21st Annual Meeting of the Southeastern Bat Diversity Network

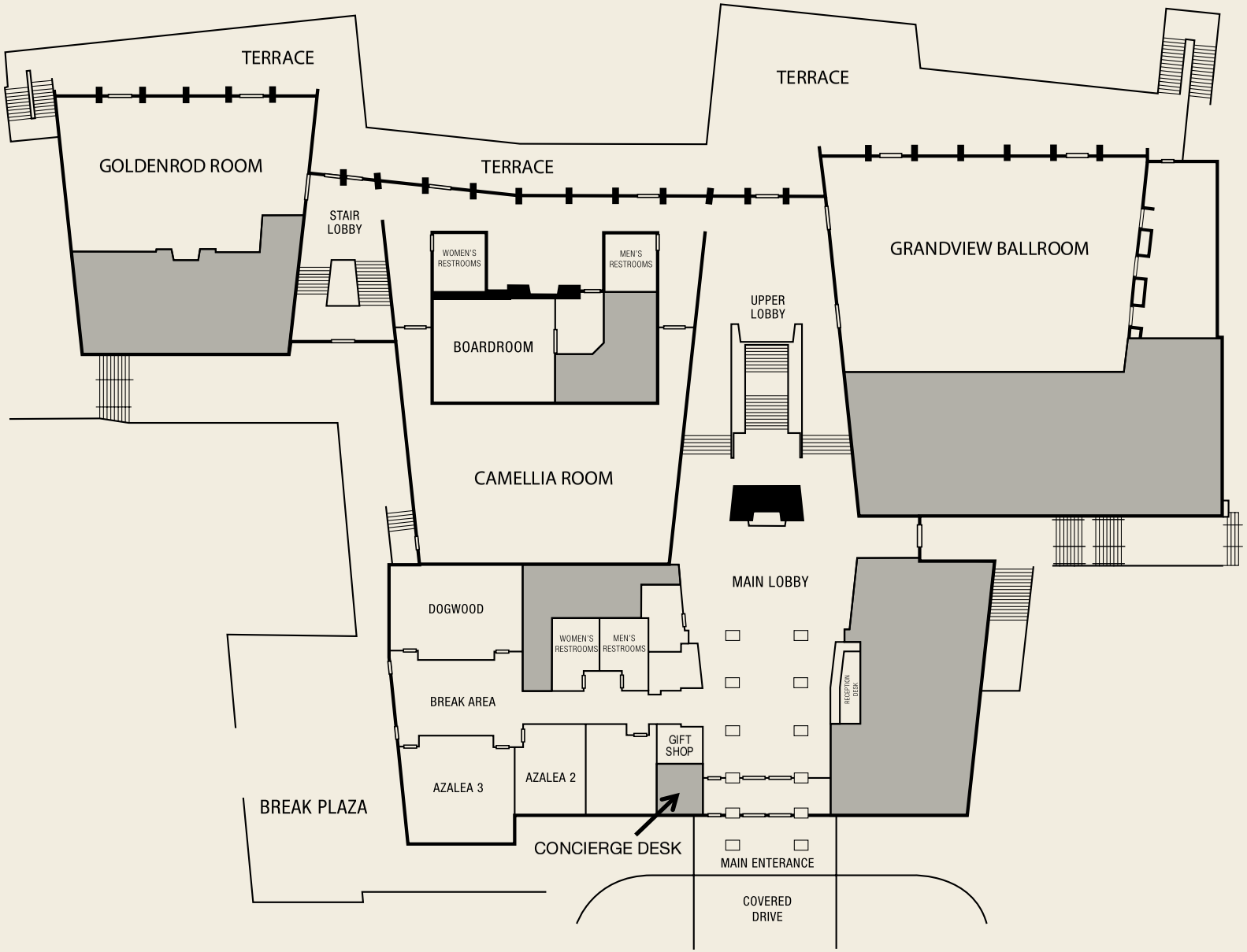
and

26th Annual Colloquium on the Conservation of Mammals in the Southeastern U.S.

February 18-19, 2016
Lake Guntersville State Park
Guntersville, Alabama

Lake Guntersville Resort State Park

Floorplan



SCHEDULE OF EVENTS

THURSDAY, FEBRUARY 18, 2016 - SBDN MEETING AND ASSOCIATED MEETINGS

7:00 a.m.-1:00 p.m.	Registration	Lobby – Concierge Desk
7:00 a.m.-12:30 p.m.	Vendor/Exhibitor Setup/Display	Grandview Ballroom
9:00 a.m.-12:00 p.m.	Field Trips (Page 8)	TBD – Meet in Lobby
8:30 p.m.-12:00 p.m.	Spotted Skunk Cooperative Study Group (Page 9)	Grandview Ballroom
10:15 a.m.-10:45 a.m.	Break (**Sponsor:** Natural Resource Group)	Grandview Ballroom
12:00 a.m.-1:00 p.m.	Lunch	On your own
1:00 p.m.-2:15 p.m.	SBDN Business Meeting	Grandview Ballroom
2:15 p.m.-5:30 p.m.	SBDN Plenary Session (Page 10)	Grandview Ballroom
2:45 p.m.-3:15 p.m.	Break (**Sponsor:** S&ME)	Grandview Ballroom
5:30 p.m.-7:00 p.m.	Dinner	On your own
6:15 p.m.-7:00 p.m.	Poster Setup	Grandview Ballroom
7:00 p.m.-10:00 p.m.	Social, Poster Session (Page 11), Silent Auction **(Co-Sponsors:** Titley Scientific; Ecological Solutions, Inc.)	Grandview Ballroom

FRIDAY, FEBRUARY 19, 2016 - COLLOQUIUM ON THE CONSERVATION OF MAMMALS

6:30 a.m.-8:00 a.m.	Breakfast (Included with registration)	Grandview Ballroom
7:00 a.m.-11:00 a.m.	Registration	Lobby – Concierge Desk
8:00 a.m.-9:30 a.m.	Oral Presentations – Session 1A (Page 13)	Camellia Room
8:00 a.m.-9:30 a.m.	Oral Presentations – Session 1B (Page 13)	Goldenrod Room
9:30 a.m.-10:00 a.m.	Break (**Sponsor:** Jackson Environmental)	Grandview Ballroom
10:00 a.m.-11:30 a.m.	Oral Presentations – Session 2A (Page 13)	Camellia Room
10:00 a.m.-11:30 a.m.	Oral Presentations – Session 2B (Page 13)	Goldenrod Room
11:30 a.m.-1:00 p.m.	Lunch (Included with registration)	Grandview Ballroom
1:00 p.m.-2:30 p.m.	Oral Presentations – Session 3 (Page 14)	Camellia Room
2:30 p.m-3:00 p.m.	Break (**Sponsor:** SWCA Environmental Consultants)	Grandview Ballroom
3:00 p.m.-3:30 p.m.	Awards, Announcements, Close	Grandview Ballroom

Local Hosts: Tennessee Valley Authority, Holly LeGrand, Liz Hamrick, Sara McLaughlin, Clint Smith

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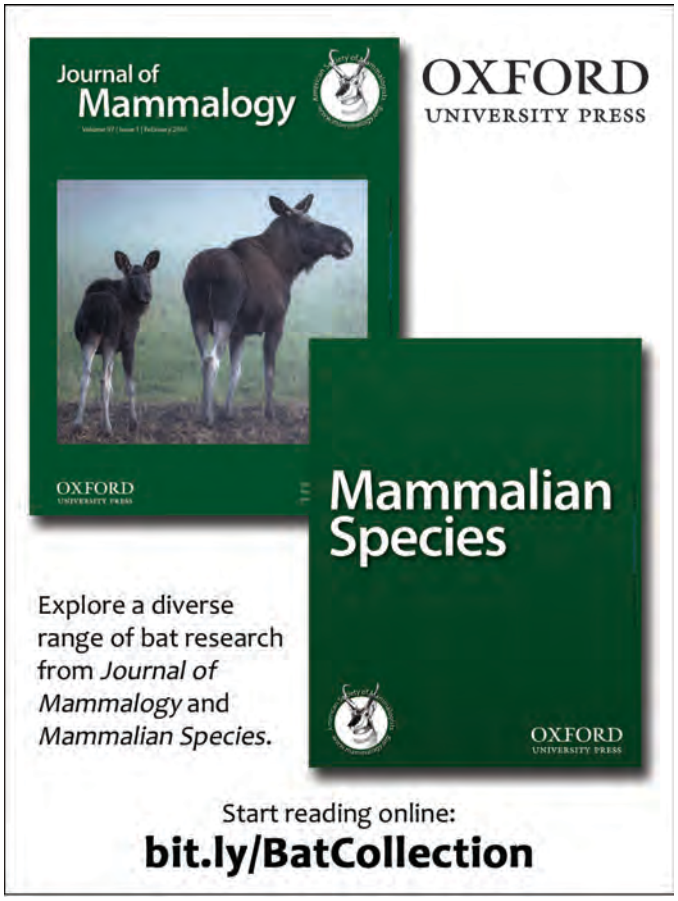

Special thanks to the Alabama Bat Working Group for all their volunteer help during this event!

www.alabamabatwg.wordpress.com

EVENT INFORMATION

LOCATION MAP

Inside front cover of the meeting program.

REGISTRATION DESK

If you have any questions or need assistance locating someone, volunteers at the registration desk (Concierge Desk) will be happy to assist you. Registration desk will be staffed during hours listed in SCHEDULE OF EVENTS (page 1) and possibly during additional times (session breaks, etc.).

FIELD TRIPS

Kate Gribbin, Lake Guntersville State Park Naturalist, has offered to provide 2 simultaneous guided field trips on Thursday, Feb 18, from 9:00 a.m. until 11 a.m. or 12 p.m. These include 1) visiting an active eagle's nest, 2) a waterfowl tour, 3) a guided hike at state park and/or 4) a visit to High Falls Waterfall and Buck's Pocket State Park. Field trip details are available at the registration desk or on the meeting website. Field trips with the greatest number of folks signed up will determine which two trips are offered.

PRESENTATIONS

Posters - All who are presenting posters should plan to bring their poster to the Grandview Ballroom between 6:15 and 7:00 p.m., Thursday, Feb 18. Poster board walls will have a number displayed that corresponds to each presenter's assigned poster number (see pages 11-12). Posters will be displayed in the Grandview Ballroom on Thursday, from 7:00-10:00 p.m. Presenters are encouraged to stand with their posters until ~9:00 p.m. Posters can remain on display through 1:00 p.m. Friday, Feb 19. Please remove posters no later than 1:00 p.m. Posters can be a maximum of 48" long and 48" tall (or smaller).

Oral Presentations - All who are delivering oral presentations should plan to provide an electronic copy of their presentation to the volunteers at the registration desk (Concierge Desk) in order to minimize last-minute confusion at the beginning of the different sessions. Oral presentations on Friday, February 19, will be delivered in the Camellia Room and the Goldenrod Room. Each presentation will be 15 minutes, and presenters are encouraged to allow 2-3 minutes of that time for questions.

Abstracts are located on pages 15-18 (Plenary), 19-32 (Poster Session) and 33-47 (Oral Presentations).

JUDGE INFORMATION

Judges, please pick up packages at the registration desk. There will be a judges meeting (oral and poster) in the Grandview Ballroom approximately 10 minutes before the beginning of the poster session to go over everything. Please see Rebekah (aka Ratty) Tuck and Jackie Beck with any questions.

REFRESHMENTS & MEALS

Thursday, February 18 - Lunch will be on your own. Options include the Pinecrest Dining Room, located in the State Park Lodge as well as several restaurants in Guntersville, located ~15-20 minutes from Guntersville State Park. Light refreshments will be provided during morning and afternoon breaks. A social will be held in the Grandview Ballroom from 7:00-10:00 p.m. Heavy hors d'oeuvres and a cash bar will be available. Be sure to bring your 2 drink tickets (provided with registration packet).

Friday, February 19 – Breakfast and lunch will be provided (included in registration fee) in the Grandview Ballroom. Light refreshments will be provided during morning and afternoon breaks.

SILENT AUCTION

Silent auction will occur from 7:00-10:00 p.m. in the Grandview Ballroom. Last call for silent auction bids will be at 9:30 p.m. Forms of payment accepted include cash, credit card, and check. Proceeds from the silent auction will fund awards for excellence in conservation efforts and student achievements and help with on-the-ground conservation efforts, such as surveys of areas in need of study. Donations also may go towards funding our Student Travel Award Program (http://sbdn.org/student-travel-award-program/).

SPOTTED SKUNK COOPERATIVE STUDY GROUP MEETING

THURSDAY, FEBRUARY 18, 2016
GRANDVIEW BALLROOM
8:30 a.m.–12:00 p.m.

8:30-8:45 INTRODUCTIONS

8:45-9:25 STATE BY STATE UPDATES ON STATUS, SIGHTINGS, AND MONITORING

- UPDATE ON PLAINS SPOTTED SKUNK LISTING DECISION – SHAUNA MARQUARDT, U.S. FISH AND WILDLIFE SERVICE

9:25-10:15 RESEARCH UPDATES (5 MINUTES/UPDATE TO PRESENT A SHORT POWERPOINT SUMMARY OF WORK)

- ALABAMA – WILLIAM CORNELISON, TY SPRAYBERRY, ANDREW EDELMAN
- VIRGINIA / WEST VIRGINIA – EMILY THORNE, MARK FORD
- TENNESSEE – BRIAN CARVER
- SOUTH CAROLINA - ROBIN ENG
- NORTH CAROLINA – COLLEEN OLFENBUTTEL
- GEORGIA – NIKKI CASTLEBERRY
- FLORIDA – DAVID JACHOWSKI, TERRY DOONAN
- TEXAS – BOB DOWLER, CLINT PERKINS
- ARKANSAS – BLAKE SASSE
- WYOMING –

10:15-10:45 BREAK

10:45-11:15 FUTURE PRIORITIES

- INATURALIST APP FOR REPORTING SPOTTED SKUNK SIGHTINGS - NICK SHARPE
- GENETIC ASSESSMENT – BOB DOWLER
- SURVEY METHODOLOGY

11:15-11:45 BREAKOUT SESSIONS ON PLANNING/IMPLEMENTATION

- GENETIC ASSESSMENT
- DIET ASSESSMENT
- SURVEY METHODOLOGY DESIGN
- MULTISTATE WILDLIFE GRANTS
- NATIONAL FOCUS – NFWF – GENETICS/DIET

11:45-12:00 FINAL DISCUSSIONS

- PLANS DEVELOPED DURING BREAKOUT SESSIONS
- FUTURE MEETINGS/CONFERENCE CALLS?

SOUTHEASTERN BAT DIVERSITY NETWORK PLENARY SESSION

THURSDAY, FEBRUARY 18, 2016
GRANDVIEW BALLROOM
2:15 – 5:30 p.m.

SESSION 1: BATS AND CONSERVATION GENETICS

2:15 **INTRODUCTION OF SPEAKER**
BRIAN CARVER, SBDN PRESIDENT

BATS AND CONSERVATION GENETICS
AMY RUSSELL, GRAND VALLEY STATE UNIVERSITY

2:45 – 3:15 **BREAK** **SPONSOR**: **S&ME**

SESSION 2: REGULATORY UPDATES, APPROACHES

DOTTIE BROWN, MODERATOR

3:15 **REVIEW STATUS: TRI-COLORED BAT, LITTLE BROWN BAT; STATUS: NORTHERN LONG-EARED BAT**
MIKE ARMSTRONG, U.S. FISH AND WILDLIFE SERVICE

3:35 **INTERPRETATION/APPLICATION OF THE FINAL 4(D) RULE FOR NORTHERN LONG-EARED BAT: FIELD OFFICE PERSPECTIVE**
KAREN MARLOWE, U.S. FISH AND WILDLIFE SERVICE

3:50 **HABITAT SCREENING AND MODELING FOR NORTHERN LONG-EARED BAT AND INDIANA BAT: APPLICATION, ASSUMPTIONS AND LIMITATIONS RELATED TO POLICY AND BIOLOGY**
PETE PATTAVINA AND MARK ENDRIES, U.S. FISH AND WILDLIFE SERVICE

4:15 **PANEL DISCUSSION - Q&A**
SESSION SPEAKERS, AUDIENCE

SESSION 3: IMPLEMENTATION AND ONGOING PROJECTS

MARY FRAZER, MODERATOR

4:30 **A PROGRAMMATIC APPROACH TO BAT CONSERVATION ON SOUTHERN NATIONAL FORESTS**
DENNIS KRUSAC, USDA, FOREST SERVICE, SOUTHERN REGION

4:45 **HABITAT CONSERVATION PLAN FOR NORTHERN LONG-EARED BAT**
JIM OZIER, GEORGIA POWER COMPANY

5:00 **PROGRAMMATIC APPROACH TO BATS BY FEDERAL HIGHWAY ADMINISTRATION AND IMPLEMENTATION BY GEORGIA DEPARTMENT OF TRANSPORTATION**
DOUG CHAMBLIN, GEORGIA DEPARTMENT OF TRANSPORTATION

5:15 **PANEL DISCUSSION - Q&A**
SESSION SPEAKERS, AUDIENCE

POSTER SESSION

THURSDAY, FEBRUARY 18, 2016, GRANDVIEW BALLROOM, 7:00 p.m.-9:00 p.m.
Posters arranged by poster and corkboard number; * Indicates Student Presenter/Competitor

1. IMPLICATIONS ASSOCIATED WITH THE WESTERN RANGE EXPANSION OF EASTERN BAT SPECIES IN THE UNITED STATES. B. ANDERSEN,* AND K. GELUSO.

