

Summer Roost at the Buffalo National River

Project Summary

White-nose syndrome has killed over 6 million bats since being discovered in New York State during 2006. The Buffalo National River (BNR) is home to 3 federally endangered bat species and one threatened species of bat. White-nose syndrome was discovered at the BNR during the winter of 2013, thus documentation of summer habitat use of bat species is critical at this juncture for management of these species. Accordingly, this two-year project will take place at the Buffalo National River, during the summers of 2017-2018. Summer roost selection and roost site use are the project's objectives. The Buffalo National River has roughly 600 acoustic-nights of bat detection on the property, collected by ultrasonic call detection. These data will be used to determine the areas where the target species were detected. The calls will be run through at least two software packages, Kaleidoscope Pro™ and Sonobat™. The calls may also be run through Echoclass™ Software and BCID™ software. In addition, visual inspection of all *Myotis* calls for additional vetting. The spatial distribution of these sites will then be examined to see if there appears to be any areas where there is a substantially higher concentration of calls from these species than the average. If there are any of these call-clusters, additional sampling sites within and near these clusters will be generated to determine areas of greatest foraging concentrations. This will result in targeted mist-netting and further ultrasonic call detection. Tagging captured individuals with radio transmitters will allow us to track individual bats to their roosts. We will also inspect nearby abandoned buildings for bat guano, or other signs that bats use the structures as summer roost sites.

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Budget:

Total Project cost =\$72,514
Total Arkansas SWG request = \$54,382
Total Matching Funds provided =\$18,132

Need- There are many threats that bat populations are facing today, and this is causing a rapid decline in their populations. Habitat loss and white-nose syndrome (WNS) are just a few. Since the arrival of WNS to the United States in 2006, more than 5.7 million bats have died from the fungus (Bat Conservation International 2016). Tree roosting bats tend to roost in dead trees, where there are cavities and bark that is flaking off for them to climb under for protection. Due to habitat loss, there are less and less suitable trees for bats to roost in. Rock roosting species use specific sites that may need to be maintained to remain suitable for bats, for example, vegetation may need to be removed as it encroaches into glades.

The Buffalo National River is home to three tree-roosting *Myotis* species (*Myotis lucifugus*, *Myotis sodalis* and *Myotis septentrionalis*) and one that roost in rock crevices (*Myotis leibii*). Out of the four, *Myotis sodalis* is listed as endangered under the Endangered Species Act (ESA) and *Myotis septentrionalis* is listed as threatened under the ESA. *Myotis sodalis* and *Myotis leibii* are both listed as Species of Greatest Conservation Need (SGCN) under the Arkansas Wildlife Action Plan.

There is a lack of knowledge when it comes to these species' summer roosting sites, making it difficult to manage habitat. There is now a way to locate bats by ultrasonic call detection and analysis. By using this information, it is possible to locate potential roost structures within expected distances of their foraging areas.

Priorities this project is addressing- This project is addressing the summer roost selection of the three tree-roosting *Myotis* species and *Myotis leibii* that roost in rock crevices that are found around the Buffalo National River.

Purpose & Objectives- The overall goal is to better understand the roosting ecology of the four target *Myotis* species during the summer months. Our specific objectives are to:

1. Locate summer roost sites by radiotelemetry to determine how many are in each study area.
2. Characterize roost site at tree and stand level used by the four target species.
3. Determine the population size for each roost site.

Location- The proposed study area is located at 38a- Upper Boston Mountains, 39a-Springfiled Plateau, 39b-Dissected Springfield Plateau- Elk River Hills, and 39c- White River Hills. The counties that the area covers are Newton, Searcy, Marion, and Baxter. The habitats that will be targeted in this study are: pine forest, pine-oak forest, bottomland riparian forest, early succession forest, open fields, and glade (Figure 1).

