

*19<sup>th</sup> Annual Meeting of the Southeastern Bat Diversity Network &  
24<sup>th</sup> Colloquium on Conservation of Mammals in the Southeastern U.S.*



February 13-14, 2014  
Stephen F. Austin State University  
Nacogdoches, Texas

# SCHEDULE OF EVENTS

## *Thursday, 13 February 2014*

## *SBDN Meeting and Associated Meetings*

7:30 a.m. – 4:00 p.m.	Registration	BPSC Regent's Suites Foyer
7:30 a.m. – 4:00 p.m.	Poster Setup	BPSC Regent's Suites Foyer
8:00 a.m. – 10:00 a.m.	Break/Refreshments	BPSC Regent's Suite B
8:00 a.m. – 9:30 a.m.	SBDN Executive Board Meeting	BPSC Room 2.303
7:30 a.m. – 4:00 p.m.	Vendor/Exhibitor Setup/Display	BPSC Regent's Suite B
9:45 a.m. – 11:45 a.m.	E Small Footed Bat WG Meeting	BPSC Regent's Suite A
10:30 a.m. – 11:30 a.m.	Wildlife Acoustics Workshop	BPSC Room 2.201
11:45 a.m. – 1:00 p.m.	Lunch (on your own)	
1:00 p.m. – 2:15 p.m.	SBDN Business Meeting	BPSC Regent's Suite A
2:15 p.m. – 2:45 p.m.	CORA/MYAU Conserv. Strategy	BPSC Regent's Suite A
2:45 p.m. – 4:00 p.m.	Break/Refreshments	BPSC Regent's Suite B
3:00 p.m. – 5:30 p.m.	SBDN Plenary Session	BPSC Regent's Suite A
5:30 p.m. – 7:00 p.m.	Dinner (on your own)	
7:00 p.m. – 10:00 p.m.	Social & hors d'oeuvres	Quality Inn and Suites

## *Friday, 14 February 2014*

## *Colloquium on the Conservation of Mammals*

7:30 a.m. – 10:30 a.m.	Registration	BPSC Regent's Suites Foyer
7:30 a.m. – 8:30 a.m.	Poster Setup	BPSC Twilight Ballroom
8:00 a.m. – 4:00 p.m.	Vendor/Exhibitor Setup/Display	BPSC Regent's Suite B
8:00 a.m. – 9:00 a.m.	Concurrent Sessions I & II	BPSC Regents' A/Room 2.201
9:00 a.m. – 10:30 a.m.	Poster Session	BPSC Twilight Ballroom
9:00 a.m. – 10:30 a.m.	Break/Refreshments	BPSC Twilight Ballroom
10:45 a.m. – 12:00 p.m.	Concurrent Sessions III & IV	BPSC Regents' A/Room 2.201
12:00 p.m. – 1:30 p.m.	Lunch	BPSC Twilight Ballroom
1:45 p.m. – 3:00 p.m.	Concurrent Sessions V & VI	BPSC Regents' A/Room 2.201
3:00 p.m. – 4:30 p.m.	Break/Refreshments	BPSC Regent's Suite B
3:30 p.m. – 4:30 p.m.	Awards Session & Wrap-Up	BPSC Regent's Suite A
4:30 p.m. – 7:00 p.m.	Dinner/Free Time (on your own)	
7:00 p.m. – 10:00 p.m.	Bat Conserv & Mgmt Acoustic Workshop	Quality Inn and Suites

# CONFERENCE EVENTS

## REGISTRATION AND INFORMATION

Registration begins at 7:30 AM, in the Foyer of Regent's Suites A&B on the Second Floor of the Baker Pattillo Student Center (BPSC). (See map on next page). Walk-in registrants will be accepted Thursday and Friday. Information and personal messages can be obtained at the registration desk for the duration of the conference. See map below for location of the Regent's Suites Foyer, Regent's Suite A, Regent's Suite B, the Twilight Ballroom, and Rooms 2.201 and 2.303.

## PRESENTATIONS

All presentations and posters are to be submitted and/or delivered to the volunteers at the registration desk upon arrival to the Conference. We encourage all who are delivering oral presentations to deliver an electronic copy of their presentation to these volunteers so as to minimize last-minute confusion at the beginning of the different sessions. We request that all who are presenting posters leave their poster with volunteers at the registration desk upon arrival to the Conference. Volunteers will hang posters in their assigned positions.

All oral presentations on Friday February 14<sup>th</sup> will be delivered in either Regent's Suite A or Room 2.201. Each presentation will be 15 minutes, and presenters are encouraged to allow **2-3** minutes of that time for questions.

All posters will be displayed initially in Regent's Suite B (on Thursday, February 13<sup>th</sup>). **The formal poster session is from 9-10:30 in the Twilight Ballroom on Friday, February 14<sup>th</sup>**. All posters can be a maximum of 48" long and 36" tall (or smaller). They will be displayed throughout the conference.

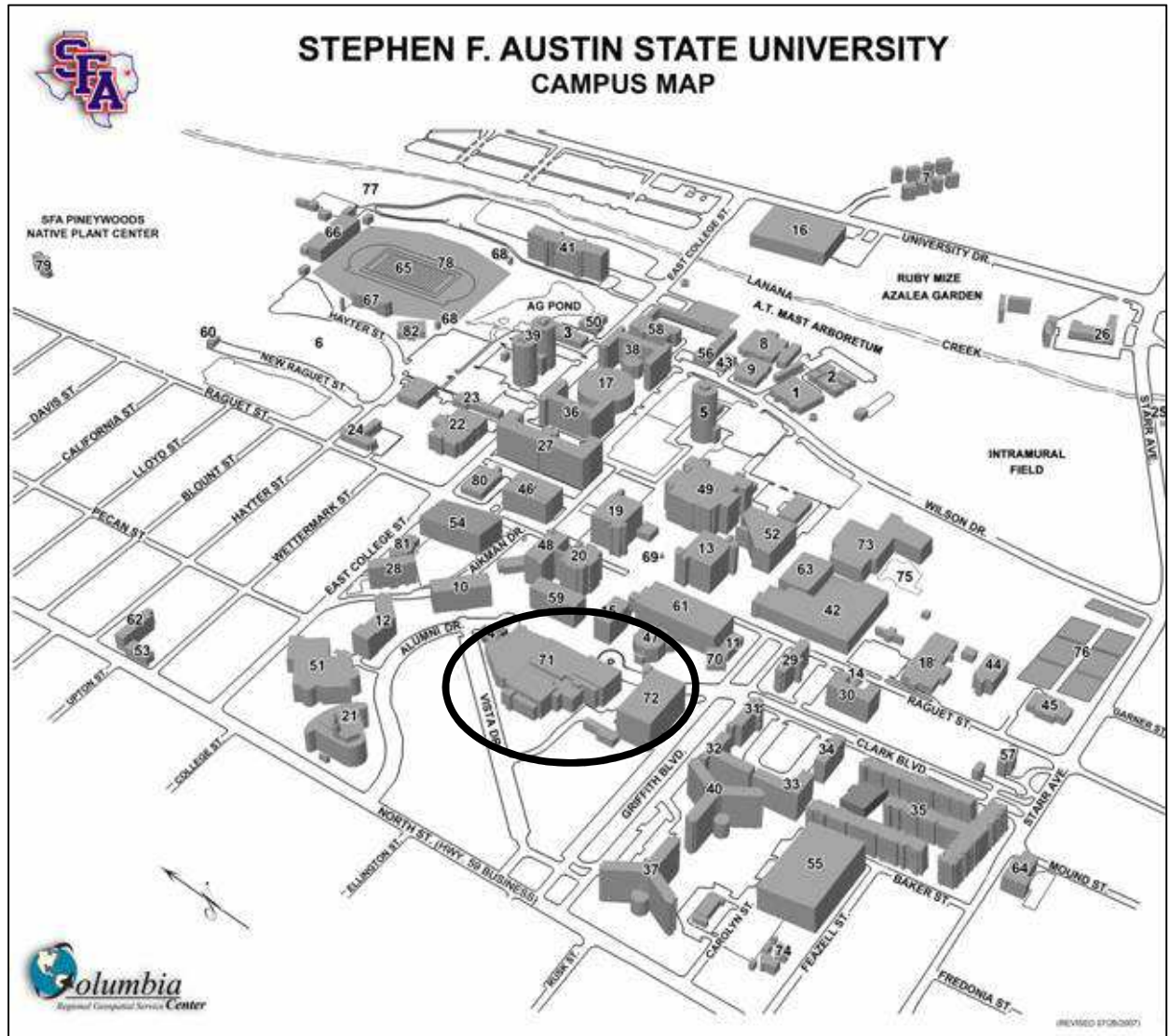
## REFRESHMENTS & LUNCHES

Lunch will be on your own on Thursday, February 13<sup>th</sup>. We encourage conference attendees to patronize some of the vendors located within the BPSC on the Stephen F. Austin State University campus, so as to minimize traveling and logistics during the day on Thursday. On Friday, February 14<sup>th</sup>, lunch will be located in the Twilight Ballroom from 12:00-1:30. The Friday Lunch is included in the registration fee.

## THURSDAY & FRIDAY EVENING EVENTS

On Thursday, February 13<sup>th</sup> a social, including a Silent Auction, will be held from 7:00 – 10:00 P.M. at the Quality Inn and Suites (3400 South St, Nacogdoches, TX 75964; see map in program). Beverages will be provided.

On Friday, February 14<sup>th</sup>, a BCM Acoustic Workshop will be held from 7:00-10:00 P.M. at the Quality Inn and Suites (3400 South St, Nacogdoches, TX 75964; see map in program).



**Building #71: Baker Pattillo Student Center**

**Building #72: Baker Pattillo Student Center Parking Garage**



**Location of Quality Inn and Suites**  
**3400 South Street, Nacogdoches, Texas 75964**



**Thursday, 13 February 2014**

**MEETING TIMES & LOCATIONS**

- 8:00 – 9:30 A.M.**      **SOUTHEASTERN BAT DIVERSITY NETWORK EXECUTIVE BOARD MEETING**  
**LOCATION:** *BPSC ROOM 2.303*
- 10:30-11:30 A.M.**      **WORKSHOP: WILDLIFE ACOUSTICS' KALEIDOSCOPE SOFTWARE**  
**LOCATION:** *BPSC ROOM 2.201*  
*LIVE DEMONSTRATION OF FULL FEATURED BAT AUDIO ANALYSIS TOOL THAT INCLUDES FILE CONVERSION, FULL-SPEC VIEWER, & AUTO-ID CAPABILITIES*
- 9:45 – 11:45 A.M.**      **EASTERN SMALL FOOTED BAT WORKING GROUP MEETING**  
**LOCATION:** *BPSC REGENT'S SUITE A*
- 9:45 – 10:05**              *REVIEW OF STATUS REVIEW: MELISSA TURNER*
- 10:05-10:20**              *DISCUSSION OF RESEARCH NEEDS: ALL PARTICIPANTS*
- 10:20-10:35**              *STRATEGIC PLANNING FOR FURTHER RESEARCH: ALL PARTICIPANTS*
- 10:35-10:55**              *REVIEW OF PRIORITY SITES ACROSS SPECIES' RANGE: GARY LIBBY*
- 10:55-11:10**              *DISCUSSION: PRIORITY SITES & MONITORING NEEDS/QUESTIONS:  
ALL PARTICIPANTS*
- 11:10-11:30**              *ARE SMALL-FOOTED BATS REALLY AS DIFFICULT TO MONITOR AS  
WE THINK? PAUL MOOSMAN*
- 11:30-11:45**              *MONITORING DISCUSSION: ALL PARTICIPANTS*
- 1:00-2:15 P.M.**              **SOUTHEASTERN BAT DIVERSITY NETWORK BUSINESS MEETING**  
**LOCATION:** *BPSC REGENT'S SUITE A (SEE BELOW FOR AGENDA)*
- 2:15-2:45 P.M.**              **CORA/MYAU CONSERVATION STRATEGY DOCUMENT PRESENTATION**  
**LOCATION:** *BPSC REGENT'S SUITE A*
- 2:15-2:30**                      *A CONSERVATION STRATEGY FOR RAFINESQUE'S BIG-EARED BAT  
AND SOUTHEASTERN MYOTIS: MICHAEL J. LACKI AND MYLEA L.  
BAYLESS*
- 3:00-5:30 P.M.**              **SOUTHEASTERN BAT DIVERSITY NETWORK PLENARY SESSION**  
**LOCATION:** *BPSC REGENT'S SUITE A (SEE BELOW FOR AGENDA)*

