

Status and distribution of quality habitat for grassland birds in northwestern Arkansas: a strategic plan for management

Management of isolated and poor-quality grassland patches has little or no positive conservation value to grassland birds and would be a waste of precious funds. For grassland bird management to be effective, conservation actions must be strategically targeted to enhance and expand the best-quality remnant grassland patches. Here, I propose to implement a stratified-random survey of relatively large grassland patches in the Arkansas River Valley, Boston Mountains, and Ozark Highland physiographic regions to identify the best existing habitat patches supporting grassland birds of special concern. Although all birds will be sampled, I will emphasize the determination of the distribution and status of Willow Flycatchers, Sedge Wrens, Henslow's Sparrows, Grasshopper Sparrows, and Lark Sparrows. These data can be used to model and identify the best grassland habitat remnants remaining in northwestern Arkansas and guide priorities for future management actions.

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Total Project Cost: \$ 83,385

Total Amount of SWG Money Requested: \$ 54,200

Total ASU Match: \$ 29,185 (35% match)

Source of Matching Funds: Salary and fringe benefits = \$14,227
Indirect Costs = \$ 14,959

- A. **Need.** This project addresses the need to strategically locate and plan management actions for native grassland landscapes to stop the declines of grasslands birds in Arkansas. Importantly, for grassland bird management to be effective, conservation actions must be strategically targeted to enhance and expand the best-quality existing remnant habitats. Indeed, costly management efforts in isolated or low-quality grassland patches would constitute a significant waste of precious conservation funds. Substantial research has documented that for grassland bird management to be effective, conservation actions must be implemented either adjacent to or in the largest and best-quality grassland remnants available (e.g., Crooks et al. 2001, Hunter et al. 2001). Currently, there is no information available about the distribution of the highest-quality grassland habitats supporting birds still existing in Arkansas. For this project, I propose to address this substantial information gap that prevents the implementation of prudent and strategic planning of management actions necessary to recover declining grassland birds in Arkansas.

To assess and identify the highest-quality grassland habitats remaining in Arkansas, my students and I systematically survey for five species of greatest conservation concern, Willow Flycatchers (*Empidonax traillii*), Sedge Wrens (*Cistothorus platensis*), Lark Sparrows (*Chondestes grammacus*), Grasshopper Sparrows (*Ammodramus savannarum*), and Henslow's Sparrows (*Ammodramus henslowii*). In the process, we would monitor for all species and provide data on the distribution and abundance of several other grassland and early-successional bird species. Further, we will model habitat relationships of the five featured species of concern and these results should enable us to predict which other associated species of birds would likely benefit by management. The random site-selection design of this proposed project will involve contacting over one hundred landowners and allow us to publicize and promote the work that we are implementing on behalf of birds of conservation concern and the Arkansas Wildlife Action Plan. In addition, the Avian Ecology Laboratory of Arkansas State University (ASU), which will implement this work, if funded, is closely linked with the state chapter of the Audubon Society. Both local and state chapters of the Audubon Society have regularly requested presentations and updates on the ornithological work done at ASU. Thus, the progress of this proposed work will be closely monitored by this key and politically-active stakeholder segment of the public, people interested in bird watching and wildlife observation. Finally, our modeling of habitat and landscape characteristics associated with the presence of these five species of concern should result in specific habitat recommendations that can lead to on-the-ground conservation.

