PROGRAM OVERVIEW

February 12th (Thursday) **Southeastern Bat Diversity Network Meeting**

8:30 – 11:30 AM	SBDN Board of Directors Meeting	Meeting Room A
11:00 – 5:30	Registration	Auditorium Lobby
1:00 – 1:15 PM	Welcome and Introduction	Auditorium
1:15 – 2:30	Symposium on winter forest bat ecology 1	Auditorium
2:30 – 3:00	Break	Auditorium Lobby
3:00 – 4:00	Symposium on winter forest bat ecology 2	Auditorium
4:00 – 5:00	SBDN Business Meeting	Auditorium
5:00 – 5:30	Tour of ASU Mammal range and teaching facilities	
7:00 – 10:00	Social	Holiday Inn Restaurant

February 13th (Friday) **Colloquium on the Conservation of Mammals in the SE United States**

8:00 – 12:00 AM	Registration	Auditorium Lobby
8:00 – 8:15	Welcome	Auditorium
8:15 – 8:30	Founders Presentation	Auditorium
8:30 – 9:45	Oral Presentations 1	Auditorium
9:45 – 10:15	Poster Session	Meeting Room A
	Break	Meeting Room A
10:15 – 12:00	Oral Presentations 2	Auditorium
12:00 – 1:30 PM	Lunch	On Your Own
1:30 – 2:45	Oral Presentations 3	Auditorium
2:45 – 3:00	Break	Auditorium Lobby
3:00 – 4:30	Oral Presentations 4	Auditorium
4:30 – 4:45	Awards, announcements, close	Auditorium

Meeting Hosts

Dr. Tom Risch, Arkansas State University
Blake Sasse, Arkansas Game and Fish Commission
Arkansas State University Student Chapter of The Wildlife Society

Sponsored with financial contribution from

Arkansas Game and Fish Commission
Environmental Sciences Program, Arkansas State University

Detailed Program

Thursday, 12 February 2009

8:30 – 11:30 AM	**SBDN Board of Directors Meeting**	Meeting Room A
11:00 – 5:30	**Registration**	Auditorium Lobby
1:00 – 1:15 PM	**Welcome and Introduction**	Auditorium
	Symposium – Winter forest bat ecology	Auditorium
1:15 – 1:30	**WINTER ECOLOGY OF BATS (THINK OUTSIDE THE CAVE).** L.W. Robbins. *Department of Biology, Missouri State University, Springfield, MO 65897*	
1:30 – 1:45	**WINTER ECOLOGY OF EASTERN RED BATS IN MISSOURI.** J.R. Flinn, B.M. Mormann, and L.W. Robbins. *Department of Biology, Missouri State University, Springfield, MO 65897*	
1:45 – 2:00	**WINTER MOVEMENTS AND ROOST SITE SELECTION OF EASTERN RED BATS IN CENTRAL ARKANSAS.** B. Reynolds, T. Nupp, *Arkansas Tech University, Russellville, AR, 72801*	
2:00 – 2:15	**TORPID EASTERN RED BAT RESPONSES TO PRESCRIBED FIRE STIMULI.** J.T. Layne* and L.W. Robbins. *Department of Biology, Missouri State University, Springfield, MO 65897*	
2:15 – 2:30	**WINTER DAY-ROOST SELECTION BY MALE SEMINOLE (*LASIURUS SEMINOLUS*) BATS ON A MANAGED PINE FOREST IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA.** C.D. Hein, S.B. Castleberry, and K.V. Miller. *ABR, Inc., Forest Grove, Oregon 97116 (CDH); Daniel B. Warnell School of Forestry and Natural Resources, University of Georgia, Athens, Georgia 30602 (SBC and KVM)*	
2:30 – 3:00	Break	Auditorium Lobby
3:00 – 3:15	**WINTER ECOLOGY OF SILVER-HAIRED BATS IN MISSOURI.** L.W. Robbins, J.R. Flinn, J.T. Layne and S.N. Dey. *Department of Biology, Missouri State University, Springfield, MO 65897*	
3:15 – 3:30	**WINTER ROOST SELECTION BY SILVER-HAIRED BATS IN FORESTS OF ARKANSAS.** R.W. Perry, D.A. Saugey, B.G. Crump. *Southern Research Station, United States Forest Service, Hot Springs, AR 71902 (RWP). Ouachita National Forest, United States Forest Service, Jessieville, AR 71949(DAS); Ouachita National Forest, United States Forest Service, Hot Springs, AR 71902 (BGC)*	

3:30 – 3:45	**CAVITY TEMPERATURE OF WATER TUPELO (*NYSSA AQUATICA*) TREES AS A POSSIBLE EFFECT ON ROOST SITE SELECTION BY *CORYNORHINUS RAFINESQUII* (RAFINESQUE'S BIG-EARED BAT)** *C.L. Rice and K.M. Tolson. *Department of Biology, College of Arts and Sciences, The University of Louisiana at Monroe, Monroe, LA 71209*	
3:45 – 4:00	**CLIMATIC FACTORS INFLUENCING *TADARIDA BRASILIENSIS* BRIDGE ROOST OCCUPANCY**. *J.N. Mink and D.S. Vodopich. *Biology Department, Baylor University, Waco, TX 76798*	
4:00 – 5:00	**SBDN Business Meeting**	Auditorium
5:00 – 5:30	**Tour of ASU Mammal range and teaching facilities**	
7:00 – 10:00	**Social**	Holiday Inn Restaurant

February 13th (Friday) **Colloquium on the Conservation of Mammals in the Southeastern United States**

8:00 – 12:00 AM	**Registration**	Auditorium Lobby
8:00 – 8:15	**Welcome**	Auditorium
8:15 – 8:30	**Founders Presentation**	Auditorium
	Oral Presentations 1	Auditorium

8:30 – 8:45 **FORTY YEARS OF ARKANSAS BAT HISTORY.** M.J. Harvey, *Department of Biology, Tennessee Technological University, Cookeville TN 38505*

8:45 – 9:00 **USE OF BAT DETECTORS TO INFER HABITAT USE IN EVENING BATS: AN EMPIRICAL STUDY.** A.D. Morris, D.A. Miller, and L.M. Conner. *Joseph W. Jones Research Center at Ichauway, Newton, GA 39870 (ADM & LMC); Timberlands Technology, Weyerhaeuser Company, Columbus, MS 39704 (DAM)*

9:00 – 9:15 **FORAGING RESOURCE SELECTION BY EASTERN RED BATS IN THE OZARK REGION OF MISSOURI.** S.K. Amelon and F.R. Thompson. *USDA Forest Service, Northern Research Station, University of Missouri, Columbia, MO 65211*

9:15 – 9:30 **INFLUENCE OF PREY AVAILABILITY ON BAT ACTIVITY IN COASTAL PLAIN MANAGED PINE FOREST LANDSCAPES.** M.J. Bender*, S.B. Castleberry, D.A. Miller, and T.B. Wigley. *Daniel B. Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA (MJB and SBC); Weyerhaeuser Company (DAM); National Council for Air and Stream Improvement, Inc. (TBW)*

9:30 – 9:45 **FINDINGS OF RADIOTRACKING EFFORTS OF A MATERNAL COLONY OF RAFINESQUE'S BIG-EARED BATS (CORYNORHINUS RAFINESQUII) AT TRINITY RIVER NATIONAL WILDLIFE REFUGE.** L.A. Lomas, M. Mora, M. Bayless, and L. Stuemke. *Trinity River National Wildlife Refuge, PO BOX 10015, Liberty, TX 77575 (LAL); Texas A&M University, 316 Nagle Hall, 2258 TAMU, Texas A&M University, College Station, Texas 77845 (MM); Bat Conservation International, PO BOX 162603, Austin, TX 78716 (MB); Stephen F. Austin State University, East College at Raguet St., Box 6109, SFA Station, Nacogdoches, TX 75962-6109 (LS)*

9:45 – 10:15	**Poster Session**	Meeting Room A
	Break	Meeting Room A

Oral Presentations 2 Auditorium

10:15 – 10:30 **COARSE CORRELATES OF GROWTH AND DECLINE AT INDIANA BAT HIBERNACULA: 1995-2005.** W.M. Ford, S.M. Crimmins, A. King, D.C. Culver and J.L. Rodrigue. *USDA Forest Service, Northern Research Station, Parsons, WV 26278 (WMF and JLR); Dept. of Forest Management, University of Montana, Missoula, MT 59812 (SMC); USDI Fish and Wildlife Service, Indiana Field Office, Bloomington, IN 47403(AK); Dept. of Environmental Sciences, American University, Washington, D.C. 20016 (DCC)*

10:30 – 10:45 **INDIANA BAT (*MYOTIS SODALIS*) SUMMER DISTRIBUTION AND ROOST ECOLOGY IN SOUTHWESTERN NORTH CAROLINA.** J.M. O'Keefe, S. Bosworth, and M. LaVoie. *Forestry and Natural Resources, Clemson University, Clemson, SC 29634 (JMO); NC Wildlife Resources Commission, current address Tyler, TX 75706 (SB); Eastern Band of Cherokee Indians, Cherokee, NC 28719 (ML)*

10:45 – 11:00 **ROOST TREE SELECTION BY INDIANA BATS (*MYOTIS SODALIS*) ON FORT DRUM MILITARY INSTALLATION, NEW YORK.** K.A. Cunningham*, J.B. Johnson, C.A. Dobony, J.W. Edwards, W.M. Ford, and J.L. Rodrigue. *Division of Forestry, West Virginia University, Morgantown WV 26505 (KAC, JBJ, and JWE); Natural Resources Branch, Environmental Division, US Army, Fort Drum, NY 13602 (CAD); USDA Forest Service, Northeastern Research Station, Box 404, Parsons, WV 262787 (WMF and JLR)*

11:00 – 11:15 **RADIOTELEMETRY STUDY OF MYOTINE BATS IN TWO INDIANA BAT (*MYOTIS SODALIS*) MATERNITY COLONIES IN KENTUCKY.** J.A. Hawkins, P.L. Sewell, M.W. Gumbert, *Copperhead Environmental Consulting, P.O. Box 73, Paint Lick, KY 40461*

11:15 – 11:30 **ASSESSING THE STABILITY AND LONG-TERM VIABILITY OF ABANDONED MINES FOR USE BY BATS.** J.C. Corcoran, T.C. Carter, and G.A. Feldhamer. *Department of Zoology, Southern Illinois University, Carbondale IL 62901(JCC and GAF); Department of Biology, Ball State University, Muncie, IN 47306 (TCC)*

11:30 – 11:45 **DENSITY OF WHITE-TAILED DEER AT VICKSBURG NATIONAL MILITARY PARK.** T.R. Bomar* and R.E. Kissell, Jr., *School of Forest Resources, Arkansas Forest Resources Center, University of Arkansas, Monticello, AR 71656*

11:45 – 12:00 **AN ESTIMATE OF POPULATION DENSITY OF WHITE-TAILED DEER IN WESTERN TENNESSEE UTILIZING AERIAL-THERMAL IMAGING.** J.S. Dennison*, R.E. Kissell, Jr., S.W. Stephenson, and M.L. Kennedy. *Department of Biology, The University of Memphis, Memphis, TN 38152(JSD and MLK); School of Forest Resources, University of Arkansas, Monticello, AR 71656 (REK); Milan Army Ammunition Plant, 2280 Highway 104 West, Milan, TN 38358 (SWS)*

