to ensure system reliability and meet state utility commission requirements. Large portions of these ROWs are within the range of federally listed bat species, which are protected under the Endangered Species Act. Duke Energy is also currently implementing an aggressive clean energy transition to achieve its goal of net-zero emissions. These construction projects would include tree clearing and associated vegetation management, which could result in "take" of federally listed species. Duke Energy is developing a Habitat Conservation Plan (HCP) to cover seven bat species: Florida bonneted bat, gray bat, hoary bat, Indiana bat, little brown bat, northern long-eared bat, and tricolored bat. The HCP describes the effects of vegetation management activities on the seven bat species, strategy for conservation, and approach to monitoring and adaptive management.

DEVELOPING A TOOL TO IDENTIFY MYOTIS TO SPECIES BASED ON SKULL CHARACTERS

E.E. Powell, and L.J. Gatens
Department of Fisheries, Wildlife, and Conservation Biology, North Carolina State University, Raleigh, NC 27606 (EEP); North Carolina Museum of Natural Sciences, Raleigh, NC 27601 (EEP and LJG)

Traditionally, bat biologists have relied on external characters to identify bats during hibernacula or summer roost surveys, and mist netting. It is also necessary to accurately identify bats when external characters are not available, especially considering White-Nose Syndrome. Keys exist to identify Southeastern bats to species, except for the *Myotis*. We are taking a series of skull measurements to quantify differences of size and shape between these species, and hope to develop a practical guide to identification based on these subtle but different skull characters.

BAT ACTIVITY IN MINES OF WESTERN NORTH CAROLINA

A. I. Guerrero*, N. A. Hammond*, Z. Heard, R.E. Jarrett, J.P. Love, R. Petric and S. Sibillia
Institute for the Environment, University of North Carolina, Chapel Hill, NC 27599 (AIG, NAH, ZH, RP, and SS); Western Carolina University, Cullowhee, NC 28723 (JPL and REJ)

With the changing urban environment of Western NC, bats have adapted by using man-made structures, such as abandoned mines, for roosting and hibernation. Due to the decline in bat populations seen in Western NC since the introduction of White Nose Syndrome (WNS) in 2011, it is important to understand how and why bats choose to use these structures for roosting and hibernation. This project aims to analyze bat behavior and activity at 14 potential hibernacula sites; 13 sites are abandoned mine shafts and 1 site is a natural cave. We collected data using ultrasonic acoustic detectors deployed at each site between September 2023 and November 2024. We set the detectors to record bat activity nightly, 30 minutes before sunset until 30 minutes after sunrise. Additionally, we collected data on the physical characteristics of each site as well as the relative humidity and internal and external temperature. Our analysis of bat acoustic data showed the highest relative abundance of the Little Brown Bat (*Myotis lucifugus*) and the Tri-Colored Bat (*Perimyotis subflavus*) in total, indicating which bat species are utilizing our sites. The site with the highest number of recorded calls, which may signify a higher relative abundance of bats, was Blowing Springs Cave. In 2024, peak bat activity at our sites occurred in April and September. The peaks and troughs in overall bat activity contribute to our understanding of how bats behave in correlation to temperature and seasonal changes. Furthermore, this research assists in our understanding of hibernacula preference and helps us properly allocate conservation efforts for bat habitat at sites where bat activity is high.

UNCONVENTIONAL ROOST SELECTION FOR BATS WITHIN STRUCTURES

E. Hall and R. Blankenship
Environmental Consulting & Technology, Inc. (ECT), Gainesville, Florida 32607

Despite the negative connotation of urban sprawl for bat populations, unconventional man-made structures, such as water storage tanks, hydroelectric dams, and overhead utility poles/towers, provide essential resources for roosting bats in the southeastern United States. However, the use of structures by bats can pose complications for the performance, maintenance, and planned improvements to these facilities. Appropriate planning and considerations should be taken prior to impacts to these unconventional roosting structures to avoid impacts to roosting bats. Survey methods for inspecting these structures have predominantly included visual inspections, DNA sampling, and the use of thermal imagery. The challenge with these conventional

methods is that they frequently require the use of specialty equipment, such as snooper trucks and manlifts, to gain access to elevated roosting habitat within a structure. This specialty equipment poses unique challenges considering the associated cost, safety concerns, and training requirements of the operators, and logistics of use on steep slopes, forested corridors, and prevalence of overhead electric lines collocated with occupied structures. Based on our project experience for various Department of Transportations, municipalities, and utility providers an appropriate survey methodology should be determined on a case-by-case basis for each project to identify the most suitable processes and equipment to determine bat use within these unconventional structures.