- B. **Location.** This survey project will be conducted in the Ozark Mountains, Boston Mountains, and Arkansas River Valley ecoregions within Arkansas (Fig. 1). These ecoregions were selected based on collective historical reports (e.g., James and Neal 1986) of primary distribution of the five grassland birds of concern included as priority species in this study. By focusing our efforts in these three ecoregions, we feel that we can quantitatively assess the distribution and status of these species in the survey area. We considered a statewide survey; however, we decided we could not do an adequate job of assessing the status of these species over the larger state area given the funding and resources available.
- C. **Objectives.** We propose to (1) identify the highest-quality grassland bird habitats remaining in northwestern Arkansas that will provide priority target areas in which to implement grassland management and restoration projects, (2) document the distribution and occurrence of five grassland birds of high conservation concern, (2) assess their status, and (3) provide data on their habitat relationships in northwestern Arkansas. Status based on the presence and abundance of probable pairs can be assessed by random sampling within the three ecoregions and then extrapolating the number of pairs (or singing males) found in the acreage surveyed to the total area of grassland habitat estimated within each of these regions. By collecting data on microhabitat within sample sites and surrounding landscape data, we can also model habitat relationships of all five study species if we are able to record an adequate number detections (>20 detections or separate locations for each species).

- D. **Approach.** We propose a 2-year project in which observers would conduct line transect surveys over many of the grassland habitats in northwestern Arkansas to better understand distribution of remaining grassland bird habitats in this region. We will employ a stratified-random sample design and use available GIS data bases to identify potential warm- and cool-season grassland areas. We will focus sampling in the Ozark Mountains, Boston Mountains and Arkansas Valley ecoregions of northwestern Arkansas. Thirty grassland sites will be surveyed in each ecoregion and we will attempt to select equal numbers of cool-season and warm-season grasslands in each region (though we may be limited by the number of warm-season grasslands). We will record observations of all birds in surveyed grasslands. However, we intend to focus on the five following birds of concern: Willow Flycatchers, Sedge Wrens, Lark Sparrows, Grasshopper Sparrows, and Henslow's Sparrows. We chose these five birds because although they are mostly grassland or open-habitat birds of conservation concern, and they each have slightly different habitat preferences ranging from obligate use of grasslands to successional woody vegetation.

Willow Flycatchers are known recently to breed in six locations in northwestern Arkansas (Arkansas Audubon Society). Their habitat in Arkansas is characterized by small clumps of trees surrounded by native tall grass prairie (James and Neal 1986). In recent years, there have only been a few reports of singing Sedge Wrens during July and August in extreme northwestern Arkansas, including a possible observation of a fledgling (Arkansas Audubon Society). Sedge Wrens in Arkansas utilize wet grasslands and dense clumps of grasses, often with a sedge component (James and Neal 1986). Lark Sparrows are local summer residents throughout most of Arkansas, though they are very uncommon in the eastern third of the state. These sparrows occur in grasslands with a shrub component, and often are found in areas where sand or rock is exposed (James and Neal 1986). Grasshopper Sparrows are local summer residents in all regions of Arkansas. Most breeding by Grasshopper Sparrows in Arkansas has been reported in cultivated grasslands such as short-grass hayfields (James and Neal 1986). Henslow's Sparrows were not known to breed in Arkansas prior to 1998. Since 1998, breeding Henslow's Sparrows have been documented in at least four locations in northwestern Arkansas. Henslow's Sparrows generally establish breeding territories in grass patches with substantial standing dead vegetation, sparse woody stems and taller live grasses (Zimmerman 1988).

Study site selection. Our surveys will be conducted in the Ozark Mountains, Boston Mountains and Arkansas Valley ecoregions of northwestern Arkansas. Existing GIS land cover maps (Center for Advanced Spatial Technologies) will be used to select areas which contain cool- and warm-season grasses. Ground-truthing prior to the breeding season will then help us to determine which areas to focus survey efforts on during the breeding season. We will restrict surveys to sites which contain at least 100 contiguous ha of grassland, as this is the approximate lower limit for the size of patches used by Henslow's Sparrows (Herkert 1994), and a similar patch size limit has also been reported for Grasshopper Sparrows (Vickery et al. 1994). We will use a stratified random site design to select 30 grassland sites in each of the three physiographic ecoregions, divided equally among warm- and cool-season grass sites, if possible. In addition to these randomly-chosen sites, we will investigate sites known to contain our birds of special interest (including all the sites currently known to contain breeding Willow Flycatchers, Sedge Wrens and Henslow's Sparrows, and a subset of sites known to contain Lark and Grasshopper sparrows). We will sample each grassland site twice, once during the early breeding period (1 May–15 June) and once during the late breeding period (15 June–31 July). This will decrease the chance that we miss any early nesting species (such as Lark and Grasshopper sparrows) or late nesting species (such as Sedge Wrens). This project will also allow give us an opportunity to collect data on a number of other species of concern that breed in or near grasslands such as Bachman's Sparrows (*Aimophila aestivalis*), Dickcissels (*Spiza Americana*), Loggerhead Shrikes (*Lanius ludovicianus*), Prairie Warblers (*Dendroica discolor*), Painted Buntings (*Passerina ciris*), and Northern Bobwhites (*Colinus virginianus*).