12:00 – 1:30 PM **Lunch** On Your Own

Oral Presentations 3 Auditorium

1:30 – 1:45 **AN ESTIMATE OF POPULATION DENSITY FOR VIRGINIA OPOSSUMS (*DIDELPHIS VIRGINIANA*) IN A SUBURBAN AREA OF WESTERN TENNESSEE.** D.M. Wolcott*, and M.L. Kennedy. *Department of Biology, The University of Memphis, Memphis, TN 38152*

1:45 – 2:00 **HOME RANGE, DISPERSAL, AND SURVIVAL OF THE OZARK POCKET GOPHER (*GEOMYS BURSARIUS OZARKENSIS*).** M.B. Connior* and T.S. Risch. *Department of Biological Sciences, Arkansas State University, State University, AR 72467*

2:00 – 2:15 **HABITAT HETEROGENEITY AND SPECIES RICHNESS: IS SPATIALSCALE A FACTOR?** J. Erin Fender*****, M.L. Kennedy, G.D. Schnell, C. Sánchez-Hernández, M. de Lourdes Romero-Almaraz, M.C. Wooten, and T.L. Best. *Ecological Research Center and Department of Biology, The University of Memphis, Memphis, TN 38152 (JEF, MLK); Sam Noble Oklahoma Museum of Natural History and Department of Zoology, University of Oklahoma, Norman, OK 73072 (GDS);Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México, A.P. 70-153, Coyoacán, México, D.F. 04510, México (CSH); Escuinapa No. 92 bis. Col. Pedregal de Santo Domingo, C.P. 04360, México, D.F, México (MLR); Department of Biological Sciences, Auburn University, Auburn, AL 36849 (MCW, TLB)*

2:15 – 2:30 **NORTHERN MYOTIS ROOST TREE SELECTION IN A CENTRAL APPALACHIAN MOUNTAINS HARDWOOD FOREST SUBJECTED TO PRESCRIBED FIRE.** J.B. Johnson*, J.W. Edwards, and W.M. Ford. *Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV 26506 (JBJ and JWE); USDA Forest Service, Northern Research Station, Parsons, WV 26287 (WMF)*

2:30 – 2:45 **DETERMINING RELATIVE AMOUNT OF ENERGY SAVINGS DURING TORPOR FOR THREE MYOTIS SPECIES.** T.J. Sichmeller*, T.C. Carter, and M. Hohmann. *Department of Biology, Ball State University, Muncie IN 47306-0440 (TJS and TCC); Engineering Research Development Center-Construction Engineering Research Laboratory, Army Corps of Engineers, Champaign, IL 61826-9005 (MH)*

2:45 – 3:00 **Break** Auditorium Lobby

Oral Presentations 4 Auditorium

3:00 – 3:15 **SOUTHEASTERN MYOTIS AND EASTERN PIPISTRELLE USE OF ELONGATED AIRSTRIP CULVERTS IN EASTERN MISSISSIPPI.** C.O. Martin, A.S. McCartney, M.E. Like, and A.D. Magoun. *Environmental Laboratory, U.S. Army Engineer Research and development Center, Vicksburg, MS 39180 (COM); Bureau of Land Management, Jackson, MS 39206 (ASM); Sphere 3 Environmental, Longview, TX 75604 (MEL)), Applied Research and Analysis, Inc., Tallulah, LA 71284 (ADM)*

3:15 – 3:30 **SOUTHERN FLYING SQUIRREL (*GLAUCOMYS VOLANS*) AGGREGATION BEHAVIOR IN SOUTH CAROLINA.** M.B. Connior and T.S. Risch, *Department of Biological Sciences, Arkansas State University, State University, AR 72467*

3:30 – 3:45 **FIRST CAPTURE OF A NORTHERN YELLOW BAT IN NORTH CAROLINA.** M.K. Clark and M.E. Frazer. *Moonlight Consulting, 1612 Bayleaf Trail, Raleigh NC 27614 (MKC); N. C. Department of Transportation, Natural Environment Unit, 4701 Atlantic Ave, Ste 116 Raleigh, NC 27604 (MEF)*

3:45 – 4:00 **GENETIC STRUCTURING AMONG HIBERNACULA POPULATIONS OF THE ENDANGERED GRAY BAT (*MYOTIS GRISESCENS*).** D.L. Lindsay, N.D. Barker, L.C. Ruff, M.D. Blake, and R.F. Lance. *U.S. Army Engineer Research and Development Center – Environmental Laboratory, Vicksburg, MS 39180*

4:00 – 4:15 **HABITAT SUITABILITY AS A PREDICTOR OF AND BAT ABUNDANCE AT A PROPOSED WIND ENERGY FACILITY.** A. Poe and C. Sutter. *Pandion Systems, Gainesville, FL 32601*

4:15 – 4:30 **WIND ENERGY BAT MORTALITY – LESSONS LEARNED FROM BIRD MORTALITY.** C. Sutter and A. Poe. *Pandion Systems, Gainesville, FL 32601*

4:30 – 4:45 **Awards, announcements, close** Auditorium

Abstracts

FORAGING RESOURCE SELECTION BY EASTERN RED BATS IN THE OZARK REGION OF MISSOURI

S.K. Amelon and F.R. Thompson. *USDA Forest Service, Northern Research Station, University of Missouri, Columbia, MO 65211*

Effective conservation of bat populations requires understanding the associations between bats and their use of multiple resources. As with other wildlife, bat conservation has focused primarily on rare and endangered taxa; however, because of their role in ecosystem health, abundant species may be the most ecologically and economically important. Typically, resource use studies compare used to available resources. Used resources are commonly defined by the resource attributes at telemetry relocations while available resources are quantified within a spatially and temporally defined area considered "available" by the researcher. In contrast to this approach to resource selection analysis, the utilization distribution (UD) approach uses a probability density function that quantifies an individual's or group's relative use of space. It depicts the probability of an animal occurring at each location within its home range as a function of relocation points. We radio-tracked 64 lactating *L. borealis* for 10 – 21 days to evaluate foraging resource use. We used resource utilization functions to provide a continuous measure of use (99%) throughout the area of interest. Resource selection for this demographic group was highly variable among individuals, geographic location, stage of lactation and temperature regime. We found, on average, foraging use was highest for low canopy cover, deciduous forest patches on ridges and upland drainages in areas close to non-forest edge and with relatively high road density.

INFLUENCE OF PREY AVAILABILITY ON BAT ACTIVITY IN COASTAL PLAIN MANAGED PINE FOREST LANDSCAPES

M.J. Bender*, S.B. Castleberry, D.A. Miller, and T.B. Wigley. *Daniel B. Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA (MJB and SBC); Weyerhaeuser Company (DAM); National Council for Air and Stream Improvement, Inc. (TBW)*

Bat activity in managed pine (*Pinus* spp.) forests within the Coastal Plain is poorly understood. Additionally, predator activity is often related to prey abundance and distribution, thus it is assumed that insectivorous bat activity is in part related to insect availability. To investigate these relationships we sampled bat activity with Anabat units and sampled insect availability with passive flight intercept traps at 71 sample points in managed pine forests in the Coastal Plain of Alabama and North Carolina. We used an information-theoretic approach to investigate relations between bat activity levels and available insect prey and evaluate relative plausibility of our candidate set of multinomial logit models. Results indicate that bat activity was positively related to insect richness. Additionally, models containing insect richness and counts combined with structural clutter data were the most plausible among our candidate set. Areas with low structural clutter and high insect richness were most likely to be high activity areas. Management activities should focus on identifying and promoting these high activity areas across the landscape. Researchers attempting to model bat activity across the landscape are likely to improve model performance by including data on insect richness and availability in models.

DENSITY OF WHITE-TAILED DEER AT VICKSBURG NATIONAL MILITARY PARK

T.R. Bomar* and R.E. Kissell, Jr., *School of Forest Resources, Arkansas Forest Resources Center, University of Arkansas, Monticello, AR 71656*

Vicksburg National Military Park is currently assessing three alternative landscape treatments to better preserve the historical and cultural features of the park as they were during the campaign, siege, and defense of Vicksburg during the Civil War. The National Park Omnibus Management Act of 1998 requires a scientific study be provided for park management decisions where actions may have a significant impact on natural resources. Our primary objective was to examine density and distribution of white-tailed deer (*Odocoileus virginianus*) for each season (summer, fall, winter and spring) in Vicksburg National Military Park prior to the landscape treatment. Deer density was estimated using distance sampling. Data were collected by spotlighting surveys along established roads. Distribution of deer was based on locations determined from spotlight surveys. We observed a total of 136 individual deer in 69 deer groups with a mean group size of 1.97 (0.8 SE) in the summer (26 September through 30 September 2008). In the fall (11 December through 15 December 2008) we observed 75 deer groups with a mean group size of 1.97 (2.0 SE) and a total of 150 deer. Density in summer and fall was 1 deer per 6.0 ha (± 4.1 (1 SD)) and 1 deer per 9.0 ha (± 1. 8 (1 SD)), respectively. There was no difference between summer and fall densities. Deer were randomly distributed in summer (Moran's $I = 0.363$, $p = 0.088$) and in fall (Moran's $I = 0.100$, $p = 0.679$) and more common in the grassland cover type and less common in kudzu cover type. We expect an increase in deer density after the landscape treatments.

FIRST CAPTURE OF A NORTHERN YELLOW BAT IN NORTH CAROLINA

M.K. Clark and M.E. Frazer. *Moonlight Consulting, 1612 Bayleaf Trail, Raleigh NC 27614 (MKC); N. C. Department of Transportation, Natural Environment Unit 4701 Atlantic Ave, Ste 116 Raleigh, NC 27604 (MEF)*

The Northern Yellow Bat (*Lasiurus intermedius*), occurs in coastal areas of the Southeastern United States and is poorly known across its range. On May 8, 2008 an adult female Northern Yellow Bat was captured in a mist-net in southern coastal North Carolina on Bald Head Island in Brunswick County. Prior to spring 2008 the species was known in North Carolina from only two specimens received by the state health department for rabies testing. In an effort to learn more about this bat's distribution in the state a two night field survey took place on Bald Head Island. Bald Head Island is the southernmost of North Carolina's cape islands, the northernmost semitropical environment on the East Coast and the northernmost location where sabal palms (*Sabal palmetto*) grow naturally. Sabal palms have been documented as important roosting sites for Northern Yellow Bats in Texas and Florida where bats were documented roosting among dead palm fronds. Bald Head Island was chosen for survey because of the similarity in vegetative composition to these sites and due to the proximity of the island to specimen records from North Carolina.

HOME RANGE, DISPERSAL, AND SURVIVAL OF THE OZARK POCKET GOPHER (*GEOMYS BURSARIUS OZARKENSIS*)

M.B. Connior* and T.S. Risch. *Department of Biological Sciences, Arkansas State University, State University, AR 72467*

The Ozark pocket gopher (*Geomys bursarius ozarkensis*) is a subspecies of the plains pocket gopher (*G. bursarius*) inhabiting north-central Arkansas with an estimated population of 3,500 individuals. Ozark pocket gophers are considered a "species of greatest conservation need"; therefore, research on spatial use and life-history characteristics were warranted. Home range size could be predicted by the females' body masses but not by the males. Home ranges were significantly larger for females in the winter/early spring versus late spring/summer possibly due to food availability and the reproductive season. Pocket gophers had relatively high survival rates for rodents; however, the majority of mortality occurred in the winter months. Mortality factors of pocket gophers included both predation and floods. Finally, fossorial burrows of pocket gophers provide protection for pocket gophers as well as other vertebrates. We recorded numerous amphibian, reptile, and small mammal associates inhabiting pocket gopher habitat. Although pocket gophers are considered agricultural pests, both conservationists and managers need to determine the Ozark pocket gopher's impact on the ecosystem's health and viability before managerial strategies are employed on this endemic subspecies.