**SOUTHEASTERN BAT DIVERSITY NETWORK BUSINESS MEETING: AGENDA**

*FEBRUARY 13, 2014*

*BPSC REGENT'S SUITE A*

*1:00 – 2:15 P.M.*

- |             |  |   |
|-------------|--|---|
| <b>1:00</b> | <b>CALL TO ORDER, INTRODUCTIONS</b>                      | <i>JOY O'KEEFE, PRESIDENT, SBDN</i>     |
| <b>1:05</b> | <b>WELCOME TO TX/18<sup>TH</sup> SBDN ANNUAL MEETING</b> | <i>CHRIS COMER, SBDN MEETING HOST</i>   |
| <b>1:10</b> | <b>COMMITTEE REPORTS</b>                                 |   |
|             | - AWARDS COMMITTEE                                       | <i>STEPHEN BURNETT, COMMITTEE CHAIR</i> |
|             | - BAT BLITZ COMMITTEE                                    | <i>KATRINA MORRIS, COMMITTEE CHAIR</i>  |
|             | - NEWSLETTER COMMITTEE                                   | <i>J.D. WILHIDE, COMMITTEE CHAIR</i>    |
|             | - WNS COMMITTEE  | <i>LUKE DODD, COMMITTEE CHAIRS</i>      |
|             | - WEBSITE COMMITTEE                                      | <i>STEVE SAMORAY, COMMITTEE CHAIR</i>   |
| <b>1:25</b> | <b>REVIEW OF FEDERAL LANDS COMMITTEE</b>                 | <i>MIKE LACKI, PAST-PRESIDENT, SBDN</i> |
| <b>1:35</b> | <b>TREASURER'S REPORT</b>                                | <i>TIM CARTER, TREASURER, SBDN</i>      |
|             |  | <i>KATHRYN WOMACK &amp; CLARISSA</i>    |
| <b>1:45</b> | <b>2015 TRIBAT MEETING</b>                               | <i>STARBUCK</i>                         |
| <b>1:50</b> | <b>NATURESERVE/NABCA PRIORITY REQUESTS</b>               | <i>JOY O'KEEFE</i>                      |
| <b>2:00</b> | <b>AWARD PRESENTATIONS</b>                               |   |
|             | - LIFETIME ACHIEVEMENT AWARD                             | <i>JOY O'KEEFE</i>                      |
| <b>2:10</b> | <b>OTHER BUSINESS FROM THE FLOOR</b>                     | <i>MEMBERSHIP</i>                       |
| <b>2:15</b> | <b>ADJOURNMENT</b>                                       | <i>JOY O'KEEFE</i>                      |



**SOUTHEASTERN BAT DIVERSITY NETWORK PLENARY SESSION**

***FEBRUARY 13, 2014***

***BPSC REGENT'S SUITE A***

***3:00 – 5:30 P.M.***

- 3:00**            **WHITE-NOSE SYNDROME UPDATE AND STATUS OVERVIEW**  
*KATIE GILLIES, BAT CONSERVATION INTERNATIONAL*
- 3:15**            **UPDATE ON WHITE-NOSE SYNDROME FOR THE SOUTHEAST**  
*MIKE ARMSTRONG, U.S. FISH AND WILDLIFE SERVICE*
- 3:30**            **UPDATE ON INDIANA BAT SURVEY GUIDANCE**  
*MIKE ARMSTRONG, U.S. FISH AND WILDLIFE SERVICE*
- 3:50**            **NORTHERN LONG-EARED BAT LISTING: DECISION, REVIEW OF COMMENTS, &  
TIMELINE**  
*JILL UTRUP, U.S. FISH AND WILDLIFE SERVICE*
- 4:15**            **NORTHERN LONG-EARED BAT CONFERENCE/CONSULTATION (INCLUDING  
PERMITTING) AND RECOVERY**  
*JESSICA HOGREFE, U.S. FISH AND WILDLIFE SERVICE*
- 4:45**            **LITTLE BROWN BAT & TRICOLORED BAT LISTING/STATUS ASSESSMENTS**  
*MIKE ARMSTRONG, U.S. FISH AND WILDLIFE SERVICE*
- 5:00**            **PANEL DISCUSSION (IF NEEDED)**

Friday, 14 February 2014

**CONCURRENT SESSION I – BPSC REGENT’S SUITE A**

**MODERATOR: TBA**

- 8:00** **HABITAT SELECTION OF NORTHERN LONG-EARED BATS (*MYOTIS SEPTENTRIONALIS*) IN AN EXPERIMENTAL HARDWOOD FOREST SYSTEM.** *HOLLY BADIN\* AND TIMOTHY C. CARTER*
- 8:15** **ASSESSING WINTER ACTIVITY OF HIBERNATING BATS: LESSONS LEARNED.** *CORINNE DIGGINS\*, ALEXANDER SILVIS, ANDREW KNIOWSKI, W. MARK FORD, GABREILLE J. GRAETE, AND LACI S. COLEMAN*
- 8:30** **BAT SURVEYS IN THE KENTUCKY PURCHASE: WHAT DOES ACOUSTICS AND NETTING BUY PRE-WNS?** *SANTIAGO MARTIN\*, MIKE ARMSTRONG, W. MARK FORD, AND TERRY L. DERTING.*
- 8:45** **NABAT: THE NORTH AMERICAN BAT MONITORING PROGRAM.** *SUSAN LOEB, JEREMY COLEMAN, LAURA ELLISON, THOMAS RODHOUSE, THOMAS INGERSOLL, JONATHAN REICHARD, AND CORI LAUSEN*

**CONCURRENT SESSION II – BPSC ROOM 2.201**

**MODERATOR: TBA**

- 8:00** **BAT USE OF ABANDONED MINES IN SOUTHERN ILLINOIS, WITH AN EMPHASIS ON THE ENDANGERED INDIANA BAT AND THE PROPOSED ENDANGERED NORTHERN LONG-EARED BAT.** *BRADLEY J. STEFFEN AND TIMOTHY C. CARTER*
- 8:15** **TRACKING SPRING MIGRATING FEMALE INDIANA BATS TO PREVIOUSLY UNKNOWN MATERNITY COLONIES.** *PIPER ROBY AND MARK GUMBERT*
- 8:30** **THE SOUTHEASTERN BAT IN MISSISSIPPI: A PRELIMINARY ASSESSMENT.** *CHESTER O. MARTIN, ALISON S. MCCARTNEY, KATHY SHELDON, AND BECKY ROSAMOND*
- 8:45** **MALE INDIANA BAT ROOST SELECTION IN A MANAGED FOREST.** *SCOTT M. BERGESON\* AND JOY M. O’KEEFE*

\* INDICATES STUDENT PRESENTER/COMPETITOR

**CONCURRENT SESSION III – BPSC REGENT’S SUITE A**

**MODERATOR: TBA**

- 10:45 THE STATE OF NATURAL HISTORY COLLECTIONS: A CASE STUDY USING THE GEORGIA MUSEUM OF NATURAL HISTORY.** *NIKOLE L. CASTLEBERRY*
- 11:00 MODELING ENDANGERED CAROLINA NORTHERN FLYING SQUIRREL OCCUPANCY.** *W. MARK FORD, ANDREW M. EVANS, RICHARD H. ODOM, JANE L. RODRIGUE, CHRISTINE A. KELLY, NICOLE ABAID, AND CORINNE DIGGINS*
- 11:15 POPULATION DENSITY, ABUNDANCE AND DETECTION PROBABILITY OF URBAN MESOPREDATORS.** *JASON V. LOMBARDI\*, CHRISTOPHER E. COMER, AND DANIEL G. SCOGNAMILLO*
- 11:30 TEXAS MOUSE: JUNIPER OBLIGATE OR HABITAT GENERALIST?** *CHRISTOPHER J. REDDIN*
- 11:45 SURVIVAL AND CAUSE-SPECIFIC MORTALITY OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) FAWNS IN URBAN AND RURAL AREAS.** *CHAD R. WILLIAMSON\*, TIMOTHY C. CARTER, AND CHAD M. STEWART*

**CONCURRENT SESSION IV – BPSC ROOM 2.201**

**MODERATOR: TBA**

- 10:45 BAT OCCURRENCE IN BOTTOMLAND HARDWOOD FORESTS TREATED FOR DESIRED FOREST CONDITIONS IN THE MISSISSIPPI ALLUVIAL VALLEY.** *LORRAINE P. KETZLER\*, CHRISTOPHER E. COMER, AND DANIEL J. TWEDT*
- 11:00 BAT COMMUNITY COMPOSITION AND ITS RELATIONSHIP TO STAND STRUCTURE IN A BOTTOMLAND HARDWOOD FOREST OF EAST TEXAS.** *CARLA J. WEINKAUF\*, CHRISTOPHER E. COMER, WARREN C. CONWAY, AND SCOTT BOSWORTH*
- 11:15 DEVELOPING PREDICTIVE MODELS OF BAT ACTIVITY USING REMOTELY SENSED FOREST CANOPY DATA.** *LUKE E. DODD, MICHAEL J. LACKI, NICHOLAS S. SKOWRONSKI, MATTHEW B. DICKINSON, AND LYNNE K. RIESKE-KINNEY*
- 11:30 FOREST HABITAT RELATIONSHIPS OF THE NORTHERN BAT DERIVED FROM LONG-TERM RESEARCH ON THE FERNOW EXPERIMENTAL FOREST, WEST VIRGINIA.** *ALEXANDER SILVIS\*, ANDREW KNIOSWKI, JANE L. RODRIGUE, AND W. MARK FORD*
- 11:45 TORPOR PATTERNS OF HIBERNATING GRAY BATS: IMPLICATIONS FOR WNS.** *ERIC BRITZKE, MICHAEL WHITBY, MIKE ARMSTRONG, RICK TOOMEY, STEVE THOMAS, BRAD HADLEY, CHARLES BITTING, AND ANN SARNECKI*

**\* INDICATES STUDENT PRESENTER/COMPETITOR**

**CONCURRENT SESSION V – BPSC REGENT’S SUITE A**

**MODERATOR: TBA**

- 1:45** **DIGITAL APPLICATION FOR BAT FIELD DATA COLLECTION.** *JEREMY JACKSON AND KAT. A. CUNNINGHAM*
- 2:00** **USING PUBLIC AWARENESS TO ASSIST IN LOCATING WHITE-TAILED DEER FAWNS FOR RESEARCH.** *CHAD R. WILLIAMSON\*, TIMOTHY C. CARTER, AND CHAD M. STEWART*
- 2:15** **COMPARING FOUR ACOUSTIC ANALYSIS SOFTWARE PACKAGES AND THE ACCURACIES OF THEIR AUTO-CLASSIFICATION RESULTS FOR DETERMINING BAT OCCUPANCY IN A HABITAT.** *JOHN D. CHENGER, JOSEPH M. SZEWCZAK, AND JANET D. TYBUREC.*
- 2:30** **INDIANA BAT ROOST HABITAT SELECTION IN THE SOUTHERN APPALACHIAN MOUNTAINS.** *JOY O’KEEFE AND SUSAN LOEB*

