Nightwing News

The Newsletter of the Southeastern Bat Diversity Network

Volume 103, Number 2 December 2013

PRESIDENT'S ADDRESS
Joy M. O'Keefe

As we near the Winter Solstice, the first official day of winter, bat biologists around the Southeast are gearing up for winter cave surveys. Six southeastern states received WNS funding from USFWS, some of which will go to winter cave surveys. Two WNS-related outreach products were recently released – a poster on how agencies are responding to the disease, and the second installment of *The Battle for the Bats* video. Both are available via this link: http://whitenosesyndrome.org/news.

The 2013 SBDN Bat Blitz was a huge success! Thanks to host Shea Hammond and others from the Ozark Plateau National Wildlife Refuge for hosting this event, which drew about 100 folks from 18 states, and tallied over 700 captures and 9 species. Topping the list were eastern red bats, tri-colored bats, northern long-eared bats, and evening bats. Ozark big-eared bats and gray bats were also captured. In lieu of a traditional blitz in 2014, the SBDN Bat Blitz Committee is considering the idea of a multi-state blitz. Check the SBDN webpage (www.sbdn.org) for info or look for an update at the 2014 meeting.

On 13-14 February 2014, we'll have the 19th Annual Meeting of the Southeastern Bat Diversity Network and the 24th Colloquium on the Conservation of Mammals in the Southeastern U.S. Our hosts are Chris Comer and Warren Conway at Stephen F. Austin State University in Nacogdoches, Texas. More info on the meeting, including a call for abstracts, will be available on our website.

One of the highlights of the February meeting will be the unveiling of the *Corynorhinus rafinesquii*/*Myotis austroriparius* Conservation Strategy. Producing this strategy has been a collaborative effort between Bat Conservation International and SBDN, with Past-President Mike Lacki taking the lead on authoring the document. In February, Mike will present the strategy to our membership and BCI will have printed copies for distribution (a free electronic version will be posted online).

Undoubtedly, the proposed listing of northern long-eared bats as an endangered species will be another topic of discussion during the February meeting. The USFWS is seeking public comments on the species' biology, conservation measures, potential impacts or threats, and potentially critical habitats. Comments may be submitted until **2 January 2014** to www.regulations.gov, or search www.fws.gov for more information.

In their status review for eastern small-footed bats, USFWS noted that this species is often underrepresented in summer surveys and overlooked during winter surveys; thus, effective monitoring for this species is a priority. At the *Myotis leibii* Working Group meeting, which will take place in Texas just before the SBDN meeting, we plan to discuss effective means for summer monitoring and knowledge gaps that need to be filled to better manage for these bats.

Concerns about the status of these and many other species are not relegated only to the Southeast. Many species are distributed across regional and international boundaries, but we have not yet established conservation priorities at larger scales. BCI and the Organization for Bat Conservation are spearheading an effort to revive the North American Bat Conservation Alliance (NABCA). In 2014, I will represent SBDN in a series of conference calls with representatives from the Latin America Bat Conservation Network (RELCOM), WBWG, MWBWG, NEBWG, and Canada to facilitate collaboration and coordinate priorities. Please attend the SBDN Business Meeting in February for an update on our progress with NABCA and plans for gathering data from SBDN member states in the future.

I hope you all have a safe and happy holiday season.

In This Issue

Southeastern Bat Diversity Network
Executive Committee
Mid-Year Conference Call Meeting Minutes
November 6, 2013

Attendees:

Joy O'Keefe, President
Brian Carver, President Elect
Mike Lacki, Past President
Tim Carter, Treasurer
Piper Roby, Secretary
Steve Samoray, Member at Large
Chris Comer, 2014 SBDN/ Colloquium host, guest

Action Items

AI 1: Carter will work with Brooke Hines to complete the write-up from the 2011 joint annual meeting. (Unfinished from previous AIs)

AI 2: Roby will put votes/decisions in an Excel file with logical headings for ease of sorting. O'Keefe will assist and advise.

AI 3: Lacki will call JD Wilhide to let him know that changes to the Newsletter will be sent to Wilhide and the student assistant so that there is a double check that changes get made.

AI 4: Carter will provide a list of attendees from the last three annual meetings to the Membership Committee, i.e., Chris Comer (Unfinished from previous AIs).

AI 5: Steve Burnett should get an announcement of the student awards application in the spring newsletter and on the list serve earlier in the year. O'Keefe will work on this with him.

AI 6: O'Keefe and Lacki will discuss what information to present to the membership about the Federal Advisory Committee so the membership can decide whether to table to committee or if someone wants to chair it.

AI 7: Carter will send an example of a Treasurer's report intended for the Newsletter to O'Keefe and Lacki for their input.

AI 8: McMurray will check with both Tom Risch and Blake Sasse to see if they are still/would like to continue assisting with the annual audit. (Unfinished from previous AIs). (O'Keefe will follow up)

AI 9: O'Keefe will tell Awards Committee that it is their responsibility to create protocol for awards (e.g., how to recognize the person, wording for what the award would be) and the President will "rubber stamp" the approval.

AI 10: O'Keefe tell Awards Committee that it is their responsibility to determine what the criteria are for students to receive the travel award

AI 11: Samoray work with Trina Morris to update blitz data

AI 12: O'Keefe will create a protocol for how to deal with SBDN's position on issues that are brought to us and pass it around to the EC for comments.

AI 13: O'Keefe will talk to BCI about chipping in for cost of helping with Mike Lacki's travel.

AI 14: Lacki will talk with Steven Castleberry and Susan Loeb about the finances of the big-eared bat symposium publication to see if they can be used for printing costs.

AI 15: Comer will get a list together of who he would like to invite to talk about MYSE listing for the EC to review and help him contact the correct people.

AI 16: O'Keefe will check with Sybill Amelon to get her thoughts on the 2015 joint meeting

Call to order 1303 EST, President O'Keefe (Lacki joined at 1306 hrs and Comer joined at 1354 hrs)

2013 Feb Executive Committee and Board of Directors meeting action items:

- Carter/Hines 2011 meeting write up. AI 1: Carter will work with Brooke Hines to complete the write-up from the 2011 joint annual meeting.
- Past EC motions emailed to EC by Carter. AI 2: Roby will put votes/decisions in an Excel file with logical headings for ease of sorting. O'Keefe will assist and advise.
- Newsletter get proofed before gets sent out. AI 3: Lacki will call JD Wilhide to let him know that changes to the Newsletter will be sent to Wilhide and the student assistant so that there is a double check that changes get made.
- Carter send list of attendees sent to Membership Committee. AI 4: Carter will provide a list of attendees from the last three annual meetings to the Membership Committee, i.e., Chris Comer
- Burnett get student awards application in newsletter and list serve. AI 5: Steve Burnett should get an announcement of the student awards application in the spring newsletter and on the list serve earlier in the year. O'Keefe will work on this with him.
- Membership info transferred to Roby. Done
- WNS committee invited to bi-weekly national conference call. Done. Gabrielle Greater has been calling in.
- Federal Advisory Committee. AI 6: O'Keefe and Lacki will discuss what information to present to the membership about the Federal Advisory Committee so the membership can decide whether to table the committee or if someone wants to chair it.
- SBDN surplus funds. Work out money with bat blitz hosts and just put extra in surplus funds. Some events go over amount received, so can use extra funds to cover those costs, use it for paying taxes, hiring accounting help, etc.
- Treasurer report for Newsletter. AI 7: Carter will send an example of a Treasurer's report intended for the Newsletter to O'Keefe and Lacki for their input.
- Annual audit. AI 8: O'Keefe will follow up with McMurray to check with both Tom Risch and Blake Sasse to see if they are still/would like to continue assisting with the annual audit.

November 2013 Agenda

- Committee Reports:

Federal Lands – nothing to report

Awards Committee – A concern about how to best recognize Dr. Vuong has prompted discussion about determining a protocol for how to recognize award winners. There needs to be wording for ad hoc awards so there is something formalized when a nomination is made. It was decided that the Awards Committee would be responsible for determining this protocol and the President of SBDN would approve it. AI 9: O'Keefe will tell Awards committee that it is their responsibility to create protocol for awards (e.g., how to recognize the person, wording for what the award would be) and the President will "rubber stamp" the approval.
Similarly, a discussion about the eligibility of students to receive the travel award suggested options ranging from no criteria (i.e., anyone who gave a talk is eligible for the student travel award) to the student has to be at a university in the southeastern United States. The final suggestion for the Student Travel award was that the student's talk must have a connection to the SE, e.g., SE university, studying a southeastern species, but it is ultimately the Awards Committee decision. AI 10: O'Keefe tell Awards Committee that it is their responsibility to determine what the criteria are for students to receive the travel award

Bat Blitz Committee – the 2013 blitz was held in the Oklahoma Ozarks with 100 participants from 18 states. 735 bats of 9 species were caught: 329 LABO, 122 PESU, 99 MYSE, 96 NYHU, 41 EPFU, 3 LACI, 1 LASE, 38 MYGR, 6 COTO. The report has been submitted. Trina Morris said there is outdated blitz data on the website and Samoray will help her with that. 2014 blitz will be unique in that it will take place in several states for at least 2 nights from 4-10 September 2014. Morris will update us, but she is still looking for hosts for years beyond 2014. AI 11: Samoray work with Trina Morris to update blitz data

Website Committee – The SBDN email was hacked, but got fixed. Samoray and Aleida have teamed up and worked out a system of updating for website. EC thanks Samoray immensely for his role with the website.

WNS Committee – On behalf of the committee, Evan Pannkuk presented a WNS poster at the SEAFWA meeting in 2012, but it hasn't been updated since that meeting. Possible for it to be presented at the 2014 meeting in TX. Website is up-to-date per Luke Dodd's additions. Working on understanding federal protocols for WNS decontamination. One committee member traveled to Boise, ID for the annual meeting. Committee Member Gabrielle Greater is on bi-weekly national conference calls.

Database Committee – Susan Loeb is transferring data to USGS, but not done yet. SBDN will relinquish responsibility to national database for bat data collected.

Treasurer Report – O'Keefe delivered in Carter's place. Extra money was rolled into the Colloquium fund, and the deficit for the 2013 Bat Blitz is counteracted by the excess funds in that account. Funds in the general account will go to helping Lacki with travel expenses to the 2014 meeting. There is a sufficient amount of money in the student travel account and there will be a checkbox on the registration form for attendees to donate to the fund.

New Business

- Taking positions on issues

SBDN has been asked to sign other groups' petitions or their official stances in support of various issues. We discussed what kind of group we wanted to be and discussed the fact that the diversity of members makes it difficult for us to take an official stance on certain issues. AI 12: O'Keefe will create a protocol for how to deal with SBDN's position on issues that are brought to us and pass it around to the EC for comments.

- Miscellaneous financial issues

Carter says that it is difficult for meeting hosts to purchase required items, so he would like to get a separate credit card for them. A list of responsibilities will be sent along with the card.
The EC determined that the Treasurer, Tim Carter, is authorized to get a second credit card to send to meeting and blitz hosts.

- MYAU/CORA conservation strategy

SBDN will assist Lacki with travel costs to the 2014 annual meeting so that he can present the completed conservation strategy. The President has $500 in discretionary spending and there are sufficient funds in the general account. AI 13: O'Keefe will talk to BCI about helping with Lacki's travel. BCI has the document in its final form and there will be 200 copies printed. BCI is going to cover shipping to the non-game programs in the southeast. SBDN is going to provide $1000 to help with printing. There may be funds remaining from the Big-eared Bat Symposium in 2010. AI 14: Lacki will talk with Steven Castleberry and Susan Loeb about the finances of the big-eared bat symposium publication to see if we can use them for printing costs.

- 2014 meeting in TX

Chris Comer is going to ask the historic hotel near campus if we can get a government rate for hotel rooms, but if not, he will reserve a block of rooms at the Quality Inn, 5 miles from campus. There was discussion about what the theme of the meeting would be. It was decided that a regulatory session would be the most important to discuss the MYSE listing, for the most part. AI 15: Comer will get a list together of who he would like to invite to talk about MYSE listing for the EC to review and help him contact the correct people. Sonobat and Wildlife Acoustics want to have workshops after the meeting. SBDN isn't going to help coordinate any outside events, but we can give them information about where the meeting will be and the dates, so they can make their own arrangements.

- 2015 meeting in MO

The 2015 meeting is scheduled to be a joint meeting, but O'Keefe and Carver haven't heard anything from Sybill Amelon, who is supposed to be the meeting host. Several working groups are on board. Amelon mentioned making the 2015 meeting the first NABCA (North American Bat Conservation Alliance) meeting that involves Canada, the US, and Mexico. Several working groups would come together to identify regional conservation issues and develop broad scale priorities for the continent. Rob Mies said he'd lead the alliance effort, but the EC is not aware of any progress to date [update: O'Keefe spoke with Mies following the conference call. He and Mylea Bayless (BCI) are working on a request for participation that will go to regional working groups]. AI 16: O'Keefe will check with Sybill Amelon to get her thoughts on the 2015 joint meeting.

- Prioritizing conservation issues for SE bats

The Western BWG has conservation strategies and species priorities, but we don't have anything like that in the East. O'Keefe suggested we have a representative come to an SBDN meeting to tell us how they created their plan and kick start something similar in the east. Comer will put the topic on the list for the business meeting in 2014.

O'Keefe – no motions this meeting.

Motion to adjourn by Carver, seconded by Lacki: passed unanimously.

Meeting adjourned at 1505 hrs.

Addendum: Decisions, Motions (yeas-nays-abstentions), and Executive Actions from February 2013-November 2013, as compiled by Piper Roby and Joy O'Keefe for SBDN records:

- 7 March 2013, The EC passed a motion to create a SBDN Facebook page (4-0-1)
- April 2013: EC sent letters to all federal congressional representatives indicating our support for providing funding to State and Tribal Wildlife Grants Programs.
- May 2013: Update to the Canada/Mexico/United States Trilateral Wildlife Committee on bat conservation activities by SBDN and associated working groups
- May 2013: EC sent letter to San Antonio, TX mayor and other city officials to express support for protection of the area around Bracken Cave
- August 2013: SBDN was one of 1600 organizations to sign on to a letter to Congress regarding our support for State & Tribal Wildlife Grants Program, North American Wetlands Conservation Fund, Neotropical Migratory Bird Conservation Fund, Forest Legacy Program and Land and Water Conservation Fund
- Nov 2013: The EC determined that the Treasurer, Tim Carter, is authorized to get a second credit card to send to meeting and blitz hosts.

Treasurers Report – Fall 2013

One of the major services that SBDN offers to the bat community is holding and dispersing money for various functions and groups. Annually our two largest events are the Bat Blitz, and the Annual Meeting and Colloquium.

SBDN received and then dispersed almost $30,000 to the local hosts of the 2013 Bat Blitz. The 2013 SBDN/Colloquium Meeting cost over $16,000 all of which was covered by registration fees and sponsors.

The SBDN General Operations account has a current balance of $9,026.83. Membership dues remain our primary source of operating income. The largest general expense of this year is having our taxes prepared ($610). This will remain the case for the foreseeable future. Other regular expenses include presentation awards at the annual meeting and publication of our newsletter.