SOUTHERN FLYING SQUIRREL (*GLAUCOMYS VOLANS*) AGGREGATION BEHAVIOR IN SOUTH CAROLINA

M.B. Connior and T.S. Risch, *Department of Biological Sciences, Arkansas State University, State University, AR 72467*

Nest box aggregations of southern flying squirrels (*Glaucomys volans*) was studied from 1992-1998 at the Savannah River Site in South Carolina. Of 5,859 occupied boxes, 60.3% contained solitary individuals, 13.6% contained litters, and 26.1% contained aggregations of 2-10 adult and/or subadult individuals. Of 1,529 aggregations, 10.7% contained subadults, 42.3% contained mixed-aged individuals, and 47% contained adults. We determined by following matriarchal lineages that at least 24% of the aggregations containing adults and/or subadults contained at least 2 related individuals. Group mean was significantly different for all age classes: subadult ($N = 164$, $X = 2.561 \pm 0.80$), mixed age ($N = 647$, $X = 3.575 \pm 1.64$), and adults ($N = 718$, $X = 2.978 \pm 1.30$). Sex ratio for aggregations was 2.1:1, males: females ($N = 1529$) and differed significantly from 1:1 ($P < 0.0001$). Both group size (1-10) and aggregation size (2-10) were inversely related to minimum temperature ($P < 0.001$). Number of related individuals (dyads) in aggregations was inversely related to aggregation size ($P < 0.001$). Yet, number of dyads in aggregations was not related to minimum temperature ($P = 0.38$). Southern flying squirrels seem to aggregate during periods of cold temperature in order to minimize energy expenditure from thermogenesis. Although, some of the related individuals were captured together on many occasions, overall this trend is not represented throughout the entire population.

ASSESSING THE STABILITY AND LONG-TERM VIABILITY OF ABANDONED MINES FOR USE BY BATS

J.C. Corcoran, T.C. Carter, and G.A. Feldhamer. *Department of Zoology, Southern Illinois University, Carbondale IL 62901(JCC and GAF); Department of Biology, Ball State University, Muncie, IN 47306 (TCC)*

In the past decade tens-of-thousands of bats, including the federally endangered Indiana bat (*Myotis sodalis*), have been hibernating in a complex of abandoned underground microcrystalline silica mines in southern Illinois owned by Unimin Specialty Minerals Corporation. One concern of having so many endangered bats hibernating in one mine is the stability of the mines and the dangers the bats may face using them as hibernacula. The mines were created relatively recently and are still in the process of settling. Thus, these mines might act as a potential sink, drawing in hibernating bats but potentially collapsing and killing them. Thirteen mines were surveyed for bats and for the amount of spalling (falling material) that occurred over the 16 month study period from September 2006 to December 2007. Factors that could increase the amount of spalling were quantified, including temperature, moisture in the material of the walls in the mines, and temperature variability. Use of the mines by bats was also documented. All three variables were important at predicting the presence of bats. Spalling events could also be predicted with these variables. Variation in temperature was the best predictor of bats presence. Because bats prefer stable temperatures above freezing and spalling occurs more often at high variability of temperatures and very low temperatures, bats were usually in areas that exhibited little or no spalling.

ROOST TREE SELECTION BY INDIANA BATS (*MYOTIS SODALIS*) ON FORT DRUM MILITARY INSTALLATION, NEW YORK

K.A. Cunningham*, J.B. Johnson, C.A. Dobony, J.W. Edwards, W.M. Ford, and J.L. Rodrigue. *Division of Forestry, West Virginia University, Morgantown WV 26505 (KAC, JBJ, and JWE); Natural Resources Branch, Environmental Division, US Army, Fort Drum, NY 13602 (CAD); USDA Forest Service, Northeastern Research Station, Box 404, Parsons, WV 262787 (WMF and JLR)*

We determined roost-tree selection of radio-telemetered Indiana bats (*Myotis sodalis*) on the Fort Drum Military Installation in New York. Between 12 May and 16 September 2008, we mist netted 23 sites over 28 nights and captured 12 Indiana bats: 7 females (5 adults and 2 juveniles) and 5 males (3 adults and 2 juveniles). Each bat was equipped with a transmitter and tracked an average of 15 days until signal failure or loss of the transmitter. We tracked bats daily to 42 separate roost trees. Tree switching frequency was 2.0 days (SE ± 1.6 days) with an average travel distance of 0.3 km (SE ± 0.2 km) between each new roost. In addition to the 42 roosts located in 2008, we included 36 roost trees found as part of a pilot project in 2007 in our analysis. We compared characteristics of located roost trees to trees found in paired, random plots. Roost trees selected by Indiana bats were larger in diameter, but similar in roost height, crown position, percent bark, and decay class to random trees. Roost trees included 13 species: *Ulmus americana* (n = 37), *Acer saccharum* (n = 12), *Carya cordiformus* (n = 7) and *Pinus strobus* (n = 6), comprising nearly 80% of tree species available with 9 other species with little representation. Snags within roost plots, excluding roost trees, were also larger in diameter than those in random plots. We will continue our ongoing field work beginning May 2009.

AN ESTIMATE OF POPULATION DENSITY OF WHITE-TAILED DEER IN WESTERN TENNESSEE UTILIZING AERIAL-THERMAL IMAGING

J.S. Dennison*, R.E. Kissell, Jr., S.W. Stephenson, and M.L. Kennedy. *Department of Biology, The University of Memphis, Memphis, TN 38152(JSD and MLK); School of Forest Resources, University of Arkansas, Monticello, AR 71656 (REK); Milan Army Ammunition Plant, 2280 Highway 104 West, Milan, TN 38358 (SWS)*

The public, both sportsmen and non-sportsmen, are increasingly holding decision makers accountable for their judgments relating to natural resources, and reliable data are required to assess the effectiveness of decisions relating to management and conservation planning of exploited species. Stewardship is a concern for one of the taxa most sought after and scrutinized in western Tennessee, the white-tailed deer (*Odocoileus virginianus*). Overabundance of this taxon is a concern in many areas, while depressed populations characterize others. Yet density data critical to planning is lacking for most regions. Therefore, population abundance of deer was assessed at the Milan Army Ammunition Plant in Carroll and Gibson counties in western Tennessee during February 2008 (pre-hunt) and December 2008 (post-hunt). The study was conducted on approximately 7,869 ha utilizing transect sampling and employed aerial-thermal imaging. We replicated the assessment 3 times on separate nights. In February, density was estimated as one deer per 13.2 ha (32.3 acres), and, in December, it was estimated as one deer per 12.3 ha (30.3 acres). Generally, population levels are estimated to range from 5-25/km2 (13-65mi2). Our results follow an outbreak of Epizootic Hemorrhagic Disease in the southeastern United States that impacted the deer herd in western Tennessee.

HABITAT HETEROGENEITY AND SPECIES RICHNESS: IS SPATIAL SCALE A FACTOR?

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The prediction that habitat heterogeneity and species richness of small mammals are associated was tested at three spatial scales (0.04-ha, 0.25-ha, and 1-ha) in the tropical dry-forest region of Colima, Mexico. This location, within the Mesoamerican biodiversity hotspot, was sampled during winters of 2003-2007. Sampling was conducted (in total) on 25 trapping grids (each grid station with an arboreal and ground-level trap) using a 10m x 10m design at each level, which resulted in 200 traps per grid. Grids were trapped an average of 7 nights during each sampling session. In total, there were 40,000 trap-nights (1 trap-night = 1 trap set for 1 night). Species richness at each spatial scale was examined in relation to 14 habitat variables, representing vertical and horizontal structure, taken at each trap site. Data were examined using correlation and non-parametric multiplicative regression analyses. In total, 17 species were found within the region studied. Habitat heterogeneity and species richness were associated with selected vertical and horizontal habitat features, but these varied with scale. Our results provide new insight toward understanding the association of species richness and spatial scale and support previous investigations suggesting scale is a factor in understanding habitat heterogeneity and species richness associations.

WINTER ECOLOGY OF EASTERN RED BATS IN MISSOURI

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In 2003, we discovered that eastern red bats (*Lasiurus borealis*) were roosting in leaf litter during the winter in southern Missouri. This began a five-year study that has resulted in four Master's theses and five published papers. The initial questions (how, when, where, why) were based on a quest for scientific knowledge, but the initial results changed the focus of the project, especially toward management practices dealing with tree species and prescribed burns. This presentation will focus on the ecology and a companion presentation will concentrate on management. From December, 2004 through February 2007 we captured 276 red bats in 201 net nights. Thirty-nine of these were successfully tracked to 73 tree roosts and 62 leaf litter roosts. Tree roosts in the first study were found in eastern red cedars more often than expected. In the second study cedars were rare and pines were common and oak trees were used more often than expected. Leaf litter roosts were found in areas with deeper leaves and more ground leaf cover. The majority of roosts were located at higher altitudes with steeper slopes and where sun exposure was greatest. The energetic consequences of these apparent roost and habitat choices will be discussed.

COARSE CORRELATES OF GROWTH AND DECLINE AT INDIANA BAT HIBERNACULA: 1995-2005

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Protection of winter hibernacula from disturbance through gating and maintenance of proper airflow undoubtedly are the most important conservation measures for managing the Indiana bat (*Myotis sodalis*). Nonetheless, factors such as landscape conditions for pre-hibernation foraging and geomorphic characteristics also might influence whether hibernacula show stable, increasing or decreasing populations. We created 11 *a priori* models at a coarse "county-level" to test for relationships between Indiana bat populations at 427 hibernacula with simple forest and agricultural land cover metrics, as well as site factors such as gate presence, flood and freeze risk, and geologic stability. Akaike's Information Criterion suggested that our KARST model containing Indiana bat classification category (1-4), hibernaculum type (cave or mine/tunnel), karst area in county, and local cave density was our best-approximating model from an overall poor-performing set. Our KARST+FOREST model containing percent county area of forest and our ABIOTIC model containing flood and freeze risk and geologic stability also had empirical support. Variables that positively populations included: a lower classification category, increasing cave density in the surrounding karst, and mine/tunnel as the hibernation site. Increased freeze risk increased the odds of decrease. Decadal change in forest and agricultural cover had no appreciable influence on population change. Contrary to our expectations, the relative distribution of classification categories and stable, increasing or decreasing hibernacula did not differ across the Core, Appalachian or Northeast regions.

FORTY YEARS OF ARKANSAS BAT HISTORY

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This presentation reviews significant events and accomplishments concerning bat biology and conservation in Arkansas, especially that related to distribution, status, and ecology of endangered bat species. Throughout forty years, beginning in 1967, numerous individuals representing federal and state agencies, private organizations, universities, and others contributed considerable time and effort to learn more about Arkansas bats and to aid in their conservation.

RADIOTELEMETRY STUDY OF MYOTINE BATS IN TWO INDIANA BAT (*MYOTIS SODALIS*) MATERNITY COLONIES IN KENTUCKY

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In April 2007, Copperhead Consulting was contracted by ICI Services, LLC and the Engineer Research Development Center, Construction Engineering Research Laboratory to conduct concurrent field studies working with Myotis species in proximity to known Indiana bat (*Myotis sodalis*) colonies on the US Army Garrison Fort Knox and along Brashears Creek near Taylorsville, KY. At Fort Knox, 289 bats representing 9 species were captured at 12 sites. Focus species complement included the northern bat (*Myotis septentrionalis*; n = 111), Indiana bat (n = 25), and the little brown bat (*Myotis lucifugus*; n = 20). Brashears Creek netting resulted in the capture of a total of 78 bats representing 7 species. Focus species complement included the Indiana bat (n = 48) and the little brown bat (n = 9). Radiotelemetry at both sites resulted in the location of 47 day roosts. Of these, thirty-seven (78.7%) were roosts used by Indiana bats, six roosts (12.7%) were used by little brown bats, and four (8.5%) were used by northern bats. Forty-one roosts were located in trees of 13 species. Five roosts were located in human-built structures and one bat was found roosting in a cave. Banding of Indiana bats resulted in the recovery of three bands in two different hibernacula in Kentucky. One banded little brown bat was found hibernating in another cave, also in Kentucky.

WINTER DAY-ROOST SELECTION BY MALE SEMINOLE (*LASIURUS SEMINOLUS*) BATS ON A MANAGED PINE FOREST IN THE LOWER COASTAL PLAIN OF SOUTH CAROLINA

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Understanding year-round roost-site selection is essential for managing forest bat populations. Although our knowledge of summer day-roost characteristics has increased in recent years, information regarding winter roosting habits of forest bats is lacking. From January to March 2004–2006, we used radio-telemetry to investigate winter roost-site selection by Seminole (*Lasiurus seminolus*) bats on an intensively-managed pine (*Pinus* spp.) landscape with forested corridors in the Lower Coastal Plain of South Carolina, USA. We modeled roost-site selection using logistic regression and used Akaike's Information Criterion for small sample sizes (AIC_c) and Akaike weights to select and evaluate models relating roost-site selection to habitat and landscape features. We tracked 20 adult male Seminole bats to 71 individual roosts. Bats used a variety of roosting structures, including the canopy of overstory trees, understory vegetation, pine needle clusters, and leaf litter. Roost height, structure type, and habitat type were influenced by changes in minimum nightly temperature. On warmer nights, bats selected overstory trees in mature forest stands, but as minimum nightly temperatures decreased <4° C bats typically selected roosts on or near the forest floor in mid-rotation stands. Our results indicate distinct differences in roosting strategy by Seminole bats between winter and summer. We encourage forest managers to consider seasonal changes in roost-site selection to minimize impacts to forest bats. Furthermore, we recommend caution when conducting prescribed burns in mid-rotation stands when nightly temperatures are <4° C to reduce potential disturbance and direct mortality of winter roosting bats.

NORTHERN MYOTIS ROOST TREE SELECTION IN A CENTRAL APPALACHIAN MOUNTAINS HARDWOOD FOREST SUBJECTED TO PRESCRIBED FIRE

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Following decades of fire suppression in eastern forests, prescribed fire as a tool to restore or enhance the oak (*Quercus* spp.) -dominated communities is gaining widespread acceptance. The interactions of fire with other biotic components such as wildlife that might benefit from such reintroduction are poorly documented. In 2007 and 2008, we examined roost selection of northern myotis (*Myotis septentrionalis*) maternity colonies in stands treated with prescribed fire and in unburned control areas on the Fernow Experimental Forest, West Virginia. We radio-tracked 36 female northern myotis to 69 roost trees; 25 in the fire treatment and 44 in the unburned areas. Regardless of treatment, northern myotis roosted in black locust (*Robinia pseudoacacia*) in greater proportion than its availability. Within the prescribed-fire treatment, northern myotis were more likely to use cavity trees smaller in diameter and higher in crown class than random trees. These roosts often were surrounded closely by larger, decaying snags that were in the upper crown classes. In non-burned stands, northern myotis were more likely to roost nearer the tops of larger diameter and taller, cavity trees in early stages of decay that were surrounded by tall decaying trees. Roost trees in the prescribed-fire treatment were associated with larger overall canopy gaps than roost trees within the control treatment. Daily minimum ambient temperatures were similar between a subset of roost trees in prescribed-fire and control treatments, but daily mean and maximum temperatures were higher in the prescribed-fire treatments. Roost switching frequency, distance, and duration of individual roost tree use were similar between the prescribed-fire and control treatments suggesting similar roost tree availability despite a significantly higher proportion of potential roost trees in the prescribed-fire treatment. The reintroduction of fire accelerated snag creation, and enlarged existing or created new canopy gaps.

TORPID EASTERN RED BAT RESPONSES TO PRESCRIBED FIRE STIMULI

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Current management practices during winter utilize prescribed fires due to their minimal intensity and patchy burn patterns compared to summer burns. Concerns have arisen for Eastern red bats (*Lasiurus borealis*) that utilize fallen leaf litter for roosting during cold (<10 C) temperatures. We studied the responses of torpid red bats to stimuli from prescribed fire. From lab studies we found that bats reacted to smoke quicker than sound of an oncoming fire and were able to arouse faster than previously thought. Bats were tested out in the field to observe the effects of varying ambient weather conditions on reaction times from prescribed fire. Bats aroused and flew quicker during warmer temperatures, and the additional effect of increased wind sped up reaction times. Coupling this information with previous winter roosting studies, implications for forest management will be discussed to provide for beneficial fires conducive to red bat survival.

GENETIC STRUCTURING AMONG HIBERNACULA POPULATIONS OF THE ENDANGERED GRAY BAT (*MYOTIS GRISESCENS*)

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Past population declines in the endangered gray bat (*Myotis grisescens*) have been attributed to losses of hibernacula. As hibernacula have been increasingly protected, *M. grisescens* numbers have increased, with some apparent shifts in the locations of wintering populations (large losses and gains in numbers of individuals at major hibernacula). In order to develop a broad understanding of genetic structure in *M. grisescens*, we genotyped 373 individual samples from 11 colonies (10 hibernacula and 1 maternity) using 6 microsatellite loci previously identified in *M. myotis*. Samples included wing punches and scat. Because of the quality and amount of DNA extracted from scat, as well as the use of microsatellite markers that were not species-specific, some individuals were not completely genotyped and null alleles were detected for each locus. When possible, we employed a null allele correction developed by Chapuis & Estoup (2007), as well as utilizing robust analytical approaches. Our results indicated relatively low genetic diversity in *M. grisescens* (A = 7.20, H = 0.55) compared to other *Myotis* species (A = 8.17 – 21.0, H = 0.67 – 0.83), though null alleles may account for much of this difference. Genetic differentiation among populations (F_{ST} = 0.0327, P = 0.0001) was considerable, and significant pairwise differentiation was common between populations. We found no significant isolation-by-distance. Assignment-based clustering of populations identified several different putative clusters, some of which were comprised of hibernacula that are relatively distant geographically, and which mostly agreed with previously described subpopulation ranges. Additional work with added sites and informative, species-specific genetic markers is warranted.

FINDINGS OF RADIOTRACKING EFFORTS OF A MATERNAL COLONGY OF RAFINESQUE'S BIG-EARED BATS (CORYNORHINUS RAFINESQUII) AT TRINITY RIVER NATIONAL WILDLIFE REFUGE

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A large maternity colony of Rafinesque's big-eared bats (*Corynorhinus rafinesquii*) was discovered in an abandoned farmhouse on Trinity River National Wildlife Refuge, TX, in 2004. Due to rapid decline of the farmhouse, two more artificial bat roosts were erected near the farmhouse. They were quickly colonized. During early April 2008 and late October 2007 and 2008, 22 bats were individually color banded, fitted with radiotransmitters, and tracked to other roost sites. Efforts to study the colony include recording data regarding roost occupancy, interior roost temperature and humidity, and individual bat movement. Tracked bats were found roosting in 4 artificial structures, 1 pine tree (*Pinus taeda*), and 5 water tupelo trees (*Nyssa aquatica),* as well as the 3 original manmade roosts. Temperature triggered changes in roost selection. Tracked bats also moved considerable distances overnight to new roost sites, up to 8 kilometers. This study is one of only two studies that have involved radiotracking Rafinesque's big-eared bats in Texas.

SOUTHEASTERN MYOTIS AND EASTERN PIPISTRELLE USE OF ELONGATED AIRSTRIP CULVERTS IN EASTERN MISSISSIPPI

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Elongated airstrip culverts on Meridian Naval Air Station (NAS), Mississippi, were surveyed for bat occupancy from May 2005 thru December 2008. The culverts include a series of units in the northern and southern portions of the installation that allow stream flow beneath airstrips. Culvert complexes at the North Runway consist of four adjoining units, each approximately 3 m tall, 5 m wide, and 250 m long, whereas South runway culverts consist of three units, each 7 m tall, 5 m wide, and 180 m long. Species documented to use the culverts as roost sites were the southeastern myotis (*Myotis austroriparius*), eastern pipistrelle (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*). Counts of bats were made monthly in all culverts during the survey period, and dataloggers were installed to record temperature and relative humidity during 2007 and 2008. We compared culvert use monthly within and among culvert complexes and analyzed variation based on temperature and other factors. Eastern pipistrelles almost exclusively roosted in the North Runway culverts during the fall and winter months. Large numbers began occupying the culverts in November, and all but a few individuals were gone by April. Highest counts were recorded in February 2006 (n = 380) and December 2008 (n = 356). Southeastern myotis used South Runway culverts only as maternity roosts but were occasionally found in North Runway culverts during the cooler months. Myotis counts in South Runway culverts increased from a high of 473 in October 2005 to 1,706 in July 2008. The population of southeastern myotis in the NAS Meridian runway culverts is considered significant because it represents the largest sustaining maternity colony of this species of special concern in eastern Mississippi. However, extensive clearing of adjacent riparian forest buffers and subsequent sedimentation in the culverts places this population in jeopardy.

CLIMATIC FACTORS INFLUENCING *TADARIDA BRASILIENSIS* BRIDGE ROOST OCCUPANCY

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The Brazilian free-tailed bat (*Tadarida brasiliensis*) is perhaps the most conspicuously abundant bat species in North America. However, diversity in volancy behavior, including migrations of more than 1,300 km during spring, is not fully understood. Timing of northward migration may be critical in terms of consumptive fat demands to counter random, capricious weather to the north. Episodes of fall migration may not be as critical because bats are moving into benign climatic environments. Indeed, fall migration may be triggered by unpredictable events, such as sporadic cold fronts, and less fat reserves may be required for spontaneous movements into more favorable southern locales. It is unknown what factors stimulate mass movement of some bats from caves or bridges while other members of the population remain - staggered migration, movement before weather fronts, or alternative roosts are plausible strategies. The inherent atmospheric exposure of bridges may increase the impact of weather fronts and their relevance to bat migration. During the winter months of 2006-2008, temperatures were continuously logged at a north-central Texas bridge roost to determine if abrupt variations in climatic variables (cold fronts) correlate with the frequency of individual bat roost occupancy. Meristics collected included barometric pressure, cloud cover, humidity, temperature, wind vector and bat number. Nine cold fronts occurred in winter 2006-2007 and six events occurred in 2007-2008. Correlation coefficients suggest bridge roost occupancy positively relates to rapid temperature declines. These data suggest that weather shifts cue incremental migration, at least temporally, and that these individual bats do not vacate bridge roosts before cold front arrival. Additionally, arrival of nighttime cold fronts may influence daily bridge occupancy more dramatically than daytime cold front events.