**CONCURRENT SESSION VI – BPSC ROOM 2.201**

**MODERATOR: TBA**

- 1:45** **A PHENOLOGICAL STUDY OF BAT COMMUNITIES IN SOUTHERN MISSISSIPPI CAVES.** *ZACHARY U. ROTH\* AND DAVID C. BECKETT*
- 2:00** **FOREST MANAGEMENT AND NORTHERN LONG-EARED BATS.** *ROGER W. PERRY*
- 2:15** **BAT MORTALITY RELATED TO SINGLE-UNIT TURBINES.** *PHILLIP JORDAN\* AND THOMAS RISCH*
- 2:30** **EFFECTS OF HIERARCHICAL ROOST REMOVAL ON NORTHERN BAT ROOSTING ECOLOGY.** *ALEXANDER SILVIS\*, W. MARK FORD, AND ERIC. R. BRITZKE*

**\* INDICATES STUDENT PRESENTER/COMPETITOR**

**POSTER SESSION**  
**9:00-10:30, FRIDAY FEBRUARY 14, 2014**  
**BPSC TWILIGHT BALLROOM**

*Posters are arranged by poster number and corkboard number*

1. **ASSESSMENT OF THERMOREGULATION DURING TORPOR IN THREE SYMPATRIC SPECIES OF MYOTIS.**  
*CHAD M. ARGABRIGHT\**, *DUSTIN A.S. OWEN*, *TIMOTHY C. CARTER*, *TIMOTHY J. SICHMELLER*, AND *H. HOHMANN*
2. **BAT ACTIVITY INCREASES WITH INCREASED BAROMETRIC PRESSURE AND TEMPERATURE DURING AUTUMN IN GEORGIA.** *MICHAEL J. BENDER* AND *GREGORY D. HARTMAN*
3. **UNCLE SODALIS WANTS YOU !!** *SCOTT M BERGESON* AND *JOY M. O'KEEFE*
4. **BAT ACTIVITY ALONG THE FOREST-HARVEST INTERFACE IN AN EXPERIMENTAL LANDSCAPE.**  
*KATHERINE L. CALDWELL\** AND *TIMOTHY C. CARTER*
5. **COMPARING BAT DETECTOR DEPLOYMENTS AT DIFFERENT HEIGHTS, IN DIFFERENT ORIENTATIONS, AND USING DIFFERENT MICROPHONE TYPES.** *JOHN D. CHENGER* AND *JANET D. TYBUREC*
6. **WEATHER PROTECTION FOR ANABAT DETECTORS.** *CHRIS CORBEN* AND *KIM LIVENGOOD*
7. **LUNAR PHOBIA IN TEMPERATE VESPERTILIONID BATS: MODELING MOONLIGHT'S IMPACT ON BAT ACTIVITY.** *AARON CROSS\**, *TIMOTHY C. CARTER*, *DUSTIN A.S. OWEN*, AND *TIMOTHY J. SICHMELLER*
8. **DIET OF RAFINESQUE'S BIG-EARED BAT (*CORYNORHINUS RAFINESQUII*) IN WEST-CENTRAL LOUISIANA.**  
*BEAU B. GREGORY*, *JOHN O. WHITAKER, JR.*, AND *GREGORY D. HARTMAN*
9. **NEW HOST AND LOCATION RECORD FOR THE BAT BUG *CIMEX ADJUNCTUS* BARBER 1939 WITH A SUMMARY OF PREVIOUS RECORDS.** *MATTHEW E. GRILLIOT*, *JOHN L. HUNT*, AND *CHRISTOPHER G. SIMS*
10. **NEW RECORDS OF BATS FROM WEST-CENTRAL GEORGIA.** *GREGORY D. HARTMAN* AND *MICHAEL J. BENDER*
11. **THE EFFECT OF SHORE HABITAT AND LOCATION ON BAT ACTIVITY AND SPECIES RICHNESS MONITORED VIA ACOUSTIC SURVEY AT REELFOOT LAKE IN NORTHWEST TENNESSEE.** *CHRISTINE HASSELL* AND *NANCY BUSCHHAUS*
12. **WNS SURVEILLANCE AND MONITORING POPULATION TRENDS IN KENTUCKY: RESULTS OVER TWELVE YEARS.** *BROOKE A. HINES* AND *LARISA J. BISHOP-BOROS*
13. **EVALUATING SEX-SPECIFIC FORAGING HABITS OF *NYCTICEIUS HUMERALIS* IN AN INTENSIVELY MANAGED FOREST.** *DANIEL ISTVANKO\**, *VIRGINIE ROLLAND*, AND *THOMAS RISCH*
14. **SUMMER BAT DEMOGRAPHICS IN KENTUCKY REMAIN STABLE THROUGH THE EARLY YEARS OF WHITE-NOSE SYNDROME.** *SANTIAGO MARTIN\**, *TERRY DERTING*, AND *CHRISTOPHER MECKLIN*
15. **DESCRIBING INDIANA BAT ROOSTS USING DENDROCHRONOLOGY.** *JOSEPH L. PETTIT*, *JOY M. O'KEEFE*, AND *JAMES H. SPEER*
16. **TAKING ATTENDANCE FOR BATS: WHO'S OUT THERE?** *VANESSA G. ROJAS\** AND *JOY M. O'KEEFE*

\* INDICATES STUDENT PRESENTER/COMPETITOR

## ABSTRACTS

(in alphabetical order by last name of first author)

### **ASSESSMENT OF THERMOREGULATION DURING TORPOR IN THREE SYMPATRIC SPECIES OF *MYOTIS***

CHAD M. ARGABRIGHT\*, Department of Biology, Ball State University, Muncie, IN

DUSTIN A.S. OWEN, Center of Excellence for Field Biology, Department of Biology, Austin Peay University, Clarksville, TN

TIMOTHY C. CARTER, Department of Biology, Ball State University, Muncie, IN

TIMOTHY J. SICHMELLER, Wildlife Biologist, West Inc., Laramie, WY

H. HOHMANN, Engineering Research Development Center-Construction Engineering Research Laboratory, Army Corps of Engineers, Champaign, IL

*Abstract:* Torpor is an important behavior that allows bats to conserve energy when they are not feeding. During torpor bats slow their metabolisms and allow their body temperatures to drop to near ambient temperatures. This study examined the differences in various aspects of torpor among three sympatric species of *Myotis* bats: *Myotis lucifugus* (MYLU), *Myotis septentrionalis* (MYSE), and *Myotis sodalis* (MYSO). Body temperatures of roosting bats in Kentucky, Indiana, and Illinois were collected via temperature-sensitive radio transmitters and analyzed to quantify various aspects of torpor behavior and physiology. Kruskal-Wallis Tests revealed that MYLU tend to enter torpor an hour earlier than MYSE or MYSO. MYSE and MYSO enter torpor around sunrise and MYLU tend to enter torpor around 75 minutes before sunrise. However, overall the amount of time each species spends in torpor is identical. There are also differences in body temperature rate of change among the three species, as MYLU body temperature decreases at a faster rate than MYSE or MYSO. It is unknown what exactly causes this higher rate of decrease, but it could be caused by a variety of factors, such as ambient temperature differences, roosting behavior, or physiological differences.

### **HABITAT SELECTION OF NORTHERN LONG-EARED BATS (*MYOTIS SEPTENTRIONALIS*) IN AN EXPERIMENTAL HARDWOOD FOREST SYSTEM**

HOLLY BADIN\*, Department of Biology, Ball State University, Muncie, IN

TIMOTHY C. CARTER, Department of Biology, Ball State University, Muncie, IN

*Abstract:* Populations of northern long-eared bats (*Myotis septentrionalis*) have been declining because of White-nose syndrome and its effects on hibernating bats, leading to the anticipation that *M. septentrionalis* will be added to the federally endangered species list in autumn of 2014. Because of this and other issues, the relationship between forest management practices and bats has become increasingly important, especially the conservation of summer maternity sites. However, *M. septentrionalis* roosting preferences are poorly understood and yet are now of increasingly higher conservation value. We attempt to identify the environmental factors important in roost selection for *M. septentrionalis*. We examined how those differed between undisturbed and disturbed forests in the Hardwood Ecosystem Experiment in Morgan-Monroe and Yellowwood state forests of southern Indiana. This large scale project consists of nine management units of different forest harvest regimes: three even-aged, three uneven-aged, and three control units. Bats were captured by mist-nets in two designated areas per management unit as well as three additional ponds. Female *M. septentrionalis* were fitted with radio-

transmitters and tracked via radiotelemetry to their roost trees. Microhabitat characteristics were measured at each roost tree, and at randomly chosen trees within the same harvest type. Typically this species is a generalist in regards to roosting, but may prefer specific tree characteristics that promote a more cluttered roosting environment.

### **BAT ACTIVITY INCREASES WITH INCREASED BAROMETRIC PRESSURE AND TEMPERATURE DURING AUTUMN IN GEORGIA**

MICHAEL J. BENDER\*, Gordon State College, Barnesville, GA.

GREGORY D. HARTMAN, Gordon State College, Barnesville, GA.

*Abstract:* Activity patterns of bats are known to vary substantially among nights, seasons, years, and geographic regions but the underlying reasons for those patterns are poorly understood. Our objectives were to assess the temporal variability of acoustically-determined bat activity during autumn in central Georgia and to evaluate the influence of barometric pressure and nighttime temperature on nightly activity using AIC<sub>c</sub> and regression models. We recorded 134,392 bat calls and 13,753 sequences using an ANABAT SD2 detector during 87 sample nights (11 August – 11 November 2011) at a residence in Barnesville, Georgia. The number of sequences recorded nightly ranged from 3 to 763. On average, activity was consistent throughout the night with a slight peak just before sunrise, but within-night activity patterns varied among nights. Modelling results indicate that nightly bat activity was positively related to average nightly temperature and average nightly barometric pressure. In contrast to our expectations, measures of pressure change prior to or during sample nights were not plausibly related to bat activity. The positive relationship between autumn bat activity, temperature, and barometric pressure likely was related to the energetic costs and benefits associated with flight and prey availability during this season in central Georgia

### **MALE INDIANA BAT ROOST SELECTION IN A MANAGED FOREST**

SCOTT M. BERGESON\*, Indiana State University Center for Bat Research, Outreach, and Conservation, 600 Chestnut St., Terre Haute, IN

JOY M. O'KEEFE, Indiana State University Center for Bat Research, Outreach, and Conservation, 600 Chestnut St., Terre Haute, IN

*Abstract:* Far more research has been conducted on the summer roosting ecology of female Indiana bats (*Myotis sodalis*) vs. males, though we know both genders rely on trees as roosts and are often found together in forested landscapes in summer. Additionally, there is a growing interest in the effects of timber harvest on bat species. Therefore, our goal was to determine how male Indiana bats select roosts in a managed forest. In summers 2012-2013, we tracked 4 adult male Indiana bats to 18 roosts in south-central Indiana, and we measured the characteristics of roost and random trees. Bats roosted within hickories ( $n_{\text{hickories}} = 6$ ; *Carya spp.*) more than would be expected based on random tree species ( $n_{\text{hickories}} = 0$ ). Bat roosts were taller ( $25.2 \text{ m} \pm 2.7$ ) and larger in diameter ( $36.4 \text{ cm} \pm 4.2$ ) than random trees ( $14.5 \text{ m} \pm 2.6$  and  $22.6 \text{ cm} \pm 2.6$ ; respectively). However, both canopy closure and bark remaining were similar between roost and random trees. Finally, both roost and random trees were approximately 300 m from recently harvested areas. Preliminary analyses suggest that male Indiana bats use more hickories and slightly larger trees than would be expected based on their availability in the landscape.