An experienced observer will conduct line transect surveys (Burnham et al. 1980) from about sunrise to mid-morning, walking 2000 m of line transects while listening and recording observations of and

distances to birds. Surveys will be conducted during the peak of singing activity from 1 May through 31 July. In order to identify important habitat features for these and other species, vegetation data will be collected in areas where the five species of concern are found as well as in a random subset of habitats where the five species of concern are not detected.

Vegetation will be quantified by using a Robel (1970) pole to measure height-density of grasses and a Daubenmire (1959) quadrat to measure canopy cover and density of vegetation. Additionally, landscape-level data such as distance to roads and forests will be recorded. GIS analyses will be conducted to calculate types of land cover that surround our grassland patches. Program DISTANCE will be used to calculate densities of birds at study sites (Buckland et al. 2001). Analyses of bird densities and species richness in relation to vegetation differences between sites will also be performed. Data will be used to model the habitat relationships of all five species if adequate numbers of detections are recorded.

All sampling would be scheduled over the spring and summers of 2013 and 2014. Thus, we would request an extension to complete the field work in 2014 and the final report.

- E. **Expected Results and Benefits.** Currently, grassland management in Arkansas is being implemented in a haphazard fashion with no strategic plan for achieving tangible results. This lack of comprehensive planning for grassland management is particularly problematic, as there is strong evidence that management applied in isolated or lower-quality grassland patches could likely create habitat “sinks” and, in fact, adversely impact grassland species of conservation concern (Crooks et al. 2001). This proposed project will identify the largest and highest-quality grassland habitat patches remaining in the Ozark Mountains, Boston Mountains, and Arkansas River Valley ecoregions within Arkansas. This information can then be used to develop a strategic plan on how to prioritize limited management funds to locations where management will likely to have the most cost-effective and greatest positive impact on grassland birds and other wildlife of greatest conservation need.

This project will also yield information on the current status of 5 species of grassland birds of greatest conservation need in the state. Further, we should be able to model the habitat relationships and these models may be used to assess the habitat potential for grassland bird habitats for which no bird data are available. Therefore, these models can be used to assess the management potential of grassland sites within the study area and adjacent regions as far as their capacity to support early-successional species of conservation concern. Such modeling assessments may be incorporated into strategic planning and can further assist managers in prioritizing the expenditure of management funds to sites that are likely to have greatest positive population impacts on birds.

F. **Budget: 24 months (1 January 2013 to 31 December 2014)***

Salary and benefits	\$ 40,583	
Travel	20,580	
Supplies	<u>2,336</u>	
Total operating expenses	\$ 63,499	
Indirect costs	<u>19,886</u>	
Total Costs	\$ 83,385	
Amount requested from SWG		\$ 54,200
In-kind match from ASU	35%	<u>29,185</u>
Total project cost		\$ 83,385

*A 2-month project extension would be required to allow us to implement this proposed project in the spring and summer of 2013 and 2014, and to prepare a final report at the end of 2014.