USE OF BAT DETECTORS TO INFER HABITAT USE IN EVENING BATS: AN EMPIRICAL STUDY

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Ultrasonic bat detectors are often used to infer habitat use of bats in spite of questions regarding their ability to do so appropriately. However, there have been no empirical tests to determine appropriateness of using detectors for habitat use studies. Therefore, we evaluated ability of bat detectors to determine habitat use in evening bats, *Nycticeius humeralis,* in southwestern Georgia. We radiotracked evening bats while simultaneously acoustically sampling using bat detectors during summer 2008. We used radiotelemetry data to assess whether habitat selection had occurred among four habitat types (mature pine stands, hardwood stands, open stands, and pine plantations) at multiple scales, and to rank these habitats by preference. We also deployed ultrasonic bat detectors overnight at 100 randomly selected sites in the four habitat types. Compositional analysis showed that habitat selection occurred at both the study area (2^{nd} order selection) and home range scales (3^{rd} order selection). At the study area scale, evening bats selected hardwood, open, and mature pine stands, over pine plantations. At the home range scale, evening bats preferred mature pine and open stands, over hardwood stands and pine plantations. Evening bat activity, as assessed by time-expansion bat detectors, was high in mature pine stands and open stands, and was low in hardwood stands and pine plantations. Bat detector methods successfully identified habitat types preferred at the home range scale. However, bat detector methods failed to recognize importance of hardwood stands, which were preferred at the study area scale. We discuss biases associated with acoustic sampling and conclude that the method may only be appropriate for examining stand-level feeding and commuting patterns.

INDIANA BAT (*MYOTIS SODALIS*) SUMMER DISTRIBUTION AND ROOST ECOLOGY IN SOUTHWESTERN NORTH CAROLINA

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Most research on the federally endangered Indiana bat (*Myotis sodalis*) has focused on Midwest populations. Little information exists about the distribution and roost ecology of Indiana bats in the southern Appalachian Mountains, the southern extent of the species range. These data are critical for developing effective management strategies and monitoring programs in the southern Appalachians. Our objectives were to collect summer distribution data and identify the characteristics of summer roosts in southwestern North Carolina. We netted on 52 nights at 38 sites in six counties. We captured 554 bats representing 11 species and placed transmitters on four adult male and four adult female Indiana bats. Characteristics of roost trees and random trees with roost potential and the surrounding habitat (0.1 ha plots) were measured; random trees were ≥50 m from the roost in a random direction. We located two eastern hemlock (*Tsuga canadensis*) roosts for two males and 10 shortleaf pine (*Pinus echinata*) roosts for four females. Hemlock roosts (82.2 cm dbh; 95% bark remaining) were snags in 128–158 year-old northern- or hemlock-hardwood stands. Pine roosts (27.3 cm dbh; <23% bark remaining) were snags in 43–80 year-old mixed pine-hardwood stands. Five variables distinguished pine roosts from random trees (paired two-sample tests, $p < 0.1$). Pine roosts were taller and farther from another tree the same height or greater. Pine roost plots contained a lower proportion of trees taller than the roost, more dead trees, and more dead trees in decay stage two. In southwestern North Carolina, Indiana bats appear to selectively roost in tall conifers, which should maximize solar exposure, and in close proximity to other suitable snags, which may facilitate switching in the event of a disturbance. In 2009, we will collect more roost data in the southern Appalachians and will analyze roost selection at the landscape scale.

WINTER ROOST SELECTION BY SILVER-HAIRED BATS IN FORESTS OF ARKANSAS

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The silver-haired bat (*Lasionycteris noctivagans*) is a common, migratory bat found throughout North America, but may only occur in the southeastern United States during winter. Although studies have examined roost selection during summer across its summer range, little is known about their roosting habits in forests during winter and no quantitative studies have been conducted on winter roosting by this species. Using radiotelemetry, we quantified 31 roosts of silver-haired bats during winter in Arkansas. Twenty-eight roosts were in trees, one roost was in the crack of a large rock outcrop, and two roosts were at ground level. Silver-haired bats roosted in 5 species of trees, but most (81%) were in live shortleaf pines (*Pinus echinata*) and typically under loose bark. Average diameter (dbh) of all roost trees was 33.1 cm and average height to roosts in trees was 5.1 m. Silver-haired bats preferred roosting in pine or pine-hardwood stands >50 years old, and pine or pine-hardwood stands >50 years old that had recently been partially harvested via single-tree selection and subjected to recent controlled burning. They generally avoided roosting in stands that were 15 to 50 years old. Aspect of both topographic sites and locations of roosts on tree boles were primarily southerly, and bats located their roosts in areas of the study area dominated by southern aspects. Mean minimum temperature of days when roosts were located in the rock outcrop or near the ground was significantly less than days when roosts were located in trees, suggesting bats switched to rock or ground roosts when ambient temperatures were coldest. Our results demonstrate the importance of mature (>50 years old) forest stands located on southern aspects and the effects of temperature to roost site selection by silver-haired bats during winter.

HABITAT SUITABILITY AS A PREDICTOR OF AND BAT ABUNDANCE AT A PROPOSED WIND ENERGY FACILITY

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Spatio-temporal distribution of bats in the atmosphere is an important determinant of collision risk at wind facilities. For a collision (or near-collision) event to occur requires a bat be present within the air space occupied by the turbine at a time when the turbine is rotating. Under all other combinations of time and space bats are not exposed and thus do not experience mortality. Such relationships can be explored using geo-spatial tools such as GIS. We used such an approach to determine if habitat suitability could *a priori* determine relative levels of abundance and mortality exposure for lasuirine bats at a proposed wind facility. The areas immediately surrounding 4 ReBAT acoustic monitoring stations were classed according to suitability. We predicted that areas with higher suitability would have higher levels of acoustic activity (indicator of abundance) within the rotor swept height (indicator of exposure). The 4 stations were classed as: high (1 site), moderate (1), low (2) habitat suitability. Pre-construction call rates from acoustic monitoring at rotor swept height supported these designations with the highest call rate (average of 6 calls/hour) reported at the site with the highest suitability value and the lowest call rate (average of 1 call per hour) at the lowest suitability site. This relationship between suitability as modeled in GIS and acoustic activity patterns, if verified at other sites, could serve as an indicator of total abundance, total exposure, and relative mortality risk at proposed wind facilities. Such a relationship could be used to 1) model how changes in habitat (e.g. clearing forest) might affect suitability and thus bat abundance at proposed wind facilities; 2) minimize lasiurine bat mortality) when siting potential wind facilities and when micrositing turbines within facilities.

WINTER MOVEMENTS AND ROOST SITE SELECTION OF EASTERN RED BATS IN CENTRAL ARKANSAS

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Eastern red bats (*Lasiurus borealis*) are foliage roosting bats that occur statewide in Arkansas and are common throughout much of the eastern United States. Red bats inhabit a variety of habitat types from bottomland hardwoods to upland pine stands. Red bats roost in foliage of hardwood trees during the summer, however little is known about winter movements and roost requirements. Red bats have also been documented roosting in deciduous leaf litter during sub-freezing temperatures. In our study, we used mist nets (41 net nights) to capture six male eastern red bats during the winter months (November—March 2006, 2007) in order to determine their winter roost selection and movements in central Arkansas. We attached radiotransmitters and tracked each bat an average of 11 days. Five of 61 roost locations were under leaf litter. Tree roosts were located 1.2 to 15 m high in eastern red cedars (28%), Japanese honeysuckle tangles in trees (25%), hardwoods (23%), and smilax (16%). Most roost locations (89%) faced south or southeast suggesting bats select roosts based on early morning solar radiation. Bats selected roost locations in vines or hardwood trees when nighttime temperature remained above 5°C, shifting to red cedar and leaf litter roosts on colder nights. Daily distance moved between roosts varied between 1.2 and 2,059 m. However, movement of bats ceased when nighttime ambient temperatures fell below 0°C. Our data suggests that red bats select roosts in locations with sparse canopy cover, forest edges, dense understory vegetation and roads. The use of eastern red cedars, honeysuckle, and leaf litter as roosts during winter months suggests that thinning and prescribed burning, both common forestry/wildlife management techniques in southeastern forests, may adversely affect overwintering red bats.

CAVITY TEMPERATURE OF WATER TUPELO (*NYSSA AQUATICA*) TREES AS A POSSIBLE EFFECT ON ROOST SITE SELECTION BY *CORYNORHINUS RAFINESQUII* (RAFINESQUE'S BIG-EARED BAT)

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Corynorhinus rafinesquii (Rafinesque's big-eared bat) is found in scattered localities throughout the southeastern United States and is listed federally as a "species of concern". Throughout its range, this species is known to roost in water tupelo (*Nyssa aquatica*) tree cavities. Tree cavities of 59 potential roost sites (water tupelo, *Nyssa aquatica*; bald cypress, *Taxodium distichum*; willow oak, *Quercus phellos*; and water oak, *Quercus nigra*) were searched for eighty-two days from May 2007 to January 2009. During the winter of 2007, twelve individuals were radio-tracked for 52 days to determine winter roost site preference. The data revealed that *C. rafinesquii* might select different "types" of water tupelo tree cavities during the summer than in the winter. The tree types have been classified according to the location of tree cavity openings: Type 1 (basal opening only), Type 2 (basal opening and chimney opening), and Type 3 (chimney opening only). Research efforts were initiated at the Upper Ouachita National Wildlife Refuge in northeast Louisiana to determine if the internal cavity temperatures of the three tree types differ from one another during both the summer and winter. One temperature data logger was placed at a randomly selected height within thirty-six water tupelo trees (12 of each tree type) that were confirmed roosting sites, while two other data loggers were used to record the ambient temperature. Approximately seven months (July 2008 - January 2009) of data will be analyzed to determine the internal cavity temperature for all three tree types.

WINTER ECOLOGY OF BATS (THINK OUTSIDE THE CAVE)

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Published reports on winter ecology of bats before the late 1990s dealt primarily with cave and hibernation ecology. Non-cave species were represented by individual records or anecdotal reports. However, in 1998 David Saugey tracked three eastern red bats in Arkansas and reported their winter roosting habits. This was the beginning of a series of papers documenting the presence, activity and roosting ecology of Seminole bats in S. Carolina, eastern red bats in N. & S. Carolina, and Virginia, and a five-year study on eastern red bats in Missouri. During the course of this study it was discovered that evening and silver-haired bats were also present and active during the winter months. All of these species are considered to be migratory. We have no recapture data to indicate that the individual eastern red bats that are present during the summer are also present in the winter, and silver-haired bats have not been captured in this area during the summer. However, recapture data do show that individuals of both sexes of evening bats remain on the study area throughout the year. Although all three species are active on warm (>9-10 C) winter evenings winter feeding studies indicate that eastern red bats feed during these active periods, evening bats do not feed, and some silver-haired bats feed, but the data are limited. Evening bats occupied cavities in deciduous trees. The roosting ecology of red and silver-haired bats will be discussed in companion presentations.