## **UNCLE SODALIS WANTS YOU!!**

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JOY M. O'KEEFE, Indiana State University Center for Bat Research, Outreach, and Conservation, 600 Chestnut St., Terre Haute, IN

*Abstract:* The federally endangered Indiana bat (*Myotis sodalis*) uses roosts with different characteristics throughout its range. To determine the extent of this variation, and if there are underlying common trait(s) across the species' distribution, we will conduct a distribution-wide study using standardized methods of data collection. We will enlist the help of researchers like you to collect data on Indiana bat roost characteristics over the species' range from May – August, 2013-2016. After tracking Indiana bats of either sex back to their roosts, we ask that you follow a provided standardized protocol to collect data on variables such as roost height, roost type, canopy closure, tree species, tree height, tree DBH, tree condition, tree decay status, and emergence counts. These data will be compiled and analyzed to determine if there are patterns in roost characteristics across the species' range. Results from this study will provide us a better understanding of the overall roosting ecology of this endangered species and could potentially allow for more adaptive Indiana bat management practices across the species' distribution. We have already collected data on 159 roosts from 5 states. However, we need much more data to be collected throughout the Indiana bat's range. Therefore, your help is essential!

## **TORPOR PATTERNS OF HIBERNATING GRAY BATS: IMPLICATIONS FOR WNS**

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MICHAEL WHITBY\*, Bowhead Science and Technology, Vicksburg, MS

MIKE ARMSTRONG, USFWS Kentucky Ecological Services, Frankfort, KY

RICK TOOMEY, Mammoth Cave Intnt'l Center for Science & Learning, Mammoth Cave, KY

STEVE THOMAS, NPS, Cumberland Piedmont Network, Mammoth Cave, KY

BRAD HADLEY, Missouri Department of Conservation, Shannon County, MO

CHARLES BITTING, NPS, Buffalo National River, Harrison, AR

ANN SARNECKI, USFS, Ozark National Forest, Mountain View, AR

*Abstract:* White nose syndrome (WNS) has resulted in the death of over 5 million hibernating bats across 7 species since it was first discovered in 2006. While the exact cause of mortality is unknown, WNS infected little brown bats (*Myotis lucifugus*) arouse more frequently than uninfected bats. While gray bats (*M. grisescens*) have been shown to be infected with WNS, extreme mortality events have not yet been observed. Factors such as hibernation behavior are being proposed as possible explanations. For example, if gray-bats naturally arouse more frequently than other species, they may have enough energy reserves to survive WNS. We attached temperature sensitive radio transmitters to 58 bats across 4 hibernacula and recorded body temperature at approximately 15 minute intervals for over 90 days. We manually identified peaks in body temperature and recorded torpor bout lengths. Torpor bout length did not differ between caves. Average torpor bout length for all bats was  $11.5 \pm 4.09$  day. Our data show that Gray bats torpor bout length is consistent with the limited studies of other species (10-20 days for *M. lucifugus*, *Eptesicus fuscus*, and *Perimyotis subflavus*). WNS has had devastating effects on these species, therefore torpor bout length is likely not an explanation for the limited mortality in gray bats.



## **BAT ACTIVITY ALONG THE FOREST-HARVEST INTERFACE IN AN EXPERIMENTAL LANDSCAPE**

KATHERINE L. CALDWELL\*, Department of Biology, Ball State University, Muncie, IN  
TIMOTHY C. CARTER, Department of Biology, Ball State University, Muncie, IN

*Abstract:* Silvicultural practices alter forest structure that bats contend with for flight and foraging, creating hard edges at the harvest-forest interface. Increased bat species abundance and richness along harvested edges have been documented, but use of the forested side of the edge has been scarcely investigated. Better understanding of forest management influence on forest-dwelling bats is crucial to conservation and management efforts. We examined bat activity along both sides of the harvest-forest interface using high-frequency acoustic detectors in Morgan-Monroe and Yellowwood State Forests, Indiana from mid May to late July, 2013. We used Wildlife Acoustics Song Meter SM2BAT+ to sample 36 edge locations: 18 sites on the harvest side of the harvest-forest interface and 18 sites on the forest side of the harvest-forest interface. Species abundance and diversity was significantly greater on the harvest side of the interface. Additionally, call abundance was significantly greater on the harvest side of the interface for four species: *Eptesicus fuscus*, *Lasiurus borealis*, *L. cinereus*, and *Perimyotis subflavus*. *Myotis* spp. did not show significant difference between the two edge locations. This information suggests both sides of the edge are useful to bats of differing species, thus forest management that creates a mosaic of small harvests can be beneficial to many bat species.

## **THE STATE OF NATURAL HISTORY COLLECTIONS: A CASE STUDY USING THE GEORGIA MUSEUM OF NATURAL HISTORY**

NIKOLE L. CASTLEBERRY\*, Assistant Curator of Vertebrate Collections, Georgia Museum of Natural History, University of Georgia, Athens, GA

*Abstract:* Natural History collections across the United States are facing budget shortfalls, staffing shortages, and losing space to house collections. According to the NSF Scientific Collections Survey in 2009, almost half (49%) of surveyed collections will experience erosion or funding decreases by 2014. Additionally, 40% of those collections have received collections that were deaccessioned by other organizations. While funding and staffing are down for many collections, acquisition of new collections is up. The Georgia Museum of Natural History has experienced many of the same challenges, while acquiring several large collections over the past 10 years. Most recently, we received approximately 30,000 mammal, 1,500 bird, and 30,000 fish specimens from Northeastern University. This acquisition places the Georgia Museum of Natural History in the top 11 marine mammal collections in the world, in the top 6 marine mammal collection in the United States and among the top University associated Natural History collections in the United States. While this acquisition has helped secure the Georgia Museum of Natural History among the top University natural history collections, it still faces many of the above challenges such as adequate space to house the collections and funding for additional staff to help accession these materials into the permanent collections.

## **COMPARING BAT DETECTOR DEPLOYMENTS AT DIFFERENT HEIGHTS, IN DIFFERENT ORIENTATIONS, AND USING DIFFERENT MICROPHONE TYPES**

JOHN D. CHENGER, Bat Conservation and Management, Inc., Carlisle, PA

JANET D. TYBUREC\*, Janet Tyburec Consulting, Tucson, AZ

*Abstract:* Protocols have been developed for conducting acoustic inventories that contain recommendations for effectively deploying detectors and microphones to intercept free-flying bats during Endangered Species and other species-of-interest surveys. These protocols have been based partly on actual field trials with bat detectors, combined with assumptions for how bats travel through their habitats. But today, most acoustic monitoring efforts are conducted using detectors and microphones that were not included in the original field trials, and did not even exist when recommendations for deploying acoustic equipment were adopted. This seven-season, seven-site project tests eleven combinations of modern ultrasonic microphones and acoustic detectors for monitoring bats. Trials were conducted side-by-side, to evaluate the relative effectiveness of different deployment heights, orientations, and microphone types under typical field conditions, in various habitats throughout the United States. Though the scope of this effort is exceptionally broad, several consistent results have emerged, indicating that using a high-quality microphone combined with the highest possible elevation above ground, or at least a 45-degree from horizontal orientation of the microphone, all play important parts in documenting species occupancy, especially for short-term monitoring efforts when rare or uncommon species are being targeted. Because acoustic monitoring efforts for bats will likely only increase in the near future, researchers should be encouraged to deploy equipment to maximize inventory efficiency.

## **COMPARING FOUR ACOUSTIC ANALYSIS SOFTWARE PACKAGES AND THE ACCURACIES OF THEIR AUTO-CLASSIFICATION RESULTS FOR DETERMINING BAT OCCUPANCY IN A HABITAT**

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JOSEPH M. SZEWCZAK, Humboldt State University, Arcata CA

JANET D. TYBUREC\*, Janet Tyburec Consulting, Tucson, AZ

*Abstract:* Much effort has been expended to develop automated bat species classification software programs that are designed to make echolocation call analysis more efficient and more quantitative. Software designers have purported everything up to 99<sup>44/100ths</sup> % pure accuracy against their own training data. But, what happens when these programs are used on (1) voucher calls, which were collected by 3<sup>rd</sup> party bat-workers and *not* used in the development of any software programs, and (2) on large data-sets of passively collected recordings, from in the wild, under conditions likely to be faced during actual acoustic surveys for bats? We answer these questions by using popular North American bat classification programs; BCID, EchoClass, KaleidoscopePro and SonoBat, to process both voucher call collections and passively collected field recordings. Field recordings were manually vetted by the authors, who have over 60-years of combined experience with collecting and analyzing bat echolocation calls. Automated classifier outputs were compared on a file-by-file basis with the manually vetted results to determine accuracy. The results support our recommendation that biologists should *limit* the use of automated classification to an *assistive* technology for evaluating bat species occurrence, done

in conjunction with knowledgeable oversight of bat species call characteristics and bat echolocation behavior.

### **WEATHER PROTECTION FOR ANABAT DETECTORS**

CHRIS CORBEN, Titley Scientific, Columbia, MO

KIM LIVENGOOD\*, Titley Scientific, Columbia, MO

*Abstract:* There are many schemes which can be used to protect bat detector microphones from adverse weather. Most involve reflecting the incoming signal into a microphone which is physically hidden from the elements. For example, a microphone could be safely pointed downwards while having an axis of greatest sensitivity which points upwards into the weather. Some such schemes have been the subject of studies purporting to compare their effectiveness, but such comparisons have been complicated or invalidated by misunderstandings about the physics of sound and just what was being measured. We have conducted a number of comparisons of various weather-protection devices suitable for Anabat microphones, and present our findings here. A key result is that the directionality of a tube used for weather protection may not be at all obvious from the physical features of the tube. In particular, the direction of the axis of greatest sensitivity can be a long way off the main axis of the front of the tube.

### **LUNAR PHOBIA IN TEMPERATE VESPERTILIONID BATS: MODELING MOONLIGHT'S IMPACT ON BAT ACTIVITY**

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TIMOTHY C. CARTER, Department of Biology, Ball State University, Muncie, IN

DUSTIN A.S. OWEN, Center of Excellence for Field Biology, Department of Biology, Austin Peay State University, Clarksville, TN.

TIMOTHY J. SICHMELLER, Wildlife Biologist, WEST, Inc. 200 S. 2nd St. Laramie, WY

*Abstract:* Lunar cycles have long been associated with changes in animal behavior. Previous studies concerning bat behavior in response to lunar cycle have described lunar phobia tendencies. We examined how lunar cycle influences three bat species within the *Myotis* genus and assessed if lunar phobia explains their behavior. Study sites included three sites in Indiana; two in Illinois; and one in Kentucky. Within the five study sites, a total of fifty bats were captured and fitted with transmitters. Receivers were placed within the roosting sites and recorded data on bat activity during nighttime hours. Moon phase, (moon) percent illumination, moonrise / moonset times, and cloud cover data were converted into numerical forms and factored into a model to estimate the relative amount of moonlight received each night. Results suggest that bat foraging time was significantly influenced by moonlight level, while number of bats captured each night showed no such relationship. North American *Myotis* bats may have a preference for foraging during nights where the moon is brighter and has more of a presence. Instances of lunar phobia in bats are likely the result of regional differences in preferred prey and influential predator species.