2. INTERNAL ROOST TEMPERATURE AFFECTS BAT BOX USE BY INDIANA BATS. S. M. BERGESON,* AND J. M. O'KEEFE.

3. ISOLATION, IDENTIFICATION, AND CONTROL AGENTS OF *PSEUDOGYMNOASCUS DESTRUCTANS*: PRELIMINARY RESULTS. K. BURNS,* W. E. STONE, AND J. JONES.

4. ROOSTING HABITS OF THE EASTERN SMALL-FOOTED BAT IN THE SHAWNEE NATIONAL FOREST. K. CONFORTIN,* AND T. CARTER.

5. HABITAT SELECTION, HOME RANGE SIZE, AND SURVIVAL OF *SPILOGALE PUTORIUS* IN TALLADEGA NATIONAL FOREST, ALABAMA. W. CORNELISON,* A. EDELMAN, AND T. SPRAYBERRY.

6. SURVEYS IN NORTH ALABAMA FOR THE AMERICAN PYGMY SHREW WITH NEW RECORDS FROM LAWRENCE COUNTY, ALABAMA. H. A. CZECH, A. A. BOHLMAN, W. B. SUTTON, AND W. E. STONE.

7. ASSESSING WINTER ACTIVITY OF HIBERNATING BATS USING ULTRASONIC ACOUSTICS: LESSONS LEARNED. C. A. DIGGINS,* A. SILVIS, A. KNIOWSKI, W. M. FORD, G. J. GRAETER, AND L. COLEMAN.

8. WING PUNCHES STORED IN ETHANOL VS. FROZEN DRY YIELD DIFFERENT STABLE ISOTOPE RESULTS. T. J. DIVOLL,* J. M. O'KEEFE, AND R. H. MICHENER.

9. USE OF FLORIDA HIBERNACULA CAVES BY TRI-COLORED BATS AND POTENTIAL WHITE-NOSE SYNDROME IMPACTS. T. J. DOONAN, J. A. GORE, L. SMITH, AND M. P. TUCKER.

10. THE SEARCH FOR MEADOW JUMPING MICE IN EAST-CENTRAL ALABAMA. D. R. DUFFIE,* R. A. GITZEN, AND N. W. SHARP.

11. THE EASTERN SPOTTED SKUNK IN SOUTH CAROLINA… AND BEYOND. R. Y. Y. ENG,* J. BUTFILOSKI, S. WILSON, AND D. S. JACHOWSKI.

12. USING NEXT-GENERATION SEQUENCING TO INVESTIGATE DIETARY PREFERENCES OF BATS IN THE WAKE OF WHITE-NOSE SYNDROME. S. A. FULTON,* AND L. E. DODD.

13. USING CAPTIVE-BRED PERDIDO KEY BEACH MICE FOR SUCCESSFUL REINTRODUCTIONS. D. U. GREENE, J. A. GORE, AND J. D. AUSTIN.

14. DETERMINING THE DISTRIBUTION OF DECLINING BATS IN NORTH GEORGIA. J. GRIDER,* S. CASTLEBERRY, AND J. HEPINSTALL-CYMERMAN.

15. ORGANOCHLORIDE PESTICIDES PRESENT IN THE FUR OF BATS AND RODENTS IN AN AGRICULTURAL REGION OF SOUTHEASTERN ARKANSAS. M. E. GRILLIOT, J. L. HUNT, AND C. G. SIMS.

16. THE UTILITY OF FIXED DATA LOGGING TOWERS IN DETERMINING BAT HABITAT USE – SUCCESSES AND LIMITATIONS. K. R. HAMMOND, J. GRUVER, AND T. SICHMELLER.

17. FLIGHT BEHAVIOR OF INDIANA BATS SELECTING ARTIFICIAL ROOSTS. J. P. S. HOEH,* AND J. M. O'KEEFE.

18. SUMMER OCCUPANCY RATES OF SCIURID POPULATIONS USING CAMERA TRAPS. K. A. LIPFORD,* C. A. DIGGINS, AND W. M. FORD.

19. THE MAMMAL COLLECTIONS AT THE FLORIDA MUSEUM OF NATURAL HISTORY: A VALUABLE RESOURCE FOR RESEARCH AND CONSERVATION. V. L. MATHIS.

20. THE RELATIONSHIP OF SALAMANDER SIZE STRUCTURE AND BAT ACTIVITY IN THE LAND BETWEEN THE LAKES WATERSHED IN WESTERN KENTUCKY. R. MILAM,* A. SMITH*, N. BUSCHHAUS, C. MOTT, R. BAKER*, AND H. WHITEMAN.

21. SELECTION OF MICROHABITAT BY EASTERN SMALL-FOOTED BATS ON NATURAL AND MAN-MADE ROCKY SLOPES. P. R. MOOSMAN JR.

22. THE BAT COMMUNITY AT LAND BETWEEN THE LAKES NATIONAL RECREATION AREA PRE- AND POST-WHITE NOSE SYNDROME. J. C. ROBBINS, T. L. DERTING, AND K. SCHAEFER.

23. CHARACTERISTICS OF BATS AT A CAVE IN EASTERN OKLAHOMA: FALL SWARMING. L. W. ROBBINS, K. M. ARMSTRONG AND R. C. STARK.

24. MULTI-SCALE HABITAT FEATURES AFFECTING GRASSLAND VERTEBRATE OCCUPANCY IN THE EAST GULF COASTAL PLAIN. K. W. RYER,* AND C. P. MCGOWAN.

25. TRI-COLORED BAT ROOST TREE USE AND MOVEMENT PATTERNS POST- WHITE-NOSE SYNDROME. K. E. SCHAEFER,* T. L. DERTING, AND J. C. ROBBINS.

26. UNDERSTANDING THE VULNERABILITY OF TRI-COLORED BATS TO WHITE-NOSE SYNDROME IN THE SOUTH: TORPOR PATTERNS AND HIBERNACULA CONDITIONS. P. SIRAJUDDIN,* H. E. BLACKWELL,* S. C. LOEB, E. R. BRITZKE, AND D. JACHOWSKI.

27. THE RELATIONSHIP OF SALAMANDER SIZE STRUCTURE AND BAT ACTIVITY IN THE KIMBALL CREEK WATERSHED IN WESTERN COLORADO. A. SMITH,* R. MILAM*, N. BUSCHHAUS, C. MOTT, AND H. WHITEMAN.

28. BAT COMMUNITY RESPONSES TO UPSTREAM FOREST THINNING AND PRESCRIBED BURNING. W. E. STONE.

29. RECENT WINTER BAT NUMBERS AT MAMMOTH CAVE NATIONAL PARK: PRE/POST WHITE-NOSE SYNDROME ARRIVAL. S. C. THOMAS.

30. FIRST OBSERVATION OF POST-WEANING FOOD PROVISIONING IN EASTERN SPOTTED SKUNKS (SPILOGAE PUTORIUS). E. D. THORNE,* C. WAGGY AND W. M. FORD.

31. A SCALABLE AND REPEATABLE ACOUSTIC SITE SELECTION FRAMEWORK FOR THE NORTHERN LONG-EARED BAT. Z. WARREN, M. WHITBY, AND C. ALLEN.

32. 2015 NATIONAL BAT BLITZ. M. WHITBY.

33. LATE SUMMER ROOST SITES OF REMNANT POPULATIONS OF MYOTIS BATS IN ACADIA NATIONAL PARK, MAINE. D. YATES, T. DIVOLL, M. INGALLS, C. BYRNE, AND B. CONNERY.

COLLOQUIUM ON THE CONSERVATION OF MAMMALS IN THE SOUTHEASTERN U.S.

FRIDAY, FEBRUARY 19, 2016, 8:00 a.m.–3:30 p.m., ORAL PRESENATIONS

	SESSION 1A, CAMELLIA ROOM	SESSION 1B, GOLDENROD ROOM
	HABITAT (AMY RUSSELL MODERATOR)	**HABITAT (TOM RISCH, MODERATOR)**
8:00	**DISTRIBUTION AND HABITAT ATTRIBUTES OF THE SOUTHEASTERN POCKET GOPHER IN ALABAMA.** M. S. BARBOUR.	**DEN USE AND ACTIVITY PATTERNS OF EASTERN SPOTTED SKUNKS IN THE TALLADEGA NATIONAL FOREST, ALABAMA.** T. SPRAYBERRY,* AND A. EDELMAN.
8:15	**HABITAT ANALYSIS OF THE SOUTHEASTERN POCKET GOPHER (*GEOYMS PINETIS*) IN SOUTHEAST ALABAMA.** M. E. BENNETT,* R. A. GITZEN, M. BARBOUR, AND H. TRIPP.	**ECOLOGICAL DISTRIBUTION OF SHREWS IN THE CUMBERLAND PLATEAU OF ALABAMA.** J. L. MOSS*.
8:30	**HABITAT USE AND NICHE PARTITIONING OF BATS IN THE CENTRAL GULF COASTAL PLAINS OF MISSISSIPPI.** S. A. VEUM,* S. A. RUSH, AND M. E. COLVIN.	**SOUTHEASTERN MYOTIS ROOSTING HABITS IN AN OLD-GROWTH BOTTOMLAND HARDWOOD FOREST.** S. P. KIMPEL,* S. LOEB, AND P. JODICE.
8:45	**ROOSTING HABITS OF THE NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*) IN A MANAGED FOREST.** T. CARTER, J. KARSK, K. CONFORTIN, AND S. HAULTON.	**ROOST TREE SELECTION OF THE SOUTHEASTERN MYOTIS AND RAFINESQUE'S BIG-EARED BAT IN THE CACHE RIVER NATIONAL WILDLIFE REFUGE, ARKANSAS.** S. A. SCHRATZ,* V. ROLLAND, AND T. S. RISCH.
9:00	**HABITAT ASSOCIATIONS OF THE EASTERN SPOTTED SKUNK (*SPILOGALE PUTORIUS*) IN WESTERN VIRGINIA.** E. D. THORNE,* C. WAGGY, D. JACHOWSKI, M. KELLY, AND W. M. FORD.	**VARIATION IN PRIMARY AND SECONDARY ROOSTS COULD AFFECT MANAGEMENT STRATEGIES IN TWO INDIANA LANDSCAPES.** S. M. BERGESON, J. B. HOLMES,* AND J. M. O'KEEFE.
9:15	**TROPHIC TRANSFER OF MICROCYSTIN FROM A FRESHWATER LAKE TO LITTLE BROWN BATS.** D. N. JONES,* M. M. WOLLER-SKAR, AND A. L. RUSSELL.	**USE OF DRY STONE FENCES BY SMALL MAMMALS AT LOWER HOWARD'S CREEK, KENTUCKY.** L. E. DODD, Z. L. COUCH, AND Z. WEESE.

** Indicates Student Competitor, Underlined author indicates presenter*

9:30 a.m.–10:00 a.m. BREAK Sponsor: Jackson Environmental

	SESSION 2A, CAMELLIA ROOM	SESSION 2B, GOLDENROD ROOM
	MONITORING (TIM CARTER, MODERATOR)	**HABITAT MANAGEMENT (ANDREW EDELMAN, MODERATOR)**
10:00	**METHODS OF AERIAL TRACKING USING "HOME RANGE AND HABITAT USE OF FORAGING GRAY BATS *(MYOTIS GRISESCENS)* FROM FIVE MATERNITY SITES IN NORTHERN ARKANSAS" AS A CASE STUDY.** P. R. MOORE,* T. S. RISCH, AND V. ROLLAND.	**BAT COMMUNITIES AND PRESCRIBED FIRE IN THE SOUTHERN APPALACHIANS.** A. EDELMAN, J. JOHNSON, AND J. STOBER.

10:15	**USE OF ULTRASONIC ACOUSTICS AS A MONITORING TECHNIQUE FOR ENDANGERED FLYING SQUIRRELS IN THE APPALACHIAN MOUNTIANS.** C. A. DIGGINS,* L. M. GILLEY, C. A. KELLY, AND W. M. FORD.	**HOW DO BATS OF THE CUMBERLAND PLATEAU RESPOND TO POST-FIRE HABITATS?** L. K. BURNS,* S. C. LOEB, W. C. BRIDGES JR., AND P. G. JODICE.
10:30	**EFFECTS OF CALL CLASSIFICATION SOFTWARE AND SURVEY METHOD ON TRI-COLORED BAT DETECTION AND OCCUPANCY PROBABILITIES.** B. D. NEECE,* S. C. LOEB, AND D. S. JACHOWSKI.	**EFFECTS OF PRESCRIBED FIRE ON BAT ACTIVITY FOLLOWING THE ARRIVAL OF WHITE-NOSE SYNDROME.** R. E. GRIFFITTS,* L. E. DODD, AND M. J. LACKI.
10:45	**USING FALSE-POSITIVE OCCUPANCY MODELS TO ESTIMATE PROBABILITY OF PRESENCE FOR *MYOTIS SEPTENTRIONALIS.*** V. G. ROJAS,* J. M. O'KEEFE AND S. C. LOEB.	**EFFECTS OF THREE FOREST MANAGEMENT STRATEGIES ON *PEROMYSCUS* MICE IN THE MISSOURI OZARKS OVER TWO DECADES.** R. A. GITZEN, R. B. RENKEN, D. K. FANTZ, R. G. JENSEN, A. J. WOLF, A. D. BLEISCH, AND J. J. MILLSPAUGH.
11:00	**HABITAT SUITABILITY MODELLING OF THE NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*) IN SOUTHERN INDIANA.** J. KARSK,* AND T. C. CARTER.	**EFFECT OF FOREST OPENING LANDSCAPE CHARACTERISTICS AND VEGETATION STRUCTURE ON BAT ACTIVITY IN WESTERN NORTH CAROLINA.** J. D. BROOKS,* S. C. LOEB, AND P. D. GERARD.
11:15	**WHAT HOME AND LAND USE PRACTICES AFFECT THE PROBABILITY OF HUMAN-ELEPHANT CONFLICT IN NEPAL?** D. NEUPANE,* R. L. JOHNSON, AND T. S. RISCH.	**EFFECTS OF HABITAT MODIFICATION ON RODENT POPULATION DYNAMICS AND COMMUNITY STRUCTURE.** A. L. LARSEN,* J. A. HOMYACK, T. B. WIGLEY, D. A. MILLER, AND M. C. KALCOUNIS-RUEPPELL.

** Indicates Student Competitor, Underlined author indicates presenter*

11:30 a.m.–1:00 p.m. LUNCH

	SESSION 3, CAMELLIA ROOM (HAN LI, MODERATOR)
1:00	**USE OF HIGHWAY CULVERTS, BOX BRIDGES, AND CAVES BY WINTER-ROOSTING BATS IN MISSISSIPPI.** J. B. KATZENMEYER, K. SHELTON, J. C. JONES, B. N. HODGES, D. RICHARDSON, AND B. ROSAMAND.
1:15	**SURVIVAL OF HIBERNATING TRI-COLORED BATS IN SMALL MINES OF THE OUACHITA MOUNTAINS.** R. W. PERRY AND P. N. JORDAN.
1:30	**PRELIMINARY COMPARISON OF URBAN AND RURAL WHITE-TAILED DEER HABITAT USE IN SOUTHERN INDIANA.** T. C. CARTER, G. B. CLEVINGER, AND J. K. TRUDEAU.
1:45	**SEASONAL NORTHERN LONG-EARED BAT ACTIVITY ON THE COASTAL PLAINS OF NORTH CAROLINA.** D. BROWN, D. COOPER, AND K. ROMANO.
2:00	**BAT USE OF A MANAGED CENTRAL HARDWOODS FOREST: A COMPARISON OF CALL ABUNDANCE ACROSS THE HARVEST-FOREST GRADIENT.** K. L. CALDWELL AND T. C. CARTER.
2:15	**BAT VS ANT: THE STRUGGLE CONTINUES.** K. A. CUNNINGHAM, J. E. CURRY, T. C. NEWMAN, AND J. D. WILHIDE.
2:30	**URBANIZATION EFFECTS ON BATS ACROSS MULTIPLE NORTH CAROLINA CITIES WITHIN THE NABAT SAMPLING FRAMEWORK.** H. LI, K. CALDWELL, AND M. KALCOUNIS-RUEPPELL.

2:45 p.m.–3:15 p.m. BREAK Sponsor: SWCA Environmental Consultants
3:15 p.m.–3:45 p.m. AWARDS, ANNOUNCEMENTS, AND CLOSE

PLENARY ABSTRACTS AND BIOS (*in alphabetical order by last name of first author*)

REVIEW STATUS: TRI-COLORED BAT, LITTLE BROWN BAT; STATUS: NORTHERN LONG-EARED BAT

MIKE ARMSTRONG, *Southeast Bat Recovery and White-nose Syndrome Coordinator, U.S. Fish and Wildlife Service, 330 West Broadway, Room 265, Frankfort, Kentucky 40601*

Abstract: Updates will be provided on status of review by the U.S. Fish and Wildlife Service as to whether tri-colored bat or little brown bat should be considered for federal listing under the Endangered Species Act. Information on population status of northern long-eared bat, in the context of both the southeast and throughout the range of the species, also will be discussed..

Bio: Mike has worked for the USFWS for 18 years. He has been stationed in the Frankfort, KY Field Office for the past 13 years and has served as the Southeast Region's bat recovery and WNS Coordinator for the last 5 years.