IMPROVING DEFINITIONS OF TRICOLORED BAT HABITAT WILL FACILITATE SITING/PERMITTING THROUGHOUT THE SPECIES' RANGE

K.R. Hammond, K.E. Torrey, L.J. Bishop-Boros, M.C. True, and P.F. O'Brien
West, Inc., Cheyenne, WY 82001

The tricolored bat (*Perimyotis subflavus*, PESU), once widespread across the eastern United States, has experienced significant population declines prompting a proposed endangered species listing in 2024. In addition to disease, potential impacts from wind energy infrastructure pose further threats to PESU. This study examines the relationship between PESU fatalities and factors such as habitat type, proximity to forest cover, seasonal timing, and sex, to better inform wind energy siting and permitting decisions. Using data from the Renew database, which includes post-construction fatality reports from 13 U.S. states and one Canadian province, we assessed 862 PESU fatalities. Our analysis shows that most fatalities occurred in heterogeneous habitats (70.0%), with significant numbers also found in open grasslands (17.4%) and agricultural areas (12.5%). Approximately 28.2% of fatalities occurred more than 1,000 feet from forest cover, and 95.0% occurred within 10,000 feet of a woodlot or forest. Seasonal trends indicated that the majority of fatalities occurred in August (62.5%), with a higher proportion of fatalities in spring being female. These findings suggest that siting wind turbines 1,000 feet from the nearest forest may reduce fatalities but not fully mitigate the risk for PESU, especially in areas lacking forested habitat within 10,000 feet. The results also indicate potential seasonal variations in collision risk, with spring fatalities possibly affecting more females. These insights are critical for optimizing wind energy development strategies while mitigating impacts on this declining species.

TRICOLORED BAT (*PERIMYOTIS SUBFLAVUS*) GENETIC AND IMMUNOGENETIC POPULATION STRUCTURE: EPIDEMIOLOGICAL IMPLICATIONS

L. Henderson*, T. McElroy, and R. Shultz
Department of Ecology, Evolution, and Organismal Biology, Kennesaw State University, Kennesaw, GA 30144

The highly susceptible tricolored bat, *Perimyotis subflavus*, is threatened by white-nose syndrome (WNS) at population and regional scales, with substantial declines detected in Southeastern U.S. populations. Transmission of disease in bats is thought to occur via pronounced gene flow. Research on population structure and disease spread indicates that decreased connectivity between bat populations likely reduces WNS infection risks to susceptible populations. In *P. subflavus* populations, recent findings indicate weak genetic structure through D-loop mtDNA analysis, but such studies are limited for this species. Further genetic analysis of *P. subflavus* across its southern range is needed to understand these declines and the relationship between WNS epidemiology and genetic structure. This may resolve unknown population structure, which is important for vulnerable species. Additionally, major histocompatibility complex (MHC) genetic variation is related to susceptibility, resistance, and local adaptation. Increased genetic diversity in MHC II genes is linked to

potentially greater resistance to pathogens. In bats, DQ and DR MHC subregions have been extensively studied. To our knowledge, no studies have assessed these regions for immunogenetic variation as it pertains to WNS in *P. subflavus*. We sought to describe *P. subflavus* population genetic structure via D-loop sequences. We also aimed to assess immunogenetic diversity and whether selection is occurring within genes in response to WNS, as this may confer advantages to survival and WNS resistance. So far, bat oral swabs were collected from Georgia and Texas (more sites are being added this season). Samples were stored on ice and sent to Kennesaw State University for DNA extraction via QIAGEN DNeasy kits. DNA loci were amplified by standard end-point PCR and gel electrophoresis conditions. Sequencing will be done by CD Genomics, NY. Our analyses will allow insight into WNS epidemiology and *P. subflavus* adaptive response through measures of gene flow and immunogenetic markers.

A PILOT STUDY OF BAT SPECIES ASSEMBLAGES IN A RAPIDLY URBANIZING LOCALITY

E. C. Holman* and M. C. Fulbright
Labry School of Science, Technology, and Business, Department of Biology, Cumberland University, Lebanon, TN 37087

Urbanization can impact bat echolocation ability and how they use the environment. The Nashville Metropolitan area is rapidly expanding, and with that population growth, comes increased development and modification of natural habitats. We expected differences in higher species diversity in natural habitats and lower diversity in urbanizing areas. We placed acoustic recorders with ultrasonic microphones in urban, agricultural, and mixed mesophytic forest habitats to determine bat species diversity in each of these areas. Our preliminary analysis shows that species diversity is higher in mixed mesophytic forest habitats with a significant difference when compared to the urban site. Notably, we have only recorded endangered gray bats in mesophytic forest and agricultural habitats but not the urban location. We plan to expand our data collection, increase the number of sampling sites, and evaluate seasonal differences in habitat use across the different species we record.

A BATTY SUMMER AT FLORIDA'S NAVAL INSTALLATIONS

J. S. Jackson, M. A. Drake**
Fauna Conservation & Analytics, 7901 4th St. N., STE 8213, St. Petersburg, FL 33702 (JSJ, MAD); Florida Virtual School, 5422 Carrier Drive, Suite 201, Orlando, Florida (JSJ)

With the recent proposal to up-list the tricolored bat to endangered status, land managers need to fill data gaps related to the species composition at their properties. To help fill these data gaps, we conducted bat surveys at three Navy installations in the state of Florida. The surveys ranged from seven to ten days at each base and were conducted during the summer of 2024. At each base, mist netting was conducted at a minimum of six sites. Acoustic detectors were deployed at six sites, for three nights at each. Telemetry was conducted for any rare, threatened or endangered species captured. We captured a total of 24, 67 and 6 bats at Naval Station (NS) Mayport, Naval Air Station (NAS) Pensacola and NAS Whiting Field, respectively. The total bats captured across all bases represented seven total species including: The Tri-colored bat (1), Northern Yellow bat (5), Seminole bat (2), Southeastern myotis (70), Brazilian Free-Tailed bat (2), Evening bat (10), and the Big brown bat (7). Additionally, the Eastern-red bat and Hoary bat's presence were supported by acoustically-derived maximum likelihood estimates (MLE) of <0.05. In conclusion, NS Mayport had the highest species richness

likely due to its diversity of high-quality roosting and foraging habitat. NAS Whiting Field had the lowest species richness and abundance. This could be a result of the base having overall lower quality habitat and decreased prey availability from heavy pesticide usage. NAS Pensacola, had the highest abundance possibly resulting from their regular use of forest management practices. The one tricolored bat that was captured at NS Mayport was tracked for four consecutive days to various cabbage palm tree snags next to a salt marsh.

METHODS TESTING & CALIBRATION FOR UAS SURVEYS OF INDIANA WILDLIFE

TM Jackson*, PA Zollner, JP Hupy
Department of Forestry and Natural Resources, Purdue University, West Lafayette, IN 47907 (TJ, PAZ). Department of Aviation and Transportation Technology, Purdue University, West Lafayette, IN 47907 (JH).

Wildlife density estimates are valuable and necessary information that land managers use to inform management, establish allowed harvesting rates and to predict areas of potential disease outbreak. Traditional wildlife estimation methods such as aerial surveys and camera traps can be costly and time intensive. In preparation for a larger project focused on wildlife surveys to estimate the density of white-tailed deer, coyotes and turkey, we purchased and explored the use of a Skydio X10 unmanned arial system (UAS) to select and optimize flight methodology and a data processing workflow. To calibrate the performance of our flight and analysis methods, we conducted 30 flights at deer farms in Indiana where known estimates of target species were readily available. Flights were conducted during the winter of 2024-2025. We tested different flight parameters such as flight height, percent overlap and imagery type to determine the best method for nocturnal detections in winter. Several advantages and limitations related to the use of the Skydio X10 were observed. Preliminary results show that the accuracy of detection rates varied with the percent of image overlap, imagery type and flight height. In the limited sample size collected to date, the average accuracy of deer counts in video format was higher than for counts recorded from still images. In transects conducted with overlap, accuracy improved with decreased sidelap and frontlap. In general, the accuracy of deer counts improved with flight heights over 200ft above ground level. Data collection for this project is ongoing and will continue throughout the winter of 2025 to increase sample sizes for each variable tested.