## **ASSESSING WINTER ACTIVITY OF HIBERNATING BATS: LESSONS LEARNED**

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ANDREW KNIOWSKI, Department of Fish and Wildlife Conservation, Virginia Tech,  
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W. MARK FORD\*, U.S. Geological Survey, Virginia Cooperative Fish and Wildlife Research  
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GABREILLE J. GRAETE, North Carolina Wildlife Resources Commission, Asheville, NC,

LACI S. COLEMAN, Department of Fish and Wildlife Conservation, Virginia Tech,  
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*Abstract:* 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, we 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, discuss importance, report additional findings, and provide cave temperature and humidity profiles.

## **DEVELOPING PREDICTIVE MODELS OF BAT ACTIVITY USING REMOTELY-SENSED FOREST CANOPY DATA**

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MICHAEL J. LACKI, Department of Forestry, University of Kentucky, Lexington, KY

NICHOLAS S. SKOWRONSKI, Northern Research Station, US Forest Service, Morgantown,  
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MATTHEW B. DICKINSON, Northern Research Station, US Forest Service, Delaware, OH

LYNNE K. RIESKE-KINNEY, Department of Entomology, University of Kentucky, Lexington,  
KY

*Abstract:* Bats are an imperiled, yet ecologically-important group of vertebrate predators. Our ongoing research focuses on testing hypotheses about the effects of fire on canopy structure and insect prey availability, and how these factors relate to use of foraging space by bats during the pre- and post-hibernation periods at Kentucky's Mammoth Cave National Park. LiDAR-derived data (Fall 2010) were intersected with spatially explicit acoustic surveys of bats (2010-2011) in order to characterize relationships between canopy structure and bat activity. Multiple linear regression models were then developed for our zero-crossing acoustic data (high- and low-frequency groups). Suites of models were developed *a priori* and incorporated LiDAR-derived predictor variables for targeted portions of the forest canopy (understory, midstory, overstory, and total clutter throughout the canopy). Models within this suite were then ranked using

Akaike's Information Criterion. The models with the strongest support were considered further, with significant predictor variables interpreted in the context of bat foraging strategies and prescribed fire management in oak-hickory forests.

## **MODELING ENDANGERED CAROLINA NORTHERN FLYING SQUIRREL OCCUPANCY**

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RICHARD H. ODOM, Geospatial and Environmental Analysis, Virginia Tech, Blacksburg, VA

JANE L. RODRIGUE, U.S. Forest Service, Princeton, WV

CHRISTINE A. KELLY, North Carolina Wildlife Resources Commission, Asheville, NC

NICOLE ABAID, Department of Engineering Science and Mechanics, Virginia Tech,  
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CORINNE DIGGINS, Department of Fisheries and Wildlife Conservation, Virginia Tech,  
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*Abstract.* In the southern Appalachian Mountains of North Carolina, Tennessee and Virginia, transects of artificial nest-boxes were used to survey for the presence of the endangered Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*), a disjunct northern flying squirrel subspecies associated with high elevation (> 1,300 m) montane boreal and northern hardwood forest habitats. Using Program Presence, we created 35 *a priori* variants of the  $\psi(\cdot), \gamma(\cdot), \varepsilon(\cdot), \rho(\cdot)$  model from 1,001 boxes surveyed from 1996-2011 in western North Carolina examining various environmental and physical parameters thought to be associated with squirrel presence. Our best approximating model, "Odom #2", showed that squirrel occupancy on the landscape relative to denning was associated with sheltered landforms and the proximity to montane conifer, i.e., primarily red spruce (*Picea rubens*). As sheltering decreased, proximity to conifer increased in importance. Because squirrels preferentially forage in montane conifer patches and surveys underrepresented areas above 1,700 m, we combined predicted probability of occupancy models with red spruce-Fraser fir (*Abies fraseri*) distributions derived from satellite imagery. Above 1,300 m, we determined that 23, 232 ha of 90,133 ha in North Carolina, 7,913 ha of 14,273 ha in Tennessee and 650 ha of 4,602 ha in Virginia were highly probable habitat. Occupied patch sizes ranged from 35 ha in the Long Hope Valley area to approximately 20,000 ha in the Great Smoky Mountains National Park. These findings will allow managers to better define, protect and enhance existing squirrel habitat as well as provide a basis for future survey efforts in the region.

## **DIET OF RAFINESQUE'S BIG-EARED BAT (*CORYNORHINUS RAFINESQUII*) IN WEST-CENTRAL LOUISIANA**

BEAU B. GREGORY, Louisiana Natural Heritage Program, Louisiana Department of Wildlife and Fisheries, Lake Charles, LA

JOHN O. WHITAKER, JR., Department of Biology, Indiana State University, Terre Haute, IN

GREGORY D. HARTMAN\*, Department of Biology, Gordon State College, Barnesville, GA

*Abstract:* We investigated diet of Rafinesque's big-eared bats, *Corynorhinus rafinesquii*, in west-central Louisiana by examining fecal pellets collected from beneath three bridges that were used as day roosts. Fresh fecal material was found under the bridges during every month of the year.

Five insect orders, including five families, were detected in fecal pellets collected from 25 August 2005 to 5 January 2007. Lepidoptera represented 93.8% of the total volume and was the only order observed in 100% of our samples. Coleopterans, mostly Scarabaeidae, were the next most abundant food item and represented 5.8% of the total volume. Hemiptera, Diptera, and Hymenoptera together represented 0.4 % of the total volume. Diptera, Hemiptera, Hymenoptera, and scarabaeid Coleoptera were observed in fecal pellets collected under some, but not all three of the bridges. No insect orders were observed that previously had not been reported as prey of Rafinesque's big-eared bats. Our results were similar to those reported in studies conducted in Kentucky, North Carolina, and Florida, and we concluded that Rafinesque's big-eared bats primarily prey upon lepidopterans, and do so throughout the year in west-central Louisiana.

#### **NEW HOST AND LOCATION RECORD FOR THE BAT BUG *CIMEX ADJUNCTUS* BARBER 1939 WITH A SUMMARY OF PREVIOUS RECORDS**

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JOHN L. HUNT, University of Arkansas at Monticello, School of Mathematical and Natural Sciences, 397 University Drive, Monticello, AR

CHRISTOPHER G. SIMS, University of Arkansas at Monticello, School of Mathematical and Natural Sciences, 397 University Drive, Monticello, AR

*Abstract:* As part of a larger study, we collected 10 individuals of Rafinesque's big-eared bats (*Corynorhinus rafinesqueii*) from a maternity colony in Drew County in southeastern Arkansas. Four of the bats were harboring bat bugs which were collected and subsequently identified as *Cimex adjunctus* Barber 1939. This is the first record of this bat bug from Arkansas, and the first record from this host species. A summary of previous records of the insect are provided, as is a summary of ectoparasite records from *C. rafinesqueii*.

#### **NEW RECORDS OF BATS FROM WEST-CENTRAL GEORGIA**

GREGORY D. HARTMAN\*, Department of Biology, Gordon State College, Barnesville, GA

MICHAEL J. BENDER, Department of Biology, Gordon State College, Barnesville, GA

*Abstract:* A lack of data on the presence or absence of species hampers the ability of biologists and wildlife professionals to assess the status of many mammal populations in Georgia, including bats. Prior to 2011, there were published records of the occurrence of only two species of bat, *Lasionycteris noctivagans* and *Nycticeius humeralis*, from within an area encompassing 18 contiguous counties and more than 5,745 square miles in west-central Georgia; both records were for Lamar County. Using roosting-site surveys, mist-netting, and salvage, we are conducting an ongoing study to document bat species richness in west-central Georgia. Thus far, we have documented the occurrence of the following within the 18-county region: *Tadarida brasiliensis*, *Eptesicus fuscus*, *Lasiurus borealis*, *Lasiurus seminolus*, *Myotis austroriparius*, *Nycticeius humeralis*, and *Perimyotis subflavus*.

Poster Session

## **THE EFFECT OF SHORE HABITAT AND LOCATION ON BAT ACTIVITY AND SPECIES RICHNESS MONITORED VIA ACOUSTIC SURVEY AT REELFOOT LAKE IN NORTHWEST TENNESSEE.**

CHRISTINE HASSELL, Department of Biological Sciences, University of Tennessee at Martin, Martin, TN

NANCY BUSCHHAUS\*, Department of Biological Sciences and Reelfoot Lake Environmental Field Station, University of Tennessee at Martin, Martin, TN

*Abstract:* Northwest Tennessee falls outside of the karst region that predominates the rest of Tennessee and the surrounding areas. However, even with the lack of caves, the region is home to a unique lake and wetland area, known as Reelfoot Lake, which attracts many bats to the area. The goal of this study was to determine the effect of shore habitat type and location on bat activity and species richness at Reelfoot Lake. We collected acoustic samples of bats at four shore locations, representing two habitat types (open shore versus channelized shore) at Reelfoot Lake, June – August 2012. We used a Wildlife Acoustics EM3 detector to record full-spectrum bat calls and the SonoBat automated classifier for the Kentucky-Tennessee region v3.1.4 to analyze species and activity. We found that location had a significant effect on both bat activity and species richness, with the east side of the lake having both higher activity and higher species richness. We concluded that the slower, more protected water that harbors dense emergent aquatic vegetation on the east side may have higher concentrations of aquatic insect emergences, thus increasing the activity of insect foraging bats.

## **WNS SURVEILLANCE AND MONITORING POPULATION TRENDS IN KENTUCKY: RESULTS OVER TWELVE YEARS**

BROOKE A. HINES, Kentucky Department of Fish and Wildlife Resources, Frankfort, KY,  
LARISA J. BISHOP-BOROS\*, Kentucky Department of Fish and Wildlife Resources,  
Frankfort, KY

*Abstract:* Over the past 14 years we have monitored population trends and movements of 15 Kentucky bat species, using the bat banding program, acoustic monitoring, and hibernacula surveys. This has given us an opportunity to examine trends in population, both pre and post white-nose syndrome (WNS). WNS is a devastating emergent, epizootic disease responsible for mass mortalities in hibernating North American bats. First detected in Kentucky within a Trigg County cave in April 2011, 51 caves in 17 counties are now confirmed with the syndrome or the causative fungus *Pseudogymnoascus destructans* (*P.d.*). Using preliminary 2014 hibernacula count data at seven WNS(+) caves, the largest declines occurred in little brown bats and tri-colored bats, whereas Indiana bats showed a smaller decline (<20%), two years after *P.d.* was confirmed at a site. Big-eared bat counts have continued to increase since 2002. We currently have 13,891 bands from 15 species in our database. To date we have recovered approximately 1,681 bands from 13 species, recording movements up to 296 km and across six state lines. We also present trends of winter and spring passive acoustic monitoring data (2010–2013) at the entrance of five hibernacula, four of which are *P.d.* positive. Winter bat activity occurred during every surveyed year at all five sites, but activity indices were highest during the winter of 2013, regardless of the year of first *P.d.* detection at those sites. These patterns indicate activity during mild winters may be normal for some species.