WINTER ECOLOGY OF SILVER-HAIRED BATS IN MISSOURI

L.W. Robbins, J.R. Flinn, J.T. Layne and S.N. Dey. *Department of Biology, Missouri State University, Springfield, MO 65897*

Silver haired bats (*Lasionycteris noctivagans*) are uncommon during the summer months in Missouri. However, occurrence records increase during the fall and spring migration. Throughout our studies on the ecology of winter bats in Missouri, we captured 43 silver-haired bats during the fall/winters of 2004 through 2008, with captures in every month from October through March. Of the 43 bats captured, 41 were caught in mist nets over ponds, streams and service roads in forested areas of Southern Missouri; the other two were found on the ground near Springfield, Missouri. Nine males and 3 females were fitted with radio transmitters. We tracked bats to roughly 24 roosts, with the all but one roost tree being an oak species. We had one male roost in a cavity of a dead and decaying shortleaf pine. Roosts consisted of live and dead trees with crevasses, loose bark and/or cavities. Mean diameter at breast height and height of roost trees were significantly different from random trees. In addition to capture data, we placed Anabat detectors in four distinct habitat types. These habitat types consisted of shortleaf pine forest, pine/oak regeneration, oak/hickory deciduous and pond. This species was recorded more often in regeneration areas and ponds compared to continuous pine and deciduous areas. Fecal analysis indicated that these bats are feeding on two orders of flying insects as well as non-volant larval insects. We also found the average mass of females was greater than males at the beginning of the winter but masses were similar in late winter.

DETERMINING RELATIVE AMOUNT OF ENERGY SAVINGS DURING TORPOR FOR THREE MYOTIS SPECIES

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Torpor is an important strategy for many endothermic organisms. By decreasing body temperature, animals can conserve energy that would otherwise be needed for internal heat production. Quantifying the amount of energy savings on animals in a field setting can be a difficult task. Our objective was to compare the amount of energy conservation between three species of female Myotis bats during pregnancy, lactation, and post-lactation. Using an equation provided from Willis (2007), that provides a standardized threshold for differentiating torpor from normothermia, we were able to accurately calculate the relative amount of energy savings based on temperature of the bats. Over the summers of 2007 and 2008, we captured and applied temperature sensitive radio transmitters to 53 female, Indiana bats (*Myotis sodalis*), 33 female, northern long-eared bats (*M. septentrionalis*), and 23 female, little brown bats (*M. lucifugus*). Using telemetry dataloggers, we were able to continuously record the signal from the transmitters and convert the data points into temperatures of the bats. The data were recorded at set intervals throughout the day and from these intervals, we extracted the temperature of the bat at important events of the roosting bat's day, such as arrival to the roost, departure from the roost, onset of torpor and becoming active. By applying Willis' equation as an upper limit of the onset of torpor, we then used body temperatures of the bats in torpor to create a relative index for the amount of energy conservation of the three different reproductive states of the Myotis species.

WIND ENERGY BAT MORTALITY – LESSONS LEARNED FROM BIRD MORTALITY

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The status of our current understanding of bat fatalities at wind energy facilities is comparable to that of avian fatalities in the late 1980's when large scale avian mortalities were first reported at Altamonte. The initial hypothesis that avian abundance and mortality are proportional ($A_{bird} \approx M_{bird}$) was borne out for some avian taxa (e.g. $A_{raptors} \approx M_{raptors}$) but not for most taxa (e.g. $A_{waterfowl} \neq M_{waterfowl}$ and $A_{shorebirds} \neq M_{shorebirds}$). Studies of bat mortality have yielded similar results in there is an apparent relationship between abundance and mortality for some species in some locations but this relationship is not universal. For birds intensive research on collision-prone avian species identified behavioral factors which resulted in increased mortality for these species. For example, engagement in hunting behavior by Golden Eagles appears to increase mortality ($A_{goldeneagle} + B_{hunting} \approx M_{goldeneagle}$). The equation describing the relationship between abundance and mortality was modified to include behavioral factors ($A_{s1}+B_{s1..sn} \approx M_{s1}$). These lessons learned for birds suggest that 1) the selection of the taxonomic unit is critical to prevent patterns from being obscured and 2) that the relationship between abundance and mortality may be behaviorally-mediated. If so, then identification of these species-specific factors is critical to improving the strength of pre-construction abundance studies to predict post-construction bat mortality.

AN ESTIMATE OF POPULATION DENSITY FOR VIRGINIA OPOSSUMS (*DIDELPHIS VIRGINIANA*) IN A SUBURBAN AREA OF WESTERN TENNESSEE

D.M. Wolcott*, and M.L. Kennedy. *Department of Biology, The University of Memphis, Memphis, TN 38152*

Density was assessed for a population of Virginia opossums (*Didelphis virginiana*) during winter of 2008. The study was conducted at the Meeman Biological Station in western Tennessee, which was located in a suburban area of Memphis. Habitat was mainly upland forest typical of the region. Mark-recapture data were collected from captures on a trapping grid. Trap configuration was 5 x 10 (traps spaced approximately 150 m apart) with traps distributed over approximately 81 ha. Branches were placed along sides and rear of traps to prevent animals from robbing bait (commercial canned catfood). Traps were set to capture Virginia opossums during 40 nights; this yielded a total of 2,000 trap nights (one trap set for one night) for the study. Upon capture, animals were tagged in both ears with ear tags and released at the site of capture. Density was estimated using the program DENSITY. In total, 38 Virginia opossums (20 males; 18 females) were captured 81 times. The mean greatest distance moved between points of capture (based on movements of 13 individuals with multiple captures) was 152 m. Total area of effect was determined to be 150 ha. Density was estimate as 1 opossum per 4.0 ha. To our knowledge, this investigation represents the first report of population density for the species in a suburban area of Tennessee.

POSTER SESSION ABSTRACTS

AN INEXPENSIVE BATTERY POWERED TIMER TO FACILITATE PASSIVE SAMPLING WITH A PETTERSSON D 240X BAT DETECTOR

M.J. Bender*, S.B. Castleberry, D.A. Miller, and T.B. Wigley. *Daniel B. Warnell School of Forestry and Natural Resources, University of Georgia, Athens, GA (MJB and SBC); Weyerhaeuser Company (DAM); National Council for Air and Stream Improvement, Inc. (TBW).*

Acoustical sampling is an important and widely used component of bat surveys and monitoring programs. Researchers have developed methods to acoustically sample bats and store data effectively and inexpensively using Pettersson D240X detectors coupled with MP3 recording devices. One factor hampering more widespread use of this full spectrum passive recording system is the lack of a timer to program stop and start times. Timers are critical to passive acoustic sampling, ensuring that multiple detectors sample concurrent time periods, extending battery life, and limiting data collection to time periods of interest. We created an inexpensive, battery operated timer that allowed us to program start and stop times, enhancing our ability to conduct passive surveys with this recording system. Material costs were approximately $75 and construction took less than 30 minutes. We constructed and used four timers over two summer seasons, corresponding to over 300 timer nights, without malfunction. Our timers permitted us to deploy detectors during daylight hours and retrieve them at our convenience the following day. Because detectors were deployed before sunset, personnel safety was enhanced and additional research activities (e.g., mist-netting) could be conducted during the hours around sunset.

FIRST DOCUMENTED INDIANA BAT MATERNITY COLONY ON THE DANIEL BOONE NATIONAL FOREST

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On July 12, 2007, a post lactating Indiana bat was captured on the Daniel Boone National Forest (DBNF) during a mist netting survey for a transmission line in Clay County, Kentucky. The female bat was the first documentation of Indiana bats in Clay County and telemetry led to the first Indiana bat maternity colony in Clay County and on DBNF property. The bat was tracked to a dead American elm (RT1) on July 13 and to another dead elm (RT2) on July 15, but could not be located on July 14 or after July 15. Emergence counts at RT1 yielded 15 bats (including the female) on July 13 and 11 bats on July 16. Only one bat emerged from RT2 on July 17. Based on the time of year, the colony had likely disbanded into smaller groups that were using their primary roost(s) less and their alternate roosts more frequently. Therefore it is likely the colony was using other roost trees near RT1 and RT2. To determine the amount of suitable roosting habitat around the two roost trees, the colony's home range was examined using forestry data. The home range was estimated to encompass an 8-km radius around the roost trees and contained approximately 20,342 ha, 18,322 ha (90%) of which were forested. The forested acres contained 1,976,000 trees of appropriate species and size (dbh >23 cm) to be potential roost trees. However, because maternity colonies typically use dead or dying trees, an estimate was made of 1 to 2 dead or dying trees per hectare, resulting in 18,300 to 36,600 suitable roost trees in the home range. This high density means that the colony likely uses other roost trees in the home range and should be able to locate other suitable roost trees when RT1 and RT2 are no longer usable.

PROBABILITY OF DETECTING INDIANA BATS IN KENTUCKY USING ANABAT II DETECTORS—DEVELOPMENT OF A SAMPLING PROTOCOL

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Standardized mist nets protocols are used to survey for the federally endangered Indiana bat (*Myotis sodalis*) when disturbances are proposed in potential habitat. Because bats often elude nets, use of acoustic detectors can increase detectability of some species. Consequently, in 2007 the USFWS Kentucky Field Office initiated the use of Anabat II bat detectors in Indiana bat surveys. The objectives of this study were to determine the sampling effort required to obtain a 90% chance of detecting Indiana bats if they are present using the Anabat II system. We established 30 acoustic sampling sites at each of 2 locations where Indiana bat maternity colonies were documented in 2007. Anabat II detectors connected to CF-ZCAIMS were placed at each site for 3 nights in late June and mid-late July and echolocation calls were recorded for the entire night. We identified calls to species using a discriminant function analysis and determined the probability of detecting Indiana bats using the program PRESENCE. Detection probabilities did not vary with sampling night but were lower for ½-night sampling (0.43-0.47) compared to full night sampling (0.52-0.59). Based on average detection probabilities, the probability of detecting an Indiana bat if it is in the area is 0.52-0.59 after 1 full night of sampling, 0.77-0.83 after 2 nights of sampling, 0.89-0.93 after 3 nights of sampling, and 0.95-0.97 after 4 nights of sampling. However, if $\geq$2 detectors are used and placed at independent sites, a 90% chance of detecting an Indiana bat can be obtained in an area with 2 nights of sampling even if sampling only occurs for 5 hours. Our results provide a baseline for the survey requirements in areas of known Indiana bat presence and future work will examine the sampling effort needed to detect Indiana bat presence in areas with lower density.

FIRST RECORD DOCUMENTING THE SILVER COLOR VARIANT OF *MYODES GAPPERI* (RED-BACKED VOLE) IN NORTH CAROLINA

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Myodes gapperi, red-backed vole, occurs throughout much of northern North America, with southward extensions into the Rocky and Appalachian Mountains. In western North Carolina *M. gapperi* is common above 3,000'. In June 2008 we conducted a small mammal survey on a 16.08 acre tract of the recently acquired Pineola Bog State Natural Area in Avery County, North Carolina. Trapping was conducted over a three night period and a total of 13 specimens of 4 species were collected. These included *Blarina brevicauda* (4), *M. gapperi* (4), *Peromyscus leucopus* (2), and *Ochrotomys nuttalli* (3). One of the 4 *M. gapperi* exhibited the gray pelage variation with very little red along the dorsal band. One specimen of the gray variation was reported from Wise County, VA in 1967. Though common in the northern portion of it's range, this color variant has not yet been reported from North Carolina.

DOES WHITE-NOSE SYNDROME AFFECT SUMMER ENERGETICS OF *MYOTIS LUCIFUGUS*?