PROGRAMMATIC APPROACH TO BATS BY FEDERAL HIGHWAY ADMINISTRATION AND IMPLIMENTATION BY GEORGIA DEPARTMENT OF TRANSPORTATION

DOUG CHAMBLIN*, Ecology Manager, Georgia Department of Transportation, 600 West Peachtree Street, Atlanta, Georgia, 30308*

Abstract: On April 17, 2015, the Federal Highway Administration and the U.S. Fish and Wildlife Service finalized the “Range-Wide Biological Assessment for Transportation Projects for Indiana Bat and Northern Long-Eared Bat” (BA), spelling out the process for programmatic informal consultation under Section 7 of the Endangered Species Act for the two federally protected bat species. The BA also dictates the appropriate avoidance and minimization measures (AMMs) that should be included under different conditions to ensure that a project can remain in the “not likely to adversely affect” category. The guidance in the BA is detailed and complex, and once it became the de facto section 7 process for these species, GDOT struggled to implement it consistently and correctly. To make that job easier, Georgia DOT worked closely with the Georgia Division of the Federal Highway Administration and the Georgia Field Office of the US Fish and Wildlife Service to develop a series of checklists to walk our ecologists and ecology consultants through the process. We are hopeful that the checklists have boiled down the process into a series of straightforward questions and that it will help achieve consistency in implementing the appropriate AMMs and completing informal consultation within the confines of the programmatic process. This presentation will discuss the BA and the checklist that has been developed.

Bio: Doug has a BS in Biology from Virginia Tech and an MS in Wildlife Resources from West Virginia University, where he studied the effects of mountaintop removal coal mining on small mammal populations. His work experience includes 5 years studying spotted owls in the Northwest and 3 years studying ravens in the Mojave Desert. He has been with the Georgia DOT Ecology Section since 2005, and has been section manager since 2010.

A PROGRAMMATIC APPROACH TO BAT CONSERVATION ON SOUTHERN NATIONAL FORESTS

DENNIS KRUSAC*, USDA, Forest Service, Southern Region, Endangered Species Specialist/Pollinator Conservation Coordinator, 1720 Peachtree Road, NW Atlanta, GA 30309*

Abstract: Prior to 1996, southern national forests did not have a focus on bat conservation. We protected key hibernacula, but our habitat management was directed at wildlife in general, not bat centric. In 1996, we were sued by Heartwood on a timber sale in the Daniel Boone National Forest for impacts to Indiana bat, and we lost. This was the turning point for bat conservation on national forests in the eastern U.S. In the southeast, we took a programmatic approach to bat conservation by amending forest plans to be more bat friendly. The major mistake we made was approaching this effort forest by forest and not regionally. This led to inconsistencies across forests as well as in the biological opinions

we received from the U.S. Fish and Wildlife Service. When the northern long-eared bat was proposed for listing, we approached this at a regional scale covering nearly 11 million acres scattered across 12 states, and implemented through13 different forest plans. This resulted in considerable cost savings, consistency, and one biological opinion with a streamlined consultation process for implementation.

Bio: Dennis Krusac has worked for the USDA Forest Service for more than 35 years. This includes experience in two Forest Service regions, 3 national forests, and the Southern Regional Office. For the past 25 years, Dennis has provided regional oversight for the conservation of threatened, endangered, and at risk species as well as pollinators. He has been engaged in bat conservation efforts for more than 20 years, and has served on the board of the Southeastern Bat Diversity Network and serves on the Bats and Wind Energy Cooperative's Technical Advisory Committee. Dennis also enjoys being an Albert Einstein impersonator in his free time.

INTERPRETATION/APPLICATION OF THE FINAL 4(D) RULE FOR NORTHERN LONG-EARED BAT: FIELD OFFICE PERSPECTIVE

KAREN MARLOWE*, Senior Biologist, U.S. Fish and Wildlife Service, Alabama Ecological Services Field Office, 800 Lakeshore Dr., Rm. 229 Propst Hall, Birmingham, AL 35229-2234*

Abstract: The northern long-eared bat (*Myotis septentrionalis*) is listed as threatened with a 4(d) rule under the U.S. Endangered Species Act of 1973, as amended, that specifies the regulations deemed "necessary and advisable to provide for the conservation of" the species. The 4(d) rule, which became effective on February 16, 2016, recognizes that the main threat to the continuing existence of the northern long-eared bat is white nose syndrome and clarifies that incidental take, with certain exceptions near hibernacula and maternity roost trees, is not prohibited. During this presentation, Karen Marlowe will step through the 4(d) rule and how project reviews, federal and non-federal, will be handled by the U.S. Fish and Wildlife Service at the field office level.

Bio: Karen Marlowe has over 30 years of experience with the U.S. Fish and Wildlife Service (Service). Prior to arrival in Alabama in 2009, she spent the previous 19 years in the Service's Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii, administering the endangered species program for Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, and American Samoa. She specializes in all aspects of the Endangered Species Act, but particularly consultation and recovery, and is the lead biologist for the Alabama Ecological Services Field Office on all bat issues in Alabama.

HABITAT CONSERVATION PLAN FOR NORTHERN LONG-EARED BAT

JIM OZIER*, Environmental Affairs, Georgia Power Company, 2480 Maner Road, Atlanta, GA 30339*

Abstract: Utility companies are heavily regulated and work hard to ensure compliance with their many permits. Georgia Power is developing a Habitat Conservation Plan for the northern long-eared bat, gray bat, and Indiana bat to help ensure regulatory certainty as new power line rights-of-way are cleared and existing ones maintained within potentially occupied forested habitat. Mitigation for potential incidental take includes maintenance and enhancement of hardwood stands, installation of roosting structures, and other beneficial measures on hundreds of acres on multiple tracts of company lands in the northern half of the state.

Bio: Jim Ozier is a wildlife biologist with the Georgia Power Company, where he is responsible for rare species management, avian protection, special areas management, and other aspects of terrestrial biodiversity conservation. Prior to joining Georgia Power, he had a career as a wildlife biologist and program manager with the Georgia Department of Natural Resources, Nongame Conservation Section where his responsibilities also centered on conservation of rare and declining species and habitats.

HABITAT SCREENING AND MODELING FOR NORTHERN LONG-EARED BAT AND INDIANA BAT: APPLICATION, ASSUMPTIONS AND LIMITATIONS RELATED TO POLICY AND BIOLOGY

PETE PATTAVINA AND MARK ENDRIES*, U.S. Fish and Wildlife Service , 105 WEST PARK DRIVE, SUITE D, ATHENS, GA 30606 (PP); U.S. Fish and Wildlife Service, 160 ZILLICOA ST, ASHEVILLE, NC 28801 (ME)*

Determining where myotis bats occur and how habitat usage is partitioned across landscape presents difficulties to land managers, conservationists, and Endangered Species Act practitioners because of seeming wide environmental disparities that exist over species' ranges and other factors that may confound analyses, such as: (1) poorly understood behavioral traits; (2) unknown hibernacula locations; (3) data limitations; (4) unknown behavioral and social factors; and (5) datasets largely composed of non-random, unstratified survey points. Spatial analyses and modeling may offer valuable insight not only for future data needs but also may provide landscape-level habitat classification systems that can assist both for determining effects to myotis bats where a paucity of site-specific data exists and aid in the development of scalable conservation programs. To better understand spatial distribution of bats across the Tennessee Valley Authority (TVA) service area, the U.S. Fish and Wildlife Service's (Service) Asheville Field Office (FO) created predictive habitat maps for Indiana and Northern Long-Eared bat using geographic information systems and maximum entropy (maxent) modeling. Maps were derived by comparing species occurrence information with a suite of elevation- and landcover-derived environmental variables, including measures of elevation, slope and aspect, distance to water, distance to hibernacula, landscape fragmentation, landform, landcover, karst, average annual temperature, and average annual precipitation. Both models were able to predict species distribution and achieved a rating of average in terms of performance. The maps identify predicted probability of suitable habitat conditions by bat species, help identify known and potentially important habitat areas for these bats, and facilitate communication of this information with partners to assist with conservation planning efforts throughout the TVA service area. Independent of the NC FO effort, the Service's Georgia FO created a simplified, spatially-driven habitat analysis for northern long-eared myotis and will discuss analysis development, utility, and limitations in terms of ESA policy, staff resources, and conservation.

Bio: Originally from Wisconsin, Mark Endries received a B.S. in Biology and an M.S. degree in ecology from the University of Wisconsin-Oshkosh. Mark's professional interests lie in applying the tools of Geographic Information Systems (GIS) to assist with and improve habitat protection planning and wildlife conservation. Mark spent the first ten years of his professional career as a GIS Analyst with the Florida Fish and Wildlife Conservation Commission (FWC). While employed by the FWC, Mark authored a report entitled Wildlife Habitat Conservation Needs in Florida, which recommends and maps needed conservation lands called Strategic Habitat Conservation Areas throughout the state. The last six years Mark has been employed with the US Fish and Wildlife Service (USFWS) in Asheville, NC. For the USFWS Mark has developed distribution models for over 250 aquatic species, as well as applied GIS to a variety of listed species conservation efforts.

Bio: Pete Pattavina, Athens, Georgia is a biologist with the U.S. Fish and Wildlife Service specializing in bat and plant conservation and policy. Throughout his 13-year career with USFWS, Pete has taken a keen interest in bio and phytogeography and more recently (4 years) started working with bats in Georgia, collaborating with Georgia Department of Natural Resources on summer mist net and winter cave surveys. Pete grew up hunting and fishing with his older brothers in central Connecticut and has an enormously-tall golden retriever (Dolores) and two boys, aged 10 (Adam) and 13 (Henry).

BATS AND CONSERVATION GENETICS

A. L. RUSSELL*. Grand Valley State University, 1 Campus Drive, Allendale, MI 49401*

Abstract: Bats have come under increasing pressure in recent years from existential threats such as white-nose syndrome and wind turbines. Field biology, disease ecology, and population demography, among other areas of study, have made critical contributions to our understanding of the mechanisms of these threats, their impacts on bat populations, and potential methods of mitigation. Conservation and

landscape genetics also have important roles to play in understanding and mitigating these threats to bats. Using case studies, I will review the power of conservation genetics, as well as its limitations. While tissue sampling may add a few extra minutes to your field protocol, it is typically minimally invasive, and can provide valuable information that may not be otherwise accessible. Make friends with a geneticist today!

Bio: Amy Russell is an Associate Professor of Biology at Grand Valley State University. She earned B.S. and M.S. degrees at Bowling Green State University, received her Ph.D. at the University of Tennessee, Knoxville, and completed postdoctoral fellowships at Yale University and the University of Arizona. Her research interests broadly concern the population and evolutionary genetics of bats, and have focused on the biogeography of bats in Madagascar, biotic and abiotic forces influencing patterns of bat diversity in the Caribbean, and the impacts of disease and wind turbines on the conservation genetics of North American bats.

POSTER PRESENTATION ABSTRACTS (*in alphabetical order by last name of first author*)

IMPLICATIONS ASSOCIATED WITH THE WESTERN RANGE EXPANSION OF EASTERN BAT SPECIES IN THE UNITED STATES

BRETT ANDERSEN*, AND KEITH GELUSO. *Biology Department, University of Nebraska at Kearney, Kearney, NE 68845*

The Great Plains once served as a buffer creating a division between many eastern and western woodland species. However, expansion of riparian corridors along these prairie waterways has enabled a broad assortment of eastern deciduous mammals to expand their distributional range westward. Following the capture of an evening bat (*Nycticeius humeralis*) in southwestern New Mexico, which indicated a significant range extension for the species, we compiled all recent capture records to determine if this species has been documented elsewhere outside of its historic range. Although such captures may be anomalies, there is evidence to support the possibility that this and another eastern species, the tricolored bat (*Perimyotis subflavus*), may exist in previously undocumented areas. After finding multiple records of these species in novel areas, these captures should encourage researchers to factor in the possible occurrence of eastern bat species in mist netting and acoustic surveys to reduce the likelihood of misidentification. The movement of these eastern species along riparian corridors could also become an avenue for the transmission of White Nose Syndrome (*Pseudogymnoascus destructans*) into western cave systems resulting in unprecedented impacts to western bat communities.

INTERNAL ROOST TEMPERATURE AFFECTS BAT BOX USE BY INDIANA BATS

S.M. BERGESON*, AND J.M. O'KEEFE. *Center for Bat Research Outreach and Conservation, 600 S. Chestnut St., Indiana State University, Terre Haute, IN*

Roost selection by bats has often been attributed to preferences for internal roost microclimates, as roost temperatures can greatly influence the energy budgets of bats. However, little research has been conducted to support this claim. We examined the effect of internal roost temperature on the selection of roosts by a small population of Indiana bats in central Indiana. We affixed temperature data loggers inside 22 bat boxes (including birdhouse box, rocket box, and BrandenBark^{tm} styles) located near the Indianapolis International Airport and recorded internal roost temperatures every 2 minutes from March to November over 3 years (2013-2015). We also conducted frequent emergence counts and/or spotlight counts on all logged boxes during the project period, which we used as a proxy for roost use. To determine how roost temperature may affect bats' selection of roosts, we compared daily emergence counts with roost temperatures, weather conditions, and their interactions. We collected 7802 temperature days of data and conducted 3800 emergence counts. Preliminary analyses suggests that high-use bat boxes were slightly cooler (18.2^{o}C ± 0.3 ^{o}C) during the day (4:00–19:00 EDT) than low-use boxes (20.2^{o}C ± 1.3 ^{o}C; $t = 21.24$, $p < 0.01$). Internal roost temperatures of low-use boxes occasionally rose to > 48 ^{o}C, a temperature above the known threshold for bat mortality. These boxes were likely unsuitable for bats during warmer periods of the reproductive season and, therefore, experienced less use by aggregated maternity groups (including newly volant pups). Additionally, the cooler temperatures of high-use boxes may allow bats to more efficiently enter daily torpor. Future analyses will account for seasonal changes in population size and weather to further explore how roost temperature may affect roost selection throughout the reproductive season.

ISOLATION, IDENTIFICATION, AND CONTROL AGENTS OF *PSEUDOGYMNOASCUS DESTRUCTANS*: PRELIMINARY RESULTS

KRIS BURNS*, WILLIAM E. STONE. AND JEANETTE JONES. *Biological and Environmental Sciences Department, Alabama A&M University, Normal, AL 35762*

White-nose syndrome (WNS) has spread rapidly across the eastern United States and Canada since it was first documented in New York a decade ago. *Pseudogymnoascus destructans*, or *Pd*, (formerly *Geomyces destructans*), has been demonstrated to cause WNS. *Pd* has been detected as far south as Alabama. WNS has killed more than 5.7 million bats in the eastern part of North America. In some

hibernacula, 90 to 100 percent of bats have died. Greater knowledge of the fungus' characteristics including tolerance to environmental conditions, dynamics of fungal infection and transmission as well as growth inhibiting agents, might lead to better control methods. Our research will focus on identifying environmental conditions necessary for growth and survival of this cold-loving fungus and identifying possible control agents (eg., fungicides) that may retard the growth of cultured fungal specimens in the laboratory. *Pd* was obtained in several ways. In October 2015, *Pd* was collected by swabbing noses of Indiana bats (*Myotis sodalis*) captured in a harp trap at a known positive hibernaculum in northern Alabama during a state-sponsored monitoring survey. *Pd* had previously been obtained by swabbing cave ceilings, walls and substrate in the summer in that hibernaculum and four others across northern Alabama. *Pd* was also available from a frozen carcass of a Tricolored bat (*Perimyotis subflavus*) that succumbed from WNS in a northern Alabama cave in 2014. We have successfully cultured and isolated *Pd* from all three sources in our laboratory using standard mycological laboratory techniques. We will expose cultures to varying levels of temperature, humidity and acidity to record growth responses, but we have only initiated this phase of the research in early 2016. Our final objective involves screening approximately 10 agents for signs of *Pd* growth inhibition. Inhibitory agents will include fungicides, sulfur compounds, volatile organic compounds, and natural agents.

ROOSTING HABITS OF THE EASTERN SMALL-FOOTED BAT IN THE SHAWNEE NATIONAL FOREST

KRISTI CONFORTIN*, AND TIMOTHY CARTER. *Department of Biology, Ball State University, Muncie, IN 47306*

The Eastern small-footed bat *(Myotis leibii)* is a unique species. Unlike many other *Myotis* species, the Eastern small-footed bat primarily uses upland habitats. The spread of White Nose Syndrome has made it more crucial to understand the species distribution across the landscape. Recently a population of this species was discovered in the Shawnee National Forest in Southern Illinois. Over the last few years limited work has been done to document the presence and basic roosting habits for this population. Because of the limited distribution and perceived low numbers, the Eastern small-footed bat was added to the Illinois Threatened Species List in spring 2015. The US Forest Service wants a better understanding of the summer roosting ecology and how it might impact future management decisions. During the summer of 2015 we examined the roosting habits of the Eastern small-footed bats on the Shawnee National Forest. Based on previous work, we predicted that bats would be found primarily under loose rocks on rocky outcrops within the forest. During the summer of 2015, 7 females and 11 males were fitted with radio transmitters and tracked to their day roosts. Bats were tracked for a total of 162 bat days. Characteristics were recorded for all 64 roosts that were located. Preliminary results show that Eastern small-footed bats use a diversity of roosts beyond loose rocks. This species also made use of rock cervices, cliff bluffs, and man-made structures as their day roosts. The proportion of time each roost was used differed by roost type.