## **EVALUATING SEX-SPECIFIC FORAGING HABITS OF *NYCTICEIUS HUMERALIS* IN AN INTENSELY MANAGED FOREST**

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VIRGINIE ROLLAND, Department of Biological Sciences, Arkansas State University,  
Jonesboro, AR

THOMAS RISCH, Department of Biological Sciences, Arkansas State University, Jonesboro,  
AR

*Abstract:* Knowledge of species-specific requirements is essential to the development of adequate conservation initiatives, especially in landscapes intensely managed for forest resources. But, in general, there is a paucity of knowledge on the spatial habitat requirements of bats. So, our objective was to evaluate sex-specific foraging habits of the evening bat (*Nycticeius humeralis*), an abundant species in north-central Arkansas. We radio-tracked 39 evening bats (25 males & 14 females) from June 1 to August 14, 2013 at five different sites (i.e., Casteel Cemetery, Optimus, Big Spring Hollow, Lone Rock and Roasting Ear Creek) in the Sylamore Ranger District, Ozark National Forest. *N. humeralis* tends to exploit multiple, diurnal roosts and uses multiple core foraging areas. Although more female-specific data are needed, our 2013 observations suggest that males and females exploit different foraging areas during early summer. This evaluation of *N. humeralis* foraging habits will help determine if management regimes (established for *Myotis sodalis*) provide adequate foraging habitat for other species like *N. humeralis*, and more specifically for spatially, sexually segregated species.

## **TOWARD A WHOLE-ANIMAL CONSERVATION PARADIGM: A CASE STUDY OF THE AFRICAN ELEPHANT**

DAVID S. JACHOWSKI, Department of Fish and Wildlife Conservation, Virginia Tech, 106  
Cheatham Hall, Blacksburg, VA and Amarula Elephant Research Programme, School of  
Life Sciences, University of KwaZulu-Natal, Durban, South Africa

ROB SLOTOW AMARULA Elephant Research Programme, School of Life Sciences,  
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JOSHUA J. MILLSPAUGH, Department of Fisheries and Wildlife Sciences, University of  
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### **NOTE: PRESENTATION CANCELED**

*Abstract:* In the face of global change, ecologists and managers must not only respond to recent current threats, but predict how future biotic and abiotic changes will impact wildlife populations in the next several decades and centuries. To address such complex and difficult conservation questions, there is increasing evidence that monitoring must be integrated across multiple scales in order to identify the mechanisms that drive observed responses to changes. We present a framework to simultaneously monitor multiple intrinsic and extrinsic processes across a range of scales to both assess response of animals to their surrounding environment, and identify mechanism for those transition points of conservation concern – an approach we term whole-animal conservation. As a case study, we profile research we have conducted over the past decade on African elephants in South Africa. The active restoration of elephants to South Africa over the past 40 years has resulted in a dramatic increase in elephant numbers. However,



reintroduced elephants have exhibited aberrant behavioral problems (e.g., refuge, aggressive and streaking behaviors) that result in habitat destruction, and even the killing of rhinos and people. We used a combination of physiological, behavioral, and landscape-level monitoring to gain insight into African elephant ecology and how to mitigate human-elephant conflict. Our findings not only inform elephant restoration and management strategies, but highlight the potential to integrate multiple data streams to build ecological knowledge over time that can be used to identify sometimes cryptic mechanisms that can operate at multiple spatial and temporal scales. We suggest that given the availability of new technologies and analytical tools, a similar approach could be used to inform conservation of other species in the southeastern US and globally.

### **DIGITAL APPLICATION FOR BAT FIELD DATA COLLECTION**

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KAT A. CUNNINGHAM\*, Jackson Group, 3945 Simpson Lane, Richmond, KY

*Abstract:* Data management is a major component of bat research and is a very time consuming aspect of bat work that cannot be avoided. While very important, a lot of energy is wasted when you enter data for writing reports and permitting and problems can arise if there are any illegible data sheets. To alleviate this issue and to allow us to focus more on bat work, we have created a digital application to enter bat field data. Instead of writing out data on field sheets, you can enter it straight into your tablet and at the push of a button export a spreadsheet or a pdf straight to your computer. One feature added to help with bat identification is that the application will use your location to determine what species you are likely to find and provide you with their taxonomic characteristics. All of this is designed to get us back to what we are really in the field to do, catching bats.

### **BAT MORTALITY RELATED TO SINGLE-UNIT TURBINES**

PHILLIP JORDAN\*, Department of Biological Science, Arkansas State University, Jonesboro, AR

THOMAS RISCH, Department of Biological Science, Arkansas State University, Jonesboro, AR

*Abstract:* It is estimated between 666,000 and 888,000 bats are killed annually due to wind turbines. While these estimates are based on large wind facilities, little is known about the contribution of single-unit turbines to bat mortality. The objective of this study was to collect baseline data on bat mortality due to single-unit turbines in two Arkansas ecoregions. To address this objective, six single-unit turbines were surveyed using passive-acoustic monitoring, mist netting, and fatality searches during the summers of 2012 and 2013. Acoustic monitoring logged over 160,000 files for both seasons, of these files BCID East identified 17,978 (12 species) as bat pulses. Landscape characteristics, such as, local-water source, agricultural lands, and high wood density showed a positive association with bat activity. Mist netting resulted in the capture of 100 bats representing 10 species. Mortality was only observed at a single turbine during the course of the survey. Twenty bats (three species) were found fatally wounded at Diaz, AR. Based on observations of this preliminary study we suggest assessment of bat activity using the above methods prior to installation of single-unit turbines.

## **BAT OCCURRENCE IN BOTTOMLAND HARDWOOD FORESTS TREATED FOR DESIRED FOREST CONDITIONS IN THE MISSISSIPPI ALLUVIAL VALLEY**

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Austin State University, Nacogdoches, TX

CHRISTOPHER E. COMER, Arthur Temple College of Forestry and Agriculture, Stephen F.

Austin State University, Nacogdoches,

DANIEL J. TWEDT, US Geological Survey – Patuxent Wildlife Research Center, Vicksburg, MS

*Abstract:* Desired Forest Conditions (DFCs) are a set of recommendations proposed by the Lower Mississippi Valley Joint Venture for managing bottomland hardwood forests for priority wildlife species. DFC treatments may be achieved through even and uneven-aged timber harvests and thinnings. Although DFC treatments have been shown to benefit songbirds, the effect on bats has not been previously studied. To examine bat community response to DFC treatments, we surveyed 14 federal- and state-managed lands in the Mississippi Alluvial Valley. From 15 April 2013 to 9 August 2013, for each area we conducted acoustic sampling using 2 paired Pettersen D500X acoustic recording devices in each of 3 treatment and 3 control units for 6 consecutive nights. We identified echolocation calls to species using a combination of SonoBat™ version 3.1 Northeast software and manual verification of call sonographs. Eight species were identified, with Seminole and eastern red bats (*Lasiurus sp.*), evening bats (*Nycticeius humeralis*), and tri-colored bats (*Perimyotis subflavus*) the most common species. Detection probability and occupancy by species were calculated using program PRESENCE, and will be related to forest stand characteristics to achieve DFCs.

## **A CONSERVATION STRATEGY FOR RAFINESQUE'S BIG-EARED BAT AND SOUTHEASTERN MYOTIS**

MICHAEL J. LACKI, Department of Forestry, University of Kentucky, Lexington, KY

MYLEA L. BAYLESS, Bat Conservation International, Austin, TX

*Abstract:* Disjunct distributions, limited data on population status and an incomplete understanding of the life history requirements of Rafinesque's big eared bat (*Corynorhinus rafinesquii*) and southeastern myotis (*Myotis austroriparius*) have served as impediments to long-term conservation of these two bats. Both species are syntopic in their affinity for bottomland hardwood forests of southeastern United States, and both roost in hollows of large-diameter live and dead black gum (*Nyssa sylvatica*), water tupelo (*N. aquatica*), and baldcypress (*Taxodium distichum*) trees, sometimes roosting temporally or spatially in the same trees. This commonality in habitat use, coupled with evidence for declines in mature bottomland hardwood forests across the southeast, has led to concern over the long-term survival of these bat species. These concerns precipitated efforts on behalf of Bat Conservation International, Inc., and the Southeastern Bat Diversity Network to form a Technical Advisory Group, spearheaded by the Rafinesque's Big-eared Bat Working Group, to hold a series of meetings in 2008 and 2009 which brought together bat experts across the southeast region to formulate an approach to development of a conservation strategy for these two species that could be used to facilitate their management and conservation in the absence of protected status at the federal level. This presentation covers an overview of the content, approach, and short- and long-range goals of this conservation strategy.

## **NABat – THE NORTH AMERICAN BAT MONITORING PROGRAM**

SUSAN LOEB, US Forest Service, Clemson, SC

JEREMY COLEMAN, US Fish & Wildlife Service, Hadley MA

LAURA ELLISON, USGS, Fort Collins, CO

THOMAS RODHOUSE, National Park Service, Bend, OR

THOMAS INGERSOLL, Department of Defense, Aberdeen, MD

JONATHAN REICHARD, US Fish & Wildlife Service, Hadley, MA

CORI LAUSEN, Wildlife Conservation Society Canada, Kaslo, BC

*Abstract:* Bats in North America are facing unprecedented threats including White-Nose Syndrome, wind energy development, habitat loss and fragmentation, and climate change. Until now there has been no coordinated monitoring program to track changes in their populations in response to these threats. The North American Bat Monitoring Program (NABat) has been under development since 2012 and will be operational in 2014. NABat will provide the statistical, biological and administrative architecture for coordinated bat population monitoring that will promote effective decision-making and long-term viability of bat populations across the continent by providing robust data on changes in bat distributions and abundance. The sampling framework is comprised of 10 x 10 km grids. A spatially balanced design will be used to select grid cells within each state. The primary data sources for the monitoring program are maternity and hibernacula counts, and acoustic data collected along driving transects or at stationary points across the landscape. Data will be housed and managed in the Bat Population Database (BPD) at the USGS Fort Collins Science Center and once sufficient data are available, NABat will produce periodic “State of North America’s Bats” reports.

## **POPULATION DENSITY, ABUNDANCE AND DETECTION PROBABILITY OF URBAN MESOPREDATORS**

JASON V. LOMBARDI, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, TX 75965

CHRISTOPHER E. COMER, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, TX 75965

DANIEL G. SCOGNAMILLO, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University, Nacogdoches, TX 75965

*Abstract:* The coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and bobcat (*Lynx rufus*) Grey Fox (*Urocyon cinereoargenteus*) are medium-sized carnivores that have become more common in and around urban areas. From November 2013 to January 2014, we conducted an 8-week camera mark-recapture study to estimate abundance, population density and detection probability of coyotes, red fox, bobcats, and grey fox in the city of Nacogdoches and immediate surrounding area. We set two Cuddeback Cameras at 120 sites (rotating 30 sites every two weeks) across a 123.67 km<sup>2</sup> within the study area. After 3360 trap nights, we identified 61 coyotes, 25 red foxes, and 16 bobcats, and 10 grey foxes. We used spatially explicit capture-recapture models using Maximum Likelihood (ML) estimators in Program DENSITY to estimate density and abundance. Estimated population densities, were 1.6 coyotes per km<sup>2</sup>, 0.93 red fox per km<sup>2</sup>, 0.48 bobcats per km<sup>2</sup>, and 0.18 grey fox per km<sup>2</sup>. We report one of the highest urban coyote densities in the literature, while bobcat and red fox densities were consistent with previous urban studies. These data represent the first density estimates for urban grey foxes.