LANDSCAPE CHARACTERISTICS THAT SUPPORT BAT ASSEMBLAGE DIVERSITY ALONG A RURAL TO URBAN GRADIENT

K. Larkin, T. McElroy, L. Moore
Department of Ecology, Evolution and Organismal Biology, Kennesaw State University, GA (KL and TM); Wormsloe Institute for Environmental History, GA (LM)

Human population has transformed wildlife habitat into urban areas for human use. These urban areas are predicted to continue expanding, with the potential to negatively or positively alter wildlife communities. Development can lead to damage or total loss of habitats which threatens the survival of wildlife and healthy ecosystem processes. When development occurs wildlife in these areas either adjust to the newly modified landscape or may become excluded from the new habitat. Habitat fragmentation and loss, barriers such as roads, local climate change, unnatural predators such as domestic cats and dogs, and light pollution are all byproducts of urbanization that may alter species composition. Although urbanization is often viewed as a damaging process it can be done in a way that minimizes negative impacts to ecosystems. Some bat species may adapt well to altered landscapes while other species may be excluded. Generally, we expected areas that are more developed to have a higher diversity of bat species that are adapted to hunting in open spaces and areas that are less developed to have a higher diversity of clutter adapted bat species. Bat activity was monitored with Song

Meter Mini Bat 2 recorders (Wildlife Acoustics, Inc.). Calls were processed using Kaleidoscope Pro 5. Calls were grouped based on frequency. The initial data analyses suggest that open adapted species have been recorded more at Sun City and Palmetto Bluff (more developed), whereas clutter adapted species have been recorded more at Brays Island and Nemours (less developed). Future analyses will incorporate landscape features such as lighting intensity, canopy height, mid story clutter, housing density, and adjacent land use to delineate factors that may influence bat species diversity.

SURVEYING INDIANA'S SMALL MAMMAL COMMUNITIES USING THE AHDriFT CAMERA TRAP METHOD

L.X. Lee*, S.M. Bergeson
Purdue University Fort Wayne, Fort Wayne, IN 46805

Small mammals play an important role as primary and secondary consumers and prey for predators in most ecosystems. The distribution and health of small mammal communities within Indiana haven't been widely surveyed for several decades. While there are several established methods for capturing and surveying small mammals, such as Sherman box traps, these often lack the efficiency of capturing a wider range of species and require more effort to maintain. Thus, we randomly deployed 102 adapted-hunt drift fence technique (AHDriFT) camera trap systems in Indiana during the summer of 2024 to investigate the distribution of both at-risk and common small mammal species. These systems will continuously collect photos of small organisms until the winter of 2025. We will use mixed regression models to analyze the influence of micro- and macrohabitat characteristics on species presence. So far, we have over 800,000 photos to analyze and have observed 4 threatened or state-endangered species; including the Franklin's ground squirrel (*Poliocitellus franklinii*), pygmy shrew (*Sorex hori*), swamp rabbit (*Sylvilagus aquaticus*) and least weasel (*Mustela nivalis*). With the help of artificial intelligence, we are able to produce preliminary distribution maps of small mammal species for the southern ecoregion of Indiana. Results from this study may allow for the generation of more effective and better-informed management strategies for small mammal species and the ecosystems they reside within in Indiana.

QUESTION THE MARK: A GLOBAL REVIEW AND ASSESSMENT OF BAT MARKING PRACTICES

S.C. Loeb, J.M. O'Keefe, A.B. Bennett, R.M.R. Barclay, A.B. Cable, S.M. Gaulke, F. Gual-Suárez, J. Kindel, V. Kuczynska, C.L. Lausen, S. Pérez-Harp, and B.J. Westrich
USDA Forest Service, Southern Research Station, Clemson, SC 29634 (SCL); Natural Resources and Environmental Sciences, University of Illinois, Urbana, IL 61801 (JMO); Vermont Department of Fish and Wildlife, Essex Jct., VT 05452 (ABB); Biological Sciences, University of Calgary, Calgary, AB, Canada T2N 1N4 (RMRB); School of Natural Resources, University of Tennessee, Knoxville, TN 37996 (ABC); Colorado Cooperative Fish and Wildlife Research Unit, Colorado State University, Fort Collins, CO 80523 (SMG); Laboratorio de Ecología y Conservación de Vertebrados Terrestres, Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City, Mexico (FG-S and SP-H); South Carolina Department of Natural Resources, Union, SC 29379 (JK); USFWS Missouri Ecological Services Field Office, Columbia, MO 65203 (VK); Wildlife Conservation Society Canada, British Columbia, Canada V0G 1M0 (CLL); Indiana Department of Natural Resources, Bloomington, IN 47401 (BJW)