HABITAT SELECTION, HOME RANGE SIZE, AND SURVIVAL OF *SPILOGALE PUTORIUS* IN TALLADEGA NATIONAL FOREST, ALABAMA

WILLIAM CORNELISON*, ANDREW EDELMAN, AND TY SPRAYBERRY*. Department of Biology, University of West Georgia, Carrollton, GA 30118*

Due to a lack of ecological knowledge and an observed decline in abundance, Alabama has classified eastern spotted skunks as a state protected species of high conservation concern. Our objective is to conduct a telemetry-based study of eastern spotted skunks in Talladega National Forest, Alabama in order to provide knowledge of habitat use, home range size, and mortality. To date 4 individuals equipped with radio collars have been monitored through the autumn season of 2015, and 3 individuals are currently being monitored through the winter season of 2015 and 2016. During each 3-month season, ≥30 locations per individual skunk have been collected, via biangulation or homing. We have overlaid the autumn and winter location data for collared individuals with coarse GIS habitat layers to show a rough estimate of habitat use. Live trapping is ongoing with the goal of collaring 20 individuals. Future analysis will examine spotted skunk habitat selection at 3 different hierarchical orders: individual

home ranges (second order selection), usage within home range components (third order selection), and den sites (fourth order selection). We will compare the availability of land cover types in TNF to the estimate of home range use and compare habitat use within the home range to covariates of predicted importance calculated based on LIDAR and GIS data. Finally when mortality is confirmed we will identify the cause of death in order to better understand survivorship and cause specific mortality for this population. This detailed assessment of the habitat selection and survivorship will provide essential data for the development of a management plan for eastern spotted skunks in Alabama, and will assist in the creation of conservation strategies that may reverse the decline of populations in the region and eventually reestablish eastern spotted skunks as a furbearer species within the state.

SURVEYS IN NORTH ALABAMA FOR THE AMERICAN PYGMY SHREW WITH NEW RECORDS FROM LAWRENCE COUNTY, ALABAMA

H. A. CZECH, A. A. BOHLMAN, W. B. SUTTON, AND W. E. STONE. *Biological and Environmental Sciences, Alabama A&M University, Normal, AL 35762 (HAC, AAB, WES); Agricultural and Environmental Sciences, Tennessee State University, Nashville, TN 37209 (WBS)*

The American Pygmy Shrew (*Sorex hoyi*) is a boreal species found inhabiting a wide swath of Alaska, Canada, the northeastern and upper midwestern United States, and with populations in the transition forests of the southern Appalachians. Despite a wide geographic range, it remains one of North America's most obscure mammals and at the southernmost periphery of its distribution, it is considered rare and poorly understood. The subspecies *S. h. winnemana* (Southern Pygmy Shrew) was first detected in Alabama in 1995, and has been collected solely from Jackson County, Alabama, despite the presence of similar habitat elsewhere in the state. We conducted pitfall trapping surveys to sample for Pygmy Shrews in adjacent Madison County, Alabama from April to October 2015, and in Lawrence County, Alabama in December 2015. No Pygmy Shrews were captured in Madison County; one Pygmy Shrew was collected from a thinned and prescribed burned loblolly pine (*Pinus taeda)* stand in the Bankhead National Forest, in Lawrence County. The 72,580 ha Bankhead National Forest is located within the southern Cumberland Plateau region, and is a deciduous forest with patches of fire-dependent pine and oak forest and pine plantations. In addition to surveys, unidentified small mammal specimens collected as by-catch during trapping studies conducted in Jackson and Lawrence Counties during the last 10 years and stored at Alabama A&M University were examined. Five Pygmy Shrew specimens, from 2008, were identified in a collection from Lawrence County. These new county records represent the southernmost records for the species and the first records for the species outside of Jackson County in 20 years. In Alabama, the species is ranked as Highest Conservation Concern; these new records will help clarify the distribution of the species, its habitat requirements, ecology and life history in the southern Appalachians and Alabama.

ASSESSING WINTER ACTIVITY OF HIBERNATING BATS USING ULTRASONIC ACOUSTICS: LESSONS LEARNED

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White-nose Syndrome (WNS) has caused the deaths of millions of hibernating bats in North America. Although WNS-positive bats appear to exhibit increased overwinter arousal and shorter hibernation, little is known about these patterns and whether within-cave arousal is correlated with exodus from hibernacula. To assess how WNS influences these patterns and whether activity is related to cave and site climate, we conducted a pilot study monitoring bat activity and associated environmental conditions in 3 hibernacula in North Carolina with differing WNS histories. We placed continuously active acoustic detectors and temperature loggers inside and outside of caves to record bat activity and climate data from December 2012 through April 2013. Despite equipment malfunction and vandalism, were able to record some acoustic data from all three study sites. Notably, timing of activity outside of caves differed

among our sites. We offer suggestions for future acoustical monitoring of hibernacula and discuss applicability of this technique.

WING PUNCHES STORED IN ETHANOL VS. FROZEN DRY YIELD DIFFERENT STABLE ISOTOPE RESULTS

T. J. DIVOLL*, J. M. O'KEEFE, AND R. H. MICHENER. *Center for Bat Research, Outreach, and Conservation, Department of Biology, Indiana State University, Terre Haute, IN 47809 (TJD and JMO); Boston University Stable Isotope Laboratory, Department of Biology, Boston University, Boston, MA 02215 (RHM)*

Many bat researchers opportunistically collect 3 mm wing biopsies during field surveys and store them in ethanol (EtOH) for future genetic analyses. Non-genetic studies typically store samples frozen dry. Could stable isotope analysis of archived skin samples stored in EtOH be used to infer changes in diet or niche over time? To compare isotopic results from EtOH or frozen dry storage, we performed a small experiment with freshly collected skin samples. We collected biopsies from each wing of 29 bats, randomly storing one in EtOH and one frozen dry. Samples were collected at a managed forest (20 *Myotis septentrionalis* and 4 *M. sodalis*) and a riparian-agricultural site (5 *M. sodalis*) in central Indiana. Carbon ($d^{13}C$) and nitrogen ($d^{15}N$) isotope ratios were measured in all samples and statistical parameters were estimated by Markov chain Monte Carlo with 10^5 repetitions to determine the probability that pairs were different. We calculated 4 additional metrics by group (species & site): range of carbon and nitrogen, bivariate total area and standard ellipse area in isotopic space. Overall, there was a 100% probability that the mean difference (MD) between EtOH and dry samples was significant for carbon (MD = 0.948, CrI = 0.224, 0.465) as well as nitrogen (MD = 0.583, CrI = 0.364, 0.807). All groups visually occupied different areas of isospace and dry samples had greater standard ellipse area than EtOH samples (*M. septentrionalis*, Pr = >98%; *M. sodalis*, Pr = 73.9%). For all groupings, we observed a greater range of carbon values in dry samples than in EtOH; it is likely that carbon molecules in EtOH increased uniformity of values. Though skin samples stored in EtOH may be useful for genetic analyses, we do not recommend using archived wet samples for stable isotopes.

USE OF FLORIDA HIBERNACULA CAVES BY TRI-COLORED BATS AND POTENTIAL WHITE-NOSE SYNDROME IMPACTS

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White-nose syndrome (WNS) is the fungus-caused disease that is decimating bat populations while they hibernate in caves across eastern North America. The causative fungus, *Pseudogymnoascus destructans*, grows most actively in the cool environments of winter hibernacula caves. Of Florida's resident bat species, the tricolored bat (*Perimyotis subflavus*) is the species that most frequently enters extended torpor and is thus most susceptible to WNS. In Florida, most caves used by roosting bats are located in the panhandle and the north central area of the peninsula. We have not detected *P. destructans* in any Florida cave as of February 2015, but these hibernacula maintain ambient winter temperatures that are suitable for growth of *P. destructans* (mean temperature = 9.4^0C, *SE* = 1.03). In 2014 we surveyed 31 potential hibernacula caves. A total of 369 tricolored bats were recorded in 20 caves, with numbers ranging from 1-141 per cave (mean = 11.9, *SE* = 5.46). In 2015 we expanded our study and surveyed 105 caves. A total of 1049 tricolored bats were recorded in 73 caves, with numbers ranging from 1-220 per cave (mean = 11.6, *SE* =3.39). Two caves sheltered the majority of the bats in both years. There were greater numbers of *Perimyotis* using caves in the panhandle, where ambient cave temperatures tended to be colder. However, no physical cave parameters had a significant effect on use by the bats. There was a trend for caves with *Perimyotis* to be colder, but there was not a significant relationship between cave temperature and number of bats. Warmer temperatures in the peninsula may enable bats there to be more active throughout the winter, which may help mitigate impacts from WNS on this tricolored bat population.

THE SEARCH FOR MEADOW JUMPING MICE IN EAST-CENTRAL ALABAMA

DUSTON R. DUFFIE*, ROBERT A. GITZEN, AND NICHOLAS W. SHARP. *School of Forestry and Wildlife Sciences, Auburn University, 602 Duncan Drive, Auburn, AL, 36849 (DRD and RAG); Alabama Department of Conservation and Natural Resources Division of Wildlife and Freshwater Fisheries, 21453 Harris Station Road, Tanner, AL 35671 (NWS).*

The meadow jumping mouse (*Zapus hudsonius*) is a species of high conservation concern within the state of Alabama due to the lack of information about its current range and population size. Only a few publications have documented the species within central Alabama, with the latest of these being from 1977. The objective of our study was to begin assessing the occurrence of meadow jumping mice in east-central Alabama. We built a database of possible trapping locations in ArcGIS and selected sites from this database using GoogleEarth® imagery. These sites were selected based on locations where jumping mice were found in previous studies and areas with suitable habitat for the species. Jumping mice inhabit areas with moist soils and predominately herbaceous or shrubby vegetation with dense cover. Therefore, our study focused on abandoned hayfields and grassy meadows along marshes, ponds, and streams. During summer 2015, 17 sites were sampled, each with alternating Sherman live traps and sooted track tubes. We did not capture or detect any meadow jumping mice. As a secondary objective, we compared the trapping efficiency of track tubes verses live traps for the two most commonly captured species, *Sigmodon hispidus* and *Oryzomys palustris*. We found no difference in trap efficiency between trap types for *O. palustris* ($p=0.62$); however, we found a significant difference between trap types for *S. hispidus* ($p=0.01$), with a higher detection rate in track tubes than live traps. Track tubes detected more species than live traps, including shrews, chipmunks, and herpetofauna. Given the sporadic nature of previous jumping mouse captures, it is unknown whether the species has declined in east-central Alabama. For future studies of this species in Alabama, we intend to extend the geographic scale and increase trapping effort to provide further information about the jumping mouse's current population and range throughout Alabama.

THE EASTERN SPOTTED SKUNK IN SOUTH CAROLINA… AND BEYOND

ROBIN Y.Y. ENG*, JAY BUTFILOSKI, SARAH WILSON, AND DAVID S. JACHOWSKI. *Dept. of Forestry and Environmental Conservation, Clemson University, Clemson, SC 29634 (RYE and DSJ); SC Dept. of Natural Resources, Columbia, SC 29202 (JB); Auburn University, Auburn, AL 36849 (SW)*

In 2015, a team from Clemson University detected Eastern Spotted Skunks (*Spilogale putorius)* at five sites in the Blue Ridge Mountains of northwestern South Carolina. Although there have been incidental sightings in SC in the past, these were the first verified detections of spotted skunks in the state in 17 years. The confirmed presence of a *S. putorius* population in the region illuminated the necessity for further studies of this species. Over the next two years, with the support of the SC Department of Natural Resources, and collaboration with the North Carolina Wildlife Resource Commission and the Georgia Department of Natural Resources, we will be implementing a remote-camera monitoring program to identify the distribution of Eastern Spotted Skunks in the tri-state region. The program will survey approximately 120 sites located on public lands, and each site will be monitored between January and April. Sites were selected using a Generalized random tessellation stratified (GRTS) sampling design, with an even distribution across five elevational strata from 250 to 1420 meters. In addition, three separate bait and lure combinations will be tested to assess the efficacy of various attractants for detecting spotted skunks. The completion of this study will yield new information about the distribution and habitat associations of Eastern Spotted Skunks in the Southern Appalachians, and provide additional knowledge about effective methods for monitoring this cryptic mesocarnivore.

USING NEXT-GENERATION SEQUENCING TO INVESTIGATE DIETARY PREFERENCES OF BATS IN THE WAKE OF WHITE-NOSE SYNDROME

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The arrival of White-nose Syndrome (WNS) in North America has led to dramatic population declines in many cave-hibernating bat species. Although these declines have been associated with relaxed spatial and temporal niche partitioning, potential changes in bat diets post-WNS have not been investigated. To determine if prey consumption patterns at Mammoth Cave National Park have changed since the arrival of WNS, we will compare the pre- and post-WNS diets of *Corynorhinus rafinesquii, Perimyotis subflavus,* and *Myotis* bats. Although *C. rafinesquii* is not affected by WNS, this Lepidopteran specialist shares a foraging niche with *P. subflavus* and *Myotis* species, which are also known to consume Lepidoptera. Fecal samples were collected from *Myotis* and *P. subflavus* captured at the entrance of Colossal Cave at Mammoth Cave National Park in the fall (August – September) of 2015; fecal samples for *C. rafinesquii* were collected in the summer (May – August) of 2015 from a colony roosting in a barn at Mammoth Cave National Park. Prey DNA is being extracted from fecal samples, amplified, and sequenced using next-generation techniques. The Barcode of Life Data System (BOLD) will be used to identify prey sequences to species by comparison to reference arthropod sequences. Additionally, Quantitative Insights into Microbial Ecology (QIIME) software will be used to classify prey sequences into Molecular Operational Taxonomic Units (MOTUs) and to calculate taxonomic alpha and beta diversity among MOTUs. Results will be compared to data collected prior to the arrival of WNS. We expect that diets will either: expand to include additional insect orders, or narrow toward preferred insect orders following the relaxation of spatial and temporal niches associated with WNS.

USING CAPTIVE-BRED PERDIDO KEY BEACH MICE FOR SUCCESSFUL REINTRODUCTIONS

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Perdido Key beach mice (*Peromyscus polionotus trissyllepsis*) occur in narrow stretches of dune habitat along the Florida-Alabama border. Local populations have been extirpated after being isolated by storms and land development, and some populations have been restored via translocations of wild-born animals. Although Perdido Key beach mice have been bred in zoos since 2004, none were ever used for reintroductions. In March 2010, we released 48 beach mice from 2 Florida zoos into twelve 2-m diameter pens at Gulf State Park, where mice had been absent for >13 years. The pens provided cover and food, but mice could readily burrow out. We fitted 28 mice with radiocollars and live-trapped mice at 2-, 4-, 8-, 12-, and 24-weeks post-release, and again at 1-, 2-, and 5-years. Fifteen collared mice were killed by red foxes (*Vulpes vulpes*) within 5 days of release and 2 others died in a collapsed burrow, and of the 48 mice released, only 13 were known alive after 2 weeks. Still, at least 5 captive-born mice were pregnant 4 weeks after release and 5 wild-born mice were captured at 8 weeks. Despite the inauspicious start, we captured 73 individual mice at the site 1 year post release, 80 mice after 2 years, and 194 after 5 years. Genetic diversity was low among released mice and continued to decline through 24 weeks, but diversity increased after year 2 when some mice apparently immigrated from a nearby population. Although wild mice are preferred for reintroductions, wild populations of Perdido Key beach mice are often too small to serve as donors. This study demonstrated that naïve, captive-bred beach mice can be used to reestablish a population in vacant habitat if suitable wild populations are not available.

DETERMINING THE DISTRIBUTION OF DECLINING BATS IN NORTH GEORGIA

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Since 2006, White Nose Syndrome has killed over 5.5 million cave dwelling bats in the eastern United States and Canada leading to several species becoming a management priority. Developing

conservation strategies for these species is difficult due to limited knowledge regarding their distribution and habitat associations. To address this paucity of knowledge, we are examining the ecology of cave roosting bats during summer. Our objective is to determine the summer distribution and habitat use of declining cave-dwelling bat species in northern Georgia so that land use decisions, such as highway development, can be made that minimize impacts to bats in the region. We surveyed 44 sites on public lands for two nights using mist-netting and acoustic detection to determine species presence. We developed preliminary logistic regression models in response to land cover, aspect, elevation, and landscape dynamics at the home range and landscape scale. A total of seven species were captured. Of those the only threatened or endangered species captured was the Northern long-eared bat (*Myotis septentrionalis*; five females, three males), thus it was the only species for which we developed predictive models. Of the covariates tested, percent mixed forest and elevation at the home range scale predicted Northern long-eared bat occurrence better than the null model, and percent mixed forest was a significant predictor of occurrence probability. Additional field seasons are planned for 2016-2017 and will increase the data available to build and refine spatially explicit habitat models for bats in northern Georgia.

ORGANOCHLORIDE PESTICIDES PRESENT IN THE FUR OF BATS AND RODENTS IN AN AGRICULTURAL REGION OF SOUTHEASTERN ARKANSAS

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Bats in agricultural settings may be prone to bioaccumulation toxins. A maternity colony of Rafinesque's big-eared bats (*Corynorhinus rafinesquii*) roosts in an abandoned building between an agricultural field and Bayou Bartholomew in Drew County, Arkansas. On July 30, 2014, 3 males and 7 females were captured by hand net; blood and hair samples were taken from each. Samples from 5 individuals were sent to the Center of Environmental Sciences and Engineering at the University of Connecticut for analysis. Results indicated significant levels of dichlorodiphenyltrichloroethane (DDT) or its metabolite dichlorodiphenyldichloroethylene (DDE) in the fur of 2 bats. One bat had DDT at 3,929 parts per billion (ppb) in the fur; another had DDE at 14,545 ppb. Blood samples did not have measureable levels of toxins. Additionally, we collected hair and blood from a hispid cotton rat (*Sigmodon hispidus*) during the study, and found DDE at 5323 ppb in the fur. Later, we collected hair samples from 7 white footed deermice (*Peromyscus leucopus*) at the same site. One individual had dichlorodiphenyldichloroethane (4,4-DDD), another metabolite of DDT, at 629 ppb, and another had trans-nonachlor, a component of chlordane at 647 ppb. DDT was banned in the United States in 1972 due to risks to the environment and human health; chlordane was banned in 1988. This study raises questions about environmental persistence of DDT/DDE and other organochlorides. There may be risk to wildlife populations, warranting further investigation into effects of long-term exposure to these toxins.