Table #1 - Banking Balance Summary

2013 Bat Blitz	1,630.06
2013 SBDN - Colloquium Meeting	3,665.41
Bat Blitz Funds	9,495.00
Big Eared Bat Symposium	4,334.25
Colloquium-meeting funds	12,405.29
IB Reward Account	529.16
NC Bat Working Group	521.00
SBDN - General Account	9,026.83
SBDN - Student Travel Award	5,026.82
TOTAL Bank Accounts	46,633.82
Cash Accounts	
Cash Box	281.40
TOTAL Cash Accounts	281.40
OVERALL TOTAL	**46,915.22**

Respectfully submitted: 12/10/2013 – By Tim Carter – SBDN Treasurer

12th Annual SBDN Bat Blitz
Ozark Plateau National Wildlife Refuge
Oklahoma
28 July – 1 August 2013

Submitted by:
Richard Stark
US Fish and Wildlife Service Biologist
Ozark Plateau National Wildlife Refuge

The Southeastern Bat Diversity Network's (SBDN) 12th Annual Bat Blitz was hosted by the Ozark Plateau National Wildlife Refuge (NWR) in Oklahoma from July 28th to August 1st, 2013. Roughly 100 participants from 18 states, including Arkansas, Florida, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Michigan, Mississippi, Missouri, New Mexico, New York, Ohio, Oklahoma, North Carolina, Tennessee, Texas, and Wisconsin volunteered their time for this landscape-scale survey for bats in the Ozark Highlands of northeastern Oklahoma. Over three consecutive nights, 28 sites within three counties in northeastern Oklahoma (Adair, Cherokee and Delaware; Figure 1) were sampled for bats. Netting sites were located within the Ozark Plateau NWR, wildlife management areas owned and managed by the Oklahoma Department of Wildlife Conservation, and lands owned by the Cherokee Nation of Oklahoma, the City of Tulsa, and The Nature Conservancy. In total, volunteers captured a record 735 bats representing nine different species, including the federally-listed endangered Ozark big-eared bat (*Corynorhinus townsendii ingens*) and gray bat (*Myotis grisescens*). The predominant bat species captured during this event were the eastern red (*Lasiurus borealis*), tricolored (*Perimyotis subflavus*), northern long-eared (*M. septentrionalis*), and evening bat (*Nycticeius humeralis*), while others included the big brown (*Eptesicus fuscus*), hoary (*L. cinereus*), and Seminole bat (*L. seminolus*).
The Seminole bat represents a new county record for this species in Oklahoma.

Endangered Ozark big-eared bat captured during the 2013 Bat Blitz Hosted by the Ozark Plateau NWR in northeastern Oklahoma.
Photo Credit: Priscilla Crawford, Oklahoma Biological Survey

ALABAMA BAT BLITZ

5th Annual Alabama Bat Blitz
Alabama Bat Working Group (ABWG)
Northeastern Alabama
7- 11 October 2013

Submitted by:
Dr. William Stone
CWB, Assoc. Prof. Alabama
A&M University

The Alabama Bat Working Group (ABWG) of the Southeastern Bat Diversity Network held its 5th annual Bat Blitz from October 7-11, 2013 in northeastern Alabama. Nearly thirty individuals participated in mist-netting and harp-trapping for bats including government biologists, university professors and students, private consultants and volunteers. This exceeded participation recorded during previous years despite the absence of federal biologists during the government shutdown. Nevertheless, representatives from the Alabama Department of Conservation and Natural Resources, Alabama A&M University, Auburn University, University of Tennessee, Tennessee Valley Authority, Redstone Arsenal, Alabama Geological Survey, Alabama Coal Mine Reclamation, and several environmental/energy consulting firms met to survey fall migrating bats in the Tennessee Valley and to gain experience with bat survey and monitoring techniques.

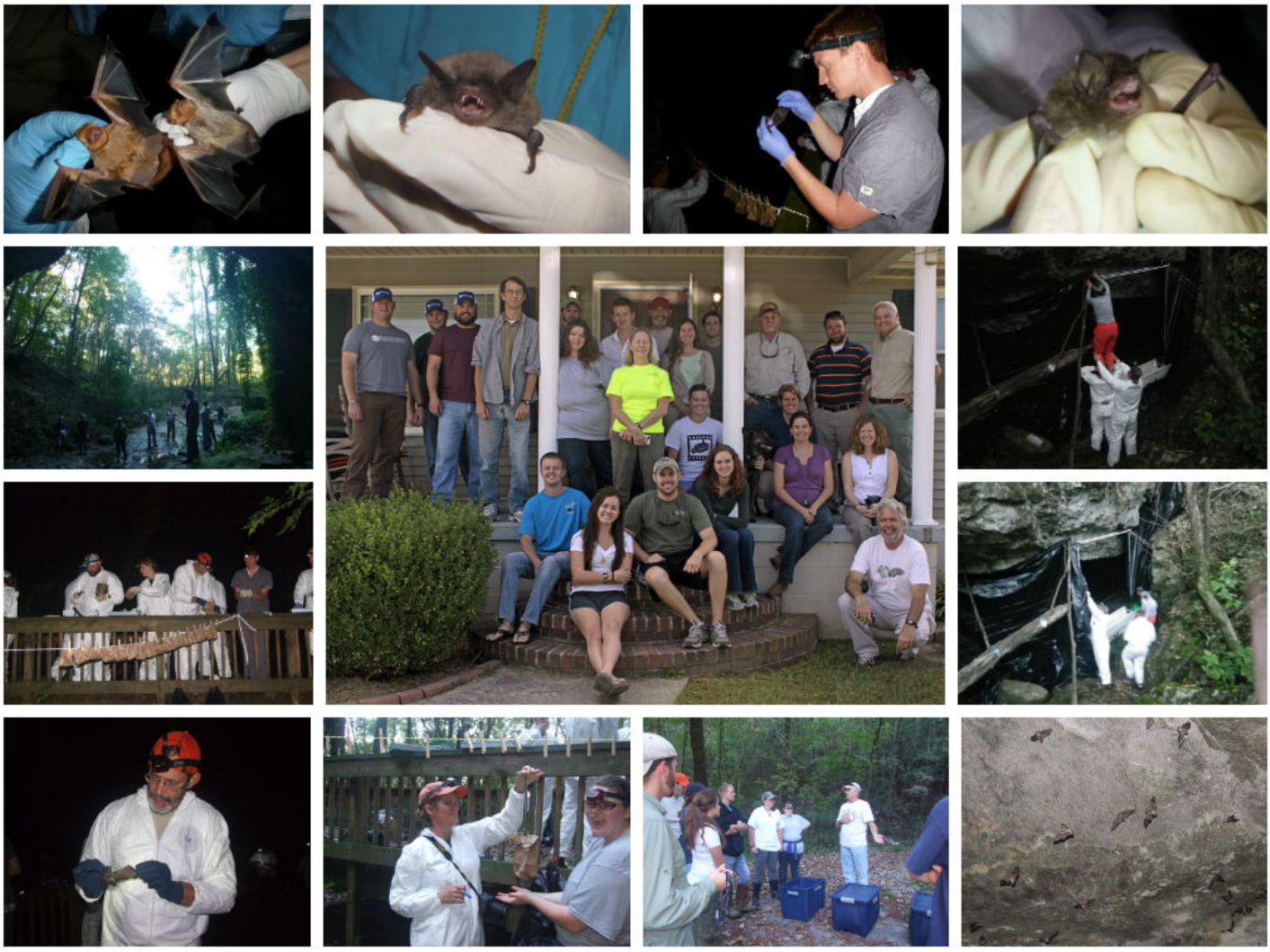
The weather was superb, and participants had their hands full all week. A survey team harp trapped a cave on private land near the Madison-Jackson county border the first night and captured 157 male gray bats (*Myotis grisescens*) and a lone male tri-colored bat (*Perimyotis subflavus*) emerging at dusk. A larger team then deployed six mist nets in the state's Skyline Wildlife Management Area near the Tennessee border and captured 24 male red bats (*Lasiurus borealis*), one female red bat, two male tri-colored bats, and a male northern long-eared myotis (*Myotis septentrionalis*) on the second night. During the third night, a harp trap was deployed at the lower entrance of Sauta Cave National Wildlife Refuge and 187 male gray bats, one female gray bat, and one female Indiana bat (*Myotis sodalis*) were captured. Additionally a male gray bat was captured in one of the two mist nets deployed nearby. The final night of netting occurred in the remote Walls of Jericho "Forever Wild" state lands near the Tennessee border. Six mist nets were deployed over Hurricane creek in the "Walls" to capture 39 male red bats, nine female red bats, three female Seminole bats (*Lasiurus seminolus*), two male tri-colored bats, and one male gray bat. Additionally, a nearby cave was harp trapped and one female Indiana bat was captured emerging (?) nearly an hour past dusk. Numerous bats were tail punched (uropatagium) and the very small pieces of tissue will be sent to the American Museum of Natural History. Tissue is collected to preserve unique genetic information about these bat species for future researchers. Some gray bats were swabbed for possible early detection of the deadly white-nose syndrome (*Pseudogymnoascus destructans*) on the third night, but no bats appeared to have any visible signs of the disease in this part of the state where *P.d.* was first confirmed on hibernating tri-colored bats in 2012 during a state-wide cave survey. All bats handled during the survey were immediately released on site after being examined.

Other portions of the Alabama Bat Blitz included training sessions and a formal meeting of the Alabama Bat Working Group. The event was headquartered in a house belonging to The Nature Conservancy in Gurley Alabama. Participants learned about, and participated in, decontamination protocols to prevent the spread of White-nose syndrome in bats. During the ABWG meeting on Wednesday morning, attendees learned about protocols and results from summertime acoustic monitoring survey routes conducted by automobile in the State. During these surveys, biologists and volunteers drive a designated route and record bat echolocation calls with Anabat Acoustic Monitoring Equipment in efforts to determine species presence/absence and long-term trends in bat abundance. These agencies are always looking for volunteers to assist with this monitoring effort in the summer months. Attendees of the ABWG meeting also heard about research conducted on the diets of bats in China this summer and about the effectiveness of three websites to convey information about white-nose syndrome to three target groups among the public. Additionally, the results of the 2013 state-wide cave survey were discussed as well as plans for the upcoming cave surveys during the winter of 2014. The semi-annual meeting ended with a tribute to ADCNR non-game biologist Keith Hudson who retired on Halloween this year following more than three decades of service to the wildlife resources of Alabama, including bats. Following the meeting, attendees were able to handle a couple of live Egyptian fruit bats (*Rousettus aegyptiacus*) used for education and outreach that one of the participants had brought to the meeting. Needless to say, it was an event-filled week that left many sleep-deprived, but satisfied.

Who is the ABWG?
The Alabama Bat Working Group was formed in February 2009 to bring together individuals, organizations, and agencies interested in conserving the state's bat species. In summer 2009 the group formed a committee known as the Alabama White-nose Syndrome (WNS) Management Team to develop a management strategy for this fungal pathogen and its deadly effects. WNS has killed up to 100% of hibernating bats in some caves in the Northeast and has been spreading rapidly south since 2006. White-nose syndrome was documented in Alabama during the 2012 winter survey season. For more information on the ABWG visit http://alabamabatwg.wordpress.com

Photos submitted by Jeff Jackson, Vicki Smith and William Stone.

Clockwise from top left: Robin, an Egyptian fruit bat; Will Dillsaver with Robin; Vicky Smith holding her first gray bat; gray bat captured at Sauta Cave.



Center group photo from 2013 Alabama Bat Blitz. Clockwise from top left: Red bat and Seminole bat side by side; Indiana bat; Jeff Jackson processing a gray bat at Sauta Cave; Indiana bat captured at a small cave entrance located near "The Walls of Jericho" in north Alabama; Team work strategy setting up the harp trap; Harp trap set-up; Gray bats from inside Sauta Cave; Decon instructions; Checking a bat's weight; Mark Ray examines a bat; Process, process, process; From inside Sauta Cave.

STATE WORKING GROUP REPORTS

5th Annual Alabama Bat Blitz

Alabama hosted their 5th Annual Alabama Bat Blitz this year in the Southeastern portion of the state. For photos and a full summary, check out the Alabama Bat Blitz section of Nightwing News.

Confirmation of Indiana bat colony in Cleburne County
Piper Roby, Copperhead Environmental Consulting, Inc.

A radio-tagged bat from Rose Cave in White County, TN was documented to be using the Shoal Ranger District of the Talladega National Forest for a second spring in a row, and in 2013 another radio-tagged bat from the same hibernaculum was also roosting in the area. Additional adult female Indiana bats were radio-tagged and a 2-year total of 16 roost trees were identified. Large exit counts, tracking the colony through 16 May, and the capture of only adult female Indiana bats confirms this as a maternity colony.

Indiana bat roost tree in Cleburne County, AL

Arkansas State University
Evan Lacy Pannkuk

Currently, five graduate students are working on degrees under the supervision of Dr. Thomas Risch and Dr. Virginie Rolland at Arkansas State University. Patrick Moore is starting his first field season in June 2014, studying home range and habitat use of foraging gray bats (*Myotis grisescens*) at four maternity sites in northern Arkansas using aerial radio telemetry. This two-year Master's project will result in tracking 100 females. Phillip Jordan is using passive acoustic monitoring along with fatality searches to determine bat activity in the vicinity of single unit turbines. He has conducted two years of mist net surveys for comparison of acoustic/mist net capture rates. Daniel Istavanko completed his first field season performing radio telemetry on evening bats. Samuel Schratz joined the lab this year and will start his research in the summer of 2014, studying roost site characteristics of the Indiana bat (*Myotis sodalis*), the northern long-eared bat (*Myotis septentrionalis*), the southeastern myotis (*Myotis austroriparius*), and the Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) at Cache River National Wildlife Refuge in east-central Arkansas. Evan Pannkuk is completing his 5th and final year as a Ph.D. student. He has published four manuscripts on how *Pseudogymnoascus destructans* interacts with bat surface lipids and is currently isolating extracellular enzymes that facilitate the fungal disease white nose syndrome.

Please submit your updates for the next newsletter in June 2014.

Updates from Georgia
Katrina Morris
GA Dept. of Natural Resources

Anabat Routes were completed again this season. All the calls have been run through the two software programs. Currently, Jackie Jeffrey is working on reviewing and compiling results as well as quality control checks from the software results. An additional route was completed this year on the Chattahoochee River (Photo, Chat River Anabat Route, Credit Allyson Reed, NPS).

Jackie Jeffrey and Lauren Austin completed work as the 2013 DNR summer interns. They completed the field portion of a project helping Craig Bland, UGA grad student on a joint project between UGA and GA DNR. The crew worked on Sapelo Island and Little St. Simon's Island completing mist netting, radio telemetry and vegetation plots related to the yellow bat (*Lasiurus intermedius*) project. Overall, the project has been very successful. Craig is working on the results and will be presenting at the SBDN meeting in Texas.

The GA Bat Working Group is finally being started again. The first meeting, in a very long time, will be held Tuesday, Dec. 17th at Gordon State College in Barnesville, GA.
For more information, contact Katrina Morris (katrina.morris@dnr.state.ga.us).

Trina Morris completing Georgia's first aquatic Anabat route with the National Park Service on the Chattahoochee River.

Georgia Bat Team
Dottie Brown, Ecological Solutions

The bat team of Ecological Solutions, located in Roswell, Georgia, had an amazing 2013 summer and fall. They successfully mist netted 53 sites for clients in Georgia. In addition, they helped survey five sites for the Chattahoochee National Forest in northern Georgia, one site for North Carolina Wildlife Resources Commission in western North Carolina, and assisted Dr. Yates with research in southern Georgia. A total of 62 sites were surveyed and over 600 bats processed, including 25 gray bats (*Myotis grisescens*) and 32 northern long-eared bats (*Myotis septentrionalis*). The team also helped with netting and harp trapping caves at the Alabama bat blitz. Here are just a few highlights from the season; netting on the property of a large (60+ exotic animals) petting farm where peacocks called most of the night, treeing a mamma bear and her two cubs as they approached our processing the table, car battery stolen during a truck break in, and netting between the lemurs and bison exhibits at the Chehaw Zoo. A big thanks goes out to Kim Romano, Ryan Malloy, Nick Kovacs, Jenna Kohles, Bethany Chagnon, Dr. Mark Yates, Lanora Yates, Thomas Wilder, Jennifer Starvetsky, Michelle Rouleau and all temporary help not mentioned. These are the members of the best bat team ever. A big thanks to Pete Pattavina with USFWS and Trina Morris with GADNR for all their support throughout the season.

Feeding the rhinos at Chehaw Zoo.

Nick Kovacs removing a big brown bat from a net.

Detection Dogs to aid in Endangered Indiana Bat Surveys
Tony Miller
Aquatic Resources Management

In an effort to assist endangered bat recovery, Tony Miller at Aquatic Resources Management has facilitated the training of a dog to aid in Indiana bat surveys. Using guidance from an ongoing USFWS project in southern Florida for the bonneted bat (*Eumops floridanus*), Tony worked with a training facility to find and train a dog to exclusively identify *Myotis sodalis* guano in the field. The first successful candidate is Otis, a one-year-old yellow Labrador that was trained to search exhaustively for the scent of *M. sodalis* guano solely for the

reward of a tennis ball. The summer of 2013 was the first time Otis was tested in the field and he successfully identified known summer roosts in several locations (plus added a few new ones to the list). Currently, Tony is working with USFWS to develop survey protocols required to set qualifications for detection dog use. If the results seen with Otis are an indication of true potential, the use of bat detection dogs could significantly reduce survey time for endangered bats while decreasing false positive and false negative results. Improved survey efficiency would assist in species recovery through a reduction in accidental take. Contact Tony at tmiller@aquaticresources.us for more information about Otis or wildlife detection dogs in general.