It is often necessary to mark bats through tagging or other means to obtain essential information on their demography, movements, and behavior. However, marks may have lethal or sublethal effects and hence may bias study results. Our aim was to review the effects and efficacy (i.e., return rates) of marking techniques used on bats globally. Our objectives were to 1) describe marks currently used in bat research to identify motivations

for marking, trends in commonly used types of marks, and trends in the reporting of efficacy and injury rates in the recent literature, and 2) synthesize the body of literature on effects and efficacies of marking bats. We conducted two literature reviews. In a targeted review we examined all papers that used bat marking published from 2013 through 2022 in three bat- or mammal-focused journals to identify recent trends in bat marking. Our systematic review compiled papers reporting on the effects and efficacy of bat marking from the early 1900s to the present. Our targeted review found that researchers rarely report the effects of marks on bats and many papers fail to provide details of marks and marking procedures. Our systematic review found that the effects of marks ranged from minor irritation and behavioral changes, to potentially life-threatening injuries, such as changes in body condition. Effects of marks, particularly bands, often varied across species. Fewer deleterious effects were reported from newer marking procedures such as Passive Integrated Transponder (PIT) tags. Further research on marking effects and thorough reporting of marks and their effects are needed. Our next goal should be to develop useful guidelines on when to mark bats and what types of marks are most appropriate, effective, and safe for a particular study and species.

HABITAT DIVERSITY AND ITS ROLE IN TRICOLORED BAT CONSERVATION IN FLORIDA: INSIGHTS FROM STATEWIDE ACOUSTIC MONITORING

M. N. Monarchino and T. J. Doonan
Florida Fish and Wildlife Conservation Commission, Defuniak Springs, FL 32435 (MNM); Florida Fish and Wildlife Conservation Commission, Lake City, FL 32055 (TJD)

The tricolored bat (*Perimyotis subflavus*) ranges throughout Florida and is commonly recorded acoustically in the state. Recent data suggest that tricolored bat populations are in decline in Florida, although white-nose syndrome has yet to be detected there. Previous modeling using our statewide acoustic dataset indicated that increased habitat richness in a 50-meter buffer around a detector best predicted increased tricolored bat activity. The goal of this analysis was to identify habitat pairings, rather than isolated habitat types, that best predict tricolored bat activity in Florida. As part of the Florida Fish and Wildlife Conservation Commission's statewide Long-term Bat Monitoring Program, we recorded stationary acoustic data either two or four times per year from 2021 through 2024 at 138 detector locations in Florida. We developed null, global, and quarterly co-occurrence models to assess whether specific habitat pairs occurred more frequently than expected at detector sites. Our null model suggested that no habitat pairs within the 50-meter buffer occurred more frequently than expected on the landscape. However, when incorporating bat activity data, certain habitat pairs were observed more frequently than expected. For all combined seasonal data, of the 34 habitat pairs analyzed, 20% showed significant positive associations and 20% showed significant negative associations. The strongest positive association occurred between hardwood forested uplands and freshwater non-forested wetlands. Urban areas also showed several positive associations with other habitat types, particularly with hardwood forested uplands and high pine and scrub habitats. Quarterly data revealed various significant pairings, but urban habitat was consistently associated with positive results across all seasons, except in quarter four when hardwood forested uplands had more positive associations. Overall, these findings underscore the critical role of habitat diversity in supporting tricolored bat populations in Florida, highlighting the need for tailored conservation strategies that account for seasonal shifts in habitat preferences.