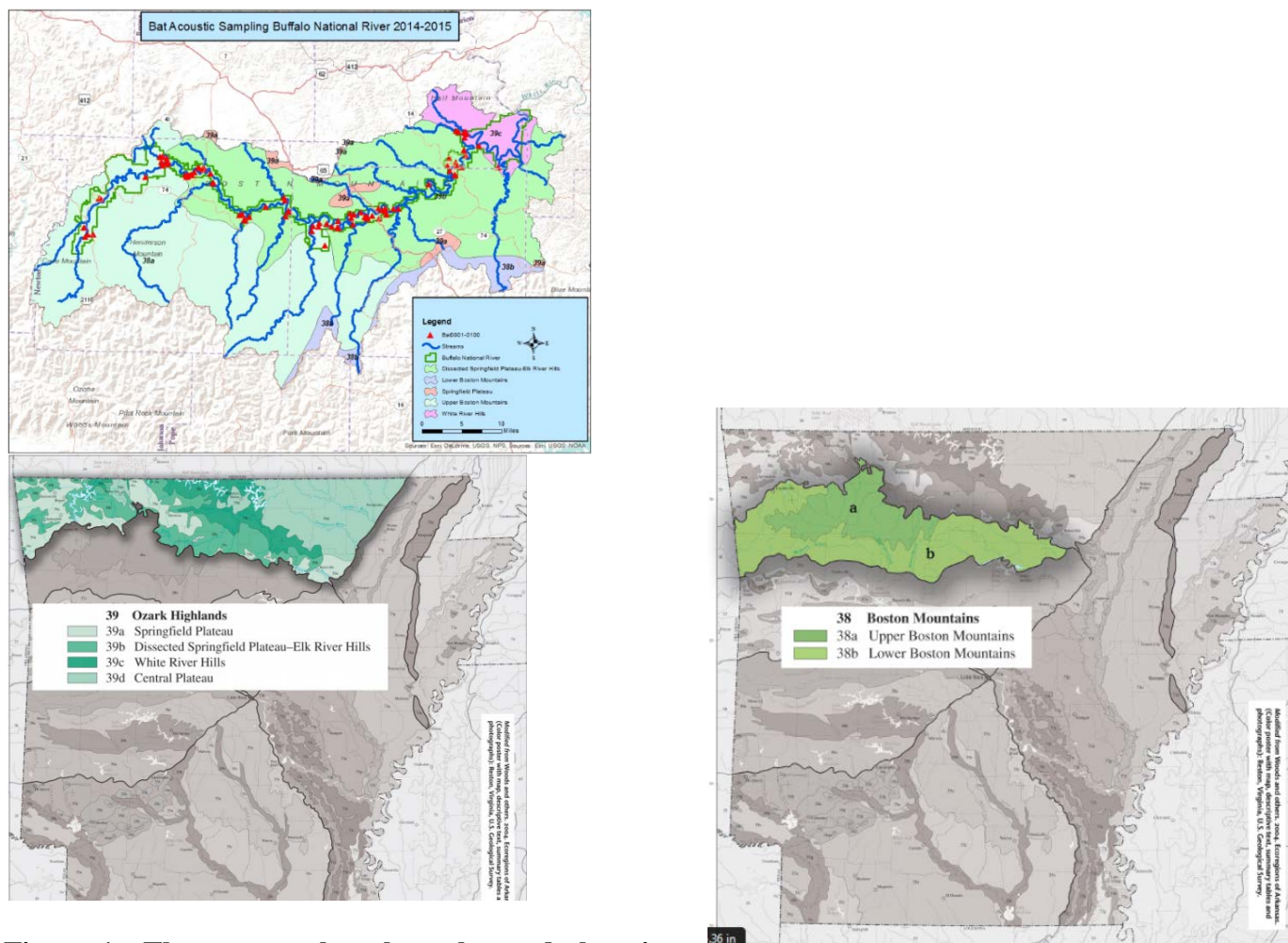


Figure 1. Three maps that show the study location as the BNR in Arkansas

Approach- During the first year, the study sites will be selected. Data from the previously collected 600 acoustic-nights will be vetted for areas of positive detection for the four target species. Locations of target species call-clustering will then be mapped. Mapped cluster-sites will be netted to gather information from in-hand positive identification. Each site will be netted and acoustic data collected for two nights. Additionally to supplement the existing acoustical data set, acoustical data will be collected continuously for two years beginning approximately on November 1st 2016. Calls will be identified by species as described in project summary. Netting will take place during early May to mid-August.

Each site that is being netted will be characterized with the following information:

1. Date(s)
2. Location, UTM coordinates
3. Description of the site (Road, trail, habitat)
4. Observer(s), technician(s) setting up equipment
5. Atmospheric conditions such as cloud cover, wind speed, and temperature
6. Moon phase
7. Time of sun set

8. Length of survey per night
9. Start time for acoustics
10. Detector settings (for acoustics only)
11. Placement description for acoustics detector (road, trail, direction it is facing)

While netting, if any bat is caught additional data will be taken for each bat:

1. Time of capture
2. Net captured in
3. Species
4. Sex
5. Age
6. Wing damage for each wing based on the Reichard scale (Reichard and Kunz 2009).
7. Parasites (mites, bat, flies, ticks)
8. Band number for target species
9. Height of capture in mist nets

If any of the target species are captured, than a radio tracker will be placed on the bat's back between the scalpuli using surgical glue. The radio transmitters will not exceed 5% of the bats body weight. We will track the bat to the roost site the next day and continue to monitor the location of each bat up to 2 weeks. Ideally, ten radio transmitters will be placed on each species of bat and 5 on each sex, but species composition of captured bats will altimetry determine this. Radio transmitters will start being diploid the last 2 weeks in May of 2017 and 2018. We will use transmitters with a 2 week battery life with increased signal strength. After each night, the data from the acoustics gathered will be analyzed to see if any target species were detected. If a target species was tagged with a radio tracker the night before, the bat will be tracked back to the roost tree, or structure. Once the roost has been found, it will be characterized. An exit count will be done to determine the colony size. If any of the transmitters are lost and cannot be tracked by foot, we will use a plane to see if we can pick up the signal and locate the transmitter that way.

Roost trees will be characterized along with a random tree that is in a 50-m radius. The random tree will represent available trees. The habitat surrounding the two trees will be characterized following BBIRD protocol (Martin et al. 1997).

Roost trees and the randomly selected trees will be characterized by:

1. Basal area
2. Type of tree species
3. Management regime
4. Height of tree
5. Canopy cover

For *Myotis leibii*, roost sites will be characterized by:

1. Canopy cover
2. Slope
3. Aspect
4. Distance to vegetation outside each day-roost

5. Elevation

For *Myotis leibii*, the roost sites will be characterized along with a random site to quantify roost selection.

During the second year, additional areas that were not surveyed the first year will be netted, and the same data will be collected as during the first field season. Then, appropriate structures will be located and checked for bat activity. If any structures are found that exhibit bat activity, than an exit count will be performed. If all of the study areas are characterized the first year, than we will return and determine if there are any more areas that have potential roost sites. Once completed, we will return to the areas where summer roosts were found the first year to determine multi-year bat use. If still used, another exit count will be performed to quantify the colony size. At the end of two seasons, all of the data collected will be entered into a spread sheet for analysis.

Expected Results and Benefits- With the data collected throughout the two year study, the Buffalo National River will have a better understanding of what type of summer roosts and areas of activity the four target *Myotis* species prefer. Better ways to manage and protect these areas of use and species can be planned for on a spatial scale. This will assist in reducing the impacts of threats facing bats today. The species in greatest conservation need in Arkansas that will benefit from this project are *Myotis leibii* and *Myotis sodalis*. Additionally, the two species that have the highest death rates from white-nose syndrome, *Myotis leibii* and *Myotis septentrionalis* will also see direct benefits.

Budget

Budget	Justification	SWG	Match	Total
Personnel				
Project Leader (T. Risch)	1.15 mos of Summer Salary		\$ 10,304	\$10,304
Arin Vann	9 mo @ 1400/mo	\$12,600		\$12,600
Field Technician (part-time student)	6 mo @ 1300/mo	\$7,800		\$7,800
Fringes				
Thomas Risch	25% summer rate		\$2,576	\$2,576
Graduate student	0% of salary base			
Part-time student	0% of salary base			
Supplies & Services				
Airplane time from CAP		\$5,900		\$5,900
HolohilLB-@X Transmitters	40 @ 200	\$8,000		\$8,000
Misc Field Supplies		\$2,000		\$2,000
Publication cost		\$1,500		\$1,500
Arin Vann Tuition	12 credit hours	\$3,672		\$3,672
Travel				
Vehicle Mileage to study site	15,000@0.42/mile	\$6,300		\$6,300
Meetings		\$2,000		\$2,000
Total Direct Cost*		\$49,772	\$12,880	\$62,652
Indirect Cost	10 % of TDC	\$4,610	\$ -----	\$4,610
Match Indirect Cost**	36% of SWF	\$ -----	\$4,637	\$4,637
Waived Indirect Cost***	36%- 10% SWF	\$ -----	\$11,986	\$11,986
Total Cost		\$54,382	\$29,503	\$83,885

Budget Match Details

Salary (PI Dr. T.S Risch)*	\$ 10,304
Fringe (PI Dr. T.S Risch)*	\$ 2,576
Match Indirect Costs**	\$ 4,637
Waived Indirect Costs***	\$ 11,986
Total Match from ASTATE	\$ 29,503 (25%)

* = 40.35% of one month's salary & 25% summer fringe rate

**36% of \$12,880 = \$4,637

***ASTATE's IDC rate is 36%

Qualifications:

Arkansas State University (A-State) is providing lab space, equipment (e.g., nets, Anabat acoustic detector), and assistance to this project within the College of Science and Mathematics. The research team's lab has studied Arkansas bats for over 13 years. Most of this research has focused on the endangered species found in Ozark region of Arkansas Including the Buffalo National River. The University maintains a field station in collaboration with the NPS that will be used through the course of this study.

Dr. Thomas Risch is a bat expert with a Ph.D. from Auburn University. He is a Professor of Animal Ecology, Curator of Mammals, and Chair of the Department of Biological Sciences at A-State. Risch's strength is in field ecology with over 13 years of experience studying bats in the Eastern United States. He has served on the Board of Directors of the Southeastern Bat Diversity and is on this group's White-Nose Syndrome committee. He, along with students, has published 19 peer-reviewed papers on bats including papers that focus on the species addressed in this proposal. He will provide expertise, materials and assistance from the field ecology lab at A-State.

Arin Vann a graduate student at Arkansas State University and is going to be the graduate student on the project. She has a bachelor's degree in Wildlife Ecology and Management. She has two years of experience working with bats in the Ozarks.

Chuck Bitting is the Natural Resource Program Manager at the Buffalo National River. He has been working for the park service for 29 years. He is the point person for caves, bats, wilderness, land, GIS, NEPA, and wildlife habitat related things at the Buffalo National River. He has been conducting acoustic bat surveys for four years.