

**A. Title of Project:**

**Restoration and expansion of a remnant of a Faulkner County prairie**

**B. Project Summary:**

We propose to increase the size of a unique good-quality prairie remnant in Faulkner County by restoring an adjacent degraded prairie and oak woodland. The restoration will improve habitat for native grassland birds related edge bird species, and increase good quality grassland habitat from 4 to 15 acres. In addition to the actual restoration, we will monitor the responses of birds, suppressed native grassland plants, and exotic woody invaders to our restoration approaches. The project will involve citizen-scientists and educate the public about the historic role of fire and its importance for Arkansas wildlife and habitats.

**C. Project Leader and Job Title:**

Katherine Larson, Ph.D., Associate Professor of Biology

**D. Affiliation:**

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**H. Project Partners:**

M. Victoria McDonald, Ph. D., Associate Professor of Biology, Department of Biology, University of Central Arkansas, [mcdonaldv@uca.edu](mailto:mcdonaldv@uca.edu), 501-450-5924

Faulkner County Forestry Commission, Greenbrier, AR, 501-679-2806

**I. Total Amount of Project Cost:**

\$42,250

**J. Total Amount of SWG Money Requested:**

\$19,250

**K. Amount and Source of Matching Funds:**

Larry Lawrence, Director of the UCA Physical Plant will fund \$5,000 for each year of the project (\$10,000 total) to remove woody vegetation. He will also supply necessary capital equipment. In addition, Larson and McDonald make an in-kind contribution of their summer salary and fringe (\$13,000). Larson will oversee the restoration work and monitor exotic species restoration plots and MacDonald will oversee and conduct bird surveys.

### **A. Which of the funding priorities does your preproposal address?**

This proposal addresses two funding priorities. First, we propose to increase the size of a four acre good-quality tallgrass prairie and adjacent woodlands in the Arkansas River Valley (#7). Second, by restoring a degraded prairie, improving a good quality prairie, and opening the woodland to colonization by native grasses, we propose to improve the habitat for grassland birds (#2). Using prescribed burning, our restoration project will increase the acreage of native grasses from the current 4 acres to 15 acres of mixed open woodland and prairie. Several additional attributes strengthen the proposal. The prairies and woodland make up the Jewel Moore Nature Reserve on the University of Central Arkansas campus; we believe we are in a unique position to involve academic scientists and citizen scientists in not only an on-the-ground restoration, but in quality restoration science that can serve as a demonstration for further restorations. In addition, by being located on the campus of a public university, we have the forum for making our work as well as the goals of the Arkansas Wildlife Action Plan known to campus visitors and the community at large. UCA has already funded a system of perimeter trails, educational signs, and events at Jewel Moore Nature Reserve to inform campus visitors and the community about the ecology and conservation of Arkansas prairies and woodlands.

### **B. In what ecoregion, ecobasin, terrestrial habitat or area will your project be conducted?**

The prairie and woodland lie at the eastern end of the Arkansas River Valley. According to a 2007 site report by Theo Whitsell, Arkansas Natural Heritage Commission Botanist, the prairie and woodland represent the only remnants of the 2,500 acre prairie that once occupied land now overlain by the city of Conway (Fig. 1). Whitsell based his analysis on an 1819 land survey that included this area, and also on journal notes of the early explorer and naturalist Thomas Nuttall. The natural extensive prairies described by these early surveys include both the good quality remnant and the degraded prairie we propose to restore. Restoration of the degraded prairie will increase the acreage to a size sufficient to sustain and enhance native plants and wildlife, and will secure this unique prairie footprint within the Arkansas River Valley before it is degraded to the extent that restoration is unfeasible.

### **C. What are the methods (briefly) by which you propose to carry out your work?**

Objective 1: Expand the area of good quality tall-grass prairie. The 4 acre “good-quality” prairie contains many conservative species, but has been invaded by islands of woody vegetation and sweetgums. We intend to increase the area of this “good-quality” prairie by cutting woody vegetation and treating stumps with herbicide. An additional 4 acres of degraded prairie (see Fig 1) that has been mowed rather than burned over the past 20 years will be restored. We propose to cut woody species from this degraded prairie area (eastern red cedar and sweetgum), herbicide the stumps, and restore fire to both prairies (currently only the good-quality prairie is burned). Student volunteers will conduct most of this work. Citizen scientists will participate in an experiment to determine if inter-seeding conservative species into experimental plots within the degraded prairie will result in more rapid recovery than control plots that are only burned. Seeds will be collected from the “good quality” prairie.