WELCOME BACK FRANKS! REINTRODUCING FRANKLIN'S GROUND SQUIRRELS (*POLIOCITELLUS FRANKLINII*) INTO NORTHWESTERN INDIANA

J. Moore*, B. Westrich, C. Williamson, S.M. Bergeson
Purdue University Fort Wayne, Fort Wayne, IN 46805 (JM, SMB); Indiana Department of Natural Resources, Bloomington, IN 47401 (BW); Saginaw Valley State University, University Center, MI 48710 (CW)

The increased use and expansion of agricultural development has threatened prairie ecosystems worldwide causing them to become one of the most threatened regions in the world. Specific to our study region, Indiana and Illinois have reported a 99.9% loss of prairie. The Franklin's Ground Squirrel (*Poliocitellus franklinii*; FGS) is a grassland Sciurid that is declining throughout the Midwest and currently listed as endangered in Indiana due to the loss of critical habitat. We initiated the first stage of a reintroduction of the species into western Indiana during the summer of 2024 by translocating 25 adults and 16 offspring from five capture sites in Brown County, South Dakota. We fitted 10 adult squirrels with GPS collars to monitor space use and survival and soft-released at Efroymson Prairie, Indiana. Five collars slipped, 1 squirrel was predated by a badger, and the remaining 4 were tracked until hibernation. Post-release, average dispersal distance was 482.4 ± 165.5 m (n=6). Mean home range size averaged 5.2 ± 4.4 ha for 50% core areas, 10.1 ± 8.7 ha for 75% home ranges, and 19.5 ± 16.5 ha for 95% home ranges with males exhibiting home ranges nine times larger than females (n=4). The 2024 population will be reinforced with more individuals from South Dakota in 2025, with continued monitoring of survival and space use. Success of the study will be evaluated based upon establishment, survival, and reproduction of the reintroduced FGS population.

SBDN BAT BLITZES AS A TOOL FOR DOCUMENTING CHANGING BAT COMMUNITIES AND PROVIDING TRAINING OPPORTUNITIES FOR STUDENTS AND FIELD BIOLOGISTS

K. Morris, S. Perea, E. Ferrall, P. Pattavina, N. Sharp, M. Hunt, L. Pattavina, N, Castleberry, S. Castleberry
Georgia Department of Natural Resources, Wildlife Resources Division, Wildlife Conservation Section, Social Circle, GA 30025 (KM, MH); University of Wisconsin–Madison, Department of Forest & Wildlife Ecology, Madison, WI 53706 (SP); United States Fish and Wildlife Service, Ecological Field Services, Athens, GA 30606 (EF, PP, LP); TTL, Huntsville, AL 35806 (NS); Odom School of Ecology, University of Georgia, Athens, GA 30602 (NC); Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA 30602 (SC)

The Southeastern Bat Diversity Network (SBDN) and participating states have been organizing bat blitzes across the southeastern US since 2002. As part of that effort, SBDN Bat Blitz events were conducted in Alabama and Georgia pre-white-nose syndrome (WNS; 2008 and 2010) and post-WNS (2022 and 2023). Capture results from these events were analyzed to investigate changes to bat communities in the Southern Appalachians since the invasion of WNS. Whenever possible, exact locations and netting effort were replicated at the trapping locations. During the pre-WNS blitzes, 676 bats from 11 species were documented. Post-WNS only 283 bats from seven species were documented. As expected, we observed significant declines in captures of WNS affected bats, including a 99.4% decline in northern long-eared bat (*Myotis septentrionalis*) captures and an 87.7% decline in tricolored bat (*Perimyotis subflavus*) captures. Declines were also observed for most Myotis species and eastern red bats (*Lasiurus borealis*), while increases were observed for big brown bats (*Eptesicus fuscus*) and evening bats (*Nycticeius humeralis*). In general, these results were not surprising considering observed declines for WNS-affected species. However, the observed changes in species not affected by WNS are important observations that warrant continued investigation. We encourage states to consider additional efforts to repeat previous bat blitzes to document changes in bat communities over time. In addition, these blitzes offer an opportunity for students and early career field biologists to gain field experience and observe species that are becoming increasingly difficult to detect on the landscape.

SEASONAL INTERACTION OF GI TRACT PLASTICITY, GUT MICROBIOME, AND DIET IN NORTH AMERICAN DEER MICE (*PEROMYSCUS MANICULATUS*)

S. Munkh-Orgil* and B. McLean
Department of Biology, University of North Carolina at Greensboro, Greensboro, North Carolina 27412, USA