Otis finding a new roost tree.

Otis taking a break from a long day of training.

Ft. Knox Acoustic Lure
Piper Roby, Copperhead Environmental Consulting, Inc.

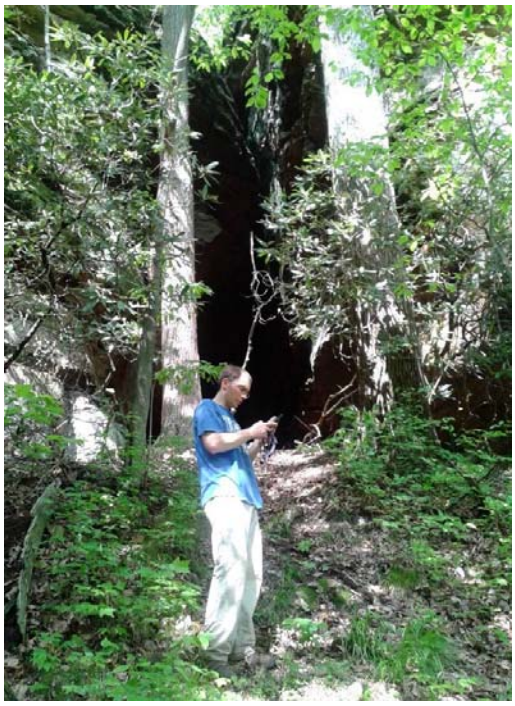
Copperhead Consulting has been continually working with the USFWS at Ft. Knox, KY to develop and test the success of acoustic lures in increasing capture success of Indiana bats at mist-net sites. In 2013, trials took place at 40 net sites over the course of 10 nights for a total of 88 net-nights. A total of 258 bats were captured of 9 species including 39 Indiana bats (*Myotis sodalis*) and 1 gray bat (*Myotis grisescens*). The Indiana bats were captured at 13 different mist-net sites. The average capture rate for all species during this study was twice as high as previous studies on base without the lure. Average capture rates of Indiana bats increased an order of magnitude from the previous five years combined to the 2013 study. Capture height was significantly lower for nets that were running the lure verses non-lure nets.

New Indiana Bat Colony at Ft. Knox
Piper Roby, Copperhead Environmental Consulting, Inc.

Installation of artificial roosts (BrandenBark™) housed a previously unknown maternity colony of Indiana bats on the NW side of Ft. Knox. Radio-tracking adult females in August 2013 led to the identification of 11 roost trees and 2 BrandenBark™ structures.

New Virginia Big-eared Bat Maternity Roost
Josh Adams, Copperhead Environmental Consulting, Inc.

In mid-May Copperhead Environmental Consulting in cooperation with USFWS and the Kentucky Department of Fish and Wildlife Resources, conducted a radio telemetry project with the goal of documenting new maternity roosts in the Kentucky subpopulation of the Virginia big-eared bat (VBEB- *Corynorhinus townsendii virginianus*). We attached radio transmitters to 15 adult female VBEB captured on the landscape and at known maternity roosts and used a combination of aerial and ground radio telemetry techniques to follow the bats as they switched roosts. After 15 days of tracking and walking over 100 km of cliff line we were able to document a previously unconfirmed maternity roost containing approximately 100 VBEB in northern Menifee County, KY.



Price Sewell Recording Coordinates.

Please submit your updates for the next newsletter in June 2014.

Please submit your updates for the next newsletter in June 2014.

Mississippi Bat Working Group

Bat Seminar Held at the Mississippi Museum of Natural Science

On November 8, 2013, members of the Mississippi Bat Working Group sponsored an educational workshop about bats, primarily targeting individuals and companies who work with bats. Information about bat biology was presented by Kathy Shelton from the Museum of Natural Science, and an update on white nose syndrome was given by Kathy Lunceford of the US Fish and Wildlife Service. Melissa Tucker from the Mississippi Department of Health gave an overview of bat rabies cases in Mississippi and discussed with the group the Health Department's interest and protocol for reporting bats for testing of rabies within the state. During the afternoon, James Dale with the Mississippi Department of Agriculture and Commerce Bureau of Plant Industry discussed pesticides and how none were currently legal to use for bats. Mike McDowell gave a presentation on how to work with bats in enclosed spaces such as attics, where bats may be causing problems and/or concerns to home owners.
Approximately 25 people attended the workshop. Snacks, coffee and drinks were provided by the Mississippi Bat Working Group, along with several door prizes.

10th Annual Mist Net Event

The Mississippi Bat Working Group (MBWG) held their tenth annual mist net event August 6 – 8, 2013 at the Choctaw Indian Reservation in Choctaw, Mississippi. The event kicked off with a potluck supper at the Mississippi State Extension building where participants enjoyed a variety of delicious foods. After a safety briefing, the group divided into three teams for the first night of netting.

On Wednesday, participants toured the Choctaw museum and were treated to a cooking demonstration by Pearlie Thomas detailing preparation of hominy and fry bread. Following that, hostess and co-coordinator Mitzi Reed explained the basics of stickball, a traditional Choctaw sport, and rabbit sticks (a traditional hunting method). Participants had a chance to try out the stickball sticks and rabbit sticks and it was determined that: 1) We all needed a lot of practice before we could attempt stickball and 2) We would starve to death if we had to use rabbit sticks to hunt. Luckily the group was able to partake of the hominy and fry bread prepared during the demonstration so no one went hungry!

Supper! Hominy and fry bread, traditional Choctaw foods, prepared by Pearlie Thomas. (photos by Shea Staten)

Wednesday evening, after supper, the group divided into two groups for a second night of netting. In all, the group caught a total of 31 bats and a southern leopard frog (go Chester!). The distinction of most bats caught was held by the team led by Kathy Shelton, who accounted for 21 of the 31 bats captured. Species captured included *Lasiurus seminolus* (1), *L. borealis* (15), *Nycticeius humeralis* (12), and *Myotis austroriparius* (3). Fifteen juvenile bats and 16 adult bats were captured. Nearly half (14) of the bats were captured in a triple high net stretched across a dry gravel road surrounded by bottomland forest. The group followed the national protocol for handling bats to avoid spreading white-nose syndrome, wearing nitrile gloves, cleaning equipment between uses, and boiling nets between uses. No equipment was used that had previously been used in a white-nose positive state. Additionally, the wings of captured bats were examined for damage, using the "Wing-Damage Index" developed by Jonathan Reichard. No significant damage was observed.

Triple high net responsible for catching nearly half of all bats captured.

Removing a red bat from the net.

Shea Staten and Alison McCartney weigh a bat.

Measuring the forearm of an evening bat.
Above photos by B. Rosamond and H. Stewart.

Alligator near mist netting site along Beaver Dam Road – just to keep things interesting!! (photo by Shea Staten)

The group would like to thank the following individuals: sponsor Chester Martin; Mitzi Reed and Kathy Shelton who helped with site selection; Chester Martin, Alison McCartney, and Kathy Shelton who served as group leaders. Additional thank you's go out to Mitzi Reed and Pearlie Thomas for the demonstrations and to the Mississippi Band of Choctaw Indians for providing access to their lands for this event. Thank you to everyone who attended – we wouldn't have these events without you!

Outreach and Education

- Kathy Shelton conducted several outreach activities regarding bats including:
- Discussed bat issues with the Wildlife/Human conflict class at Mississippi State University
- Discussed bat monitoring with MS Wildlife Federation's Habitat Stewards class. Three bat boxes were given to the group by MBWG and will be placed around south MS and monitored by the group.
- Submitted an article on bats and WNS for MS Museum of Natural Science Newsletter and MS Outdoors magazine.
- Presented "Monitoring MS Caves for White Nose Syndrome: Implications for Mississippi's Bats" at the 2013 MS chapter of The Wildlife Society annual meeting.
- Appeared on the radio show "Creature Comforts"
- Becky Rosamond presented programs on bats at two teacher workshops, speaking to approximately 50 teachers.
- Shea Staten continued his work with the bat house program. Houses were donated to the Mississippi Habitat Stewards Program and to the Choctaw Reservation in Neshoba County.
- Becky Rosamond and Kathy Shelton represented the MBWG at the Choctaw Wildlife Festival
- Shea Staten represented the MBWG at the Eagle Festival at Lake Arkabutla
- Members Becky Rosamond and Candis Jones presented a program on bats to 10 – 16 year-olds participating in the Mississippi State Extension Camp. The program was followed by a mist netting demonstration at Noxubee National Wildlife Refuge. Participants were able to see 3 species of bats.

Research

Kathy Shelton continued her work inventorying and monitoring bats in the state. She conducted summer and fall Anabat routes in Jackson and Tishomingo counties, mist netted in various locations across the state, and monitored known maternity roosts. Her newest project is an extensive culvert monitoring project: a 1-2 year project to survey box culverts to determine use by bats as hibernacula.

A second year of mobile bat acoustical monitoring was completed at 10 National Wildlife Refuges across the state. Routes were sampled 1-6 times each from June - July 15. Auto-classification of the call files is being done using BCID software. This effort is contributing to a larger effort by the U.S. Fish and Wildlife Service and other agencies to look at long-term changes in bat populations.

Upcoming Annual Meeting

The next meeting of the Mississippi Bat Working Group will be held January 16, 2014 from 9 a.m. – 4 p.m. at the Mississippi Museum of Natural Science. Please contact the group at msbats@hotmail.com for more information.

MO Department of Conservation Annual Update

Shelly Colatskie
Missouri Department of Conservation

The Missouri Department of Conservation initiated several mist net surveys across the state this past summer (2013). We surveyed Big Oak Tree State Park in Mississippi County in conjunction with Missouri State Parks and Missouri Bat Census. We captured 3 juvenile Southeastern Myotis (see picture 6604), 2 males and 1 female (making these the first records of reproduction of Southeastern Myotis in the state of Missouri). One juvenile male was transmittered and tracked to a dead cottonwood snag. We also captured a female lactating Rafinesque's Big Eared Bat (making it the first female captured in the state as well as first sign of reproduction in the state). We radioed her, but she was never found.

We mist netted at private land in Cape Girardeau near Trail of Tears State Park and captured 3 lactating female Indiana bats and 1 adult male Indiana bat. Two of the females were radioed and tracked to their roost trees. We also conducted mist net surveys at Donaldson Point Conservation Area in

New Madrid County and captured 2 adult male Southeastern Myotis.

A mist netting effort between USFS, Missouri Department of Conservation, Missouri State University and Missouri Bat Census was conducted on private land in Stone County with several caves in an attempt to document the presence of the Ozark Big Eared Bat. No big eared bats were captured, but we did capture Northern long-eared bats, gray bats, tri-colored bats, Eastern red bats, evening bats, and big brown bats. The project showed a great collaborative effort between several agencies and organizations.

Tony Elliott and I represented Missouri Department of Conservation at the annual SBDN Bat Blitz in Oklahoma where I (Shelly Colatskie) was one of the team leaders. My team won the awards for the most bats captured and the highest species diversity. We were lucky enough to see a couple of Ozark Big Eared Bats.

Fall swarming studies began in September and during these surveys, bats were mist netted or harp trapped, banded, swabbed, weighed, etc.

We are now gearing up for winter hibernacula counts and white-nose syndrome surveillance. We plan on surveying around 25 caves/mines and will collaborate with others in the state.

The Missouri Department of Conservation, USFWS and MO Bat Census completed winter bat identification for cavers and volunteers. Close to 100 people signed up and participated across 5 areas in Missouri. Topics on cave bat identification, how to conduct surveys and basic white nose syndrome information were covered. I, Shelly Colatskie, made ID sheets and Kirsten Alvey with MO Bat Census generously donated laminated copies for all attendees. These laminated bat ID cards can be easily taken into caves for surveys and decontaminated afterwards.

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Tony Elliott
Missouri Department of Conservation

We surveyed 37 caves in Missouri this past winter (2012-2013), documenting WNS in 9 additional caves in 3 additional counties.

The World Bird Sanctuary in St. Louis Missouri is developing a public education partnership with bat researchers in Missouri and invited a few of us out for their "Baturday Event" in April. Shelly Colatskie, MO Dept of Conservation, Bree McMurray, MO Dept of Transportation, and Sybill Amelon, USFS Northern Research Station, gave presentations on the bats of Missouri and kid-friendly demonstrations of bat research techniques. Sybill Amelon brought some of her bat rescue and rehab animals, with a special appearance by "Sally", a pallid bat that was reported from south of St. Louis Missouri this spring. Sally probably hitched a cross-country ride aboard a transport vehicle and made it safely to our state. Sybill got her in great health and due to MO being a WNS positive state, Sally cannot return to a rehabber in her native range for release. Sally, the pallid bat has now become an education animal.

Additionally Sybill and I (Tony Elliott) gave a presentation on bats and WNS to the public in St. Louis in April 2013, then Shelly Colatskie and I gave a similar presentation at the Missouri Department of Conservation's Volunteers Conference.

Sybill Amelon (center) U.S. Forest Service Northern Research Station at World Bird Sanctuary 'Baturday' Event in St. Louis MO, April 2013- Photo credit Ron Colatskie, MO Dept of Natural Resources

J.T. Layne, MO Dept of Conservation releasing newly banded juvenile southeastern Myotis, Mississippi Co MO, June 2013- Photo credit Ron Colatskie

Shelly Colatskie and Tony Elliott (with antennae), MO Dept of Conservation, release newly banded and transmittered Rafinesque's big-eared bat, Mississippi Co MO, June 2013.

Our lactating female Rafinesque's big-eared bat Banded and transmittered for release to attempt to find the first recorded maternity roost for this species in the state of Missouri. Pictured- same female in hand and release. Photo credit Kirsten Alvey.

Juvenile southeastern Myotis, Mississippi Co, MO, June 2013- Photo credit Shelly Colatskie

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Bree McMurray
Missouri Department of Transportation

I have been working on a Programmatic Biological Assessment for the Indiana bat and Transportation Improvement Projects in the state of Missouri. There has been a lot of coordination and discussion. The Federal Highway Administration and US Fish and Wildlife Service are working together on a range wide consultation programmatic process for Indiana bats, as well. Very few states have gone through the process and Missouri is trying to learn from the examples of OH DOT and KY Transportation Cabinet and their efforts to streamline the consultation process when it comes to possible impacts to Indiana bat habitat from transportation improvement projects. The Missouri document is in draft form and we hope to be able to complete formal consultation on this procedural document by the end of 2013. I have also been assisting (on a volunteer basis) with multiple state and federal partners with summer surveying efforts. It builds relationships and gets me out in the field, so I don't mind donating my time! If only I could get my hands on some big brown bats! I continue in my capacity as an endangered species biologist with MoDOT to educate MoDOT staff in regards to assessments and protection of the Indiana bat with transportation improvement projects.

There has been an exciting development or two in the state of Missouri in the last several months. One of these is the official launch of the Missouri Bat Census, a non-profit organization led by a very experienced caver and cave steward who is very active in training other cave stewards for WNS monitoring, coordinates several hundred cave censuses each year, assists with summer survey efforts, and conducts her own cave/karst workshops and educational opportunities for caves and cave life around the state of Missouri. Please check out Missouri Bat Census on Facebook and congratulations to Director Kirsten Alvey-Mudd for a magnificently successful 'emergence'!

Missouri Bat Census Annual Review
Facebook.com/MissouriBatCensus
Kirsten Alvey-Mudd, Director

What a great first full-time non-profit year we have had! Here is our 2013 review as we prepare for the 2014 season to begin.