## **THE SOUTHEASTERN BAT IN MISSISSIPPI: A PRELIMINARY ASSESSMENT**

CHESTER O. MARTIN, Retired, Mississippi Bat Working Group, Vicksburg, MS

ALISON S. McCARTNEY, Southeastern States Field Office, U.S. Bureau of Land Management,  
Jackson, MS

KATHY SHELTON, Museum of Natural Science, Mississippi Department of Wildlife,  
Fisheries, and Parks, Jackson, MS

BECKY ROSAMOND\*, North Mississippi Refuges Complex, U.S. Fish and Wildlife Service,  
Grenada, MS

*Abstract:* The southeastern bat (*Myotis austroriparius*) is listed as an S1/S2 species (critically imperiled and vulnerable to extinction) by the Mississippi Natural Heritage Program. However, few studies had been conducted on the species in Mississippi prior to the early-2000s and little information was available on its distribution, population status, and habitat use. Historic records documented southeastern bats from only six Mississippi counties. Recent surveys have verified occurrence in additional localities and indicate that the species is more common than previously thought. Large populations (2,000 – 6,500 individuals) have been reported from elongated culverts in east-central Mississippi and abandoned cisterns in the southwestern part of the state. Additionally, populations have been found in three caves in eastern Mississippi and at bridges and culverts in several regions. Maternity colonies have been reported from cavity trees in bottomland forests or artificial roosts associated with water. Additional surveys are needed to better understand population structure and habitat use. Although the status of southeastern bats appears to be less critical than previously thought, removal of potential roost sites and habitat destruction along riparian feeding corridors continue to pose a threat to local populations.

## **BAT SURVEYS IN THE KENTUCKY PURCHASE: WHAT DOES ACOUSTICS AND NETTING BUY PRE-WNS?**

SANTIAGO MARTIN\*, U.S. Fish and Wildlife Service, Frankfort, KY

MIKE ARMSTRONG, U.S. Fish and Wildlife Service, Frankfort, KY

W. MARK FORD, U.S. Geological Survey, Virginia Cooperative Fish and Wildlife Research  
Unit, Blacksburg, VA

TERRY L. DERTING, Department of Biological Sciences, Murray State University, Murray,  
KY

*Abstract.* July- August 2013, we examined data from mist-netting, permanent acoustic stations, and 5 transects of multiple acoustic stations in and around Ballard County WMA in western Kentucky. Netting and acoustics documented *Lasiurus borealis*, *Myotis austroriparius*, *Myotis grisescens*, *Myotis septentrionalis*, *Myotis sodalis*, *Nycticeius humeralis*, and *Perimyotis subflavus*. Presence of *Lasiurus cinereus*, *Myotis leibii* and *Myotis lucifugus* were only determined acoustically, whereas *Corynorhinus rafinesquii* was only documented by netting. In this pre-WNS environment, mist-netting had higher detection probabilities for the three species of primary interest, *Myotis grisescens*, *Myotis septentrionalis* and *Myotis sodalis*. However, detection probabilities from acoustics were sufficiently high and levels of effort needed to determine site absence or presence were still more efficacious than netting. Analysis of permanent acoustic stations suggest that detection probabilities for *Myotis grisescens* and *Myotis sodalis* peaked in late July, indicating that acoustic surveys later in the summer will need to incorporate expanded effort. Acoustic detection probability for *Myotis septentrionalis* was

constant through August. Impacts from WNS on detection probabilities are untested locally, however, data from the Northeast and Appalachians suggest that mist-netting detection probability will decline proportionally more than will acoustics.

### **SUMMER BAT DEMOGRAPHICS IN KENTUCKY REMAIN STABLE THROUGH THE EARLY YEARS OF WHITE-NOSE SYNDROME.**

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TERRY DERTING, Department of Biological Sciences, Murray State University, Murray, KY

CHRISTOPHER MECKLIN, Department of Mathematics and Statistics, Murray State University, Murray, KY

*Abstract:* White-nose syndrome (WNS) has spread throughout most of the eastern United States causing high mortality in cave-dwelling bats in northeastern states; however, impacts in more southern states are unclear. White-nose syndrome was first observed in Kentucky in April 2011 and no signs of high mortality were observed through 2013. The purpose of our research was to determine if capture rates differed pre- and post-WNS in Kentucky. We used statewide bat capture records from Indiana bat surveys, conducted from 2004–2013 in Kentucky. We pooled data into three disease periods: pre-WNS (2008–2009), WNS detection (2010–2011), and post-WNS (2012–2013). We tested the effect of disease period on capture rates using separate negative binomial models for each of three categories of bats: congregating cave-dwelling, non-congregating cave-dwelling, and non-cave dwelling species. There were no significant differences in capture rates between the disease periods within any category of bat species. Furthermore, capture rates did not differ pre- and post-WNS for the most commonly captured species. The results suggest that WNS has not had a measurable impact on summer bat populations during the first two years of its documented appearance in the state.

### **INDIANA BAT ROOST HABITAT SELECTION IN THE SOUTHERN APPALACHIAN MOUNTAINS**

JOY O'KEEFE\*, Indiana State University, Terre Haute, IN

SUSAN LOEB, USDA Forest Service, Southern Research Station, Clemson, SC

*Abstract:* The federally endangered Indiana bat (*Myotis sodalis*) is being impacted by white-nose syndrome and habitat loss across much of its range, and climate change may pose additional threats. A better understanding of summer roost ecology of the species may facilitate conservation of healthy populations and the overall survival of the species. Our goal was to identify the multi-scale characteristics of maternity roost habitat for Indiana bats in the southern Appalachian Mountains. From May–August 2008–2012, we attached 0.32–0.42 g radio transmitters to adult females and juveniles, and measured characteristics of trees, 0.1 ha plots, and landscape attributes for 69 day roosts and associated random trees. We used an AIC approach to compare 15 candidate conditional logistic regression models. The best model, which carried 95% of total model weights, had 3 important terms. Indiana bats showed strong selection for yellow pine snags that were significantly taller than random trees and in areas with a greater number of snags within 0.1 ha. In our study area, Indiana bats are responding to a pulsed resource, dead yellow pines. Further, tree structure and switching opportunities appear to be

more important for roost selection than larger scale factors. Management practices that create or preserve large pine snags should aid in the management and recovery of the Indiana bat.

### **FOREST MANAGEMENT AND NORTHERN LONG-EARED BATS**

ROGER W. PERRY, Southern Research Station, Forest Service, United States Department of Agriculture, Hot Springs, AR.

*Abstract:* The northern long-eared bat (*Myotis septentrionalis*) is a candidate endangered species. In light of its potential listing, forest managers are increasingly interested in the effects of forest-stand management on northern long-eared bats. Here, I discuss effects of forest management practices on summer roosting and foraging ecology. During summer, maternal females tend to roost mostly in large snags found in open-forest conditions brought about by thinning, midstory reduction, and burning. Females select roost locations with fewer midstory trees than males, and these open-forest conditions have less clutter and greater solar exposure than sites with abundant midstory trees. Males often roost in small midstory trees, which are more abundant in unmanaged forests and streamside zones. Not much information is available on foraging habitats used by this species. Studies have found they avoid large open areas such as clearcuts for foraging and typically forage under forest canopies. Studies of other species found bats forage more in small openings associated with group-selection management than in surrounding forest. Activities such as thinning and burning that reduce structural forest clutter tend to increase bat use for foraging. Consequently, thinning, midstory reduction, and burning likely improves habitat for female roosting and foraging by both sexes. Because males often roost in small midstory trees, maintaining a mix of mature forest habitats, including stands with abundant midstories or unharvested streamside zones would likely maintain habitat for northern long-eared bats.

### **DESCRIBING INDIANA BAT ROOSTS USING DENDROCHRONOLOGY**

JOSEPH L. PETTIT\*, Department of Earth and Environmental Systems, Indiana State University, Terre Haute, IN

JOY M. O'KEEFE, Department of Biology, Indiana State University, Terre Haute, IN

JAMES H. SPEER, Department of Earth and Environmental Systems, Indiana State University, Terre Haute, IN

*Abstract:* Indiana bats often use snags as roosts but we are limited in our knowledge of snag ages and time between death and use as a roost. Height and girth are typical measures of roost trees, but these measures do not yield data on roost age or decay time. Our objective was to report age at death of Indiana bat roost trees and the time a snag is dead before housing bats. We used dendrochronological methods to sample Indiana bat roosts, 35 in central Indiana and 31 from Tennessee and North Carolina. The median age of roosts in Indiana is 102 years. Primary roosts ranged in age from 58-231 years; four of seven primary roosts were early successional trees. We show that younger, early successional species of trees are used as primary roosts, which has implications for how we manage forests for Indiana bats. In the future, we plan to determine stand age from dendrochronological methods, plus gain information on gap dynamics and, thus, gap infilling, which may relate to roost use by bats. Tree ring data may also help us to understand the influence of nutrient inputs from bat guano on gap dynamics.

### **TEXAS MOUSE: JUNIPER OBLIGATE OR HABITAT GENERALIST?**

CHRISTOPHER J REDDIN, Arkansas Cooperative Fish and Wildlife Research Unit,  
Department of Biological Sciences, University of Arkansas, Fayetteville, AR

*Abstract:* The Texas mouse (*Peromyscus attwateri*) is reportedly a rocky habitat specialist that has been poorly studied in the Ozark Mountains. Other researchers in Missouri, Texas, and Oklahoma found Texas mice primarily in juniper glades associated with rocky cliff habitats. The white-footed mouse (*P. leucopus*) is associated with juniper glades outside of the Texas mouse's range and in captivity the two species competitively displace one another. We tested whether Texas mice are responding to the juniper or the substrate as well as whether Texas mice are sympatric with white-footed mice in the field. We used Sherman and Tomahawk live traps to sample small mammals along 22 transects in 6 habitats over the course of a year at Pea Ridge National Military Park in northwestern Arkansas. Most Texas mice (85.5%) were caught in areas with juniper forest that was not glade-like or along rocky bluffs in oak stands. No Texas mice were captured in open grasslands or, strangely, juniper habitat along rocky bluffs. Texas mice were infrequently caught in the same locations as white-footed mice (20% of locations trapped). Additional research is needed to test the degree of competitive exclusion between Texas and white-footed mice as well as why Texas mice were not found along the juniper-dominated bluffs.

### **TRACKING SPRING MIGRATING FEMALE INDIANA BATS TO PREVIOUSLY UNKNOWN MATERNITY COLONIES**

PIPER ROBY\*, Copperhead Consulting, Paint Lick, KY  
MARK GUMBERT, Copperhead Consulting, Paint Lick, KY

*Abstract:* Little is known about bat migration, but a few studies on Indiana bats (MYSO) throughout the range have begun to shed light on the mystery. Thirty-eight of 49 female MYSO collected from Rose Cave in White County, TN were radio-tagged in April 2013. Mean weight of all female MYSO was  $6.9 \pm 0.1$  g ( $\bar{x} \pm SE$ ). Sixteen radio-tagged bats were detected after release (42%) and 2 were actively tracked as they migrated. Six new summer colonies were confirmed from this effort ( $\bar{x} = 169.4$  km from hibernaculum) and 1 summer colony documented in 2012 in Cleburne County, AL was confirmed as a maternity colony. The six new summer colonies identified and the distance from Rose Cave were: 1 in Holly Springs National Forest, Benton County, MS (368 km SW); 1 housing at least 2 radio-tagged bats in McNairy County, TN (300 km SW); and 4 colonies housing at least 7 radio-tagged bats in Wilson County, TN (range: 75 – 92 km NW). Average migrating speed was  $20.7 \pm 0.6$  km/hr over 5 nights and  $18.2 \pm 0.7$  km/hr over 1.5 nights for the MS and McNairy Co. bats, respectively. Twenty-three roosts of 11 tree species were identified. Mean DBH was  $43.6 \pm 2.9$  cm, mean height was  $16.5 \pm 1.1$  m. Emergence counts were conducted and bats were tracked through 15 May in Tennessee and Alabama to confirm the presence of maternity colonies.