The mammalian gastrointestinal (GI) tract hosts a dynamic microbial community that impacts host biology, including nutrition, immune system development, and behaviour. However, the GI tract itself is a flexible organ whose length and form can change in response to fluctuating diet. This study explores how seasonal dietary shifts, reproductive status, and sex influence both gut microbiome composition and gastrointestinal (GI) tract morphology in free-ranging deer mice (*Peromyscus maniculatus*) in the Southern Appalachian Mountains. Field and lab analyses will measure GI tract length and microbiome diversity across an entire year, with dietary analysis using metabarcoding and microbiome profiling through 16S rRNA gene sequencing. Statistical models will assess relationships between diet, microbiome function, and GI tract morphology. Expected results include seasonal variations in diet and microbiome diversity, sex-specific differences, and evidence that higher microbial functional diversity in winter reduces the need for extensive GI morphological changes. This work will contribute to understanding mammalian response to changing environments through the critical lens of microbiome diversity and phenotypic plasticity.

FILLING THE GAPS: FLORIDA BONNETED BAT ROOST SELECTION AND POPULATION STRUCTURE BETWEEN KNOWN POPULATIONS

A.R. Nash, E.C. Braun de Torrez, J.P. Borkholder, and J.D. Austin
Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, Gainesville, USA (ARN, BDT, JPB); *Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, USA (JDA)*

Understanding the genetic structure and gene flow of endangered species is essential for effective conservation management. The Florida bonneted bat (*Eumops floridanus*) is a federally endangered species with an extremely restricted geographic range. The known roosts of *E. floridanus* are divided into four distinct regions separated by distances of 100–250 km: three western populations in natural areas (Polk, Charlotte and Collier Counties), and one eastern population in an urban area (Miami-Dade County). Previous research revealed that the genetic structure of the urban population is evolutionarily distinct from the three western populations, suggesting minimal to no gene flow despite the species' long-distance foraging behavior. Although previous acoustic surveys detected *E. floridanus* between these populations, little is known about the genetic structure or roost selection of these bats. To better understand the lack of gene flow and possible reproductive barriers between populations, we sampled the region between the urban population (Miami-Dade County) and the closest western population (Collier County). This region primarily comprises vast expanses of wetlands (Everglades) with few roosting opportunities, which may preclude interactions between populations. Mist nets, coupled with acoustic lures and a lure spinner, were used in 20 survey sites over 28 nights across the Everglades. Nine *E. floridanus* were captured in sites where the species had never been captured and fitted with VHF transmitters using break-away collars. Despite extensive aerial and ground-based radio telemetry efforts, only three bats captured in Everglades National Park were tracked to urban roosts in Miami-Dade County. One of those was captured 30.1 km from its roost, documenting the furthest capture from a known roost site. Genetic samples collected from each bat are currently being analyzed at the University of Florida using genotyping by sequencing (GBS) libraries as part of a comprehensive analysis of population structure across the species' range.

EVALUATING SMALL MAMMAL COMMUNITY ECOLOGY IN THE SOUTHERN BLUE RIDGE USING AHDRIFT

Katelyn Steen* and Dr David Jachowski
Department of Forestry and Environmental Conservation; College of Agriculture, Forestry, and Life Sciences; Clemson University; Clemson, SC 29631

The southern Blue Ridge of the Appalachian Mountains is a biodiversity hotspot of conservation concern that requires active monitoring as rapid development, extensive land use, and climate change threaten the region. Small mammals are a particularly understudied taxa as traditional survey methods are labor/time intensive and come with a mortality risk to target species. Our study evaluates a novel camera trap system, the Adapted Hunt Drift Fence Technique (AHDriFT), as a viable long-term monitoring method for 6 South Carolina State Wildlife Action Plan (SWAP) listed small mammals in the southern Blue Ridge: the Carolina red-backed vole (*Myodes gapperi carolinensis*), woodland jumping mouse (*Napaeozapus insignis*), eastern woodrat (*Neotoma floridana*), masked shrew (*Sorex cinereus*), pygmy shrew (*Sorex hoyi*), and eastern spotted skunk (*Spilogale putorius*). We placed 30 AHDriFT systems in the summer of 2024 and have collected the photos from the cameras monthly. As of December 2024 we have collected 84,000 photos and confirmed detection of 3 of our 6 target species: eastern woodrat (*Neotoma floridana*), masked shrew (*Sorex cinereus*), and eastern spotted skunk (*Spilogale putorius*). The results show high activity from *Peromyscus* species and high disturbance from American black bears (*Ursa americana*). Upon setup, we collected vegetation and landscape data at the site level which will be used to investigate habitat associations that correlate to occupancy of these 6 focal small mammal species in South Carolina. In addition, at each site we are collecting data on small carnivore, herpetofauna, invertebrate, and seed relative abundance to investigate how the small mammal community acts as a sentinel for activity and diversity for other taxa in the ecosystem.