Winter 2013 WNS Hibernacula Survey Report:
230 total sites in 29 counties surveyed
8 volunteer teams in 4 of 5 regions surveying 113 sites
Kirsten Alvey-Mudd surveyed 117 sites & assisted MDC on another 10 sites

32,981 Total bats counted (does not include MDC sites)
23,447 Tri-colored bats
4292 Northern long-eared bats
2999 Little brown bats
1534 Big brown bats
151 Endangered Gray bats
434 Endangered Indiana bats
124 Unknown Myotis

We found 27 significant active guano piles indicating current summer gray bat activity at 11 sites which were followed up on through TIR filming in the summer. We surveyed every privately owned cave in Lincoln County and began a late March saturation in Crawford County to monitor WNS spread.

2013 Education and Outreach:

Provided educational cache to 23 elementary, 3 middle and 6 high schools

Had educational materials at 3 MVORs, TAG, Columbia Trailside Expo, 2500 scouts at BSA Fall Family Fun Rally, St. Louis Academy of Science BioBlitz, County Fairs, County Farmers Markets, Elks, Chamber of Commerce, and Rotary Clubs, Boy Scout Troops, Moberly High School Adventure Club and MU Geology Club.

Provided disaster clean-up, groceries, supplies, water, well-being checks and rescues for 5 landowners during/after Pulaski County flooding

*2013 Field Work: * indicates volunteer based programs*

Assisted with 22 mist netting and banding projects with MDC and State Parks
Assisted in 7 radio tracking projects with MDC and State Parks including netting, tracking and banding of multiple Federally Endangered, State Concern and new Mo species records

Provided respite care for 10 rehab bats for 11 days
Provided care for 2 educational bats for 7 days while using them at 2 educational events

*Organized and worked on a US National Weather Service Radar Anomaly Project in Dallas County which has led to several summer little brown bat roost sites.

TIR filmed at 11 caves for summer Endangered Gray bat activity & assisted MDC at another 6 TIR sites.

Provided bat rescue for 15 bats at 6 rescue sites in 5 counties.

*Installed 19 new bat houses, properly relocated 23 bat houses, monitored 179 bat houses counting 894 bats and 63 pups in bat houses on private properties.

*Worked 7 weekends at on-going Buzzard Cave Sinks Clean-up project, organized 43 other conservation cave trips to MoBat Census manage properties.

Attended: Southeastern Bat Diversity Network Bat Blitz in OK (won an innovation award), Midwest Bat Working Group in IN, Gray Bat conference in STL.

We now have 692 caves under management and survey contracts.

Thanks again to all our volunteers, landowners, donors, sponsors and followers that helped make this first year possible!

Updates from North Carolina
Mary Frazer, NC Department of Transportation

Joey Weber of Indiana State University studied the spring/summer ecology of Virginia Big-eared Bats in North Carolina. The goals included determining migratory movements, measuring characteristics of foraging ranges, and identifying maternity roosts for the NC population. Nineteen female Virginia big-eared bats were tracked 23 km from the hibernaculum to a primary maternity roost and several secondary roosts. Large caves, relatively open rock structures, and two buildings were used as roosts. Work will continue in 2014.

Joey Weber's technicians, Greta Schmidt and Megan McDowell, dig telemetry equipment out of the snow to listen for Virginia big-eared bats on Grandfather Mountain.

Jack Grider of the University of North Carolina-Greensboro is studying the year-round activity of peripheral bat populations in the NC coastal plain, where warm coastal temperatures may allow bats to remain active throughout winter, decreasing their susceptibility to WNS. (The peripheral populations include Northern Long-eared Bats.) Mist-netting and recording stations have been established in the coastal plain of NC. Based on preliminary acoustic results, the activity of bats on warm winter nights may be comparable to summer activity.

Jesse Pope of the Grandfather Mountain Stewardship Foundation is planning a bat festival/events for 2014 to promote awareness and understanding of Virginia Big-eared Bats and WNS.

The NC Natural Heritage Program (Harry LeGrand and Tom Howard) have released a website: The Mammals of North Carolina. It provides general information about the distribution, relative abundance, periods of occurrence, habitats, and behavior of all of the mammal species recorded in North Carolina. www.dpr.ncparks.gov/mammals/accounts

Garry Libby of Skybax Ecological Services completed mist-netting and acoustic surveys of the Box Creek Wilderness (Rutherford & McDowell counties). Captures totaled 58 bats of five species.

Lisa Gatens and NC Museum of Natural Sciences staff conducted mist-netting at Hofmann Forest and continues banding Big Brown Bats at Umstead State Park.

Heather Wallace and Mary Frazer of the NC Department of Transportation conducted mist-netting in Transylvania County.

Gabrielle Graeter and NC Wildlife Resources Commission staff continue year-round monitoring for the effects of WNS, including mist-netting, hibernacula surveys, summer roost/emergence counts, and acoustic transects. Four species have tested positive for WNS in NC (PESU, MYSE, EPFU and MYLU). Virginia Big-eared Bats have been found with P.d. on them, but are not exhibiting characteristics of the disease.

Nc Zoological Park staff hosted the NC Bat Working Group meeting on November 7th with 39 attendees. Kathy Martin was given a citizen conservation award for her continuing efforts to house an expanding maternity colony of Brazilian Free-tailed Bats. Joey Weber was given the NC Golden Bat Award for significant contributions to bat conservation in North Carolina.

Colony of Brazilian free-tailed bats in a bat house thanks to Kathy martin's continuing conservation efforts.

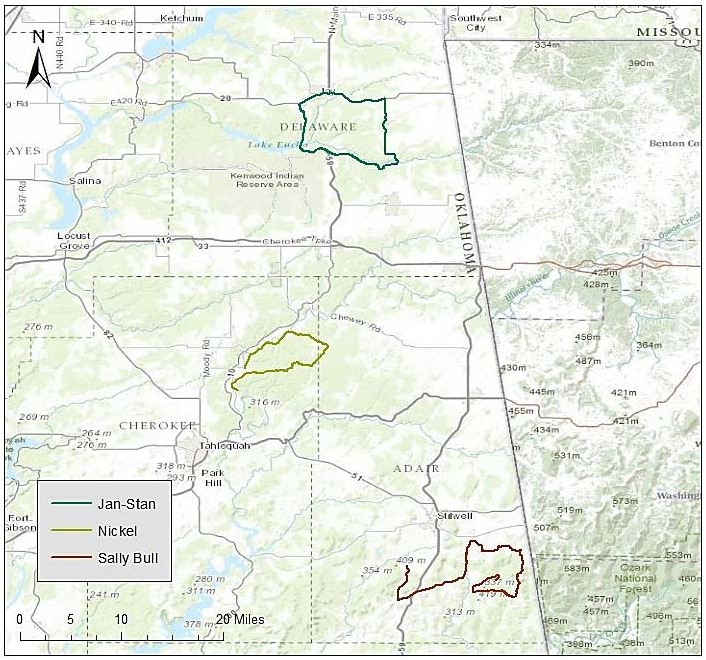
Joy O'Keefe and Joey Pettit of the ISU Center for Bat Research, Outreach, and Conservation searching for a tree tag on a downed snag in a twice burned stand. Field work was conducted in 2013 to close out a 4 year study on the effects of prescribed fire on Indiana bats. Photo taken just north of Robbinsville, NC by Zach Nickerson, an undergraduate researcher from ISU.

12th Annual SBDN Bat Blitz
Oklahoma hosted SBDN's 12th Annual Bat Blitz this year in the Ozark Plateau National Wildlife Refuge. Check out the Bat Blitz section for a summary of this year's blitz.

Updates from Oklahoma
Richard Stark, Ozark Plateau National Wildlife Refuge

Mobile Acoustical Bat Monitoring on the Ozark Plateau National Wildlife Refuge

From May 23rd through November 13th, 2013, mobile bat acoustical surveys were carried out on three transects spanning three counties (Cherokee, Delaware and Adair) in northeastern Oklahoma on or near the Ozark Plateau National Wildlife Refuge. Each survey route was conducted every 10-14 days for a period of approximately six months. Additionally, surveys were conducted using two Anabat units (driver and passenger-side of vehicle) as opposed to the traditional single unit—a double-observer system that was intended to increase the accuracy and confidence of the survey results, as well as to investigate the consistency of Anabat detection. A total of 37 survey transects were completed from May 23rd through November 13th, 2013. Overall, 2,093 classified bat calls were detected using the double-observer system. Higher numbers of calls were consistently detected by the passenger-side unit, but seasonal trends in numbers were reported relatively consistently by both units. Additional statistical analyses will be required to determine the significance of these data.



2013 Ozark Plateau NWR mobile acoustical bat monitoring routes

White-Nose Syndrome Surveillance on the Ozark Plateau National Wildlife Refuge in Northeastern Oklahoma

The Ozark Plateau National Wildlife Refuge participated in the White-Nose Syndrome (WNS) Transcontinental Transmission Study to implement surveillance for *Pseudogymnoascus destructans* (*Pd)* and WNS in northeastern Oklahoma. This study is being funded by the Ecology of

Infectious Diseases Program of the National Science Foundation, and is a collaborative effort between the University of California, Santa Cruz, University of Tennessee, and Northern Arizona University. This study requires the collection of samples from caves and mines across the North American continent to determine the prevalence of *Pd* infections in hibernating bats. A major objective of this research is to track the spread of WNS and *Pd* at a continental scale to understand the factors associated with risk of *Pd* arrival, directionality and rate of spread, and disease progression. The refuge deployed microclimate (temperature and humidity) loggers in five caves that occur on the refuge and private land in northeastern Oklahoma (Adair, Cherokee, and Delaware counties) during the winters of 2011/2012 and 2012/2013, and took swab samples from the wing and muzzle of 10 tri-colored bats from each of these five caves each winter. A cave substrate swab sample also was collected from the location where the bats were roosting. All swab samples taken to date have been negative for *Pd*. The refuge will expand the sampling effort and collect additional swab samples from 10 caves this winter.

Paul Barrett (USFWS Region2 WNS Coordinator) assists Ozark Plateau NWR staff with WNS Surveillance in a cave in northeastern Oklahoma. Photo credit: Richard Stark

Monitoring Maternity Colonies of the Endangered Ozark Big-Eared Bat on the Ozark Plateau National Wildlife Refuge

The Ozark big-eared bat was federally-listed as endangered due to its small population size, reduced and limited distribution, and vulnerability to human disturbance. The entire population currently is estimated to consist of only about 1,800 individuals. The range of the Ozark big-eared bat is limited to northeastern Oklahoma and northwestern and north-central Arkansas. Many caves considered essential for the continuing existence of the Ozark big-eared bat in Oklahoma occur on the Ozark Plateau National Wildlife Refuge or are managed cooperatively by the refuge but occur on lands owned by private landowners, other agencies, Tribes, or conservation organizations. Annual monitoring is necessary to help identify factors that may be impacting the species, and to provide information necessary to adequately assess whether current management efforts are effective. The refuge conducts annual emergent counts at Ozark big-eared bat maternity caves using night vision equipment, infrared lights, and video equipment. Video is later reviewed in slow motion and analyzed to improve the colony size estimates. Characteristics such as large ears help distinguish Ozark big-eared bats from other species.

Snapshot from video of Ozark big-eared bat maternity colony emergence from a cave on the Ozark Plateau NWR in northeastern Oklahoma. Video/Photo Credit: Richard Stark

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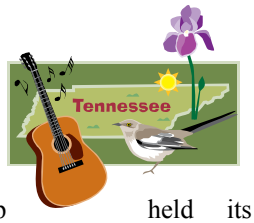
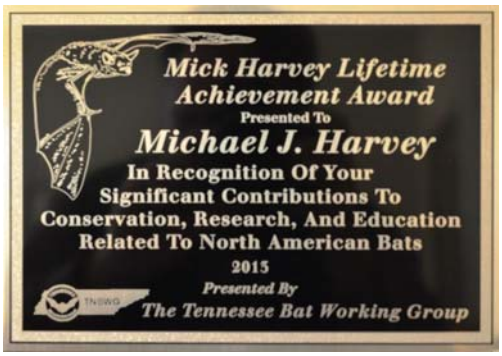
Please submit your updates for the next newsletter in June 2014.



TN Bat Working Group
Steve Samoray, Chairperson

The Tennessee Bat Working Group held its 10th annual meeting on November 21st at Fall Creek Falls State Park. The meeting brought in a diverse group of around 70 participants including folks from academia, state and federal agencies, NGOs, educators, consultants, and interested citizens. A complete agenda and some presentations can be found on the TNBWG home page (TNBWG.org). The first ever Mick Harvey Lifetime Achievement Award was also presented at this year's meeting to the most worthy of such an award, Dr. Michael J. Harvey.



The TNBWG staffed a bat education and outreach table at the Adventure Science Center in Nashville, TN as a part of their "Spooky Science" program. And the group plans to organize and introduce a citizen science program which will encourage Tennessee residents to collect exit count data on bat houses across the state.

WNS continued to spread throughout Tennessee over the winter of 2012-2013 with 21 new counties added to the "confirmed positive" list. This brings the total number of infected counties in Tennessee to 32 and includes the majority of karst areas in the state. To date no major mortalities have been recorded at our most significant bat caves, but we have observed several caves with dead bats. Partners throughout TN will continue monitoring the health of our cave hibernating bats to better understand the effects of WNS in the

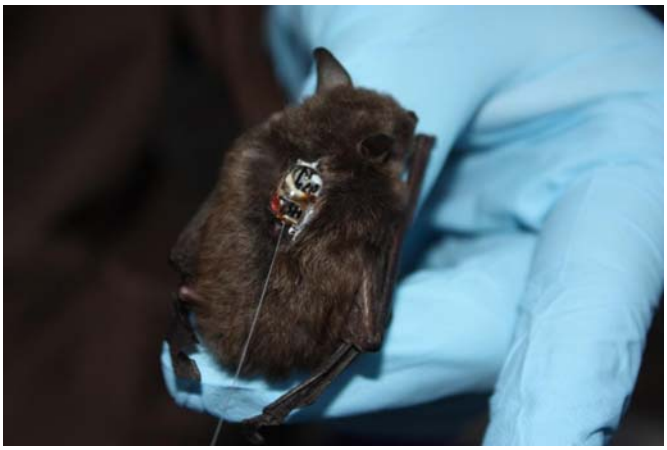
southeast.

Indiana Bat Spring Migration
Piper Roby, Copperhead Environmental Consulting, Inc.

Over the past several years, Copperhead Consulting has been working with the Tennessee Wildlife Resources Agency (TWRA) and USFWS in order to better understand the spring migratory habits of *Myotis sodalis* hibernating in Tennessee. In April 2013, 38 female M. *sodalis* were radio-tagged from Rose Cave in central TN and bats were detected traveling in at least three separate directions on the first night. By the end of the study, bats had been tracked to six previously unknown maternity colonies: Four in Wilson County, TN (75-92 km from Rose Cave), two bats were tracked to the same colony in McNairy County, TN (300 km from the cave), and one was tracked 368.1 km to the Holly Springs National Forest in Mississippi, a new state and county record.

Steve Samoray piloting Price Sewell

Theresa Wetzel prepares a transmitter for use.



Myotis sodalis *with transmitter*

Bat Surveys in the Northern District of the Cherokee National Forest
Vanessa Rojas

Vanessa Rojas (Ph.D. student at Indiana State University in Dr. Joy O'Keefe's lab) finished her first field season in the northern district of the Cherokee National Forest (CNF) in Tennessee. She spent the summer conducting mist net and acoustic surveys at 29 sites across the North CNF to determine the presence or absence of Indiana bats while also surveying the bat community as a whole. Her other objective includes validation and refinement of an Indiana bat roost predictive model developed by previous Master's student at ISU, Kristina Hammond. Although no Indiana bats were captured in 2013, a total of 7 different bat species were captured, including 2 endangered gray bats (*Myotis grisescens*). Vanessa's research will continue in the following years with additional survey sites plus driving acoustic transects.

Vanessa Rojas, Zachary Nickerson, Lisa Kleinschmidt and Julia Hoeh, prepare to net a site on the Cherokee National Forest.

Please submit your updates for the next newsletter in June 2014.

Please submit your updates for the next newsletter in June 2014.

Please submit your updates for the next newsletter in June 2014.

AWARDS AND RECOGNITION

SBDN SERVICE AWARD

Purpose: To recognize outstanding service and contributions to the Southeastern Bat Diversity Network.