## **TAKING ATTENDANCE FOR BATS: WHO'S OUT THERE?**

VANESSA G. ROJAS\*, Indiana State University, Terre Haute, IN

JOY M. O'KEEFE, Indiana State University, Terre Haute, IN

*Abstract:* It is crucial that we understand the capabilities and limitations of survey methods for bats. For example, some species may travel at different heights and some may emit calls more often or louder than others. These differences, what we don't know about bat behavior, plus the challenges of working in a forest where bats may be not be conspicuous, are important to consider when surveying bat populations. Our goal was to determine if probability of detection varies by bat phonic groups (Low, Mid, Myotis) when employing two different sampling methods, acoustic and mistnet surveys. We sampled one night/site, 21:00-02:00 EDT, at 18 sites using simultaneous mistnet and acoustic surveys from 19 May - 29 July 2013. We used Anabat SD2s; 2m high microphones were directed 35° across the road corridors we mistnetted. Acoustic data were analyzed using Bat Call ID v2.6a. Preliminary analyses show that probability of detection for each group varies by method. Myotis bats represented 73.8% of acoustic files, but only 16.2% of captures. Only 3.4% of acoustic files were identified as Mid frequency bats, which comprised 41.5% of captures. Low frequency bats were 22.8% of the calls identified and 42.3% of captures. We plan to use occupancy models to test the effects of temperature, humidity, vegetation and other factors that may explain differences in detection probabilities for the two sampling methods.

## **A PHENOLOGICAL STUDY OF BAT COMMUNITIES IN SOUTHERN MISSISSIPPI CAVES**

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DAVID C. BECKETT, Department of Biological Sciences, The University of Southern Mississippi, Hattiesburg, MS

*Abstract:* Mississippi is generally not known for its caves and consequently its cave flora and fauna remain largely unstudied. From fall 2010 to winter 2013 we studied the bat populations in the three largest caves in Mississippi. The most common (and only) species found in these caves were *Myotis austroriparius* and *Perimyotis subflavus*. I collected monthly data on the number of bats per species, behaviors and locations of the bats within the caves as well as atmospheric data at selected positions within each cave. All three caves were found to have significant temperature differences between seasons (winter<fall=summer). Two of the caves also showed temperature differences between some internal locations. *Perimyotis subflavus* was found in significantly higher numbers during winter and individuals were usually in torpor. However, an experiment in winter with "marked" (by nearby strings) *P. subflavus* revealed that the majority of these bats did not remain in their original positions for more than two days. In contrast, *M. austroriparius* was found in significantly higher numbers in the summer than winters. Two of the caves were used as maternity roosts by *M. austroriparius*. The largest cave in Mississippi, which unfortunately is highly vandalized, usually contained ~8,000 *Myotis austroriparius* during the summer months.



## **EFFECTS OF HIERARCHICAL ROOST REMOVAL ON NORTHERN BAT ROOSTING ECOLOGY**

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W. MARK FORD, U.S. Geological Survey, Virginia Cooperative Fish and Wildlife Research  
Unit, Department of Fish and Wildlife Conservation, Blacksburg, VA USA

ERIC R. BRITZKE, U.S. Army Engineer Research and Development Center, Environmental  
Laboratory, Vicksburg, MS USA

*Abstract:* Conservation of summer maternity habitat is considered critical for forest-roosting bats, yet how roost loss affects bats is poorly understood. We examined this issue by identifying and monitoring 3 northern bat maternity colonies on the Fort Knox Military Reservation, Kentucky, before and after targeted roost removal. We designated two treatment groups; a primary roost removal colony wherein we mechanically removed a single primary roost and a secondary roost removal colony wherein we removed 23% of known secondary roosts. Pre-removal, we tracked 54 female northern bats to 108 roosts. Post-removal, we tracked 67 female northern bats and identified 113 new roosts. We found that colony location and space use was highly similar between years but patterns of roost use within these areas differed. Roost use patterns of our secondary roost removal treatment colony were dissimilar as a result of treatment impacts, but roost use by our control and primary removal colonies appeared to be most related to bat reproductive condition. Roost species selection patterns were consistent between years and roosts did not differ substantially between years. Our results suggest that northern bats may be tolerant of maternity site disturbance.

## **FOREST HABITAT RELATIONSHIPS OF THE NORTHERN BAT DERIVED FROM LONG-TERM RESEARCH ON THE FERNOW EXPERIMENTAL FOREST, WV**

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ANDREW B. KNIOWSKI, Department of Fish and Wildlife Conservation, Virginia Tech,  
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JANE L. RODRIGUE, USDA Forest Service Northern Research Station, Princeton, WV

W. MARK FORD, U.S. Geological Survey, Virginia Cooperative Fish and Wildlife Research  
Unit, Department of Fish and Wildlife Conservation, Blacksburg, VA

*Abstract:* Because of its poorly defined, generalist forest habitat relationships, proposed listing of the northern bat (*Myotis septentrionalis*) will present considerable challenges in the upcoming years to natural resource managers. Research on the foraging and roosting ecology of the northern bat has been conducted on the Fernow Experimental Forest, West Virginia for the past 15 years, providing one of the few comprehensive high quality data sets available for this species. We used these data to develop models of the forest-landscape relationship of the northern bat using two presence-only modelling approaches, maximum entropy and maximum likelihood. Both approaches produced outputs that were biologically relevant or easily caveated by known data limitations and biases, but maximum likelihood methodology produced superior output. Our models highlight the importance of landform index and forest type in roosting habitat selection and the difficulties associated with modelling probability of presence using presence only data derived from acoustic sampling.

**BAT USE OF ABANDONED MINES IN SOUTHERN ILLINOIS, WITH AN EMPHASIS ON THE ENDANGERED INDIANA BAT AND THE PROPOSED ENDANGERED NORTHERN LONG-EARED BAT.**

BRADLEY J. STEFFEN, TRC Companies, Inc., Cincinnati, OH

TIMOTHY C. CARTER, Ball State University, Muncie IN

*Abstract:* With the proposed listing of the northern long-eared bat as endangered, it is increasingly important to gather baseline data regarding species occurrence and habitat preferences. From 2003-2007, a total of 110 surveys of 45 abandoned microcrystalline silica mines in southern Illinois were systematically conducted for the presence of hibernating bats. This mining complex provides suitable hibernation habitat for six species of bats, including the federally endangered Indiana bat as well as the proposed endangered northern long-eared bat. Over the course of the study, a total of 75,067 bats representing six species were observed hibernating in 43 of the 45 mines surveyed, including 68,325 Indiana bats and 2,980 northern long-eared bats. While Indiana bats were observed in a total of 12 mines, a majority (87%, n=59,501) were observed in Magazine Mine. Conversely, northern long-eared bats were observed in 36 mines with only 32% (n = 944) of the observed individuals located in Magazine Mine. This mining complex has been, and continues to be, an important resource for hibernating bats. Most mines, regardless of size experienced significant population growth over the course of this study. The observed population growth is occurring in all five species of bats that regularly hibernate in southern Illinois.

**BAT COMMUNITY COMPOSITION AND ITS RELATIONSHIP TO STAND STRUCTURE IN A BOTTOMLAND HARDWOOD FOREST OF EAST TEXAS**

CARLA J. WEINKAUF\*, Arthur Temple College of Forestry and Agriculture, Stephen F.

Austin State University, Nacogdoches TX

CHRISTOPHER E. COMER, Arthur Temple College of Forestry and Agriculture, Stephen F.

Austin State University, Nacogdoches TX

WARREN C. CONWAY, Arthur Temple College of Forestry and Agriculture, Stephen F. Austin

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*Abstract:* Although forest stand structure and composition affect chiropteran communities by affecting roosting and foraging habitat, these relationships are poorly understood for most species. We characterized the bat community and related it to key stand structural characteristics at the Old Sabine Bottom Wildlife Management Area (OSBWMA) in Smith County, TX. We conducted acoustic sampling using Pettersson D500X monitors from April 19, 2013 to August 26, 2013. We sampled 27 points for 6-10 consecutive nights during each of two separate calendar time frames (early and late season). We recorded 8,293 bat calls and identified 5,380 (65%) to species using a combination of SonoBat™ software and manual examination of call sonographs. This included calls of 10 bat species. The most common species included Seminole and eastern red bats (*Lasiurus* sp.), evening bats (*Nycticeius humeralis*), hoary bats (*Lasiurus cinereus*), tricolored bats (*Perimyotis subflavus*), and southeastern myotis (*Myotis austroriparius*). We compared bat occurrence to key forest stand structural characteristics to determine how fine scale habitat features influence bat activity.

## **SURVIVAL AND CAUSE-SPECIFIC MORTALITY OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) FAWNS IN URBAN AND RURAL AREAS**

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TIMOTHY C. CARTER, Department of Biology, Ball State University, Muncie, IN

CHAD M. STEWART, Indiana Department of Natural Resources, Bloomington, IN

*Abstract:* Urban populations of white-tailed deer (*Odocoileus virginianus*) are increasing in many areas throughout their range. Expansion of urban development and residential suburbs provides white-tailed deer with suitable habitat that is conducive to rapid increases in population growth along with increased risk of deer-vehicle collisions, personal property damage, and elevated incidences of zoonotic diseases. Assessment of fawn survival and cause-specific mortality is important for understanding the population dynamics in these areas. Comparisons between urban and rural populations may provide additional insight about the factors that affect these populations. We captured and radio-collared 47 fawns (29 in urban areas and 18 in rural areas) from 22 May to 15 June 2013. Fawn survival was monitored a minimum of twice weekly using radio-telemetry through 2013. Primary cause of mortality was vehicle collision in urban areas, and hunting in rural areas. Other causes included abandonment and predation events. This information may help explain the population density differences in urban and rural areas, and help determine which management strategies may work the most effectively.

## **USING PUBLIC AWARENESS TO ASSIST IN LOCATING WHITE-TAILED DEER FAWNS FOR RESEARCH**

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TIMOTHY C. CARTER\*, Department of Biology, Ball State University, Muncie, IN

CHAD M. STEWART, Indiana Department of Natural Resources, Bloomington, IN

*Abstract:* Radio-collaring of white-tailed deer (*Odocoileus virginianus*) fawns helps managers and biologists to understand the population dynamics in deer herds. Methods for locating and capturing newborn white-tailed deer fawns are well documented. Conducting ground searches in efforts to locate neonates requires considerable resources in terms of time and personnel. Urban areas can have additional difficulties such as land access and public awareness. Involving community citizens in scientific research can be beneficial to both citizens and researchers. In efforts to collar urban fawns, we implemented a public involvement strategy to promote support for the project and to aid researchers in locating fawns. This strategy used two main modes of directly communicating with the public including website/email and a phone hotline. We raised public awareness of the project through local newspaper articles, radio interviews, mail fliers, community events, and via word of mouth. During this study we captured and radio-collared 47 fawns in 2013. Of those, 32 were captured as a result of public reports. Time spent on urban fawn capture was minimal when compared to time spent on rural fawn capture. Involving communities in research-based science not only promotes learning and education but can also reduce efforts and costs for conducting urban wildlife research.

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