SHRINKING SHREWS: EXPLORING DEHNEL'S PHENOMENON IN THE APPENDICULAR SKELETON OF *SOREX CINEREUS*

K.E. Stierman, B.S. McLean
Department of Biology, University of North Carolina Greensboro, NC 27412

Shrews within the genus *Sorex* have been shown to exhibit Dehnel's Phenomenon, a rare overwintering strategy wherein components of the body shrink to conserve energy and partially or fully regrow the following Spring. However, most studies over the past 75 years have focused on aspects of body size or craniodental proportions. We investigated a Southern Appalachian population of *Sorex cinereus* in Pisgah National Forest, the lowest latitude studied in this species to date, to assess whether Dehnel's Phenomenon acts on the appendicular skeleton, which could have functional (e.g., locomotory) implications for overwintering shrews. We sampled seasonally for two years (2021-2023) using pitfall trapping and scanned specimens using microCT to construct skeletal images from which linear measurements were obtained on the cranium and two long bones in the appendicular skeleton (femur and tibia). Braincase height, a common proxy for Dehnel's Phenomenon, decreased by 11.5% and body mass decreased by 13%; both experienced the characteristic Spring regrowth, establishing that Dehnel's occurs in this population. Additionally, we found seasonal shrinkage and regrowth in long bones, but of slightly different magnitude than for body size and braincase. This work marks the first exploration of Dehnel's Phenomenon in the appendicular skeleton of any shrew, confirming this process acts beyond the common proxy of the braincase and extends to the limbs with potential impacts on locomotion and functional persistence on the landscape.

COMPARATIVE ANALYSIS OF THERMAL DYNAMICS OF BAT BAG MATERIALS

G. L. Tomboc· and C.G. Haase
Department of Biology, Austin Peay State University, Clarksville, USA

When handling bats, we commonly place individuals in bat bags, usually comprised of fabric or paper. It is unknown, however, if these bags differ in their conductive properties and if one is a better option than the other in terms of causing overheating in bats. This concern is especially relevant when working in the active months in the southeastern United States, when air temperatures are often in the realm of causing heat stress. We tested differences in bag temperature between common bat bag types (cotton fabric and paper lunch bags) and ambient air conditions. We also tested differences in the ability of these bags to dissipate heat generated by active bats by measuring bag temperatures when bats were placed within bags. We placed iButtons in 5 fabric bags and 5 paper bags, and compared to air temperatures measured by an additional data logger placed outside of bags. We then placed iButtons in paper and fabric bags when a bat was captured; we let the bat sit in each type of bag for 5 min to measure bat bag temperatures. We will compare bag temperatures between types, between types and air temperature, and between types with active bats within bags. These results will help determine the best materials used when handling active bats in warm conditions and if the bat research community should alter their capture practices.

IMPACTS OF HUMIDITY, SUBSTRATE, AND LIGHT ON *PSEUDOGYMNOASCUS DESTRUCTANS* GROWTH

L. Young*, L.N. Crowley, F. Sewell, S. Perry and C.G. Haase
Department of Biology, Austin Peay State University, Clarksville, USA

Understanding the effects of different environmental conditions on microbial growth is crucial for ecological and biological studies. This research aims to investigate the influence of humidity, substrate, and light conditions on the growth of fungal cultures, specifically focusing on *Pseudogymnoascus destructans*, the causative agent of white-nose syndrome in bats. The objectives of this study are 1) to determine the growth rate of *P. destructans* under different humidity conditions, 2) to determine the impacts of different substrates on fungal growth, 3) to compare fungal growth under light and dark conditions, and 4) to assess the interaction between humidity, substrate type, and light exposure on predicting *P. destructans* growth. We inoculated four replicates of five different treatments (standard SDA plate, sandstone, gypsum, granite, and bat wings) under light and dark conditions in a humidity chamber to control the relative humidity, temperature, and light conditions. There is already information about the growth of *P. destructans* at different temperatures; however, we are focusing on the effects of humidity and the various substrates that *P. destructans* naturally grows on to better understand growth in non-traditional hibernation conditions.