Nomination Procedure: The SBDN awards committee will call for nominations in September or October of each year through the SBDN mailing list. Nominations will be submitted to the committee by December 1. Nominations can be submitted by any SBDN member, including members of the Board and the Awards Committee. Nominations will consist of a letter that describes the nominee's service to SBDN. The committee will review the nominations and evaluate them based on significance of the contributions to SBDN. One name will be forwarded to the SBDN Board of Directors for final approval by January 1. If no worthy nominees have been submitted for consideration, no name will be forwarded to the Board.

Award Process: The awardee will be announced at the SBDN annual meeting, usually held in February. A plaque will be presented to the awardee by the previous recipient or the SBDN president. The Awards committee will be responsible for obtaining the plaque and funds will be provided by SBDN. A copy of the nomination letter and pictures of the award presentation will be deposited in the SBDN archive.

SBDN LIFETIME ACHIEVEMENT AWARD

Purpose: To recognize individuals who have made significant contributions to the conservation of southeastern bats through research, education, or management efforts. The intent of this award is to recognize more senior individuals who have amassed a variety of accomplishments throughout their careers. The award is SBDN's highest honor. The award may not be given every year.

Nomination Procedure: The SBDN awards committee will call for nominations in September or October of each year through the SBDN mailing list. Nominations can be submitted by any SBDN member, including members of the Board and the Awards Committee. Nominations will be submitted to the committee by December 1. Nominations will consist of: 1) a letter that describes the nominee's accomplishments and how they have impacted bat conservation in the southeast, 2) the nominee's Curriculum Vitae. The committee will review the nominations and evaluate them based on the totality of the accomplishments and their impact on bat conservation and/or our understanding of bat ecology. The committee will forward one name to the SBDN Board of Directors for final approval by January 1. If no worthy nominees have been submitted for consideration, no name will be forwarded to the Board.

Award Process: The awardee will be announced at the SBDN annual meeting, usually held in February. A plaque will be presented to the awardee by the previous recipient or the SBDN president. The Awards committee will be responsible for obtaining the plaque and funds will be provided by SBDN. A copy of the nomination letter, the awardee's CV, and pictures of the award presentation will be deposited in the SBDN archive.

2013 SOUTHEASTERN BAT DIVERSITY NETWORK PLENARY SESSION ABSTRACTS

HOW RELIABLE ARE ALGORITHMS AND PROBABILITIES IN THE IDENTIFICATION OF SPECIES SPECIFIC CALL SEQUENCES?

L. W. Robbins. *Biology Department, Missouri State University, 901 S. National Ave., Springfield, MO 65897*

Species identification software is now being tested and used to determine species and species groups using echolocation data. Many studies have shown the value of these data in conjunction with other survey methods. Of immediate concern is the requirement by the USFWS to use species identification software to absolutely determine presence, or presumed absence, of Indiana bats at a specific location, with or without other collaborating data. For the purposes of this presentation, consider the individual pulses in a call sequence to be letters in the bat's signature. In this case each letter can be present multiple times or totally absent, but enough letters need to be present for name recognition. However if a letter or letters are present that only occur in a different species, the original identification should be reconsidered. The existing software focus on the identification of a specific sequence to a specific species based on the characteristics present in each pulse of the sequence. Species identifications are based on the number or percentage of pulses within a sequence that have the necessary known call parameters consistent with those produced by a specific species. However, there is a high level of variation within individual call sequences. This can lead to misidentifications when only a subset or a set number of pulses are used to make an identification. Using results from identifications from some software programs, I will discuss a new algorithm called a Teacher's T-test that may be used to confirm what species is identified by the sequence, but more importantly, what species it is not.

COMPARISON OF FULL-SPECTRUM AND ZERO-CROSSING AUTOMATED BAT CALL CLASSIFERS

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Identification of bat echolocation calls to species is becoming increasingly important, particularly for assessing the risk to bat species posed by wind-energy development and for monitoring the spread and long-term effects of White-Nose Syndrome. Calls recorded using full-spectrum detectors (e.g., Pettersson) contain more acoustic information than calls recorded using zero-crossing detectors (e.g., AnaBat™), and it is commonly assumed that this leads to better species discrimination. We tested this assumption using 652 full-spectrum reference calls for nine eastern bat species. Calls were analyzed using SonoBat™ 3.04 Northeast, and classified using three types of output: Consensus, By Vote, and Mean Classification. The full-spectrum calls were then converted to zero-crossing data using Anabat Converter 0.8. Call parameters were extracted using Analook and were analyzed using BCID software, EchoClass software, and a discriminant function analysis for New York. Average correct classification rates for all methods ranged from 14.3% (*Myotis leibii*) to 93.5% (*Perimyotis subflavus*). Incorrect classification rates were lower for SonoBat methods (range = 4.4 – 7.0%) than for zero-crossing methods (36.4 – 45.9%). In general, zero-crossing methods outperformed SonoBat for *Myotis* species, while SonoBat was better at classifying non-*Myotis* species. SonoBat did not identify any *M. sodalis* calls, while zero-crossing methods correctly classified 30.8 – 38.5%. Our results illustrate some of the limitations of automated classification, and suggest that species presence and probable absence should be determined from multiple lines of evidence rather than any single data source.

SONOBAT EXPERT SYSTEM FOR BAT ECHOLOCATION CALL ANALYSIS AND SPECIES IDENTIFICATION

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SonoBat grew out of the need to address the specialized methods to acquire, process, view, and interpret bat calls and sequences using the full information content of full-spectrum data. Just as humans can outperform computers for extracting subtle visual content from challenges such as captcha images, the design and concept of SonoBat intended to facilitate applying human observational skills to bat call recognition and comparisons of unknown bat recordings with known reference recordings. Humans can often spot trends that automated systems miss because through experience humans learn to emphasize and integrate subsets of discerning (and situational appropriate) factors and disregard confounding information. Over the intervening twenty years from its inception the implementation of SonoBat has progressed to include automated call trending, parameterization, evaluation of signal integrity, and species classification, all using expert systems that meld automated machine approaches with guiding logic that incorporates the expertise gained through years of human experience from analyzing bat calls. This hybrid approach (expert system) of machine analysis and classification that incorporates supplemental and redundant logic based on human experience has proven to outperform any direct machine approaches such as artificial neural networks, Bayesian networks, etc. Perhaps more importantly, beyond demonstrated performance on test data sets of reference recordings, the many internal checks and steps refined through years of field testing render optimal performance on actual field data.

INDIANA BATS LOST THE ROCK-PAPER-SCISSORS CONTEST: LITTLE BROWN BAT ROOSTING ECOLOGY PREVAILED

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To date, the variation between the population statuses of the endangered Indiana bat (*Myotis sodalis*) and the, relatively, abundant little brown bat (*Myotis lucifugus*) has not been investigated. While it is relatively clear what is causing declines in *Myotis sodalis* populations, it is unclear how the *Myotis lucifugus* became so common throughout most of North America. Because summer maternity habitat loss is known to be a cause of *Myotis sodalis* declines, it is possible that a difference in the roosting ecologies between the 2 species may have caused this variance in population status. To determine whether the 2 species have differing maternity roosting ecologies, we conducted radio-telemetry, within 4 study areas located in southern Illinois and south-central Indiana, to track female *Myotis sodalis* and *Myotis lucifugus* back to their roosts during the summers of 2007 and 2009-2011. Roost and stand characteristics were recorded for each roost. Thirty-nine *Myotis sodalis* and 32 *Myotis lucifugus* were tracked to 76 and 20 maternity roosts, respectively. While both species roosted within similar land cover types, they tended to use different roost types; *Myotis lucifugus* primarily using crevices/cavity roosts (58% of roosts) while *Myotis sodalis* used primarily exfoliating bark roosts (87% of roosts). This seeming predilection for crevice/cavity roosts in *Myotis lucifugus* may explain their distribution wide frequent use of anthropogenic roosts, which tend to mimic crevice/cavity roost characteristics. This may also suggest that *Myotis lucifugus* were preadapted to use anthropogenic roosts prior to European settlement. With increasing urbanization, the number of natural tree roosts decreased and the number of potential anthropogenic roosts increased. We propose that *Myotis lucifugus* were ready-and-able to adapt to this increase in anthropogenic roosts while *Myotis sodalis* were not, due to their preference for exfoliating bark roosts, which are not commonly mimicked by anthropogenic roosts.

ROOSTING HABITAT SELECTION OF THE NORTHERN YELLOW BAT (*LASIURUS INTERMEDIUS*) ON TWO GEORGIA BARRIER ISLANDS

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In the southeastern U.S., northern yellow bats (*Lasiurus intermedius*) have been found to roost primarily in Spanish moss (*Tillandsia usneoides*), but are also known to roost under the fronds of cabbage palms (*Sabal palmetto*). Although hardwood habitats are important in roost site selection, specific habitat composition that provides optimal roosting habitat is unknown. We examined roosting habitat selection of the northern yellow bat on two Georgia barrier islands, one dominated by pine/mixed pine habitats and one dominated by hardwood habitats. We captured and radiotagged 16 adult males, one adult female, and one juvenile female. We tracked bats to their diurnal roosts daily until the transmitter battery died or the glue failed. Roost site characteristics were measured at roosts and random trees. Out of 177 roosts 98% were located in Spanish moss on hardwood trees and 2% were located under palm fronds. Consistent with previous research, our preliminary analyses indicated that roost trees had a larger DBH than the surrounding trees. We additionally found that percent canopy coverage was higher at random sites than at roost sites. Our results support the general supposition that hardwood habitats are important roost locations, but site-level factors may play a role in selection. Future analyses will examine additional site-level, as well as landscape level characteristics influencing roost site selection.

COMPARISON OF AUTOMATED AND MANUAL IDENTIFICATION METHODS FOR MULTIPLE PASSIVE ACOUSTIC BAT SURVEY DATASETS: IMPLICATIONS FOR FUTURE PROTOCOLS

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The U.S. Fish and Wildlife Service recently revised guidelines regarding standardized protocols for assessing the presence or probable absence of the federally listed Indiana bat (*Myotis sodalis*). These recommendations identify a need to move away from traditional mist-net surveys in favor of passive acoustic survey methodology using automated acoustic identification software to identify species. Currently, no Service-approved acoustic ID software is available, although two candidate programs have been identified: Echoclass (Version 1.1) and BCID (Version 2.4.1.1). Our study objective was to determine the degree of congruence between results of these currently-available identification tools. We compare results of manual and automatic identification methods for several passive acoustic bat survey datasets collected in the Southern Appalachians and New England between 2011 and 2012. Echoclass and BCID software were used to automatically process acoustic data for all species, while a portion of these datasets were manually analyzed and identified to species and/or guild, as is often done for passive acoustic bat datasets. We compare species groupings, overall activity levels, and the extent to which various methods agree and disagree for particular species groups and discuss implications of these differences for guiding future protocol decisions.

USING AUTO-CLASSIFIERS FOR ACOUSTIC SURVEYS: DO RESULTS REFLECT REALITY?

– OR – A BAT IN THE HAND IS WORTH HOW MANY DETECTORS IN THE BUSH?

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The development of automatic classifiers for analyzing both full-spectrum and zero-cross bat echolocation recordings has added much-needed efficiency to the tedious process of extracting call parameters and verifying species by hand. But how can we measure the accuracy of results from our auto-classifiers when there is no way to verify which species were echolocating over the microphone when the recordings were made? Also most of the call characteristics that unknown files are measured against, were collected under ideal or controlled conditions, not at all like those encountered during typical deployments conducted during surveys. This presentation considers the following questions: (1) How do results from acoustic inventories compare to those from physical capture records? (2) Does species richness affect our expectations of accuracy from acoustic surveys? (3) How do results from different auto-classifiers compare to each other when applied to the same data set? Answers will come from reviewing over 30,000 acoustic recordings, collected from over 100 survey sites, in six regions of North America: central Pennsylvania, the Mississippi River area of central Illinois and Missouri, western Kentucky, northern California, and southeastern Arizona. Recordings were post-processed using appropriate regional classifiers from the current leading software packages including: BCID, EchoClass, and SonoBat. Each acoustic site was also paired with physical capture sites where nets and traps confirmed species presence. Results will show that neither inventory method alone presents an accurate picture of bat presence. Additionally, each classifier returned different results on the same data set. This has important implications for the interpretation of acoustic surveys across the continent. As such, the use of bat detectors to determine bat presence in a habitat should be viewed as just a single tool for bat surveys, and should likely rarely be relied upon as the sole, definitive proof of bat presence without confirmation from "a bat in the hand."

AN OVERVIEW OF LITTLE BROWN BAT HABITAT PREFERENCES AT FORT DRUM MILITARY INSTALLATION

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Understanding animal-spatial use of the environment is a paramount task of wildlife management. We suggest that assessing the apparent habitat preferences of myotid bats in the Northeast and elsewhere is critical to guide the development of effective monitoring protocols following white-nose syndrome associated declines. In the summers of 2010 and 2012, we captured and radio-tagged adult female little brown bats (*Myotis lucifugus*) from an artificial bat house at Fort Drum Military Installation in northwestern New York. We conducted fixed-station simultaneous telemetry to determine nocturnal spatial use. Successful location estimates were used to calculate minimum convex polygons (MCP) for bats with > 30 locations (n=8) and to perform subsequent habitat analyses. In the summers of 2011 and 2012, we deployed a grid of 4 x 4 Anabat acoustic detectors over 5 sampling periods in various riparian and non-riparian environments near the same artificial bat house. The total group MCP mean home range of 194 ha (21-1104 ha) overlapped our area used for the acoustic grid. Rankings of habitats using Euclidean distances revealed a higher proportional use of water ($P = 0.05$) and forested riparian ($P < 0.0001$) habitats than other habitat types at the home range and landscape scales, respectively. Pair-wise comparisons of habitat types indicates that bats were found significantly closer to forested riparian habitats than to water, development, open areas, shrubs, and other riparian habitats (P-values < 0.0001) at the landscape scale. Although acoustic detector occupancy estimates were 1.0 in non-riparian habitats versus 0.43 in riparian habitats, detection probabilities were 0.23 and 0.08 in riparian versus non-riparian sites, respectively. Despite potentially lower occupancy rates, these data suggest that riparian habitat conditions may be optimal for successful detection of little brown bats in Northeastern landscapes similar to Fort Drum where severe population declines have made monitoring difficult.

WEATHER PROTECTION FOR ANABAT DETECTORS

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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, along with a brief introduction to some of the important concepts, which we hope will help users better comprehend how to get the most out of their equipment.

USING SOCIAL NETWORK ANALYSIS TO INVESTIGATE SOCIALITY IN *OCTODON DEGUS*

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Historically, the investigation of a species' social structure has relied upon analysis of indirect population-level social parameters, such as mating system, social group size, etc. However, these approaches do not address the variation in interactions between individuals or the combined effects these individual interactions have on the social structure as a whole. Thus, a challenge to developing a comprehensive model of sociality is to quantify all associations between individuals as well as the way these associations interact to form the overall social structure at the population level. An emerging tool for such endeavors is social network analysis.

Social network analysis uses social interactions between individuals to model a network where nodes represent individuals and the lines connecting the nodes represent social associations between the individuals. The primary objective of our study was to use social network analysis to investigate sociality in the degu (*Octodon degus*), a social rodent endemic to central Chile. We used previously collected live trapping data from two geographically and ecologically distinct degu populations (n=98 and n=48) to create a matrix of social association values based on how frequently each pair of individuals was trapped together. We then used this association matrix in SOCPROG 2.4 to assign values to each individual for a series of social network parameters, including association strength, reach, and affinity. Currently, we are investigating these network parameters to look for both intra- and inter-population differences. This will allow us to investigate individual variation in degu sociality within a population, as well as any population-level differences in social structure between the two distinct populations. Further, such work helps demonstrate the broad applicability of social network analysis, which may be used for a variety of ecological applications outside of social behavior, such as modeling disease transmission through a population.