THE UTILITY OF FIXED DATA LOGGING TOWERS IN DETERMINING BAT HABITAT USE - SUCCESSES AND LIMITATIONS

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With the decline in populations of bats of conservation concern and advancements in study technologies, researchers have been testing new methods to study bat populations that advance what is known of bat movements and behavior. WEST, Inc. used receivers programmed as data loggers on fixed towers during a fall bat migration study in 2015. The initial design called for towers to be spread out on the landscape to help determine the timing of initiation of migration as well as the direction of movement away from the fixed towers. Through repeated trials, WEST identified limitations of the use of fixed towers to meet migration study goals. However, by clustering tower locations, we were able to gather substantial data describing foraging, roosting, and local area movements. To collect these data manually

would have taken several crews working around the clock. Overall, the use of fixed towers with data logging receivers continue to provide limited range and data recording capabilities, and require further development for use in migration studies.. However, this technique was successful in documenting foraging and landscape movements in a project area using reduced man power and associated costs.

FLIGHT BEHAVIOR OF INDIANA BATS SELECTING ARTIFICIAL ROOSTS

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Indiana bat (*Myotis sodalis*) roost characteristics are well documented. However, the way a population selects a primary roost among similar roosts is largely unknown. Studying flight behaviors at new artificial roosts and previously known roosts may shed light on this process. We studied roost choice by measuring frequency and patterns of behaviors at different types of artificial and tree roosts within the summer range of an Indiana bat maternity colony near Indianapolis, IN. In March 2015, we erected three roost clusters (>0.8 km apart) in known Indiana bat foraging areas; each cluster contained three different roost styles (rocketbox, birdhouse, and modified BrandenBark™). We conducted emergence counts (mean 4–5 nights/week/cluster) and recorded video (one night/week/cluster) from mid-May to mid-August. We also recorded video at 9 "historic" roosts that were significant to the colony between 2002−2014 (rocketbox, birdhouse, and tree roosts). Bats used historic roosts in May, primarily a rocketbox erected in 2012. In early June the colony switched to a 2015 rocketbox, which housed the majority of bats until mid-July. Then the colony shifted to another 2015 rocketbox, but also used 2-6 secondary roosts/night. Video analysis of the first hour after sunset revealed social behaviors (e.g., checking) occurring at all observed roosts. Activity was greatest at the primary rocketbox roost during lactation (339 ± 26 instances/night). We saw more activity at historic and secondary roosts after juvenile volancy (17± 19 instances/night). Our data show a single Indiana bat population shifting from one primary roost to another, historic roosts serving as secondary roosts at the beginning and end of the maternity season, and rocketboxes used heavily in this landscape.

SUMMER OCCUPANCY RATES OF SCIURID POPULATIONS USING CAMERA TRAPS

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Sciurid species (i.e., squirrels) are typically monitored using traditional methods, such as live trapping or nest boxes. Camera trapping is considered an effective, non-invasive technique for determining occupancy of mammals, however it is typically used on large mammals or carnivores. We used camera traps to determine habitat and landscape variables that influence occupancy of two common Sciurid species in an Appalachian forest: southern flying squirrel (*Glaucomys volans*) and Eastern chipmunk (*Tamias striatus*). We conducted out study in dry upland oak and hemlock-northern hardwood stands on Salt Pond Mountain, Giles County, Virginia. We set-up two 3 x 4 camera trap grids (13.5 ha each). Camera were baited with peanut butter suet and deployed simultaneously in each grid for 14 days in July 2015. Using detection/non-detection data obtained from camera traps, we assessed species occupancy using a two-step approach single-season season model in Program PRESENCE. We used ranked relative importance values to assess the predictive strength of occupancy covariates (i.e., habitat type, landform index) and modelled all possible combinations (N = 8 models per species). We found habitat type strongly influenced occupancy of southern flying squirrels, while land form index was the greatest predictor of chipmunk occupancy. Our research demonstrates the applicability of camera traps to assessing Sciurid populations.

THE MAMMAL COLLECTIONS AT THE FLORIDA MUSEUM OF NATURAL HISTORY: A VALUABLE RESOURCE FOR RESEARCH AND CONSERVATION

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Natural history collections are often an under-utilized resource for conservation biologists, researchers, and other professionals both in and outside academia. These collections can aid in answering a multitude of questions from a variety of fields, including questions based in genetics, ecology, anatomy, morphology, diet, and evolution. Natural history collections are especially useful for research focusing on rare or endangered species and for accessing historical data on species and their distributions. The mammal collections at the Florida Museum of Natural History (FLMNH) currently houses over 33,000 specimens and is growing yearly. While world-wide in coverage, over half of the collection (55%; 18,263 specimens) are from the southeastern United States. Preparations are primarily skin and/or skeletal material but also include many fluid-preserved bats and rodents. Since 2008, almost all incoming specimens have had tissues preserved and now approximately 1,800 of our holdings have tissue material housed in the FLMNH Genetic Resources Repository, facilitating numerous genetics-based questions. Past research utilizing the mammal collections has included stable isotope analyses of Florida panther diets, ecological modelling and historical genetics of southeastern pocket gophers, and population genetics of Florida mice. Over 70% of the holdings are georeferenced, aiding studies on changing distributions and biodiversity over time and space. Researchers are encouraged to ask for loans, submit data requests, or visit the FLMNH to examine specimens in house. Our database is fully digitized and can be found at specifyportal.flmnh.ufl.edu/mammals.

THE RELATIONSHIP OF SALAMANDER SIZE STRUCTURE AND BAT ACTIVITY IN THE LAND BETWEEN THE LAKES WATERSHED IN WESTERN KENTUCKY

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Size variation in aquatic predators can influence the availability of emergent insects that are consumed by bats. For example, in ponds with both large and small salamanders, the smallest salamanders themselves may become prey of the larger salamanders, decreasing predation pressure on aquatic insect larvae that, in turn, emerge in greater quantities and are available for bat predators. We hypothesized that salamander size structure in ponds in the Land Between the Lakes National Recreation Area in western Kentucky would be related to bat activity. To quantify bat activity and species richness, we recorded bats with a Wildlife Acoustics SM2BAT+ detector and used SonoBat 3.1 with visual verification to assign species identification. We captured salamanders with dip nets and analyzed their size by using ImageJ. We collected emerging aquatic invertebrates by placing emergence traps on each sampled pond. We found a significant relationship between bat activity and size variation among salamanders.

SELECTION OF MICROHABITAT BY EASTERN SMALL-FOOTED BATS ON NATURAL AND MAN-MADE ROCKY SLOPES

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The eastern small-footed bat remains one of the least studied species of bats in eastern North America, despite increased interest in the species following the emergence of White Nose Syndrome. Information about roosting habits for this species is particularly sparse in published literature. I studied selection of microhabitat by small-footed bats (28 males, 10 solitary females, 6 maternity colonies, and 13 bats of unknown sex) during the non-hibernation period at 5 talus slopes and 2 riprap covered dams in New Hampshire and Virginia, from 2009 to 2015. Roosts were located either using radio-telemetry or visual searches. Microhabitat at 108 roosts and 104 random crevices was compared using 15 logistic regression models, and models were assessed using Akaike Information Criterion. Boulder and crevice dimensions varied substantially across sites, but bats were consistently more likely to use crevices that had narrow openings and that were formed by relatively large boulders. Simultaneous hourly

temperature recordings from a subset of 50 roosts and 47 random crevices also suggested roosts stayed warmer than random crevices during the coldest part of the morning, but this appeared unrelated to microhabitat variables we measured. Results should be considered by wildlife managers attempting to find sites with eastern small-footed bats. Boulder size and solar exposure can be gauged with remote sensing images.

THE BAT COMMUNITY AT LAND BETWEEN THE LAKES NATIONAL RECREATION AREA PRE- AND POST-WHITE NOSE SYNDROME

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A rapid decrease in bat populations is occurring in eastern North America due to the emergence of *Pseudogymnoascus destructans,* the causative agent of white-nose syndrome (WNS). White-nose syndrome affects cave-dwelling species, causing mortality during winter hibernation. Substantial declines in bat abundance in Kentucky during summer were first apparent in 2014, although infected bats were first detected in the state in 2011. We investigated the impact of WNS on bat populations in Land Between the Lakes National Recreation Area, KY by comparing historical bat survey data (1994-2005) with data from summer 2015. We compared the abundance of WNS-susceptible species with non-susceptible species. Capture rates of susceptible species that were abundant pre-WNS (i.e., *Eptesicus fuscus, Myotis septentrionalis*, *Perimyotis subflavus*) declined by 60-87%. Capture rates of males and females of WNS-susceptible species were reduced substantially in July 2015 compared with July 2005, with the decline greatest for males. Among age classes, capture rates of adults and juveniles in July declined by at 30% and 76%, respectively, for WNS-susceptible species between 2005 and 2015. Capture rates of non-susceptible species were stable for *Lasiurus borealis* and increased by over 100% for *Nycticeus humeralis.* Males may be more vulnerable to WNS because they carry smaller fat stores during hibernation and, therefore, are more likely to exhaust their energy reserves when infected with *P. desctructans.* The increase in capture rates of *N. humeralis* suggests that the species may be exhibiting competitive release and niche expansion as WNS-susceptible species decline.

CHARACTERISTICS OF BATS AT A CAVE IN EASTERN OKLAHOMA: FALL SWARMING

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A total of 488 bats was captured at three entrances to a large cave on the Ozark Plateau National Wildlife Refuge in Adair Co. OK, in the fall of 2015. This total includes 300 northern long-eared bats (MYSE), 130 tri-colored bats (PESU), 55 gray bats (MYGR), 2 Ozark big-eared bats, and one eastern red bat. Data presented here represent the first of four sampling periods (two fall swarming, two spring staging) and will be used to estimate the overwintering population numbers in this cave. Although the focus is on MYSE and all 300 were banded for later mark/recapture efforts, our efforts also include monitoring changes in the mensural characteristics and sex ratios of the three most common bat species among sampling periods and between the data from the cave and those collected on the landscape during the summer at the Bat Blitz of 2013 (collected in the same general area). Sex ratios at the cave compared to summer were: MYSE (154M: 146F, 51%M vs 27M: 18F, 60%M), PESU (98M: 32F, 75%M vs 74M: 13F, 85%M), and MYGR (53M: 2F, 96%M vs 21M: 11F, 66%M). Weights of MYSE at the cave ranged between 4 and 14 g, with 83% between 6 and 11 g, vs a range of 4 to 8 g during the summer with 83% between 5 and 6 g. Weights of PESU and MYGR were also higher during swarming than during the summer. All data are from adults.

MULTI-SCALE HABITAT FEATURES AFFECTING GRASSLAND VERTEBRATE OCCUPANCY IN THE EAST GULF COASTAL PLAIN

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Native grasslands have been almost entirely removed from the landscape in the southeastern United States and currently only a small percentage of grassland patches still remain. The Gulf Coastal Plains and Ozarks Landscape Conservation Cooperative (GCPO LCC) has made restoration of grassland for wildlife conservation a priority. The goal for this study is to provide the GCPO LCC with local and broad-scale habitat associations of grassland vertebrates that will help identify sites for grassland restoration to improve squamate, amphibian, and small mammal occurrence in the GCPO land area. We developed a list of focal species for this study based on species habitat usage, home range size, population density, and conservation concern. We conducted repeated vertebrate surveys at 57 public and private sites throughout the East Gulf Coastal Plain (EGCP) from April – June 2015. Visual encounter surveys and track plates were used to detect vertebrate species at each site. Vegetation density, tree density, herbaceous vegetation height, and shrub density were measured at all 57 sites. Broad-scale land cover data was compiled from the 2011 National Land Cover Database. We used 5 different spatial extents (200 m, 500 m, 1 km, 3 km, and 5 km) to analyze land cover type proportions around the 57 sites. We performed occupancy modeling for two small mammal species, the hispid cotton rat and oldfield mouse. We found that the hispid cotton rat and oldfield mouse occupancy was positively associated with woody wetlands in the surrounding landscape. Oldfield mouse occupancy was negatively associated with mixed forests. Local-scale vegetation conditions were determined not to affect occupancy of both species. Selecting grassland restoration sites near woody wetlands could positively influence the occurrence of the hispid cotton rat and old field mouse in the Gulf Coastal Plain.

TRI-COLORED BAT ROOST TREE USE AND MOVEMENT PATTERNS POST- WHITE-NOSE SYNDROME

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The tri-colored bat *Perimyotis subflavus* is undergoing severe declines across its range due to white nose syndrome. Our objective was to determine distinguishing characteristics of roost trees used by tri-colored bats so that their roost needs can be considered in management plans. We mist-netted for tri-colored bats at Land Between the Lakes National Recreation Area and Clarks River National Wildlife Refuge in western Kentucky. We attached a radio transmitter to adult bats. We tracked six bats to their day roosts for 1-12 days. Habitat data were collected at 19 roost trees and at randomly selected trees within the distance traveled by a bat to its roosts for comparison. Our initial data showed that tri-colored bats use roost trees within a relatively small area. The greatest distance moved between successive roosts was 207.8 m, with an average distance between roosts of 68.9 m. Bats remained within 2.5 km of their original capture site. All roosting bats were located in the foliage of live trees. Tri-colored bats appeared to not select roost trees at random. There was a correlation between tree use and increasing canopy depth. Bats were observed roosting in 10 different species of tree, with the most commonly selected species being mockernut hickory (*Carya tomentosa*) and sweetgum (*Liquidambar styraciflua*; 37% and 16% of roost trees, respectively). In contrast, the most abundant species among the randomly-selected trees were the white oak (*Quercus alba*) and sugar maple (*Acer saccharum*; 20% and 13% of randomly selected trees, respectively; n=365). Management needs of tri-colored bats likely differ from those of other declining bat species (e.g., *Myotis sps.*) which have preference for trees in mid-decay stages.

UNDERSTANDING THE VULNERABILITY OF TRI-COLORED BATS TO WHITE-NOSE SYNDROME IN THE SOUTH: TORPOR PATTERNS AND HIBERNACULA CONDITIONS

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Recent data from the southeastern U.S. suggest tri-colored bat (*Perimyotis subflavus*) populations have experienced staggering declines due to white-nose syndrome (WNS) despite milder and shorter winters in the south. While the effects of WNS on bat behavior and physiology have received considerable study recently, most of these studies have been on northern populations of little brown bats (*Myotis lucifugus*). Therefore, little is known about how environmental conditions of southern hibernacula such as humidity and temperature encourage or inhibit the growth of *Pseudogymnoascus destructans*, the fungus that causes WNS. Further, no data are available on the hibernation patterns of tri-colored bats, the most common bats in southern hibernacula, or how they react behaviorally or physiologically to WNS. We initiated a study to determine the torpor patterns of tri-colored bats in two hibernacula, a WNS+ site in northwestern South Carolina and a WNS- site in eastern Mississippi over the course of two winters. We are using temperature sensitive radio transmitters and a receiver/data logger to record tri-colored bat skin temperature (T_{sk}) and HOBO data loggers to record hibernacula temperature and relative humidity. We are determining torpor temperature, bout length, arousal frequency, and arousal duration while controlling for sex and body mass index (BMI). We will also test whether T_{sk} of tri-colored bats and hibernacula conditions are in the range of optimal growth of Pd and compare torpor patterns between WNS+ and WNS- sites. Our results will be an important contribution to the status review of tri-colored bats currently being conducted by the U.S. Fish and Wildlife Service and will allow us to gain a better understanding of tri-colored bat vulnerability to WNS.

THE RELATIONSHIP OF SALAMANDER SIZE STRUCTURE AND BAT ACTIVITY IN THE KIMBALL CREEK WATERSHED IN WESTERN COLORADO

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Bat foraging activity has previously been shown to be related to the emergence of aquatic invertebrates. The emergence of insects can be affected by the size variance of salamanders that inhabit a watershed. We hypothesized that areas in the Kimball Creek Watershed at the High Lonesome Ranch on the western slope of the Colorado Rocky Mountains that have high variance in salamander size structure would have higher levels of bat activity due to a greater abundance of emergent insects. We used a SM2BAT+ bat detector to record bat calls and SonoBat 3.1 to analyze bat activity and bat species richness. We collected emerging aquatic invertebrates by placing emergence traps along the longest axis of Kimball Creek. We captured tiger salamanders with seines and analyzed their size by using ImageJ. Salamander size structure was related to bat activity of the 15 species of bats recorded in this watershed.