Objective 2: Connect the two prairie areas and increase grassland by restoring the oak woodland that separates them. The understory of the oak woodland has been colonized by Chinese privet and Japanese Honeysuckle, two exotics that are major problems in Arkansas. Vines in general, and Japanese Honeysuckle in particular, are responding positively to global climate change and increased levels of CO<sub>2</sub>; we can expect problems with this species to be even greater in the future. Less is known about privet, but its high seedling recruitment and lack of natural enemies is fueling an exponential increase throughout the southeastern US. These two species contribute to creating a sharp boundary between the prairies and the woodland. The overstory oaks include a relatively small number of very large open grown individuals with wide spreading branches and diameters of up to 1m that are evidence of the more open habitat this area once was. However, in addition to the Japanese Honeysuckle and privet, at present there are many younger oaks and sweetgums that have grown under more crowded conditions. Our restoration goal is to eliminate the sharp boundary between the woodland and prairie by cutting and removing privet and Japanese Honeysuckle as well as some of the younger overstory trees. Privet and

honeysuckle plants will be cut, pulled, and/or sprayed with herbicide during the winter, depending on size. Overcrowded trees (25 year old oaks and sweetgums) will be killed (girdle and herbicide) or cut and removed. We are asking for funding for professional help with removal of these larger woody shrubs and trees. Prescribed burns will be started (conducted by the Faulkner County Forestry Commission). As with the prairie restoration, we will compare plots with seed additions versus plots with only fire.

Because of the importance of Japanese Honeysuckle and the various privet species as invaders of woodlands in Arkansas, we will establish monitoring plots to determine the pathway and intensity of recolonization for each of these species. The long-term maintenance of any woodland restoration in Arkansas will depend on knowing whether exotic species invade from vegetative parts (e.g. root sprouting), on-site seed banks, or seeds carried in by birds. We expect privet to have strong recruitment from the seed bank for several years, but the literature is unclear about the likelihood of vegetative regeneration from root material left behind when plants are pulled. Japanese Honeysuckle is sometimes reported to invade by seed, but we have seen little evidence of this in Arkansas. Long-term monitoring plots will allow us to quantify the relative number of seedling recruits versus vegetative recruits. Seed traps and surveys will allow us to quantify off-site seed introductions. Our goal is to understand how these two important species respond to common restoration techniques; our findings will serve as demonstrations for long-term maintenance other restoration projects within Arkansas (UCA Biology Department will support this long-term study after it is established with this proposed project).

Objective 3. Provide grassland bird habitat by converting current degraded prairie to tall-grass and restored oak-shrub-woodland edge habitat; specifically manage for Prairie Warbler, Dickcissel, and Henslow's Sparrows, and other birds of conservation concern. The current 4 acre remnant true grassland portion of the Jewel Moore Nature reserve is too small to support grassland bird populations. The surrounding degraded prairie (4 acre) has been invaded to the extent that grassland birds will not use the site. If the degraded prairie is restored and if the 8 acres of oak woodlands are converted back to oak-savanna, then the site would attract and sustain additional bird species, including several of regional (species in bold below are listed as Species of Greatest Conservation Need in the Arkansas River Valley) and continental conservation concern. According to the Partners in Flight Landbird Conservation Plan, loss of habitat and degradation due to woody invasives are two of the major problems. One of us (McDonald) has bird survey data, collected at irregular intervals, going back to spring 1991; never have resident birds from the following list been known to breed on the site, but their occurrence during migration and their nesting in areas within a 30 km radius imply that, if appropriate native grassland habitat were available, they would occupy the site. Of note, three grassland species of "Continental Importance" in the Prairie and Eastern Avifaunal Biomes (Faulkner County habitat functionally spans both biome types) are likely to establish breeding bird populations on the Jewel Moore Nature Reserve if the habitat is restored and enlarged as proposed: **Prairie Warbler**, **Dickcissel**, and **Henslow's Sparrow**. Other species, also listed of "Continental Importance" that will continue to occupy or may newly occupy the restored site, depending on the ratio, size, and configuration of surrounding wood and wood-shrub habitat to the pure grassland habitat are as follows: **Eastern Towhee**, Brown Thrasher, **Chuck-will's widow**, Wood Thrush, **Red-headed Woodpecker**, **Bell's Vireo**, White-eyed Vireo, