

Influence of fire history, fire type, fire seasonality, and burn severity on bat and avian occupancy of habitats

Project Summary

This project examines the effects of fire severity, seasonality, type, and history on bat and avian use of habitats. We will conduct passive surveys of birds and bats in multiple habitats, burn years, and severities across Arkansas. While this study will take place across the state of Arkansas, we will specifically focus on public land areas previously mapped by the Monitoring Trends in Burn Severity (MTBS) Network that are also priority ecosystems for AGFC. By better understanding the specific habitat needs and preferences of bird and bat species of concern, we will be better able to tailor management objectives to their unique preferences.

Project Leader

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Project Budget

Total amount requested (65%) = \$79,307
Total match provided by TTU (35%) = \$29,708
Total project cost = \$ 109,015

Project Statement

Need

Several species of bats and birds were identified in the 2015 State Wildlife Grant Request for Proposals (SWG-RFP) as funding priorities. These species were identified primarily as a result of the habitats that they occupy, and the SWG-RFP called for evaluation of habitat restoration and management for these species. These habitats often face encroachment by invasive or exotic species, lack of proper management, anthropogenic disturbance (e.g., grazing, tilling, agricultural conversion, urbanization), or other mismanagement. By examining bird and bat species in the context of their habitat and historic fire disturbances, we hope to provide a more complete picture of avian and bat use of a dynamic landscape.

Purpose & Objectives

The purpose of this study is to evaluate bat and bird occupancy of grasslands, upland grasslands, glades, woodlands, savannas, and forests that have experienced recent (>1985) large (>100 acre) fires. We will integrate fire parameters (burn severity, time since burn, seasonality, ignition type) and vegetation and habitat characteristics (habitat type, leaf litter depth, percent cover, woody species density, other known disturbances) to determine avian and bat activity in these areas.

Location

This study will take place across the state of Arkansas, but will specifically focus primarily on priority ecosystems on public land areas previously mapped by the Monitoring Trends in Burn Severity (MTBS) Network. Since 1985, 264 fires have been mapped in Arkansas. The mapped fires are a mix of wildfires and prescribed fires, and span public and private lands.

Approach

MTBS fire mapping data are freely available online through the MTBS.gov portal. Each fire mapped through the MTBS program has coarse resolution (30x30 m) fire severity, perimeters, dates, and type. We will target fires that occurred on public land, and stratify our fires among available years (1985-2008). Within fires, we will stratify our sampling points among severities and habitat types. We will also identify control areas in proximity to chosen burn

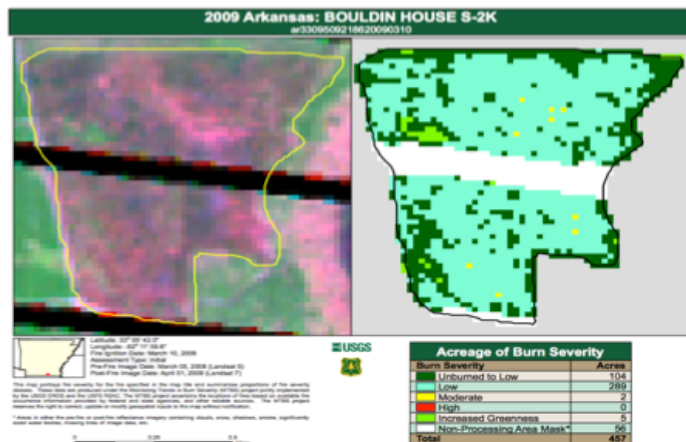


Figure 1: Example MTBS site map from a fire in Arkansas; mtbs.gov

areas in similar habitat types.

We will employ point counts for avian surveys. Once points have been identified, they will be sampled via point counts four times per year for two years by an experienced observer. Point counts will be conducted in both study years during the date ranges of 1-15 January, 1-15 April, 1-15 July, and 1-15 October. Each point will be sampled three times per sampling period on consecutive days, when weather permits, and include a morning, mid-afternoon and evening survey. Morning surveys will begin within 30 minutes of sunrise. Mid-afternoon surveys will evenly span the midpoint of the day between sunrise and sunset, and evening surveys will terminate 30 minutes prior to sunset. The point counts will be 800 m radius general inventory surveys. During a period of 20 minutes, an experienced observer will record all birds heard or seen within the 800 m radius using binoculars and/or a spotting scope. The mode of detection (seen, heard, both) and estimated distance (with a laser rangefinder) will also be recorded. If birds are flying, height using clinometers, rangefinders, and surveyor experience will be recorded. Data on wind and weather variables will be gathered with a Kestrel™ weather meter on-site. Point count surveys will not be conducted in times of inclement weather or extremely high winds that may reduce bird activities. The center of each survey will be recorded on a handheld GPS so that the observer can return to the same location for each survey.

Bat sampling will be restricted to selected recent fires within the Ozark Ecoregion. In conjunction with regional land managers, we will identify three mixed severity fires to target for this portion of the study. SM2Bat+ SongMeters with 3 m cables and a SMX-US weatherproof ultrasonic microphone (Wildlife Acoustics) will be placed at sites within each severity class for each fire and rotated among fires as necessary. SongMeters will be mounted on an adjustable painter's pole with the ultrasonic microphone attached to the end of a paint roller bar, approximately 4 m above the ground and directed horizontally in a random direction. Bat echolocation calls will be recorded in triggered .wav mode on 16 GB SDHC memory cards (PNY Technologies) from sunset to sunrise on each sample dates. Samples will be taken from 1 June – 1 July and 1 January – 1 February of both study years.

Habitat and vegetation analysis will also be conducted at each bird and bat sampling point during the growing season of both study years (15 May – 15 August). Within each habitat type, we will measure vegetation characteristics, including leaf litter depth, dominant species composition, woody species density and abundance, leaf litter depth, percent ground cover by type (e.g., bare ground, leaf litter, herbaceous), percent canopy cover, woody species basal area and height, and other appropriate metrics.

Expected Results & Benefits

This study will directly benefit our understanding of bat and avian ecology, fire ecology, and habitat management in Arkansas. By better understanding the specific habitat needs and preferences of species of concern, we are better able to tailor management objectives to their unique preferences. Knowledge gained about how to target management actions to species of concern or interest will be made readily available to both public and private land managers.

Table 1--Priority species and habitats addressed by this study.

SWG Priorities Addressed	<i>Colinus virginianus</i>	<i>Coccyzus americanus</i>
<i>Ammodramus henslowii</i>	<i>Bartramia longicauda</i>	<i>Colinus virginianus</i>
<i>Tympanuchus cupido</i>	<i>Empidonax trailii</i>	<i>Dendroica discolor</i>
<i>Circus cyaneus</i>	<i>Thryomanes bewickii</i>	<i>Melanerpes erythrocephalus</i>
<i>Empidonax trailii</i>	<i>Aimophila ruficeps</i>	<i>Passerina ciris</i>
<i>Cistothorus platensis</i>	<i>Vermivora pinus</i>	<i>Thryomanes bewickii</i>
<i>Ammodramus savannarum</i>	<i>Lanius ludovicianus migrans</i>	<i>Vermivora pinus</i>
<i>Asio flammeus</i>	<i>Chondestes grammacus</i>	Chiroptera
<i>Tyto alba</i>	<i>Dendroica discolor</i>	Prairies
<i>Vireo bellii</i>	<i>Passerina ciris</i>	Woodlands
<i>Chondestes grammacus</i>	<i>Picoides borealis</i>	Savannas
<i>Calcarius pictus</i>	<i>Aimophila aestivalis</i>	Glades
<i>Ammodramus leconteii</i>	<i>Caprimulgus carolinensis</i>	Barrens
<i>Tryngites subruficollis</i>	<i>Caprimulgus vociferous</i>	

Budget

Item	Year 1		Year 2	
	<i>TTU</i>	<i>SWG</i>	<i>TTU</i>	<i>SWG</i>
Verble-Pearson Salary	\$4,202	\$0	\$4,202	\$0
MS Student Salary	\$0	\$22,222	\$0	\$23,256
Tuition	\$0	\$7,619	\$0	\$8,000
Travel	\$0	\$5,000	\$0	\$5,000
Supplies	\$0	\$1,000	\$0	\$0
Indirect Costs	\$10,665	\$3,584	\$10,639	\$3,626
Totals	\$14,867	\$39,425	\$14,841	\$39,882

We request two years of salary and tuition for one MS student to be housed in the Department of Natural Resources Management at Texas Tech University. The MS student will devote 100% of his research time to this project. He will be primarily responsible for data collection, analysis and reporting. Dr. Verble-Pearson will devote a portion of her research time to supervision of data collection, analysis and reporting and is providing 0.5 months of salary during each year as match.

We request \$1,000 for project supplies such as batteries, memory cards, and field notebooks. We will provide equipment, including rangefinders, GPS, clinometers, SongMeters, and microphones, estimated at a total value of \$15,000. We also request \$5,000 for travel to and from study sites in both years of data collection. Travel money will be used primarily for gasoline and mileage to and from field sites. Finally, we request 10% indirect costs and provide unrecovered indirect costs (39%) as additional match.

Qualifications

Robin Verble-Pearson, Ph.D.

Robin Verble-Pearson is the Director of the Center for Fire Ecology and an Assistant Professor of Fire Ecology at Texas Tech University in Lubbock, Texas. She received her M.S. in Entomology (2008) at the University of Arkansas and a Ph.D. in Applied Biology at the University of Arkansas at Little Rock (2012). She has 6+ years of experience working in Arkansas ecosystems. Her thesis and dissertation work focused on the fire ecology of forest ants in the Ozark Ecoregion of Arkansas. In addition, she has previously worked in collaboration with The Nature Conservancy-Arkansas Field Office to evaluate tree mortality to promote woodpecker use of habitats. She has also participated in several prescribed burns in a variety of Arkansas ecosystems, including tallgrass prairies, oak woodlands and savannas, and pine forests. She is also currently working with the Valles Caldera National Trust in New Mexico to survey bats after a large wildfire and the Quail Tech Alliance in the Texas Panhandle to assess the effects of prescribed burning on grassland birds.

MS Student

Texas Tech's Department of Natural Resources Management has a competitive research-based graduate program of 60+ students. Successful applicants to our program have excellent field techniques, written and oral communication skills, and strong course grades and GRE scores. The MS student that will participate in this project will have a B.S. in Natural Resources Management or a related field, experience with prescribed burning, proficiency in wildlife sampling techniques, and a strong interest in habitat management.