Qualifications:

James Bednarz, Ph.D., Professor of Wildlife Ecology, will manage the overall project, recruit a M.S. graduate student to coordinate the field and analysis work on the project, and participate in the execution of the project from beginning to end. Jim will work closely with the M.S. student in developing final field data collection protocols, collecting the field data, participating in the analysis and interpretation of the data and contributing to the writing of report. Jim Bednarz has conducted research on six continents for over two decades emphasizing avian population ecology and conservation. Most of this work has been focused on birds of prey, woodpeckers, game birds, and songbirds, with significant emphasis on rare species. Topics of research have included effects of habitat and landscape fragmentation and other human activities on migratory bird population demography, impacts of hydroelectric development on wetland areas and wildlife, radiotelemetry and habitat use studies on a variety of wildlife species, development of endangered species conservation plans, completion of site suitability analyses (e.g., Mexican wolf), design of mitigation plans for habitat and wildlife populations, and basic questions about avian ecology. Jim has published 54 journal articles or monographs, provided 8 contributions to books, 10 papers to conference proceedings, 4 published book reviews, and completed 71 funded project reports.

Selected Publications

- 2011. Arthropod communities associated with habitats occupied by Swainson's Warbler, a ground-foraging insectivorous songbird. *Condor* 113:890-898. (with J.D. Brown and T.J. Benson)
- 2010. Relationships among survival, body condition, and habitat for breeding Swainson's Warblers. *Condor* 112:138-148. (with T.J. Benson)
- 2010. Habitat and landscape effects on brood parasitism, nest survival, and fledgling production in Swainson's Warblers. *Journal of Wildlife Management*. 74:73-85. (with T.J. Benson, N.M. Anich, and J.D. Brown)
- 2009. Estimating territory and home-range sizes: do singing locations alone provide an accurate estimate of space use? *Auk* 126:626-634. (with N.M. Anich and T.J. Benson)
- 2007. Landscape use by Hairy Woodpeckers in managed forests of northwestern Washington. *Journal of Wildlife Management* 71:2612-2623. (with D. Ripper and D.E. Varland)
- 2005. Distribution and habitat use of Swainson's Warblers in eastern and northern Arkansas. Pages 576-588 in C.J. Ralph and T.D. Rich (Eds.), *Proceedings of the Third International Partners in Flight Conference*, Asilomar, CA. USDA Forest Service Gen. Tech. Tech PSW-GTR-191. (with P. Stiller-Krehel, and B. Cannon)
- 2005. Use of group-selection and seed-tree cuts by three early-successional migratory species in Arkansas. *Wilson Bulletin* 117:353-363. (with L.E. Alterman and R.E. Thill)

M.S. Student. Student will be recruited if funds are awarded. Student will be a competent ornithologist and analytical biologist with a B.S. degree in Wildlife Management, Biology, or Ecology with experience and interest in avian sampling, analytical techniques, and conservation science.

Appendix: Literature Cited

- Arkansas Wildlife Action Plan. (<http://www.wildlifearkansas.com/>) Designing a future for Arkansas Wildlife. Accessed 2/3/2012.
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- Burnham, K. P., D. R. Anderson and J. L. Laake. 1980. Estimation of density from line transect sampling of biological populations. *Wildlife Monographs* 72, 202 pp.
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- Robel, R. J., J. N. Briggs, A.D. Dayton, and L.C. Hulbert. 1970. Relationships between visual obstruction measurements and weight of grassland vegetation. *Journal of Range Management* 23:295-297.
- Vickery, P. D., M. L. Hunter Jr., and S. M. Melvin. 1994. Effect of habitat area on the distribution of grassland birds in Maine. *Conservation Biology* 8:1087–1097.
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- Zimmerman, J. L. 1988. Breeding season habitat selection by the Henslow's Sparrow (*Ammodramus henslowii*) in Kansas. *Wilson Bulletin* 100:17-24.



Figure 1. The Ozark Mountains, Boston Mountains, and Arkansas River Valley ecoregions within Arkansas. Suitable grassland habitats will be randomly-selected and sampled for grassland bird species of greatest conservation concern throughout all three of these ecoregions to identify the best and largest grassland remnants remaining in northwestern Arkansas.