EASTERN SMALL-FOOTED BAT (*MYOTIS LEIBII)* ECOLOGY AT ACADIA NATIONAL PARK, MAINE

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Between 2008 and 2012, we have captured 166 individual *M. leibii* while foraging on Mount Desert Island at Acadia National Park (ANP) in Maine. Of those banded (n = 155), 11 have been recaptured with some of those two years after their original banding date. In addition to mist netting and acoustic surveying our studies have included mercury (Hg) analysis, stable isotope (SI) analysis, and radio telemetry to locate roosting sites. A very brief overview of these methods will be presented to highlight that *M. leibii* at ANP appear to maintain a stable population with elevated Hg levels, do not appear to migrate very far, and, in late summer, prefer roosting on top of small mountains under granite rocks in the open on gently sloping granite slabs. Maternity roosting sites remain unknown at this location with compelling data to suggest they may roost in a man-made structure. Post-maternity season foraging area requirements were estimated and suggest that this species prefers a mix of heavily wooded forest trails with adjacent open meadows and ponds along with semi-open wetlands. Hibernacula have yet to be discovered here but *M. leibii* are the first species to be captured in mist nets (April 6) and among the last on the latest date of sampling (September 29), alongside *M. lucifugus* and *M. septentrionalis*.

HOW MUCH DO WE ACTUALLY KNOW ABOUT MAMMALS OF THE SOUTHEASTERN U.S.?

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The southeastern U.S. is home to a diverse mammalian community of over 130 native and introduced species. We compared the relative knowledge of southeastern U.S. mammal species through a literature search of electronically abstracted scientific publications. We estimated the number of scientific publications for each mammal species in Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee. The number of publications per species was typically small with a mode of 0 in every southeastern state. States differed in their published knowledge of resident mammals with the median number of publications per species greatest in Florida and lowest in Alabama. There were inequalities in published literature based on taxonomic group with a disproportionately large number of publications on Order Artiodactyla and small numbers of publications on diverse groups such as Orders Chiroptera and Rodentia. Our results indicate that the general knowledge of mammals in the southeastern U.S. is far from complete. These gaps in knowledge limit our ability to effectively conserve and manage many mammal species.

SPRING BREAK 2012: WHERE THE CAROLINA NORTHERN FLYING SQUIRRELS ARE

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We radio-tracked 3 female and 2 male endangered Carolina northern flying squirrels (*Glaucomys sabrinus coloratus*) during late winter and early spring 2012 in the Mount Hardy area of the Pisgah National Forest in Haywood County, North Carolina. Over the survey period, northern flying squirrels used 13 yellow birch (*Betula alleghaniensis*; dbh 26.2 $\pm$ 2.1 cm) and 9 red spruce (*Picea rubens*; dbh 49.3 $\pm$ 4.9 cm) as diurnal dens. Ten of the 13 yellow birch dens were located in the cavities whereas the remainders were dreys. Conversely, 8 of the red spruce dens were dreys and only one was located in a cavity. The 95% adaptive kernel home ranges for the 2 males and 3 females were 12.6 $\pm$ 0.9 ha and 6.5 $\pm$ 2.2 ha, respectively. The 50% adaptive kernel "foraging core use" home ranges for the 2 males and 3 females were 1.45 $\pm$ 0.05 ha and 0.9 $\pm$ 0.3 ha, respectively. Northern flying squirrels used red spruce-dominated stands with canopies > 20 m in height greater than expected based on availability at the landscape- and both 95% and 50% adaptive kernel home range-scales. Home range size we observed was comparable to other Carolina northern and Virginia northern flying squirrels (*G. s. fuscus*) tracked where red spruce or red spruce-fraser fir (*Abies fraseri*) communities were present and home ranges were smaller than those recorded in wholly northern hardwood habitats without a red spruce component. Our results provide additional evidence that although a hardwood component is important for denning habitat, mature red spruce-dominated habitats with complex structure are preferred foraging habitats and also are used as denning habitat. These data can inform efforts to improve the

structural condition of extant red spruce forests and/or increase overall red spruce acreage to potentially benefit northern flying squirrels.

USE OF ACOUSTICAL SURVEYS IN DETECTING AND IDENTIFYING ENDANGERED CAROLINA NORTHERN FLYING SQUIRRELS (*GLAUCOMYS SABRINUS COLORATUS*) AND SOUTHERN FLYING SQUIRRELS (*G. VOLANS*)

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Acoustical surveys have long been a commonly used practice in documenting presence of species of birds and amphibians. More recently, with advancements in recording and analyzing high-frequency sounds, these same methods have been applied successfully to detecting and distinguishing individual species of bats and cetaceans. Because of the success seen in acoustic surveys for bats, this technique may be useful in detecting ecologically similar species such as flying squirrels. We assessed the efficacy of using acoustical surveys to document presence of North American flying squirrels (*Glaucomys sabrinus* and *G. volans*). Acoustic surveys were conducted in Alabama where *G. volans* occur, and in western North Carolina where southern flying squirrels and endangered Carolina northern flying squirrels (*G. s. coloratus*) occur. Recordings of flying squirrels from acoustic surveys conducted in the wild were quantified and discriminant-function analysis was used to compare calls to an existing call library of flying squirrels in captivity. Acoustic detection of *G. volans* in Alabama occurred at 20 of 44 sites for a detection-success rate of 45.5%. Two new types of calls were discovered from field-surveys for *G. volans* including chirps and downsweeps. Discriminant-function analysis and cross validation correctly classified each group of calls 100% of the time. Acoustic detection of flying squirrels in western North Carolina occurred at 66 of 136 sites surveyed for a detection-success rate of 48.5%. Carolina northern flying squirrels were recorded at 44 sites and southern flying squirrels at 22 sites. Sympatry occurred at 15 sites. Results suggest that acoustical surveys may be significantly more effective in documenting presence of flying squirrels than techniques used previously. Such surveys may be useful in detecting and monitoring endangered populations of northern flying squirrels and disjunct or locally rare populations of southern flying squirrels in eastern Canada, Central America, and the mid-western United States.

YEAR ROUND ACTIVITY OF PERIPHERAL BAT POPULATIONS IN THE NORTH CAROLINA COASTAL PLAIN

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Conservation efforts should be directed to peripheral populations when there is a major threat to core populations, as is the case with White Nose Syndrome (WNS). The objective of our study was to determine the distribution and year-round activity of peripheral bat populations of WNS-impacted and conservation concern species in the North Carolina Coastal Plain. We conducted mist netting between 15 May - 5 August of 2012. Over 60 nights of mist-netting occurred in two managed pine and two bottomland hardwood forest sites in eastern North Carolina. In addition, we established four acoustic recording stations (one at each site; song meter SM2Bat+ detectors) in the summer of 2012 to record bat ultrasound from sunset to sunrise for two years. We caught 452 bats including: 20 Rafinesque's big-eared bat (*Corynorhinus rafinesquii)*, 43 southeastern Myotis (*Myotis austroriparius)*, 50 tricolored bat (*Perimyotis subflavus)*, 8 northern long-eared bat (*Myotis septentrionalis)*, 35 big brown bat (*Eptesicus fuscus)*, 173 eastern red bat (*Lasiurus borealis)*, 7 Seminole bat (*Lasiurus seminolus)*, and 116 evening bat (*Nyctecieus humeralis)*. Total number of bats captured and species richness were higher in bottomland hardwood forests compared to intensively managed pine forests. Rafinesque's big-eared bat and southeastern Myotis were captured in bottomland hardwood forests but not in pine forests. Further, total number of bat echolocation sequences was higher in bottomland hardwood forests when compared to intensively managed pine forests. Recorded calls are currently being analyzed using Sonobat 3.1 to determine presence and seasonal activity of bat species through the year. Preliminary acoustic results suggest that relative bat activity was highest between July and August and there is evidence of winter activity comparable to summer activity on warm winter nights through December. We will discuss significance of these results in relation to WNS and coastal wind turbine development.

SUMMARY OF SIX INDIANA BAT (*MYOTIS SODALIS*) MIGRATION EVENTS FROM TENNESSEE CAVES

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Relatively little is known about the migratory behavior of Indiana bats, and movements have historically been described as straight line connections between banding and recapture sites. This neglects valuable data on an important and complex life history component of the species. Our primary objective was to identify summer grounds for bats hibernating in Tennessee caves. Secondarily we collected data on how bats migrate with regards to direction, tortuosity, flight speed, use of stopover sites, and weather effects. We used active radio-telemetry to track female Indiana bats during spring migration from 4 caves in eastern Tennessee over 4 consecutive spring migration seasons: 2009-2012. Bat movements were documented using ground and aerial tracking. A total of 25 transmitters were attached to 22 female Indiana bats during 6 tracking phases (three bats were radio-tagged twice). Three summer grounds have been located: Carroll Co., KY (230.7 km); Gilmer Co., GA (148.1 km); Cleburne Co., AL (226.1 km). The farthest tracked bat was 263.8 km but the signal was lost north of Birmingham, AL. Bats from the northern counties in Tennessee migrated north, while bats from central Tennessee migrated south. During migration flights, bats followed a relatively straight line as evidence of low tortuosity values. Migration flights were faster ($\bar{x}$ = 18.1±0.4 kph, range: 0.7-40.0 kph) than non-migrating behavior ($\bar{x}$ = 10.9±0.4 kph, range: 0.02-39.7 kph). All bats tracked for >1 night utilized stopover areas during the night to feed or night roost. When the weather became inclement (e.g., <50°F, significant rain), bats stopped migrating. Although the straight line migration

assumed by band recoveries is somewhat valid, active tracking showed us that many bats made abrupt direction changes to take advantage of landscape features before continuing on their initial trajectory. In addition, active tracking allowed for data collection on various other bat behaviors not possible with band recoveries alone.

BRANDENBARK™ MITIGATION AND HABITAT ENHANCEMENT TOOL FOR TREE BARK ROOSTING BATS

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Few tools are available to land managers as mitigation or habitat enhancement for the Indiana bat (*Myotis sodalis*). Fewer still directly address the summer habitat needs for this species. To address this issue, we developed BrandenBark, a new tool specifically designed to mitigate for the loss of summer maternity habitat for Indiana bats. The bark mimics natural trees used typically used as maternity roosts. From 2009 – 2012, sixteen BrandenBark roosts have been erected at a known Indiana bat maternity colony at Fort Knox, Kentucky: 10 bark pieces on existing snags, 6 on untreated wooden utility poles (artificial trees). In over 80 survey days, at least one roost was used by bats, with multiple roosts typically used each day. Seventy percent (70%) of snags fitted with BrandenBark had consistent use by Myotine bats. Emergence counts conducted throughout the maternity seasons show consistent bat usage with a high count of 260 individuals. One-hundred percent (100%) of the BrandenBark artificial trees were used within two months of construction, including one with an emergence count of 242 bats. To date, 221 bats have been captured exiting BrandenBark roosts. Reproductively active female (n=151), juvenile (n=31) and adult male (n=4) Indiana bats accounted for the majority of captures (85%). BrandenBark has been approved by USFWS as a mitigation tool for linear corridor projects in West Virginia. BrandenBark artificial trees are simple to install, require little to no maintenance, and are easily monitored. As such, BrandenBark is an invaluable mitigation and habitat enhancement tool for any tree roosting species.

PRESENCE ONLY MODELING OF INDIANA BAT (*MYOTIS SODALIS*) SUMMER ROOSTING HABITAT IN THE SOUTHERN APPALACHIAN MOUNTAINS

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Indiana bat habitat in the southern Appalachians is made up of dense contiguous forest where suitable habitat does not seem to be limited. Thus, managers have difficulties determining what areas are critical to Indiana bats when planning large scale timber harvests and prescribed fires. Our objectives were to create a spatial prediction of summer roosting habitat and identify the critical landscape variables using the presence-only modeling approach of maximum entropy (MaxEnt). Our study area is made up of >200,000 ha in the Great Smoky Mountains National Park, the Cherokee National Forest and the Nantahala National Forest. From 2008 to 2012, we found 82 known reproductive female and juvenile roost locations that we used to create our spatial model. Traditional variables such as elevation, slope and aspect were included as environmental variables. However we also used unique variables such as distance to ridge line and ridge curvature to characterize roost features we observed while tracking Indiana bats in this region. Preliminary analyses of the global model including 9 environmental variables has given early support for elevation and forest type as being critical indicators of Indiana bat roosting habitat on a landscape scale in the southern Appalachians. Our results will enable managers to make more informed land-use decisions considering Indiana bat summer roosting habitat and to identify potential high use areas, which may be particularly helpful in remote areas where traditional presence-absence surveys are difficult.

DISTRIBUTION AND STATUS OF THE NORTHERN AND SOUTHERN SHORT-TAILED SHREWS (*BLARINA BREVICAUDA AND B. CAROLINENSIS*) IN NORTH CAROLINA

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Two species of short-tailed shrews (genus *Blarina*) exist in North Carolina. The northern (*Blarina brevicauda*) and the southern (*Blarina carolinensis*) short-tailed shrews can be morphometrically distinguished in most cases. Throughout most of North Carolina, these two shrew species are parapatric with very little overlap. In the Middle Atlantic Coastal Plains and Southeastern Plains ecoregions, both species may coexist. Morphometric data, consisting of 15 cranial and dental characters, were collected from museum voucher specimens of *B. brevicauda* and *B. carolinensis* within the state of North Carolina. There were no differences between sexes so data were pooled to increase sample sizes. Multivariate Principal Components and Maximum Likelihood Analyses were used to determine the factors contributing to the variation in measurements. The resulting plots show a clear separation of the two species including the suggestion of a localized subspecies, which was further supported by Classification and Regression Tree Analysis. Based upon the museum locality data, each specimen was geo-referenced and mapped to view the current distribution for the genus *Blarina* in North Carolina with its current taxonomic designation. Future genetic analysis will test for concordance with the morphological findings for the species and subspecies, and look for evidence of gene flow.

MAMMAL DIVERSITY, ABUNDANCE, AND ACTIVITY PATTERNS AT JEAN LAFITTE NATIONAL PARK, LOUISIANA: PRE- AND POST-KATRINA

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Established in 1978, the Barataria Preserve of Jean Lafitte National Park. has been used and modified by people of the region for nearly 2000 years and is currently undergoing major urban and environmental impacts. We conducted the first mammal inventory of the park in 2003-2005, with field studies terminating just prior to Hurricane Katrina. Bat monitoring, live-trapping small and medium-sized mammals, and motion-triggered cameras documented occurrence and habitat distribution of 24 species. Field work for a re-assessment of mammal diversity and habitat use was just completed (2012) and is reported here. Sampling localities for the re-assessment included the sites studied in the pre-Katrina survey, but added many other sites, especially in swamp habitats. All seven species of bats documented pre-Katrina were captured/recorded post-Katrina, however, abundances were higher in some sampling locations post-Katrina and more bat species (7 vs. 4) were documented in hardwood forest habitats. Rodent diversity and abundances are low (only 2 native species, *Peromyscus leucopus* and *Ozyzomys palustris* are commonly encountered), both pre- and post-Katrina. Large mammals are very abundant in all habitats, with significant increase in the abundance of deer and carnivores (coyote, bobcats), post-Katrina. Feral hogs were not present pre-Katrina, but have now established a large breeding population that is expanding into all major habitats within the park. These results speak to the resilience of mammals in an area impacted by major hurricanes, but also to the opportunities presented for introduction of invasive species (feral hogs) that are now re-shaping the functional ecology of the park.

EFFECTS OF INTERCROPPING SWITCHGRASS (*PANICUM VIRGATUM L.*) AND LOBLOLLY PINE (*PINUS TAEDA*) ON RODENT COMMUNITY STRUCTURE AND POPULATION DEMOGRAPHICS

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Rodents are important components of forest ecosystems. They disperse seeds and fungi, regulate invertebrate populations, and are prey for higher order consumers. Intercropping switchgrass (*Panicum virgatum* L.) in loblolly pine plantations (*Pinus taeda*) is a potential way to grow and harvest a biofuel feedstock without encumbering additional arable lands. In 2008, Catchlight Energy LLC (CLE), a Chevron/Weyerhaeuser Joint Venture was formed, in part, to assess large-scale viability of such a management system. Intercropping switchgrass changes the understory vegetation composition of pine forests, which could influence rodent community structure and population demographics. We tested the hypothesis that intercropping switchgrass in intensively managed pine plantations influences rodent population demographics and community structure. We conducted seven intensive live-trapping sessions from 2 June - 27 July 2012 in Kemper County, Mississippi on 4 intensively managed pine plots (control) with trees planted in 2005 and 4 intensively managed pine plots with trees planted in 2005 and switchgrass planted between tree rows in 2009. We calculated community metrics including species richness and Simpson's Diversity Index. We estimated population abundances, survival, and recruitment for common species using Program MARK. We captured 374 individuals, including *Peromyscus leucopus*, *P. gossypinus, Oryzomys palustris*, *Reithrodontomys humulis*, and *Sigmodon hispidus* on both plot types. *Microtus pinetorum* was captured on one pine plot intercropped with switchgrass. Richness did not differ between plot types ($Z = 0.44$, $P = 0.37$), but pine plots intercropped with switchgrass had lower rodent community diversity than control pine plots ($Z = 2.03$, $P = 0.03$). Preliminary results suggest that abundances of *Sigmodon hispidus* were higher in pine plots intercropped with switchgrass, but there was no difference between abundances of other rodent species. Preliminary results also suggest that there was no difference in survival and recruitment among common species. Our findings show that intercropping switchgrass in managed pine plantations may have altered rodent community diversity in this study by altering evenness, and increasing abundance of *S. hispidus*, but not other species.

NETWORK STRUCTURE AND SOCIAL ASSORTMENT BY THE INDIANA BAT AT AN OHIO MATERNITY SITE

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In summer, female Indiana bats (*Myotis sodalis*) are known to form maternity colonies in one or more primary roost locations and use an array of other roosts in a hierarchical fashion. However, few data are available regarding individual social assortment and network structure of maternity colonies. We analyzed the social assortment and day-roost network structure of the Indiana bat at a known maternity colony in a highly agricultural landscape in central Ohio over two years. We found that the Indiana bat colony exhibited inconsistent social dynamics between years, showing strong fission-fusion characteristics in only one year. Between years, Indiana bat day-roost networks and network metrics changed substantially, possibly reflecting day-roost habitat induced changes in social dynamics. Because data on Indiana bat day-roost network structure are not available elsewhere, we compared these data to the social assortment and day-roost network structure of the conspecific northern bat (*Myotis septentrionalis*) from closed-canopy western mixed mesophytic forest in north-central Kentucky. Indiana bat and northern bat day-roost network characteristics differed drastically. Indiana bats exhibited a more concentrated use of individual day-roosts than northern bats and the extent of Indiana bat networks was much larger than that of northern bats. Unlike Indiana bats, northern bat networks varied little between years surveyed. The differences in Indiana bat social dynamics that we observed between years may be related to the ephemeral nature and micro-climatic

specific requirements for their day-roosts. Understanding the network structure and social assortment of Indiana bats is essential for conservation and management of roosting habitat at the stand- and landscape-level.

EFFECTS OF AN ONGOING OAK SAVANNA RESTORATION ON SMALL MAMMALS IN SOUTHWEST MICHIGAN

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Oak savannas have declined drastically in the Midwestern United States since European settlement and fire suppression. Species that are closely linked to these habitats, such as the federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*), help to promote and fund oak savanna restoration projects. However, it is essential that other species are monitored throughout restoration and the small mammal community, being important to the ecosystem, is particularly useful to study. The United States Forest Service is currently conducting an oak savanna restoration in the Manistee National Forest in Lower Michigan using thinning and burning. Our objective was to assess whether the small mammal community was impacted by the restoration methods that were implemented. We live trapped small mammals in each of the mechanically thinned plots (i.e., bulldozer, masticator, and shear cutter) and control plots in five blocks over four years (2008-2011). We compared small mammal diversity and relative abundance among treatments using one-way randomized block analysis of variance (ANOVA) tests. We also measured and analyzed vegetation variables over the four years using ANOVAs. Diversity significantly increased from 2008 to 2011 in all of the thinned and burned plots compared to the control plots (which were only burned). Two oak savanna species were captured in the site three years after the thinning and one year after the burn. We found canopy cover to be significantly lower in thinned than control plots and woody debris was significantly higher in thinned than control plots until after the prescribed burn. Current restoration efforts were beneficial to the small mammal community overall and promoted oak savanna species to immigrate into the restored area.

SUMMER ROOSTING ECOLOGY OF THE NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*) AT CATOOSA WMA

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Understanding the ecological requirements of a species is essential to developing conservation strategies. The Northern long-eared bat (*Myotis septentrionalis*) has been heavily affected by the fungal disease White-Nose Syndrome and thus has been proposed for listing under the Endangered Species Act. Our objective was to identify factors that affect roost selection of both male and female northern bats at different spatial scales. From May to August 2012 we mist-netted in three habitat types in Catoosa WMA, TN and caught 135 bats belonging to 5 species. Northern bat was the most frequently captured species in the area, followed by the Big brown bat (*Eptesicus fuscus*). We tracked 11 females and 10 males to 101 roost trees. We measured and identified each roost tree, sampled the surrounding habitat (1-ha plot) and compared these characteristics with those measured in randomly sampled habitat and suitable but unused trees. The tracked bats roosted in 14 different tree species: 82% hardwood, 18% pine; 57% dead, 43% alive. Roost tree and habitat characteristics were similar between males and females but females roosted in larger colonies ($p = 0.021$) and in stands with higher tree density ($p = 0.007$). On average, roost trees had a smaller dbh than unused trees. Most bats roosted in mature forest with a relatively high Shannon-Wiener diversity index but habitat characteristics were otherwise similar to those measured in random stands. The average minimum roosting area was 6.4 ± 2.0 ha and the mean 95% AKM home range was 20.8 ± 5.9 ha. In general, northern bats in Catoosa WMA appear relatively flexible in their habitat selection. Other noteworthy observations during our study included (1) northern and big brown bats roosting in the same maternity colony and (2) predation on a pregnant northern bat by a Gray rat snake (*Pantherophis spiloides*).

DIETARY NICHE OF *MYOTIS LEIBII* AND ITS ASSOCIATES INFERRED FROM FECAL CONTENTS AND STABLE ISOTOPE ANALYSIS

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Relatively little is known about the foraging habits of *Myotis leibii*. Furthermore, White Nose Syndrome (WNS) has changed structure of bat communities in eastern North America by decimating populations of formerly abundant species. It is unclear how such changes may influence dietary niche breadth of species that persist. We studied the diet of bats in a community in New Hampshire dominated by *M. leibii*, *M. lucifugus*, *M. septentrionalis* and *Eptesicus fuscus* from 2005-2011 in order to: 1) understand foraging by *M. leibii*, and 2) form predictions about how its foraging niche may change in the absence of its congeners. Diet was studied using visual identification of fecal contents (452 samples, across 4 species) and analyses of $\delta^{13}C$ and $\delta^{15}N$ in fur (62 samples, across 3 species). Volumetrically, diet of *M. leibii* (mean ± SE) was dominated by moths (53.5±3.9%), followed by beetles (17.9±2.8%), flies (15.2±2.9%) and a variety of minor constituents. Multivariate Analysis of Variance indicated $\delta^{13}C$ and $\delta^{15}N$ in *M. leibii* differed significantly from those of *E. fuscus* and *M. septentrionalis*. Similarity indices suggested diets of the 3 *Myotis* were more similar to each other than to the diet of *E. fuscus*. A Discriminant Function model classified *M. leibii* best based on the fact that it ate more moths than *M. lucifugus* and fewer unidentified arthropods than *M. septentrionalis*. Changes in the diet of *M. leibii* associated with the arrival of WNS generally were not detectable, except greater volumes of minor constituents were eaten after other *Myotis* had been largely removed from the community. Continued monitoring will be needed to verify whether this shift in diet was related to changes in composition of the bat community. Overall, our results agree with previous studies indicating *M. leibii* is flexible in its foraging habits.

IDENTIFICATION AND DELINEATION OF *MYOTIS SEPTENTRIONALIS* DAY-ROOST NETWORKS

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New insights on bat day-roosting dynamics relative to social assortment patterns and more importantly, the delineation of roost networks have potential implications for managing maternity habitat in forested landscapes. We identified day-roost networks of the northern bat (*Myotis septentrionalis*) at Fort Knox, Kentucky, using a simple movement based approach and described them using standard network measures (i.e. centralization, clustering and degree distribution). We assessed this approach by comparing network area utilization distribution spatial overlap and by examining patterns of movement of individual bats that were not assigned to a network. Additionally, we compared our movement based networks to networks assembled using an analysis of non-random social assorting group dynamics. We found that northern bat day-roost networks delineated using a movement-based approach exhibited clear activity centers and that bats not assigned to networks never crossed between core areas of separate networks. Furthermore, where present, spatial overlap of utilization distributions occurred only at the margin of the distribution, and patterns of use in areas of overlap were independent. Conversely, networks assembled using non-random social groups incorporated only a small number of tracked bats and their day-roosts and were of limited utility in delineating network areas. Additionally, the structure of our movement-based networks was scale-free, consistent with patterns reported elsewhere and with the fission-fusion dynamics of this bat species. Conservation implications will be discussed.

SPATIAL PATTERNS AND ROOST ASSOCIATIONS AMONG A BRIDGE-ROOSTING POPULATION OF *MYOTIS LEIBII*

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Little is known about roost selection in bats, especially in males, because of the inaccessibility of roosts and focus on reproductive females. Sex-specific differences in roost selection reflect differences in reproductive and thermoregulatory strategies as roosts are often chosen based on microclimate and intraspecific associations. We studied a population of mostly male *Myotis leibii* that roost in two bridges in the southern Appalachian Mountains. Our objectives were to (1) examine whether individuals chose roost locations within the bridges non-randomly and whether choices were associated with temperature, and (2) investigate whether individuals associated with one another and if they did, whether these associations were random or non-random. We PIT tagged 44 bats, checked expansion joints for bats in both bridges, and simultaneously recorded air temperature from 17 May – 26 September 2012. From 22 June – 25 September 2012 we recorded temperature within a subset of the expansion joints as well. We recorded 842 "bat observations" and observed 53 instances of associations. Bats chose expansion joints non-randomly and tended to roost alone. We will use regression models to assess the effects of site-specific and temporal factors on the number of bats observed in each crevice each day. Males may prefer cooler roosts for energy conservation, but predation risk and distance to tree cover could also be important. Associations may be rare because expansion joints with optimal temperatures are common, or there may be no great advantage to associating if factors like predation risk are of little concern. These data may help managers understand the thermal and spatial requirements of *M. leibii* when creating artificial roosts, such as bridges.

EVALUATING THE EFFECTIVENESS OF THREE ACOUSTIC MONITORING TECHNIQUES FOR LANDSCAPE LEVEL BAT POPULATION MONITORING

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Understanding population trends of any species is essential for conservation and management. However, population status of many bat species at a landscape level is poorly understood due to the difficulty sampling these species. In an effort to resolve this issue, especially with emerging threats (e.g. White-nose Syndrome and wind energy) a national mobile acoustic monitoring protocol was developed to survey summer bat populations. We compared species richness and abundance along car and boat mobile acoustic transects to identify the most efficient method. We further compared species richness to stationary acoustic detectors placed along the route to better understand the capabilities of mobile acoustic transects compared to traditional survey methods. Using sample-based rarefaction, there was no difference at the 95% confidence level in species richness (species/individual), density (species/sample), or diversity (Shannon-Weaver and Simpson's indices) between transect methods. However, car transects tended to show slightly higher measures. While over 1.5 as many calls were recorded and identified along boat transects, there were no clear advantages to boat transects (except for sampling *Myotis grisescens*). Additionally, car transects were less variable and least time consuming, leading us to conclude that car transects are the most efficient mobile acoustic method to monitor species. However, only two species (*Perimyotis subflavus* and *Lasiurus borealis*) were likely in sufficiently high abundance using either method to allow detection of small trends. Nonetheless, mobile acoustic transects offer the only measure of summer abundance and car transects likely provide opportunity to monitor 2-4 species in the eastern United States.

2013 MAMMAL COLLOQUIUM
POSTER PRESENTATION ABSTRACTS

CONSERVATION APPROACH FOR RAPIDLY DECLINING SPECIES

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Across the Eastern states, the USDA Forest Service actively manages large, contiguous blocks of forest land and protects thousands of caves and mines. Such places represent important summer and winter habitat for bats, including those affected by White-nose Syndrome (WNS). Managers are now faced with how to address rapidly declining bat populations during project planning and implementation on the Eastern national forests. These population declines are not due to habitat management, but to WNS - a factor outside the agency's control. The Forest Service is undertaking a multi-step conservation approach to address declining bat populations. The end result will be a Conservation Strategy which will outline beneficial management actions for bats on National Forest System lands and identify protective measures designed to avoid additive effects to populations already impacted by WNS. The Conservation Strategy will include: a) the addition of WNS-affected bat species with significant population declines to the Regional Forester Sensitive Species list, b) an assembly of existing and recommended bat conservation measures, c) a compilation of the best available science for use in species conservation assessments and viability evaluations, and d) range-wide trend analyses of WNS-affected populations. The Conservation Strategy is a tool that can be used to develop Conservation Agreements with the U.S. Fish and Wildlife Service or other partners. The Forest Service team is actively seeking feedback on this approach.

ALTERNATIVE ARTIFICIAL ROOST OPTIONS

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Four free-standing artificial bat roost designs were constructed in northern Missouri. Design one, designated as a bat mansion, consisted of a modified commercially available carport that was fully enclosed and had untreated oak slats inside, mimicking that of a typical attic or barn. Design two, called a rocket box, was composed of large, cylindrical PVC pipe with oak slats inserted in an alternate layering pattern. Designs three and four, the metal wrap and artificial bark wrap, respectively, were structurally similar. Both consisted of a repurposed telephone pole that was "wrapped" in oak slats positioned in an alternate layering manner. Based on acoustic surveys adjacent to the artificial roosts, big brown bats (*Eptesicus fuscus*), Indiana bats (*Myotis sodalis*), little brown bats (*Myotis lucifugus*) and the Northern bats (*Myotis septentrionalis*) are present in the area from spring to late summer. Each of these species have been documented using other manmade structures during this period. All designs were constructed and placed on site during spring and summer of 2012. Thus far, no occupancy has been recorded, but monitoring will continue. Land development reduces habitat that could negatively impact the foraging and roosting activities of the Indiana bat and other *Myotis* (Sparks, Ritzi, Duchamp, Whitaker, Jr. 2005). Artificial roosts should not be used to replace natural habitat, but should be considered if disturbance has altered or reduced the presence of natural roosts. Artificial roosts should also be considered if the adjacent, but not yet suitable, forests are being preserved and/or managed for this purpose. Hence, the need for further study in the effectiveness of artificial roost designs.

THE INFLUENCE OF PRECIPITATION AND TEMPERATURE ON THE REPRODUCTIVE TIMING OF MISSOURI BATS

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Understanding the influence of climate on reproductive events is critical for documenting population demographics and developing appropriate management strategies, because climate may vary significantly even within regions of a state resulting in intraspecific variation of reproductive timing. The timing of birth varies with latitude in several species of bats, and this effect may be due to variations in the ambient temperature and precipitation (affecting the available insect prey density). I examined which major stimulus, precipitation or temperature, is preferentially used by bats to optimize reproductive timing. Capture data from 6,668 bats representing 10 species from 24 counties and 571 sites, from April through October, were used to examine the influence of precipitation, temperature, and latitude on the annual reproductive timing of bats in Missouri. We found precipitation had the greatest effect on the timing of reproduction. Large precipitation events during the spring resulted in delayed onset of each reproductive condition (pregnant, lactating, post-lactating and volant juveniles). Differences in reproductive timing between northern and southern Missouri were not significant, although a visual trend indicated delayed reproduction following heavy precipitation events in southern Missouri, despite the cooler temperatures of northern Missouri.

HOW DOES *GEOMYCES DESTRUCTANS* INFECT BATS?