A. Janicki* and T. Tomasi. *Department of Biology, Missouri State University, Springfield, MO 65804*

White-Nose Syndrome (WNS) is a large-scale epidemic that is killing cave-dwelling bats in the northeast while they are hibernating. Since its discovery in four caves near Albany, NY, it has spread at least 250 km to at least four neighboring states. Affected caves are experiencing greater than 90 % mortality in one year. With such a rapid spread and a high mortality rate, it is important to determine the cause of this epidemic. WNS is causing bats to deplete all of their fat reserves before hibernation is over and this could be the result of higher metabolic rates in affected bats. We predict that affected bats will also have a higher metabolic rate prior to hibernation. The metabolic rates of little brown bats (*Myotis lucifugus*) were studied in multiple sites in New York, Pennsylvania, and Missouri during July and August 2008. While the bats where kept in a metabolic chamber, oxygen consumption rates and body temperatures were measured during daily torpor using an oxygen analyzer and iBBats respectively. As expected, metabolic rates increased with ambient temperature and body temperature, and decreased with relative depth of torpor. After accounting for the effect of ambient temperature, there was no difference in metabolic rates between sites ($p = 0.695$). However, when data were removed for bats with relatively shallow torpor (metabolic rate > 5.00 ml $O_2/h/g^{2/3}$), there was a significant difference in metabolic rates between sites ($p < 0.0005$). Missouri bats showed higher metabolic rates than New York and Pennsylvania bats. A three-way ANOVA showed that age ($p = 0.014$) has an effect on metabolic rate in addition to location ($p < 0.0005$), while gender does not ($p = 0.329$). There was a significant difference between sites ($p < 0.0005$) in relative depth of torpor when ambient temperature is taken into account. Contrary to our prediction, bats in New York that are affected by WNS did not show higher metabolic rates during the summer when compared to possibly affected bats in Pennsylvania and unaffected bats in Missouri.

PRESENCE/ABSENCE SURVEY FOR RAFINESQUE'S BIG-EARED BAT AND SOUTHEASTERN MYOTIS IN A BOTTOMLAND HARDWOOD FOREST IN SOUTHEAST MISSOURI

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An important step to address the conservation of species is to collect data on the range and distribution of that species. However, these data are often lacking, especially on uncommon species or in areas near the periphery of a species range. Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) and the southeastern myotis (*Myotis austroriparius*) are species native to the southeastern United States. These species are both designated as species of concern throughout much of their range. The range of these bats in Missouri is restricted to the bottomlands of the Mississippi Delta which includes Donaldson Point Conservation Area (DPCA) managed by the Missouri Department of Conservation. Despite the potential importance of this protected habitat to these rare bats and other species, the DPCA has not been surveyed for bats. DPCA contains an 888 ha natural area that contains numerous large (>100 cm dbh) tress. These trees may serve as roost sites for bat species, especially *C. rafinesquii* and *M. austroriparius*. Mist netting in the natural area took place from June 2008 to October 2008. Mist nets were set over flight corridors (i.e. access roads), and monitored for at least 5 hours each night. A total of 45 net nights were conducted. Twenty-four individual bats representing five species were captured including both *C. rafinesquii* and *M. austroriparius*. The most numerous species captured was the eastern red bat (*Lasiurus borealis*) (14 individuals). Future research will focus on the roosting ecology of *C. rafinesquii* and *M. austroriparius* on DPCA.

USE OF RAFINESQUE'S BIG-EARED BAT ROOSTS BY OTHER BAT SPECIES

S.C. Loeb and E. Winters, *USDA Forest Service, Southern Research Station, Clemson SC (SCL); USDA Forest Service, Southern Research Station, New Ellenton, SC (EW)*

Although use of day roosts by multiple species has occasionally been reported, the extent of roost sharing, either simultaneously or consecutively, has rarely been examined. The objectives of this study were to determine: 1) the extent of use of Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) roosts by other bat species, 2) seasonal variation in use, and 3) whether other species select specific roost characteristics. We inspected 46 Rafinesque's big-eared bat tree (RBEB) roosts with basal cavities and 5 roosts in artificial structures (4 bridges and 1 barn) at the Savannah River Site, Aiken and Barnwell Counties, SC, at least once per week May-October 2005-2008 and November 2008-January 2009, and 1-2 times per month November-April 2006-2008. Twenty roost trees and all of the artificial structures were used by $\geq$1 other bat species. Southeastern myotis (*Myotis austroriparius*) were found in 13 RBEB roost trees (17 times with RBEB, 67 times alone); they were never found under bridges or in the barn. Use of RBEB roosts occurred in most months but peaked from July-December. Used trees did not differ from non-used trees in terms of species, height, diameter, distance to nearest tree, or habitat. Tri-colored bats (*Perimyotis subflavus*) used 11 RBEB roost trees (12 times with RBEB, 19 times alone), 1 building (7 times with a RBEB, 2 times alone), and all 4 bridges (129 times with RBEB, 81 times alone). Tri-colored bats only used RBEB roost trees in November, December, January, April, and May but used bridges throughout the year. However, bridge use peaked during the winter months. Tri-colored bats selected the shortest RBEB roost trees; otherwise trees used by tri-colored bats did not differ from non-used trees. Our results suggest that there is substantial overlap in roost use among 3 species, especially during winter. Thus, the potential for significant interspecific interaction exists, particularly if roost structures are limited.

SEASONAL CHANGES IN THE DISTRIBUTION OF SEMINOLE BATS AND A REQUEST FOR INFORMATION

R.W. Perry. *Southern Research Station, Forest Service, United States Department of Agriculture, Hot Springs, AR 71902*

Although Seminole bats (*Lasiurus seminolus*) are found throughout the southern United States, older studies suggest they may be short–range migrants, moving to areas along the Gulf Coast during the winter months. Furthermore, data from Arkansas suggests that female Seminole bats may not reproduce in Arkansas, but may move into the area after the juvenile rearing season (July). I am conducting a study to determine if sex-based changes in the regional distribution of Seminole bats exist, or whether observed patterns are simply a function of biased sampling. I am creating seasonal distribution maps for males and females using data from museum records, publications, and mist netting studies conducted throughout the southeastern United States. To-date, I have received information on over 800 specimens housed at 19 museums, and data from 21 publications and one mist-netting study. I am requesting information on captures of Seminole bats from bat researchers and others conducting studies or surveys throughout the Southeastern United States.

AUTOMATED THERMAL INFRARED VIDEOGRAPHIC CENSUS TECHNIQUE: AVAILABILITY AND TRAINING

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To improve accuracy of census data for evaluating gray bat (*Myotis grisescens*) population trends, a thermal infrared videographic technique was developed that involves automated digital image processing to detect, track, and count bats in flight. Initial testing and validation of the technique, performed at numerous gray bat maternity caves in the southeastern US during 2006, showed the precision of this technique as well as generally favorable comparison with established census techniques, such as visual counting and estimates based on guano deposition. A baseline version of this imaging methodology has been finalized, a patent application filed, and a user's guide prepared. In support of the FWS mission to assess the population status of the endangered gray bat, a week-long hands-on training class was conducted in May 2008 at the Ozark Underground Laboratory (OUL), Protem, MO. Eighteen (18) participants, from state and federal agencies, NGOs, and the private sector, participated. After initial classroom instruction on thermal infrared imaging fundamentals, the group divided into 4 teams, one for each of the camera systems available, and independently and simultaneously collected and processed imagery data for caves in the vicinity of OUL. This represented the first opportunity to compare counts for independent simultaneous recordings of a single emergence event, multiple independent processings of a single camera recording of an emergence event, and night-to-night variation for a single cave. It was found that multiple independent recordings and processings of a single emergence events exhibited a coefficient of variation (σ/μ) around 10% when imaging setup criteria and processing guidance were carefully followed. Departure from these criteria could lead to much larger variations. Multiple independent processings of a single recorded emergence event exhibited coefficient of variation under 6% when parameter selection guidelines were carefully followed. Differences in nightly mean counts for the same cave, under similar weather conditions during the same week, were negligible (<1%). Following the class, multiple camera systems were kept in use by various class members during the summer of 2008 recording gray bat emergences at maternity caves throughout the southeastern US.

DETERMINING THE EFFECTIVENESS OF ACOUSTIC SAMPLING COMPARING DIFFERENT DEPLOYMENT TYPES

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Surveys conducted for the federally endangered Indiana bat (*Myotis sodalis*) consist of mist-netting and, in Kentucky, passive acoustic monitoring. The objective of this study was to determine how detector orientation (0°, 45°, and 90° angles) and weatherproofing (waterproof container with PVC pipe and Bathat) affect the quantity and quality of bat calls recorded with Anabat systems. Five Anabat systems were deployed on 1.5 m (5.0 ft) tripods at each site. Each detector was randomly assigned to an orientation or weatherproofing treatment and to the placement of the treatment in each station. Sites were chosen to represent the range of suitable habitats based on our experience with recording echolocation calls in similar environments. A total of 17 sites were surveyed in which sampling equipment functioned properly for all five treatments. The total number of files recorded varied by treatment ($F = 4.02$; $p < 0.006$), with the BatHat having the lowest number of files recorded, while the PVC protection had the highest. The average number of pulses varied among treatment ($F = 8.02$; $p < 0.001$) and the BatHat had shorter files comparatively. The number of files making it though the ID filter were significantly different among treatments ($F = 15.37$; $p < 0.001$) with the BatHat recording calls of lower quality than the other treatments. A total of six species were detected during this sampling. Red bats (*Lasiurus borealis*) and big browns (*Eptesicus fuscus*) were found at the most sites. Species richness recorded with the BatHat was approximately ½ of the other sites and the horizontal orientation had a lower species richness than the PVC, vertical, and 45° orientations. Overall, the 45° angle and PVC weatherproofing yielded the best results with regard to bat call detection rate and quality. Researchers should consider the impacts of the orientation and weatherproofing options on their results.

OCCUPANCY DETERMINATION AND EVALUATION OF SURVEY METHODOLOGIES FOR THE RAFINESQUE'S BIG-EARED BAT (*CORYNORHINUS RAFINESQUII*) AND SOUTHEASTERN MYOTIS (*MYOTIS AUSTRORIPARIUS*) IN EAST TEXAS

L.A. Stuemke*, C.E. Comer, W.C. Conway, M.L. Morrison, and R.W. Maxey. *Arthur Temple College of Forestry, Stephen F. Austin State University, Nacogdoches, TX 75962 (LAS, CEC and WCC); College of Agriculture and Life Sciences, Texas A & M University, College Station, TX 77843 (MLM); Texas Parks and Wildlife, Wildlife Division, Karnack, TX 75661 (RWM)*

Rafinesque's big-eared bat and Southeastern myotis populations are declining throughout their range in the southeastern United States and are classified as threatened or rare by various state wildlife agencies. Despite recent increased research attention, a primary concern for these species is the lack of reliable and accepted survey techniques to determine occupancy. In an effort to develop a sound sampling protocol we concurrently compared three survey techniques; mist-netting, acoustical monitoring, and roost tree searches along transects in randomly selected, 100-ha blocks of appropriate habitat. Between May and August 2008, we surveyed 8,179 ha of forested habitats at Caddo Lake National Wildlife Refuge, Caddo Lake Wildlife Management Area, and Little Sandy National Wildlife Refuge. We had a total of 38 net/trap nights, 59 acoustical survey nights, and 1200 ha walking transects. We successfully documented target species with all three techniques, including; four out of 98 bats captured in mist nets, three new roosts discovered, and various calls documented.