BAT COMMUNITY RESPONSES TO UPSTREAM FOREST THINNING AND PRESCRIBED BURNING

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Bats have been suggested as a bioindicator group of organisms to assess effects of forest management practices on forest health. With the help of other bat biologists and students, I captured bats during the summer and fall from 2009 to 2015 in mist nets deployed above nine streams that were downstream from loblolly pine stands that had been thinned (3 sites), thinned and prescribed burned (3 sites), and not thinned and burned (control = 3 sites) in the Bankhead National Forest in Lawrence and Winston Counties AL. Each site was netted only once per year. A total of 256 bats were captured representing

seven species. The dominant species was the red bat (*Lasiurus borealis*) that represented 61.3% of the community. The dominance of red bats began in 2012, the same year that white-nose syndrome was first detected in the State. The composition of the rest of the community in descending dominance was the tricolored bat (16.0%) (*Perimyotis subflavus*), evening bat (9.4%) (Nycticeius humeralis), northern long-eared myotis (9.0%) (*Myotis septentrionalis*), big brown bat (2.3%) (*Eptesicus fuscus*), silver-haired bat (1.6%) (*Lasionycteris noctivagans*) and the hoary bat (0.4%) (*Lasiurus cinereus*). Bat abundance was three times as high for control streams (147 bats) compared to 58 bats captured a three sites below thinned stands and 51 bats captured downstream from thinned and burned stands. However, the variability of bats captured at the three sites within a treatment type resulted in no significant difference ($F_{2,8} = 3.95$, $P = 0.08$) between treatment types when tested with a One Way ANOVA for the 2009-2014 data. Sites that were downstream from thinned and burned sites had the greatest richness of bat species. The trend for abundance of cave-dwelling bat species has been generally declining since 2011 while non-cave species maintained abundance or increased.

RECENT WINTER BAT NUMBERS AT MAMMOTH CAVE NATIONAL PARK: PRE/POST WHITE-NOSE SYNDROME ARRIVAL

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Eight of 13 bat species found at Mammoth Cave National Park regularly roost in caves at some time of the year. Three species that inhabit park caves are federally listed: gray bat (*Myotis grisescens*), Indiana bat (*M. sodalis*), and northern long-eared bat (*M. septentrionalis*). Regular population monitoring of hibernating bats to determine trends in winter bat abundance has occurred in a few park caves since the early 1980s. Since 2007, biennial winter bat counts in selected park caves have included the use of digital photography. White-nose syndrome (WNS) was first confirmed in the park in early January 2013. This disease has been documented (somewhere) in seven of the eight cave-dwelling bat species that occur on the park. The fungus which causes the disease has been found on the eighth species [Rafinesque's big-eared bat (Corynorhinus rafinesquii)], but without confirmation of the disease. Results from five winter bat counts at three caves between 2007 and 2015 (3 counts pre-WNS, 2 counts post-WNS), showed increasing numbers for the gray bat and big brown bat (*Eptesicus fuscus*), and decreasing numbers for the little brown bat (*M. lucifugus*), the tri-colored bat (*Perimyotis subflavus*) and the Indiana bat over the 9-year period. Bat numbers for four species decreased during the brief post-WNS period (from 2013 to 2015): big brown bat (35.7% decrease), Indiana bat (39.0%), tri-colored bat (62.7%), and little brown bat (92.1%). Results from five winter bat counts at five caves used by the Rafinesque's big-eared bat between 2008 and 2016 (3 pre-WNS, 2 post-WNS), showed increasing numbers for this species over the entire 9-year period. Although the declines observed during the post-WNS period are not necessarily a direct result of WNS, these findings are similar to results reported elsewhere in the eastern United States during the first few years following arrival of the disease.

FIRST OBSERVATION OF POST-WEANING FOOD PROVISIONING IN EASTERN SPOTTED SKUNKS (*SPILOGAE PUTORIUS*)

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Procurement of food by adult mammals for inexperienced offspring is a critical aspect of parental care for a range of taxa. Food provisioning by adults allows offspring to invest a greater percentage of their energy in growth and provides information about adult dietary preferences. Post-weaning food provisioning is rarely observed and is greatly understudied in small carnivores. Our study recorded an incident of food provisioning by an adult female eastern spotted skunk (*Spilogale putorius*) while monitoring den activity using remote-sensing cameras. Although the diet of the eastern spotted skunk typically consists of invertebrates and occasionally rodents, images showed a live northern slimy salamander (*Plethodon glutinosus*) brought to the offspring at the den by the adult female. Eastern spotted skunks may specifically seek out larger food items, such as salamanders, because they are

more easily transported to offspring than smaller insect prey. Additionally, providing live prey may offer opportunities for offspring to develop hunting and prey handing abilities.

A SCALABLE AND REPEATABLE ACOUSTIC SITE SELECTION FRAMEWORK FOR THE NORTHERN LONG-EARED BAT

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It can be challenging to survey a rare species at the edge of its range. To maximize efficiency and likelihood of detection, it is best to increase the number of sampling units and decrease the intensity. As a result, quality site selection within a sample unit is even more important. For a 2015 state-wide northern long-eared bat (*Myotis septentrionalis;* MYSE*)* survey, we designed a pre-survey framework to select sites within 10km x 10km grids that were drawn using the Generalized Random Tessellation Stratified (GRTS) sampling method. Our framework incorporates existing summer habitat knowledge into selection criteria that is simple to apply, scalable, repeatable, and maximizes sampling in areas where MYSE are thought to prefer. While our framework was specific to MYSE, it can easily be modified to fit the requirements of future surveys for other bat species.

2015 NATIONAL BAT BLITZ

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The Southeastern Bat Diversity Network organized its second National Bat Blitz in 2015. The goal of the National Blitz is to gain seasonal bat distribution across a wide area, educate the public, and to teach students research techniques. Individual and groups of biologists were encouraged to net 1-2 nights between August 27th and September 3rd. Ideally, this location will continue to be netted during future National Bat Blitz weeks. In 2015 there were 52 events registered for this year's blitz across 24 states, up slightly from 2014's efforts (40 events and 22 states). All data was submitted to the USGS Bat Population Database.

LATE SUMMER ROOST SITES OF REMNANT POPULATIONS OF *MYOTIS* BATS IN ACADIA NATIONAL PARK, MAINE

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Acadia National Park (ANP) and Mount Desert Island (MDI) have proved to be important summer habitat for three species of *Myotis* bats: little brown bats (*Myotis lucifugus*), eastern small-footed bats (*Myotis leibii*), and northern long-eared bats (*Myotis septentrionalis*). However, since the introduction of White Nose Syndrome (WNS) to the island in 2011, these species have exhibited a sharp decline. Little brown bats and northern long-eared bats are now listed as endangered and eastern small-footed bats are listed as threatened in the State of Maine. In addition, the northern long-eared bat was listed as Threatened, 4(d), in April of 2015 under the Endangered Species Act. In the fall of 2014 and 2015 we captured tracked 38 *Myotis* bats to 103 roost sites to document their roosting habitat preferences and fall pre-migration and migration activities. We found that most bats remained on the island through the end of October during the 2015 season, leading us to believe that many bats were either hibernating on the island or leaving later in the fall than expected. We also found that more bats than expected roost in the numerous cliffs and talus piles present on the island. Information from this and future studies will contribute to our understanding of how remnant populations are surviving, the risks remaining to recovery, and what management efforts are needed to enhance the recovery of this and other *Myotis* species.

ORAL PRESENTATION ABSTRACTS (*in alphabetical order by last name of first author*)

DISTRIBUTION AND HABITAT ATTRIBUTES OF THE SOUTHEASTERN POCKET GOPHER IN ALABAMA

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Southeastern pocket gophers (SEPG, *Geomys pinetis*) are of increasing conservation concern because of an apparent rangewide distributional decline, with recent surveys failing to detect populations in many previously occupied areas. In Alabama, the SEPG is listed as a species of greatest conservation need due to its limited distribution, conversion of suitable habitat into denser forest stands, and current absence from many areas of restored habitat. My primary objective was to determine the occupancy status of SEPG at historically known locations and determine the current distribution of the species in Alabama. Historic SEPG locations were compiled from all available sources including museum specimens, biodiversity databases, published records, and expert knowledge. All historic locations were visited and searched for the presence of pocket gopher mounds. Additional potential areas were identified by searching aerial photos for the presence of mounds. The range of SEPG has continued the decline previously reported, with a continued contraction to the southeastern portion of the state. SEPGs were detected at 18 of the 89 total historic sites (20.2%) compiled from previous records. I also found pocket gophers at 69 new sites, for a total of 87 occupied sites. SEPG are patchily distributed in Alabama, but can be locally abundant. Sites tended to consist of clusters of occupied areas, with the number of occupied areas contained within a single site ranged from 1 to 294. The overwhelming majority of extent occurrences were on private property with the Wehle Tract/Barbour Wildlife Management Area in Bullock and Barbour counties being the only public land from which occurrences were confirmed.

HABITAT ANALYSIS OF THE SOUTHEASTERN POCKET GOPHER (*GEOYMS PINETIS*) IN SOUTHEAST ALABAMA

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The southeastern pocket gopher (SEPG; *Geomys pinetis*) is a fossorial ecosystem engineer endemic to southeast Alabama, southern Georgia, and Florida. In Alabama, the SEPG is listed as a species of greatest conservation need due to its limited distribution, conversion of suitable open pine habitat into denser forest stands, and current absence from many areas of restored habitat. The Barbour Wildlife Management Area and Wehle Forever Wild Tract in Barbour and Bullock Counties, Alabama, support significant populations of the SEPG, and make up an important conservation landscape for the species. We identified areas occupied by SEPGs based on managers' reports and a visual survey of this landscape for potential pocket gopher mounds using GoogleEarth® imagery. In summer 2015, we measured habitat attributes of occupied and random sites in two portions of the landscape, with additional broad scale sampling in areas of deep sandy soils planned for 2016. Based off of SSURGO data for the area, the highest proportion of occupied sites occurred on Blanton-Bonifay loamy sands followed by Luverne loamy sands. The remaining occupied sites occurred on other soils with sandy characteristics. Initial field observations indicated that a majority of SEPG mounds occurred within well maintained open pines stands that contained mixed shrub and forb/grass patches, as well as some areas of recent longleaf pine restoration. Replanted, clear cut areas with dense shrub cover, as well as, clear cut areas with altered forb/grass communities appeared to be less suitable for SEPGs. A small portion of occupied sites occurred in mixed hardwood areas. Additional work will help to identify specific habitat requirements for the SEPG as well as provide management recommendations for increasing suitable habitat in this landscape and elsewhere in southern Alabama.

VARIATION IN PRIMARY AND SECONDARY ROOSTS COULD AFFECT MANAGEMENT STRATEGIES IN TWO INDIANA LANDSCAPES

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We often make generalizations about what constitutes suitable habitat for bats on a regional basis. This may lead to mismanagement where there is regional variation in landscape structure and resource availability. We explored this issue by comparing primary and secondary maternity roosts used by Indiana bats in two structurally different Indiana landscapes, located ~40 km apart. One site is a highly fragmented matrix of agriculture, small riparian forest patches, and urban areas; the other is comprised of large blocks of forest with small roads and timber-harvest clearings fragmenting the site infrequently. We tracked 41 Indiana bats back to 63 day roosts (fragmented site = 38, un-fragmented site = 25) during the summers of 2013-2015 and compared roost characteristics between sites and primary/secondary roosts using 2-way ANOVAs. Though all roosts were similar distances from roads and forest edges, we did find tree and plot level differences. Primary and secondary roosts were very similar in the un-fragmented site (typically, large solar-exposed snags), but very dissimilar in the fragmented site. There, primary roosts were usually large solar-exposed snags, while secondary roosts were smaller live shagbark hickories located under enclosed canopies with more surrounding live trees. This difference in primary and secondary roost variation may cause mismatched management strategies between the sites. Managers of large forested areas may be able to effectively manage for bats by promoting the production of large solar-exposed snags at moderate densities throughout the site. However, in more fragmented areas, managers may need to manage forest stands separately; promoting the production of suitable secondary roosts in some forest patches (e.g., dense mature woodlots) and large solar exposed snags in other patches (e.g., nutrient rich riparian forests).

EFFECT OF FOREST OPENING LANDSCAPE CHARACTERISTICS AND VEGETATION STRUCTURE ON BAT ACTIVITY IN WESTERN NORTH CAROLINA

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Early successional habitat (ESH) in hardwood ecosystems of the eastern United States has declined over the last century due to timber management policies, suppression of wildfire, and farmland abandonment. As a result, many ESH dependent plant and animal species have also declined. In response to these declines, some land managers have initiated programs to restore ESH. Because bats often utilize forest openings for foraging, they may be affected by ESH restoration. Our objective was to determine how forest opening size, presence of edge, and vegetation structure affects bat activity within forest openings. We placed Anabat SD2 bat detectors at the interior and edge of small (0.13 – 2.01 ha), medium (2.02 – 6.07 ha), and large (> 6.07 ha) openings in the Nantahala National Forest, North Carolina during summer 2014 and 2015 and quantified vegetation structure in each opening. We used Kaleidoscope Pro 3.1 to classify calls to species or species groups, and analyzed our data using mixed effects general linear models. We found that overall bat activity did not differ significantly among small, medium, or large openings, or between opening interiors and edges. However, *Lasiurus borealis*/*Nycticeius humeralis* activity was significantly higher at the edges of medium openings than at the edges or interiors of small openings or interiors of medium openings. Tree density had a significant negative effect on overall bat activity, *Eptesicus fuscus*/*Lasionycterius noctivagans* activity, and *L. borealis*/*N. humeralis* activity. The results of our study indicate that bats are more active in openings with more open vegetation structure, although the effect of size and edge may be important for some species. Restoration of ESH may benefit bats by creating foraging habitat. However, land managers must also ensure that other habitat needs of bats, such as roosting habitat, are also maintained.

SEASONAL NORTHERN LONG-EARED BAT ACTIVITY ON THE COASTAL PLAINS OF NORTH CAROLINA

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In North Carolina, although the northern long-eared bat (*Myotis septentrionalis*) is primarily documented in the western region of the state, there are a few historical and recent documentations in the Coastal Plain. Between 2007 and 2014, graduate students with the University of North Carolina at Greensboro discovered a population of northern long-eared bats that may reside in the NC Coastal Plain year-round. As part of a programmatic agreement between the North Carolina Department of Transportation, Federal Highway Administration, United States Army Corps of Engineers, and the United States Fish and Wildlife Service, research began in 2015 to further the knowledge of the northern long-eared bat's distribution in eastern NC, including, habitat use, seasonal activity patterns, and to determine whether overwintering occurs in the NC Coastal Plain. During the months of November and December, 2015, in four eastern NC locations, nine sites totaling 108 nights of acoustic surveys and four sites totaling 24 mist net sampling nights were completed. Eight northern long-eared bats were captured and tracked to 24 roosts. Since the discovery of White Nose Syndrome, a disease that affects hibernating North American bats and proliferates during communal hibernation, northern long-eared bat population declines of 99% have been documented in some areas. If individuals in the North Carolina Coastal Plain population of northern long-eared bats are overwintering on the coast, hibernating singly or remaining active in the winter, they may escape the effects of WNS. Continued research is expected to determine whether the species does overwinter in the Coastal Plain, and whether the Coastal Plain may be an important refuge from the disease that has devastated some populations of the northern long-eared bat in the eastern United States.

HOW DO BATS OF THE CUMBERLAND PLATEAU RESPOND TO POST-FIRE HABITATS?

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Determining whether, and how, bats respond to the structural changes generated by fire is important for making informed forest management decisions as the practice of prescribed burning becomes more common. To investigate the relationship of bat presence and foraging patterns to burn history and vegetation structure, we paired Anabat II bat detectors between previously burned forest sites and adjacent unburned sites of similar stand type and elevation, and deployed detectors for ≥ 2 nights from May through August, 2014 and 2015 in Big South Fork National River and Recreation Area, in Kentucky and Tennessee. Meteorological data were collected and vegetation surveys were conducted at each site to quantify site-specific environmental and structural characteristics. Sixty-four paired sites were surveyed in 2014 and 106 paired sites were surveyed in 2015 with 236 and 366 detector nights, respectively. Echolocation files were separated into high (≥36 kHz) and low (≤35 kHz) phonic groups using a combination of custom filters and manual examination in AnalookW software. A total of 9,866 passes were recorded, with fewer calls (n=4,435) recorded in 2015 than in 2014 (n=5,431), despite the increased sampling effort in 2015. Using generalized linear models with Poisson regression we found both bat presence and overall activity were highest in burned stands ($p < 0.001$), although activity differed between years. The mean number of high and low frequency calls was also significantly greater in burned sites than unburned sites in both years. As burned stands were found to have significantly lower stem densities than unburned stands, our results suggest prescribed fire may be beneficial for bats in our study area by reducing understory clutter. Ongoing analyses of metrological data will provide

further insight regarding how the structural effects of fire interact with the environment to influence bat presence and activity.

BAT USE OF A MANAGED CENTRAL HARDWOODS FOREST: A COMPARISON OF CALL ABUNDANCE ACROSS THE HARVEST-FOREST GRADIENT

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Bats exploit forest resources based on species-specific adaptations, resulting in differences in activity across forested landscapes. Forest management practices alter forests, impacting species differently and presumably affecting bat activity. Application of forest management that promotes bat conservation requires further understanding of bat response to silvicultural practices. We surveyed timber harvest treatments on two Indiana State Forests to compare bat activity across forest management treatments, in forests adjacent to harvests, and at locations across the harvest-forest gradient from May to July 2013 and 2014. We used Wildlife Acoustics Song Meter SM2BAT+ detectors to survey bats in relation to four treatment types: clear cut, patch cut, shelterwood cut, and intact forest. Detectors were deployed at two points within each treatment and three points on the forested periphery of treatments and recorded for three consecutive nights. We examined bat activity using *N*-mixture models that estimate abundance and probability of detection for an open population and used Akaike's Information Criterion to select the best models. Eastern red bats and hoary bats were more active in harvest treatments than control treatments. Big brown, eastern red, and tri-colored bats were most active at harvest edges. Northern long-eared and Indiana/little brown bats were most active at harvest edges and in adjacent forest and hoary bats were most active at harvest centers. All species were active in forests adjacent to harvests. Differences in bat activity across these managed forests suggest bat assemblages benefit from management that employs an array of silvicultural methods, provides edge habitat, and maintains adjacent forest stands. Our results can be used to predict effects of forest management practices on bat activity to maximize bat usage of forests.