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Geomyces destructans is a psychrophilic fungus that causes cutaneous infections in cave dwelling bats and high mortality in North American populations. *G. pannorum* is a closely related psychrotolerant species that is a rare pathogen of humans. Cold tolerant organisms can adjust lipogenic activity to lower membrane viscosity and thus survive rugged habitats by increasing lipid unsaturation, decreasing triacylglyceride (TAG) synthesis, and producing shorter carbon acyls. Lipid profiles may partially explain fungal ecological niche and *G. destructans* pathogenicity to bats. Additionally, profiles are species specific and may be utilized to differentiate closely related species and detect disease. In this study, we incubated *Geomyces* at 5°, 8°, 15°, and 22° C. Broad lipid classes of *Geomyces* were determined to be primarily sterols, free fatty acyls (FFAs), and triacylglycerides (TAGs) with minor amounts of mono-/diacylglycerides and sterol esters. TAG molecular species were determined by matrix-assisted laser desorption-ionization time-of-flight mass spectrometry. Total acyl unsaturation was determined with gas chromatography/mass spectrometry. *G. destructans* produced higher proportions of unsaturated 18 C acyls and TAGs than *G. pannorum*. *Geomyces* produced more 18:3 acyl and TAGs at five degrees than at higher temperatures; however, *G. destructans* made higher proportions of FFAs to TAGs at higher temperatures. These results indicate *Geomyces* alter lipogenic activity to survive cold temperatures by increasing lipid unsaturation. *G. destructans* may not produce increased TAGs at higher temperatures leading to FFAs reaching toxic levels and prohibiting growth. Future studies should focus on temperature optima of enzymes involved in TAG synthesis and disruption of lipogenic metabolic processes. Lipid profiles among multiple *Geomyces* species should be further investigated as a method of disease detection.

MALE BIG BROWN BAT (*EPTESICUS FUSCUS*) ASSOCIATION PATTERNS ARE INFLUENCED BY ULTRASONIC VOCALIZATIONS OF FEMALES

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It generally is accepted that bats emit ultrasonic vocalizations that function for echolocation purposes as well as for communication. I determined whether male or female big brown bats (*Eptesicus fuscus*) responded to variation in ultrasonic vocalizations of the opposite sex in a manner that would suggest that vocalizations are used in a mating context. I presented 31 female and 10 male big brown bats with ultrasonic playbacks of differentially mating (i.e., high frequency copulators = HM vs. low-frequency copulators = LM) individuals of the opposite sex. I measured 1) which side of the arena each subject selected first (HM vs. LM), and 2) duration spent (seconds) on each side of the arena (HM vs. LM). For both of these measures (i.e., first choice and duration) male subjects were more likely to select the ultrasonic vocalization of HM females, but the same respective tests determined that female subjects did not select ultrasonic vocalizations of frequently copulating males over vocalizations of infrequently copulating males. My results support the possibility that ultrasonic vocalizations of big brown bats function for communication during the mating season, and may be a precopulatory mechanism of mate selection.

ROOSTING ECOLOGY OF EASTERN RED BATS IN WEST-CENTRAL VIRGINIA

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The eastern red bat (*Lasiurus borealis*) is one of the most common species of bats in eastern North America but is experiencing population declines little is known of their roosting ecology. This lack of knowledge may hinder implementation of conservation measures. We captured 4 adult male red bats in the Blue Ridge Mountains of Virginia in June of 2012. Transmitters were placed on four bats and we successfully tracked two bats to their roosts. Diameter of roost trees and trees in the surrounding area were measured using a diameter tape and height was estimated using a laser range-finding hypsometer. Bats were located an average of 4.5 days, where they roosted in white oaks (*Quercus alba*) and suckers of American chestnuts (*Castanea dentata*) 4.1 to 10.7 meters from the ground. Roost trees displayed large variation in diameter and height. Neighboring trees displayed large variation in diameter and height when compared to roost trees. Bats usually did not use roosts longer than one day. Roosts were $\geq$ 2.75 km from capture sites, which was greater than distance reported in previous studies. Our data concur with other research, indicating that red bats have flexible roosting habits.

SINGLE UNIT TURBINES AND EFFECTS TO BAT POPULATIONS

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Northern Arkansas is home to 15 species of bats. This includes three endangered species (i.e. Gray myotis, Indiana myotis, and Ozark big-eared bat) and three species listed as special concern in Arkansas (i.e. Eastern small footed bat, Rafinesque's big-eared bat, and Southeastern bat). Necessary investigation into possible causes of bat fatalities in Arkansas is vital due to the spread of White Nose Syndrome and concerns of declining populations due to fatalities at commercial wind farms. In lower wind producing regions (Arkansas $\leq$ Class 4 wind speed), single unit utility turbines are preferred over large acreage wind farms. These units have not been investigated as a possible cause of bat fatalities. Beginning in 2012, we surveyed six wind turbines in two different Arkansas regions (karst vs. delta) using Anabat SD2, carcass searches, mist netting activity, and visual observation. Anabats were placed on or close to the turbines to determine bat presence within the vicinity of the turbine. Carcass searches were performed at a 20 meter^2 area beneath

the turbine and mist netting/visual observations were performed ≤ 1.6 kilometers of all turbines. Survey methods detected bat presence in all turbine vicinities. One turbine (delta region) is likely responsible for bat fatalities. During the investigation, 11 Eastern red bats and one tricolored bat were found dead ≤ 12 meters from the turbine base. Future investigation will use infrared lights and night vision at this turbine in order to further elucidate mechanism of bat mortality at this turbine.

ROOST TREE SELECTION OF NORTHERN MYOTIS (*MYOTIS SEPTENTRIONALIS*) IN A CENTRAL APPALACHIAN HARDWOOD FOREST

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As habitat degradation along with disease continues to negatively impact bat populations in hardwood forests, land management agencies can contribute to the conservation and possible recovery of myotis species through habitat creation by means of prescribed fire and herbicide. Within the Fernow Experimental Forest in West Virginia, three separate compartments were subjected to burning to better understand the effects of disturbance. Within each compartment, random plots were treated with herbicide along with fire to expedite tree decay. During the summer of 2011 and 2012, 38 northern myotis roost trees were located in treatment areas and non-treatment areas. Measurements were taken on three spatial scales: individual roost tree, surrounding trees in the stand, and the area outside of the immediate stand. Female and male northern myotis were captured during a total of 11 capture nights, attached with radio transmitters and located during daylight hours using radio telemetry. Both female and male northern myotis were found in areas of treatment and non-treatment. Females selected roost trees slightly larger in size and with less bark remaining than males. Female roost trees were also slightly further from surrounding trees than male roost trees. Females were 6 times more likely to roost in areas of disturbance than males. Slope at roost locations was significant in model selection, as well as the percent canopy gap in the direction north of roost trees. Black locusts, red maple, and red oak were selected by both female and male bats more than other tree species. Snags were used by the majority of female bats, in both treatment and non-treatment areas. As the burn compartments within the FEF continue to decay and regeneration is allowed to progress, the effect of disturbance on roost selection can be better quantified and allow forest managers to develop models for predicting roost tree characteristics on a local and landscape scale.

ELEVATION AND FEMALE BAT FORAGING DISTRIBUTION IN A LOW MOUNTAINOUS REGION

P. Moore* and V. Rolland. *Department of Biological Sciences, Arkansas State University, State University, AR 72467*

Reproductive female bats have high energy demands during the gestation and lactation periods. This constrains them to forage in habitats characterized with stable temperature and high prey density; typically, valleys associated with waterways. A previous study has reported a decrease in the proportion of female captured along an elevation gradient. However, this study was limited to unmarked individuals captured after July 1, at high elevations (>1030m). Here, we aim to determine the influence of relative (valley vs. mountaintop) and absolute elevation on sex-specific foraging distribution of bats, during two periods of different energy needs (pre- vs. post-fledging), in an area of low mountains. Specifically, logistic regression analyses will be conducted on sex ratio using 720 adults of four species *(Lasiurus borealis, Nycticeus humeralis, Eptesicus fuscus, Myotis septentrionalis*) captured and marked at 114 sites in the Ozark-St. Francis National Forest (Arkansas), during the May-August 2012 Indiana Bat compliance survey. We hypothesize that females forage more in valleys than mountaintops regardless of the elevation, and less so after weaning. We thus predict a lower sex ratio in valleys/low elevations and before fledging. Implications, assumptions and limitations will be discussed.

GRAY BAT WINTER ACTIVTY (*MYOTIS GRISESCENS*), ARE THEY DIFFERENT?

J.D. Parris* and L.W. Robbins. *Biology Department, Missouri State University, 901 S. National Ave., Springfield, MO 65897*

Nine species are documented to be affected by white-nose syndrome (WNS) including the endangered gray bat (*M. grisescens*). The first records of suspect cases of WNS in gray bats occurred in the spring of 2010 and the first confirmed case of WNS was recorded in May of 2012. To date, mortality of gray bats, due to WNS, has not been documented. Over the last 2 winters we acoustically monitored bat activity, both at the cave entrance and at nearby foraging areas at 3 hibernacula in Missouri—1 was a major gray bat hibernaculum in Shannon County. Acoustic data over the last 2 winters suggests higher gray bat winter activity relative to other *Myotis* species. At the entrance of the major gray bat hibernaculum, bats were recorded during all winter months and total winter bat passes exceeded 50,000 passes/winter. Acoustic data collected at foraging areas near 2 other caves in Washington and Shannon counties indicated a higher proportion of gray bat activity relative to the proportions of gray bats represented within the hibernacula. Monitoring at these sites has continued during the winter of 2012-13 and a second major gray bat hibernaculum was added in Laclede County, and winter captures are being conducted. Preliminary capture data from the 2 gray bat hibernacula indicate that gray bats are active during the first third of winter and feed when conditions are appropriate. Between December 1 2012 and January 31 2013 we captured a total of 172 bats of 4 species. *M. grisescens* represent 124 of these captures. We captured gray bats routinely at temperatures < 7º C and a single gray bat at -1.5º C.

EFFECTIVENESS OF ACOUSTIC LURES FOR INCREASING INDIANA BAT (*MYOTIS SODALIS*) CAPTURES AT MIST-NET SITES

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Certain bat species may be more adept at avoiding capture in mist-nets. In particular, some studies have shown that the Indiana bat may be more difficult to capture using mist-netting methods. This has also been noted for Myotine bats in Britain. In areas where Bechstein's bat (*Myotis bechsteinii*) is known to occur in large numbers, they are rarely captured in mist-nets. By playing back ultrasonic social calls of conspecifics, researchers there were able to increase the number of mist-net captures of this species. Our study tested the effectiveness of using similar acoustic lures to increase the capture success of Indiana bats using three types of pre-recorded, echolocation calls. We conducted our study during May and June of 2012. At each test site two, 6 meter long mist-nets were set in atypical fashion (parallel to corridors, in open fields, etc.) in an effort to decrease incidental captures. A Binary Acoustic Technology AT100 transmitter was placed in the center of each net at a height of 1 meter. The GTools software was used to play back echolocation calls during 10 minute play back trials. Silent-control trials were used between each play back to compare lure success. Trials were also recorded with a digital video camera and bat activity was monitored acoustically using AnaBat SD1 bat detectors. Our study resulted in only 13 bat captures including only one Indiana bat. However of those 13 captures, 11 occurred during a playback treatment. Video analysis showed that bats were attracted to the acoustic lure and capture rates could be increased by orienting mist-nets in a more traditional configuration.

MONITORING CAVE BATS AT MAMMOTH CAVE NATIONAL PARK

S.C. Thomas. *National Park Service, Cumberland Piedmont Network, Mammoth Cave, KY 42259*

Cave-roosting bats are important to the nutrient-poor cave ecosystem because they import organic material which supports a specialized cave invertebrate community. Nine of thirteen bat species found at Mammoth Cave National Park are generally associated with caves at some time of the year. Two of the species that inhabit park caves are on the Federal Endangered Species List: gray bat (*Myotis grisescens*) and Indiana bat (*M. sodalis*). Regular population monitoring of hibernating endangered bats has occurred in a few park caves since the early 1980s. Since the early 2000s, cave bat monitoring on the park has expanded to include additional caves, species, seasons, and methods. On-park bat population trends are declining for some species, increasing for others, and stable for additional species. The need to regularly obtain reliable information on cave bat populations is underscored, since white-nose syndrome potentially threatens all of the cave-using species in the park.

INVENTORY OF TERRESTRIAL WILD MAMMALS AT MAMMOTH CAVE NATIONAL PARK: 2005-2010

S.C. Thomas. *National Park Service, Cumberland Piedmont Network, Mammoth Cave, KY 42259*

An inventory aimed at documenting the occurrence of at least 90% of the terrestrial wild mammal species potentially present on Mammoth Cave National Park took place from 2005 to 2010. Documentation of mammal occurrence was accomplished via visual encounters and trapping. Visual encounters included methods like sighting individuals, conducting spotlight surveys by boat, locating mammal sign, hearing mammal calls, and finding dead individuals. A variety of trapping methods were used, including remote "trail" cameras, live traps, pitfall traps, drift fence-pitfall arrays, and several other opportunistic capture methods. 663 mammal records were documented by visual encounter or some trapping method representing six orders, 13 families, and 32 species. Of the 37 species potentially present in 2005, 32 species (87%) were confirmed present in 2010. Total trapping effort (# of trap-nights) was 118,567. A total of 163 specimens was collected as vouchers. No federally listed species of terrestrial wild mammals were documented.

INDIANA BAT SUMMER HABITAT: SUGGESTIONS TO IMPROVE THE CURRENT ASSESSMENT STANDARDS

B.E. Tinsley*, J.D. Parris, and L.W. Robbins. *Biology Department, Missouri State University, 901 S. National Ave., Springfield, MO 65897*

Alterations to the current and newly proposed U. S. Fish and Wildlife Service habitat suitability survey are suggested here in order to improve the standards to better identify *Myotis sodalis* habitat in Missouri and the surrounding region. They are not meant to be, nor should they be, considered for range-wide estimates of suitability. The suitability of summer habitat should not be assessed until suitable summer habitat is present. During this survey each of the forest blocks identified received a sampling intensity of 10%, which required one $1/10^{th}$ acre sample plot (37.2 radial feet) for each forested acre. A score on this scale can range from 0-10, 0 representing no suitable Indiana bat habitat and 10 representing excellent habitat. Characteristics include 1) understory clutter, 2) number of trees/acre >15 in dbh, 3) percent of dominant trees that are preferred tree species, 4) number of snags, and 5) overall stem density stems/acre. Each of these characteristics is assigned a score 0-2 based on data gathered at sample plots and summed to provide a 0-10 habitat score. An additional 10 points are based on landscape characteristics. These include the presence of a known Indiana bat maternity roost (primary or secondary) within 5 miles (+6), or the presence of a maternity colony within the same county, or an adjacent one (+4), the capture of pregnant or lactating females within 25 miles (+2), forest cover within 5 miles between 20% and 60% (+2), and water resource characteristics with forest edge border within 2.5 miles (+2).

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Items of Interest

UPCOMMING MEETINGS

2014 SOUTHEASTERN BAT DIVERSITY NETWORK AND COLLOQUIUM ON THE CONSERVATION OF MAMMALS IN SOUTHEASTERN US
Nacogdoches, Texas

13-14 February 2014

The 19th Annual Meeting of the Southeastern Bat Diversity Network and 23rd Colloquium on Conservation of Mammals in The Southeastern United States will be held at Stephen F Austin State University, Nacogdoches, Texas.

94th Annual Meeting of the American Society of Mammalogists
6-10 June 2014
Renaissance Oklahoma City Convention Center Hotel and Cox Convention Center
Oklahoma City, Oklahoma

Northeast Bat Working Group
Annual Meeting
8-10 January 2014
Clinton, New Jersey

Midwest Bat Working Group
Annual Meeting
3-4 April 2014
University of Illinois at Springfield
Springfield, Illinois

44th North American Symposium of Bat Research
Annual meeting
22-25 October 2014
Hilton Albany
Albany, New York

20th Annual Conference of The Wildlife Society
Milwaukee, Wisconsin
5-10 October 2014

EDITORS CLOSING COMMENTS

YOU DID IT AGAIN!

YOU SENT IN YOUR NEWS ITEMS AND MADE A GREAT NEWSLETTER

Thank You! Thank You ! Thank You!

I also owe a very special "Thank You" to my new assistant,
which most of you may know by now!

Vanessa Rojas

"Thank You!!!"

Again,

"**Thank You!!**"

to all of you who sent in items, you truly made this issue a real success.

Send all your interesting bits to our newsletter e-mail:
NightwingNewsletter@gmail.com

From all of us to all of you:

Merry Christmas and a Happy New Year!!!