A PROJECT OVERVIEW: FUEL REDUCTION EFFECTS OVER TIME ON FORAGING AND ROOSTING ACTIVITY IN AREAS WITH SUMMERING INDIANA BATS

K.M. Womack, S.K. Amelon, and T. Elliot. *Department of Fisheries and Wildlife, University of Missouri, Columbia, MO 65201 (KMW); USDA Forest Service, Northern Research Station, Columbia, MO 65201 (SKA); Missouri Department of Conservation, Kirksville, MO 63501(TE)*

Studies examining Indiana bat, (*Myotis sodalis*) habitat use during the summer have suggested that selective tree removal in oak-hickory dominated stands should increase *M. sodalis* activity in both foraging and roosting locations. However, no study has examined the affects of fuel reduction by selective tree removal over a long term period in *M. sodalis* maternity colonies. My study area incorporates 3 Missouri Department of Conservation areas in northeastern Missouri. Each conservation area is at a different stage of forest management. The conservation area of primary focus in my study has received no forest management. This is allowing me to collect baseline data for 2 field seasons to determine landscape use (foraging and roosting) by *M. sodalis* within and around the conservation area pre-treatment. Subsequently, I will study changes to use by *M. sodalis* during tree removal (2 seasons) and post harvest (2 seasons) in this conservation area. This study also examines female *M. sodalis* diet by using a new genetic technique (Claire, 2008) to identify individual prey species by from fecal samples DNA sequences. By comparing the insect DNA found in fecal pellets to a reference library of insect DNA sequences, I will quantify *M. sodalis* diet composition. This new approach to dietary analysis will allow me to determine if female Indiana bats are prey generalists or specialists by comparing the percentages of individual prey species in fecal samples to their availability in determined foraging areas to better understand how their diet changes throughout the summer.

EFFECT OF BAT DETECTOR ORIENTATION ON ACOUSTICAL MONITORING SURVEY RESULTS, CORRELATION OR COINCIDENCE

J.R. Young, S.R. Bishop, and J.E. Settles. *East Kentucky Power Cooperative, Inc.,4775 Lexington Rd., Winchester, KY 40391*

The U. S. Fish and Wildlife Service, Kentucky Ecological Services Field Office (KFO) issued new guidance for Indiana bat surveys in Kentucky beginning in 2007. A major component of the new survey guidance was the implementation of acoustical monitoring surveys using Anabat systems with Analook software and two filters provided by the KFO to acoustically identify Indiana bat (MYSO) calls. We conducted acoustical monitoring surveys at 59 sites (168 detector nights) throughout eastern Kentucky during the 2007 and 2008 survey seasons, resulting in 61,530 recorded call files, including 213 call files identified as MYSO. Positive MYSO identifications occurred during 28 detector nights when at least one MYSO call file was identified. These positive MYSO identifications seemed to be dependent on the habitat type where the bat detector was deployed, with 19 (68%) occurring within stream corridors, 7 (25%) from ponds and only 2 (7%) from field, road, and forest openings combined. Of the MYSO identifications within stream corridors, 17 (89%) were recorded from detectors oriented horizontal – 30º, while only 2 (11%) came from 45º – vertical orientations. MYSO identifications occurred 53% of the time detectors were deployed within a stream corridor with a horizontal – 30º orientation. No *Myotis sodalis* were captured during associated mist netting surveys within the stream segments where MYSO calls were identified; however, *Myotis lucifugus* were captured within 100% of them. Our data seems to indicate the orientation of bat detectors and the presence of other species can affect the results of an acoustical survey intended to indicate Indiana bat presence or absence. Though more research is needed to determine if these results represent a correlation or coincidence, the results are consistent with previous studies which indicate habitat types, geographic and intraspecific variation, Doppler effect, and atmospheric conditions can affect the results of acoustical monitoring surveys.

RAFINESQUE'S BIG-EARED BAT WORKING GROUP

3rd ANNUAL MEETING- 2/11/09- Jonesboro, AR

1:30 – 3:00 General Meeting of the RBEBWG

General Session (45 minutes)

- Welcome/Meeting Objectives/ Introductions
  Alison McCartney, RBEBWG Chair, alison_mccartney@blm.gov, Mary Kay Clark, RBEBWG Vice-Chair, mkclark141@aol.com , Bree McMurray, RBEBWG Secretary, Bree.McMurray@modot.mo.gov

- Member Reports/Updates
  All participants

- 2010 *Corynorhinus* Symposium Preparation Update
  Susan Loeb, Clemson University, sloeb@clemson.edu

Special Presentations (45 minutes)

- Cavity Temperature of Water Tupelo Trees as a Possible Effect on Roost Site Selection by Rafinesque Big-eared Bats
  Chris L. Rice and Kim Marie Tolson, University of Louisiana at Monroe, chrisrice44@yahoo.com

- U.S. Fish and Wildlife Service Status Assessment Working Session
  Shauna Ginger, USFWS, shauna_ginger@fws.gov

3:00 – 3:15 Break (with refreshments)

3:15 – 5:00 Rafinesque's Big-eared Bat Conservation Working Sessions

- Conceptual Model for Conservation Planning for Rafinesque's Big-eared Bat and the Southeastern Myotis.
  Prepared by John W. Lamb, ATA Conservation, john.lamb@arnold.af.mil
  Presented by Mary K. Clark, Moonlight Consulting, Raleigh, NC

- Conservation Actions Working Session for Rafinesque's Big-eared Bat and Southeastern Bat – break-out groups
  Mylea Bayless, Bat Conservation International, mbayless@batcon.org and Mary K. Clark
  - Man-made structures (bridges, buildings): Survey, replacement designs, maintenance, bridge inspection and access issues
  - Cave and mine roosts: survey protocols, protection measures
  - Research methods: species specific recommendations for surveys, monitoring, marking, data acquisition, genetic sampling, etc. including equipment recommendations if possible (e.g. bands)

Rafinesque's Big-eared Bat Third Annual Meeting
2/11/09, Jonesboro, AR
ABSTRACTS

CAVITY TEMPERATURE OF WATER TUPELO (*NYSSA AQUATICA*) TREES AS A POSSIBLE EFFECT ON ROOST SITE SELECTION BY *CORYNORHINUS RAFINESQUII* (RAFINESQUE'S BIG-EARED BAT)

*Chris L. Rice and Kim M. Tolson, Department of Biology, College of Arts and Sciences, The University of Louisiana at Monroe, Monroe, LA.

Corynorhinus rafinesquii (Rafinesque's big-eared bat) is found in scattered localities throughout the southeastern United States and is listed federally as a "species of concern". Throughout its range, this species is known to roost in water tupelo (*Nyssa aquatica*) tree cavities. Tree cavities of 59 potential roost sites (water tupelo, *Nyssa aquatica*; bald cypress, *Taxodium distichum*; willow oak, *Quercus phellos*; and water oak, *Quercus nigra*) were searched for eighty-two days from May 2007 to January 2009. During the winter of 2007, twelve individuals were radio-tracked for 52 days to determine winter roost site preference. The data revealed that *C. rafinesquii* might select different "types" of water tupelo tree cavities during the summer than in the winter. The tree types have been classified according to the location of tree cavity openings: Type 1 (basal opening only), Type 2 (basal opening and chimney opening), and Type 3 (chimney opening only). Research efforts were initiated at the Upper Ouachita National Wildlife Refuge in northeast Louisiana to determine if the internal cavity temperatures of the three tree types differ from one another during both the summer and winter. One temperature data logger was placed at a randomly selected height within thirty-six water tupelo trees (12 of each tree type) that were confirmed roosting sites, while two other data loggers were used to record the ambient temperature. Approximately seven months (July 2008 - January 2009) of data will be analyzed to determine the internal cavity temperature for all three tree types.

U.S. FISH AND WILDLIFE SERVICE STATUS ASSESSMENT OF RAFINESQUE'S BIG-EARED BAT AND SOUTHEASTERN MYOTIS - WORKING SESSION

Shauna M. Ginger, U.S. Fish and Wildlife Service, Jackson, MS.

The U.S. Fish and Wildlife Service (Service) is conducting status reviews of the Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) and Southeastern myotis (*Myotis austroriparius*) across their range. Though they have a wide distribution, these bats have been identified by the Service and others as species of concern due to either localized declines or unknown status of local populations. The Service is also working with Bat Conservation International (BCI) through a MOU to assist in updating distribution maps and creating a conservation strategy for these species. In February 2008, the Service sent out data requests to each state within the bats' historical range and subsequently received natural heritage program location data. In January of 2009, the Service distributed questionnaires to bat experts to collect information that will be used both for the status review and by BCI to update distribution maps and also outline potential management recommendations. Preliminary results of information received to date will be discussed.

CONCEPTUAL MODEL FOR CONSERVATION PLANNING FOR RAFINESQUE'S BIG-EARED BAT AND THE SOUTHEASTERN MYOTIS

Prepared by John W. Lamb, ATA Conservation, Arnold Air Force Base, TN.
Presented by Mary K. Clark, Moonlight Consulting, Raleigh, NC.

Conceptual models are often used in conservation planning to link biodiversity targets to threats and to the strategic conservation actions that are needed to create positive results. These models create a simplified visual description of a more complex project by presenting the overall project scope in a relational diagram. This kind of visual has been valuable in facilitating effective communication between project team members. John Lamb created a draft conceptual model for a joint BCI/SBDN program to create a written conservation plan for Rafinesque's big-eared bat and the Southeastern Myotis.

Preparations for the conservation plan involve meetings with expert teams. The first meeting was held in November 2008 in Raleigh, NC and another is planned for early April 2009 in Nashville. Lamb's conceptual model will be used as a template for planning and communicating concepts and actions to team members and others. Input into the model is key so we would like a critique and feedback from the Rafinesque's Big-eared Bat Working Group. In Lamb's absence Mary K. Clark will describe the model and gather input from working group members for model improvement. John Lamb will incorporate comments from the group into the model prior to the April 2009 meeting of the expert team.

CONSERVATION ACTIONS FOR RAFINESQUE'S BIG-EARED BATS AND SOUTHEASTERN MYOTIS – WORKING SESSION

Mylea Bayless, Bat Conservation International, Austin, TX and Mary K. Clark.

Bat Conservation International and the Southeastern Bat Diversity Network are collaborating to create a conservation plan for Rafinesque's Big-eared Bats and Southeastern Myotis. Both species are of conservation concern throughout their ranges and are currently undergoing a status assessment review by the U.S. Fish and Wildlife Service. The goal of the BCI/SBDN project is to produce materials that aid in proactive conservation actions for these two species. BCI and SBDN hosted a workshop in Raleigh, NC in November 2008 to create the framework and general content of a conservation action document. Participants in this meeting included federal and state agency, university, NGO, military, and the timber industry representatives. The resulting conservation strategy will include updated distribution maps and population status information and will focus on conservation actions for these two species.

We are grateful to the Rafinesque's Big-eared Bat Working Group for their help furthering the goals of this program. We will devote the last session of the annual meeting to work on developing specific guidelines for a set of conservation actions identified during our Raleigh meeting. Participants will break out into small groups and work on detailed aspects of the plan that relate to conservation issues for Rafinesque's big-eared bats and Southeastern myotis.