PRELIMINARY COMPARISON OF URBAN AND RURAL WHITE-TAILED DEER HABITAT USE IN SOUTHERN INDIANA

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White-tailed deer (*Odocoileus* virginianus) have been extensively researched throughout their distribution and in varying habitat types. Interest in urban populations has been growing due to increasing densities of white-tailed deer in these areas. Though much is known about urban populations and their rural counterparts, little is known about how these two populations interact with one another and how their habitat use varies within adjacent areas during the same time period. Understanding the differences between urban and rural white-tailed deer movements in adjacent areas is essential to effectively manage the two populations. This study was conducted in three counties in southern Indiana: Morgan, Monroe, and Brown; with our urban study area being the city of Bloomington, Indiana. Using a drop net and dart projector, we caught and collared 5 rural and 16 urban adult white-tailed deer between January 21st and July 30th, 2015. Of the 21 deer collared, 17 had Global Positioning System (GPS) collars and the other 4 had VHF radio transmitter collars. Locations were collected three times per day on the GPS collars and twice a week on the radio transmitter collars. We expected the urban deer to have smaller home ranges than the rural deer. Preliminary results show rural deer home range sizes to be approximately 40% larger than the adjacent urban deer population. Additionally, we observed an increase in average distance traveled (3.45 km) from home ranges of rural WTD as opposed to that of urban WTD (1.50 km). Male and female home range sizes did not vary within urbanization class, suggesting that urbanicity may have a greater impact on home range size than sex. Our data also shows individuals traveling across multiple subsets of urbanity, which may suggest that the localized population is operating as an open population.

ROOSTING HABITS OF THE NORTHERN LONG-EARED BAT MYOTIS SEPTENTRIONALIS IN A MANAGED FOREST

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With the listing of the northern long-eared bat *Myotis septentrionalis* in April 2015, there has been increased interest in the ecology of the species. This is especially true on managed forest lands where the effects of those management practices on this species may not be known. We report the results of 4 years of tracking female northern long-eared bats to maternity roost trees on state forest lands in southern Indiana. From 2012 thru 2015 we tracked 68 bats to 175 roost trees as part of the Hardwood Ecosystem Experiment (HEE) located in the Morgan-Monroe State Forest and Yellowwood State Forest in southern Indiana. For each roost we recorded standard microhabitat characteristics. Northern long-eared bats roosted in both living and dead trees. While some variation existed among roosts characteristics, they were remarkably consistent across years. Average DBH was 30.4 cm, average roost-tree height was 18.2 m, average roost height was 8.2 m, while average canopy closure was around roosts was 55%. Some roosts were associated with regeneration openings (i.e. at edge or within interior) but most were either in intact forest or forested areas that had recently received a single-tree selection harvest.

BAT VS ANT: THE STRUGGLE CONTINUES

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Confrontation between bats and ants is rarely recorded. To date, there have only been six known documented encounters of ants attaching to bats' faces with their mandibles. This past summer, we observed a carpenter ant (*Camponotus nearcticus*) attached to the lower eyelid of an adult male big brown bat (*Eptesicus fuscus*). Swarming and mating typically take place in late spring to mid-summer for the carpenter ant, with males being winged during this time. Previous antidotes suggests that bats are encountering carpenter ants while the ants are flying during their mating season.

USE OF ULTRASONIC ACOUSTICS AS A MONITORING TECHNIQUE FOR ENDANGERED FLYING SQUIRRELS IN THE APPALACHIAN MOUNTIANS

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In the southern Appalachian Mountains of the eastern United States, the federally Endangered Carolina northern flying squirrel (CNFS; *Glaucomys sabrinus coloratus*) is a rare subspecies that is difficult to survey using traditional methods, such as live-trapping and nest box surveys. The discovery and characterization of ultrasonic calls made by northern flying squirrels and southern flying squirrels (*G. volans*), a species that is sympatric with CNFS in the Appalachians, make it possible to utilize ultrasonic acoustics to monitor for CNFS habitat occupancy. Preliminary data suggests that acoustics provides a rapid assessment of CNFS habitat occupancy. We discuss the application, limitations, and preliminary protocol for using acoustics to monitor for an Endangered species. We also highlight current research projects related to refining monitoring protocol (e.g., how acoustics compare to other survey methods) and future research needs related to using this technique.

USE OF DRY STONE FENCES BY SMALL MAMMALS AT LOWER HOWARD'S CREEK, KENTUCKY

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Dry stone fences (DSF) are sporadic, yet conspicuous across the landscape of eastern North America. While DSF are often culturally-significant, the ecological importance of these human-made features is largely unknown. As such, we explored the importance of DSF to small mammals in the Bluegrass Region. We surveyed Lower Howard's Creek, a historic site with a high density of DSF in Kentucky. We deployed Sherman traps at grids adjacent to DSF in both field and stream habitats, as well as along a streamside bluff. Grids followed a 2 × 4 arrangement with 10-m spacing between traps. Trapping occurred monthly (May – August 2015), with each session spanning multiple nights (and traps checked daily). We experienced 30% trap success across 14 nights of trapping. All 53 captures were identified as *Peromyscus leucopus*. While trap success was greater at the bluff versus DSF-dominated habitats ($P \leq 0.05$), traps adjacent to DSF had greater success than traps away from DSF ($P \leq 0.05$). In addition to trapping, we evaluated the morphology of DSF. Results suggest variation across habitats, with a greater stone density and greater vertical wall sinuosity found at DSF in fields versus the stream habitat ($P \leq 0.05$). Of the measured characteristics, stone density significantly regressed with capture success ($P \leq 0.05$, $r^2 = 0.26$). These data suggest small mammals use DSF, and that fence morphology likely impacts use by *Peromyscus leucopus*, one of the most common small mammals in eastern North America.

BAT COMMUNITIES AND PRESCRIBED FIRE IN THE SOUTHERN APPALACHIANS

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Longleaf pine (*Pinus palustris*) forests of the southeastern U.S. are a disturbance-adapted ecosystem requiring frequent low-intensity fires to maintain an open, park-like savanna. Regionally, significant efforts are being implemented to restore this once widespread ecosystem through use of prescribed fire. Our research objective is to examine how the bat community responds to habitat changes from fire-based restoration activities in Alabama's montane longleaf forests. The study area is located on the Shoal Creek Ranger District of the Talladega National Forest in northeastern Alabama. Management efforts on the Talladega National Forest are aimed at improving longleaf pine forests for the endangered red-cockaded woodpecker (*Picoides borealis*). Frequency of prescribed fire varies considerable over the Talladega National Forest due to logistical and management considerations. During 2015-2016, we are using automated ultrasonic detectors to record bat calls along small forested stream corridors across 3 prescribed fire intervals: <4 years, 4-8 years, and >8 years. Sites with shorter fire intervals are characterized by dense ground cover, open canopies, few hardwoods, and abundant snags. Preliminary results indicate that the greatest bat call activity occurs at sites with shorter fire intervals. Tentative species specific identification of calls suggests that species of conservation concern known to occur on the study area such as Indiana bats (*Myotis sodalis*) and northern long-eared bats (*Myotis septentrionalis*) are present in all levels of prescribed fire including those with shorter fire intervals. Preliminary radio tracking of northern long-eared bats has identified roosts in areas with short prescribed fire intervals as well as no prescribed fire management. These early results suggest that prescribed fire management associated with restoration of longleaf pine is compatible with the habitat needs of the bat community. We plan to expand acoustical monitoring and radio tracking of endangered bats over the coming year.

EFFECTS OF THREE FOREST MANAGEMENT STRATEGIES ON *PEROMYSCUS* MICE IN THE MISSOURI OZARKS OVER TWO DECADES

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The Missouri Forest Ecosystem Experiment Project (MOFEP) assesses ecological responses to even-aged, uneven-aged, and no-harvest forest management strategies in oak-hickory-pine forests of the Missouri Ozarks. Each of these 3 forest-management strategies is replicated 3 times, with each replicate site consisting of a local landscape of stands operationally managed via repeated entries over multiple decades. *Peromyscus* abundance (P. *maniculatus* and *P. leucopus* combined) is assessed on two 7.6-ha trap grids per site on northeast slopes. The first two harvest entries occurred in 1996 and in 2011, with approximately 10% of the stands in even- and uneven-aged treatments harvested in each entry. We used multi-population hierarchical mark-recapture models to examine experimental management effects on *Peromyscus* abundance during 1994-1995, 1998-2001, 2008-2010, and 2012-2014. Both even-aged and uneven-aged management strategies increased *Peromyscus* abundance compared to no-harvest controls in the first 5 years after harvests. In even-aged treatment sites, the positive treatment effect was localized near harvested stands 2-3 years after harvest. However, by years 4-5 after harvest, this treatment effect was a site-wide, not stand-level, effect; it was not localized to harvested patches within even- and uneven-aged treatment sites. Effects of harvest treatments on abundance had partly dissipated 13-14 years after harvest and we are currently assessing effects 16-18 years after harvest. Our results indicate complex spatial-temporal patterns of change in *Peromyscus* abundance during the first 14 years after a single harvest entry. These patterns likely reflect the rapid re-establishment of tree and tall shrub cover in harvested areas within the first decade after harvest, supporting higher mouse abundance until harvest effects dissipate as the tree canopy cover and understory cover return to pre-treatment levels.

EFFECTS OF PRESCRIBED FIRE ON BAT ACTIVITY FOLLOWING THE ARRIVAL OF WHITE-NOSE SYNDROME

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Habitat use of bats may shift following population-level impacts of White-nose Syndrome (WNS). Specifically, the effects of WNS across forest landscapes are unclear in relation to prescribed fire. Given this, bat activity was monitored at Mammoth Cave National Park during the growing season prior to (2010-2012) and after detection of WNS (2013-2015) using transects of acoustic detectors (Anabat II) established across burned and unburned sites. Recordings were classified into low-, mid-, or *Myotis*-frequency phonic groups (Bat Call ID v.2.7c). Subsequent analyses were conducted using bat passes containing ≥ 5 pulses, with a ≥ 70% confidence interval necessary for phonic group identification. Our response variables, the number of passes / night within each phonic group, were considered in relation to the effects of prescribed fire (burned vs. unburned) and WNS (pre-detection vs. post-detection). In total, we recorded 8,478 bat passes (consisting of 101,942 echolocation pulses) over 1,594 detector/nights across the six years. Low-frequency activity was greater at burned sites versus unburned sites, and activity of this phonic group increased after WNS detection. Mid-frequency activity was greater at burned sites versus unburned sites, and activity of this phonic group decreased after WNS detection. *Myotis*-frequency activity was less at burned sites versus unburned sites, and activity of this phonic group decreased after WNS detection. Differences across phonic groups are likely due to wing morphology and echolocation characteristics. These data are equivocal on whether burned habitats provide optimal foraging habitat for declining *Myotis* species.

TROPHIC TRANSFER OF MICROCYSTIN FROM A FRESHWATER LAKE TO LITTLE BROWN BATS

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Microcystis aeruginosa is a type of cyanobacteria capable of producing a hepatotoxin called microcystin. As toxic *M. aeruginosa* overwinters in the sediments of lakes, it is ingested by some mayfly larvae, such as those of *Hexagenia* spp., and thus microcystin bioaccumulates in these insects. When *Hexagenia* emerge from lakes to reproduce, they provide an abundant, albeit temporary, food source for many terrestrial organisms such as bats. Little brown bats, *Myotis lucifugus*, likely feed opportunistically on aquatic insects. To test if microcystin moves from aquatic to terrestrial ecosystems via trophic transfer, we 1) tested bat feces for the presence of *Hexagenia* mayflies, and 2) tested bat livers and feces for microcystin. In June 2014, in correspondence with the *Hexagenia* emergence, bat feces were collected from underneath a maternity roost near Little Traverse Lake (Leelanau County, MI). On 20 and 27 June we caught 19 female *M. lucifugus*, which were euthanized, and collected their livers and feces. DNA was extracted from feces, amplified with a Polymerase Chain Reaction (PCR), and sequenced. Concentrations of microcystin in liver tissue and feces were determined using an Enzyme-linked Immunosorbent Assay (ELISA) and Liquid Chromatography with Tandem Mass Spectrometry (LC-MS). *Hexagenia* were present in the diet of *M. lucifugus* and the most likely source of microcystin. Our analyses reveal that microcystin was also present, with higher concentrations in the bat feces than the livers. Additionally, histopathology results of three bat livers with highest concentrations of microcystin show little to no cytological damage from the toxin. From these data, it appears that *M. lucifugus* are not highly affected by the ingestion of microcystin.

HABITAT SUITABILITY MODELLING OF THE NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*) IN SOUTHERN INDIANA

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Silviculture treatments have long been implemented on state forest lands in Indiana. There is a need to better understanding these influences on bat species in order to understand which forest management practices might best promote bat conservation, especially for threatened and endangered species. The northern long-eared bat (*Myotis septentrionalis*) was federally listed in 2015 and this listing is having major implications for land managers since the northern long-eared bat uses forested landscapes for summer roosting habitat. Our goal was to create a habitat suitability model that included both landscape variables and harvest history. Our study site was at the Hardwood Ecosystem Experiment (HEE) located in the Morgan-Monroe State Forest and Yellowwood State Forest in southern Indiana. We generated presence-only models of roost selection using the program MaxENT using 105 known roost locations to identify areas important to summer roosting habitat within our study area and to identify important stand-scale factors in habitat selection. The landscape variables that we used were elevation, aspect, slope, distance to major roads, and forest type. With decreasing populations and likelihood of captures, models may become an important alternative for informing future management actions.

USE OF HIGHWAY CULVERTS, BOX BRIDGES, AND CAVES BY WINTER-ROOSTING BATS IN MISSISSIPPI

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Bats throughout the United States have been reported using highway underpasses and caves as hibernacula. Because of threats of White-nose Syndrome (WNS), bat numbers have declined in locations with temperatures that support this etiologic fungus (12.5˚C-15.8˚C). Objectives of this study were to record species and numbers of bats detected in culverts and caves in Mississippi, and report results of

WNS surveys in selected culverts and caves of Mississippi. Sixteen caves and 214 culverts were surveyed for bat use in Mississippi from November through mid-March 2010-2015. Distance from caves to rivers, streams, and green spaces were measured using ArcMap. Characteristics of surveyed culverts and box bridges (exterior and interior ambient air temperature and dimensions) were recorded. Spearman's nonparametric correlation analysis showed a moderate relationship between numbers of bats in caves and distance (km) to streams (r = -0.32, P < 0.026). Analysis also showed a moderate inverse relationship between numbers of bats in culverts and outside ambient air temperatures (r = -0.04, P < 0.0001) and central air temperatures (r = -0.14, P < 0.015) and a moderately positive relationship between numbers of bats and length of culverts (r = 0.56, P < 0.0001). As part of a larger study, we tested for *Psuedogymnoascus destructans* during winter surveys, along with visual surveys using infrared light. Of the ten tested, three caves and one culvert yielded positive results for presence of *P. destructans* in 2014. We submit that culverts may provide habitat where natural roosting areas are not available or scarce and that proximity to streams may influence use by selected species. Findings of this study can be used to assist transportation departments and biologists in impact assessment and mitigation associated with culvert replacement or restoration projects and render a greater understanding of presence of WNS in winter roost sites of bats.

SOUTHEASTERN MYOTIS ROOSTING HABITS IN AN OLD-GROWTH BOTTOMLAND HARDWOOD FOREST

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There is a dearth of literature describing the roosting habits of the southeastern myotis, *Myotis austroriparius*. Southeastern myotis are considered imperiled throughout their range and knowledge of roosting habits will better inform conservation and management decisions. Our objective was to quantify roosting habits of southeastern myotis in Congaree National Park, an old-growth bottomland hardwood forest in the Upper Coastal Plain of South Carolina. We located roosts through opportunistic cavity searches and by radio-tagging and tracking bats captured from roosts during emergence. Colony sizes were obtained during emergence observations or by counting bats within the roost using a light and mirror. We attached 0.31-0.36 g Lotek or Holohil transmitters to 12 adult females, 3 juvenile females, and 1 adult male. Bats traveled 1.2 ± 1.1 km (range 0 to 2.83 km) from the capture roost to the farthest known subsequent roost. Of the three bats that flew the farthest, one was a juvenile. Bats primarily used large diameter water tupelos (*Nyssa aquatica*) with basal cavities although sweetgums (*Liquidambar styraciflua*) with basal cavities were also used. Bats spent 1 to 6 consecutive days in each roost and shifted roosts every 2.0 ± 1.5 days (range 0 to 6 days). Aggregation sizes ranged from 5 to 310 individuals per roost. Trees occupied by the most bats tended to have the most visits from tagged bats, the highest connectivity to other trees, and the longest occupancies suggesting these trees may serve as hubs for bats as they move among roosts. Hub trees tended to have larger cavity volumes than less-connected trees. Hub trees may serve as important sites for information transfer and disease or parasite transmission and may be of particular conservation importance. The fission-fusion behavior of maternity colonies and the importance of hub roosts warrant more in-depth network analysis in the future.

EFFECTS OF HABITAT MODIFICATION ON RODENT POPULATION DYNAMICS AND COMMUNITY STRUCTURE

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Switchgrass (*Panicum virgatum*), a biofuel feedstock, was planted in intensively managed loblolly pine (*Pinus taeda*) stands to investigate sustainability of this system for producing an alternative energy source. We hypothesized that changes in understory habitat conditions caused by intercropping switchgrass in pine stands would affect rodent population and community dynamics within three years. Therefore, we assessed effects of three treatments (control loblolly pine, switchgrass intercropped in loblolly pine, and switchgrass monoculture) on rodent population (abundance, survival, and recruitment) and community structure (diversity, richness, and community assemblages). We conducted vegetation surveys and live-trapping during 2013-2015 in Kemper County, MS on land managed and maintained by Weyerhaeuser Company and Catchlight Energy LLC (CLE), a Chevron|Weyerhaeuser joint venture. We conducted six trapping sessions each summer totaling 14,112 trap nights per year and captured 1733 cotton rats (*Sigmodon hispidus*), 102 *Oryzomys palustris,* 31 *Mus musculus*, 20 *Peromyscus leucopus*, 28 *Reithrodontomys fulvescens,* 22 *R. humulis,* 9 *Microtus pinetorum,* 9 *P. gossypinus*, and 2 *Neotoma floridana*. We used non-metric dimensional scaling and analysis of variance models to compare dependent variables within and among treatments across years. We found higher cotton rat abundance yet lower recruitment in monoculture compared to control plots. Intercropped plots had intermediate levels of cotton rat abundance and recruitment. Dispersal may be occurring rapidly in monoculture plots because of high population abundance and limited habitat availability with young cotton rats dispersing early, decreasing detection prior to dispersal. Cotton rat survival and rodent community metrics did not differ among treatments but did differ among years. Future analyses will investigate mechanisms linking individual behaviors to population and community dynamics to inform wildlife conservation and sustainability in this, and other, systems.

URBANIZATION EFFECTS ON BATS ACROSS MULTIPLE NORTH CAROLINA CITIES WITHIN THE NABAT SAMPLING FRAMEWORK

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The North American Bat Monitoring Program (NABat) is a continent-wide long-term survey effort to promote effective bat conservation. In partnership with biologists in South Carolina we piloted a Carolinas regional NABat program by extensive sampling across the state of North Carolina in 2015. We used AnaBat SD2 acoustic detectors to conduct driving transect survey and/or stationary site surveys on 37 NABat grids (10km x 10km) throughout the mountain, piedmont and coastal plain. Preliminary analyses reveal species distributions consistent with regional variation. For example, the southeastern Myotis (*Myotis austroriparius*) was primarily recorded at grids in the coastal plain whereas the Indiana bat (*Myotis sodalis*) was only recorded in the mountain region of North Carolina. In addition, variation between species recorded from different sampling methods was as expected. For example, interior foraging species including *Myotis* spp. and Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) were primarily recorded at stationary sites whereas driving transect surveys recorded mostly open adapted foraging species such as eastern red (*Lasiurus borealis*), evening (*Nycticieus humeralis*), and big brown (*Eptesicus fuscus*) bats. In 6 grids that had urban and non-urban stationary site pairs, we tested predictions about urbanization effects on bat community structure and activity patterns. We are also constructing a spatial model to compare all grids at the landscape scale to explore how bat community structures vary along the urbanization gradient. We will present these results and highlight ways that ecological questions can be addressed within the NABat sampling framework.

METHODS OF AERIAL TRACKING USING "HOME RANGE AND HABITAT USE OF FORAGING GRAY BATS *(MYOTIS GRISESCENS)* FROM FIVE MATERNITY SITES IN NORTHERN ARKANSAS" AS A CASE STUDY

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Aerial tracking has long been a staple in wildlife research. In the last several years, this method has assisted in gathering important migration and foraging data for several bat species. Tracking may be considered more cost-effective from airplanes when considered against large ground-based tracking teams, and signal acquisition occurs over much greater distances. In addition to potential cost favorability, aspects such as pilot and plane logistics, in-plane equipment configuration, radio signal-strength calibration at altitude, accuracy of locations, and data analysis are several points to consider. Using the methods from the study "Home Range and Habitat Use of Foraging Gray Bats *(Myotis grisescens)* from Five Maternity Sites in Northern Arkansas", the details of aerial tracking will be discussed. In this study, 112 reproductive female gray bats were transmittered over two maternity seasons. Location data were gathered from 101 individuals. Forty-two individuals with greater than 15 locations each were analyzed with compositional analysis, with 3rd order analysis showing bats preferred water over all other habitat types ($p<0.001$). Fixed-kernel density analysis, using least cross squared validation (LSCV) method, showed an average home range size of 15,935 ± 3,806 ha (865 locations). As the study progressed, more locations were gathered with greater accuracy due to refined methods of tracking. Study dynamics may change depending on distance study species travels or needed accuracy for roosting or foraging locations. Thus, a combination of ground tracking/telemetry and aerial tracking may be necessary. With either approach, aerial tracking can cut tracking time, project cost, and increase searcher efficiency.

ECOLOGICAL DISTRIBUTION OF SHREWS IN THE CUMBERLAND PLATEAU OF ALABAMA

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Shrews are small mammals that often occur in sympatry with other species of shrews. This suggests some form of resource partitioning is occurring. Using pitfall traps and drift fences, I examined eight habitats in Jackson County, Alabama, and detected evidence of habitat partitioning by shrews in pine forests, mixed forests with liana undergrowth, and deciduous riparian zones. Also, I discovered that I was 11 times more likely to capture a shrew on a night with rainfall than on a night with clear skies. Habitat segregation and increased activity on rainy nights should both be considered when researchers attempt to capture shrews in the field.

EFFECTS OF CALL CLASSIFICATION SOFTWARE AND SURVEY METHOD ON TRI-COLORED BAT DETECTION AND OCCUPANCY PROBABILITIES

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The North American Bat Monitoring Program (NABat) is a multi-agency, continent-wide monitoring effort utilizing standardized survey protocols. NABat is being implemented regionally by a number of agencies, each of which may use one or more methods for surveying and a variety of automated acoustic classification programs. It has recently been shown that there is low agreement among four commonly used bat call classification programs. Thus, it is important to understand how software choice and survey method may affect the results of NABat and other bat acoustic research. Our objectives were to examine differences in detection probabilities between two acoustic survey methods and determine the effects of classification software on the results of occupancy models for tri-colored bats (*Perimyotis subflavus*). During summer 2015, we conducted acoustic mobile transect surveys and stationary point surveys in 35 spatially balanced and randomly distributed 10 x 10 km cells across South Carolina. Call files were filtered for noise and classified to species using EchoClass 3.1 and Kaleidoscope 3.1.5. We compared species detection probabilities between mobile and stationary surveys within cells and the results of

single-season Bayesian site-occupancy models between automated call classification program outputs. For both program outputs, we found significantly higher detection probabilities for stationary surveys than mobile surveys, but no significant effect of percent forest cover on occupancy. Of the 35 cells surveyed, 33 were predicted to be occupied using EchoClass output, while 35 were predicted to be occupied using Kaleidoscope output but the differences were not statistically significant. Thus, we found slightly different results from the two classification programs, but reached the same conclusions. In this case, it appears that software choice had no effect on our results. However, our data indicate that choice of survey method affects detection probability and suggest that when possible, both survey methods be used.

WHAT HOME AND LAND USE PRACTICES AFFECT THE PROBABILITY OF HUMAN-ELEPHANT CONFLICT IN NEPAL?

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A major component of Human-Wildlife Conflict (HWC) in the US is crop and timber damage, as well as vehicle collisions from deer (representing billions of dollars lost annually). Agricultural damage is particularly heavy in the southeast US. Mitigation for damage caused by deer includes fencing, repellents, and harvest with harvest possibly the most effective mitigation tool. In contrast, elephants (*Elephas maximus*) are a major source of HWC in Nepal, but non-lethal mitigation approaches are required, as they are an endangered species, and their populations have been in decline. Elephants raid crop fields for food, causing crop and property loss and occasionally results in death of either group. Elephants are responsible for more than 40% of the HWC, 70% of the wildlife-caused human casualties, and a 25% loss in crop production in Nepal. Identification of the factors associated with elephant invasion can help mitigate conflict by changing those factors. This study used face to face interviews in 1185 houses in the villages affected by elephants in southern Nepal using a structured questionnaire to understand how land use practices are related to human-elephant conflict (HEC). Almost all (99%) of the surveyed houses had historic damage from elephants. Odd ratio analyses showed that practices such as home alcohol production, growing traditional crops (rice, maze, and millet) or certain fruit trees (banana and mango), increase the chances of elephant attacks. On the other hand, farmers using monoculture agriculture experienced less crop raiding than those using multi-crop agriculture. Our data also revealed that HEC is most intense in winter months (September-December). Changing some land use practices could reduce conflict in the region. Therefore, conservation organizations should launch educational programs recommending alternative cropping to residents of southern Nepal.

SURVIVAL OF HIBERNATING TRI-COLORED BATS IN SMALL MINES OF THE OUACHITA MOUNTAINS

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Tri-colored bats (*Perimyotis subflavus*) are the most commonly encountered species found hibernating in caves, mines, cisterns, wells, and culverts throughout the South. This species has been especially hard hit by white-nose syndrome (WNS), with complete die-offs in many areas. Given the shorter duration of hibernation required in the Southeastern U.S., mortality rates associated with WNS in this region may be lower than more northerly areas. In 2014, we initiated a study evaluating survival rates of tri-colored bats hibernating in small mines of the Ouachita Mountains of Arkansas, an area at the leading edge of the WNS spread. Our goal was to determine apparent survival rates prior to, and after arrival of WNS in the area using Cormack-Jolly-Seber models. Bats were banded at the beginning of hibernation and sampled again near the end of hibernation at 4 mines to estimate apparent survival rates during winter hibernation and the summer active season. To-date, 131 bats have been banded. Preliminary data for the first year (November 2014 - December 2015), suggests apparent survival differed among the four sites. Survival rates ranged from 0.78-0.95 during winter and 0.66-0.95 during summer. At 1 site, overwinter survival (0.87) was greater than summer survival (0.82). At 2 sites, male survival was greater than females in both winter and summer. The fungus associated with WNS was first detected in the region in winter

2014-2015 and at one of the study sites, but no outward symptoms of the disease were evident in bats. This study will continue for 2-3 years to build more accurate models and compare survival rates after WNS becomes wide spread in the area.

USING FALSE-POSITIVE OCCUPANCY MODELS TO ESTIMATE PROBABILITY OF PRESENCE FOR *MYOTIS SEPTENTRIONALIS*

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To develop effective management plans for threatened *Myotis septentrionalis*, we must understand their distributions. Traditionally, mist-netting surveys were used to assess presence/probable absence of bats. *Myotis septentrionalis* once comprised the bulk of mist-net captures on the North Cherokee National Forest (CNF). However, populations are in steep decline due to white-nose syndrome— first detected on the North CNF in 2009–10. Mist-net surveys are more difficult with dispersed, low density bat populations. Acoustic surveys aid in detecting rare and cryptic animals, but we risk false-positives. From May to August 2013–2015, we surveyed 34 road corridor sites on the North CNF for presence/probable absence of *M. septentrionalis*, using both mist-net and acoustic (Anabat SD2s; analyzed using Bat Call ID v2.7c) methods. *Myotis septentrionalis* were captured at 12 sites and represented 0.63–3.8% of acoustic files each year (recorded at 31 sites). We aimed to assess the effects of landscape level covariates (e.g., elevation, percent forest) on the probability of presence for *M. septentrionalis* species. For greater veracity, we chose multi-season false-positive occupancy models (Presence v9.7), which account for non-detection and misidentified detections. We used AIC to compare 15 occupancy models with 1-4 variables each. Based on our models that bear the most weight, sites with higher forest density and a higher pine component within 2 km of the capture site have a higher probability of presence for *M. septentrionalis*. Probability of presence also increases with lower elevations and closer distances to karst. We chose sites with similar structure and vegetation, therefore assuming sites have similar detection probabilities. However, we plan to incorporate weather-related detection factors into our models. False-positive model results also give us robust site-specific occupancy estimates. With decreasing populations and capture likelihoods, such probabilistic models may lead to more reliable distribution models and, hence, management plans.

ROOST TREE SELECTION OF THE SOUTHEASTERN MYOTIS AND RAFINESQUE'S BIG-EARED BAT IN THE CACHE RIVER NATIONAL WILDLIFE REFUGE, ARKANSAS.

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Several studies have been conducted on the southeastern myotis and Rafinesque's big-eared bat throughout their range, however, none have focused exclusively on Arkansas' Mississippi Alluvial Plain. The primary objective of this study was to characterize and identify factors that influence selection of day roost-trees. We affixed 23 transmitters to southeastern myotis in 2014 and 2015 and 9 to Rafinesque's in 2015. Bats were tracked daily to their roosts or until signals were lost. We measured diameter at breast height, canopy coverage, basal area, and tree height of all roost trees and a paired random tree. In addition, we measured diameter at breast height and recorded tree species of all trees within a 0.5 m and 11.3 m plot around each roost and random tree. We identified 17 roost-trees for the southeastern myotis and 19 for Rafinesque's big-eared bat. Six tree species were used by bats with the two most dominant species being water tupelo and bald cypress followed by black tupelo, sweet gum, red maple, and musclewood. All roosts were in live trees. The southeastern myotis select for larger diameter trees in thicker stands; the Rafinesque's also select for larger trees in thicker stands but with higher canopy coverage as compared to random trees. There were no significant differences in tree height between roost-trees and random trees of both species. Large trees roost-trees and high basal area could provide suitable space for larger colonies of bats and thus provide suitable microclimates. Future research should focus on the winter roosting ecology of these species in the Cache River National Wildlife Refuge.

DEN USE AND ACTIVITY PATTERNS OF EASTERN SPOTTED SKUNKS IN THE TALLADEGA NATIONAL FOREST, ALABAMA

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The eastern spotted skunk (*Spilogale putorius)* is a small (*ca.* 0.5-1.5 kg) omnivorous mephitid that inhabits rocky and shrubby forested areas with closed canopies and extensive vegetation cover. Historically, eastern spotted skunks were widely distributed throughout most of the eastern United States. However, since the 1940s this species has experienced precipitous population declines. While the exact reasons for their range-wide decline is unknown, a variety of possible mechanisms are suspected including anthropogenic factors such as habitat loss, pesticide use, overharvesting, and natural causes. The basic ecology and habitat requirements for the eastern spotted skunk is poorly understood and rarely researched. We are conducting a telemetry based research project in the Shoal Creek ranger district in Talladega National Forest, located in Alabama, to examine the den and space use requirements of this species. We tracked radio-collared skunks to dens and placed remote cameras to monitor the skunks' activity patterns. This method also allows us to see how often they use each den and how many dens each skunk uses. Dens are often located in burrows dug into the ground, holes in stumps, or under rocks. We will also determine at what time spotted skunks leave and return to their dens. We have captured 9 individual skunks in two hundred and thirty nine trap nights with a total of 7 males and 2 females. We have found a total of one hundred individual dens for 8 different skunks. We are currently analyzing local habitat measurements for each den. These data will assist in designing management actions and policies for maintaining habitat for closed canopy adapted species, such as the eastern spotted skunk.

HABITAT ASSOCIATIONS OF THE EASTERN SPOTTED SKUNK (*SPILOGALE PUTORIUS*) IN WESTERN VIRGINIA.

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Eastern spotted skunk (*Spilogale putorius*) populations are believed to have declined range-wide over the last few decades. Though little is known about the ecological requirements of this species, these declines have been attributed to habitat loss or change, increased competition with sympatric mesocarnivore species, or wildlife diseases. We utilized a detection/non-detection sampling method using baited camera trap data to evaluate the influence of landscape level environmental covariates on spotted skunk detection probability and site occupancy throughout the Appalachian Mountains in western Virginia. We surveyed 90 sites for ≥ 2 weeks from January to May, 2014-2015. We observed that spotted skunks strongly preferred young to mature forest stands with age of occupied forest stands decreasing with decreasing elevation. However, skunks showed no specific preference for understory vegetation such as presence of ericaceous shrubs as originally hypothesized. Nonetheless, our results indicate occupied sites are characterized as having complex understory structure that provide cover and that those conditions vary among stand age along an elevational and landform gradient. Our results provide insight to the factors that impact spotted skunk spatial distribution and habitat selection which can be used to generate conservation assessments and inform management decisions.

HABITAT USE AND NICHE PARTITIONING OF BATS IN THE CENTRAL GULF COASTAL PLAINS OF MISSISSIPPI

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Evaluating dimensions of resource use among syntopic species is essential for quantifying factors permitting species coexistence. To better understand how interspecific interactions influence resource

partitioning in forest-dwelling, insectivorous bat species of Mississippi, we assessed the foraging ecology of bat communities. Bats were surveyed using echolocation recorders and mist-nets deployed in pine, mixed pine-hardwood, and hardwood habitats of the Sam D. Hamilton Noxubee National Wildlife Refuge. Echolocation call structure and time of detections was used to determine species presence while stable isotope analysis of fur permitted identification of dimension of resource assimilation. Spatial partitioning among habitat types was observed, however, there was no evidence of temporal partitioning in foraging activity. Greatest bat diversity was detected in open areas with highest activity associated with proximity to water. Despite overlapping foraging in several habitats, isotopic values measured in fur differed among several species providing evidence of species-specific prey consumption. Our results indicate there are several characteristics that influence the foraging ecology of insectivorous bats in Mississippi. Echolocation call structure may influence foraging-habitat preferences yet bats may prefer habitats based on the distribution of available prey. Understanding how bat species have evolved different ecological niches in the same habitat can afford greater insight to the ecology of bat species and their conservation.

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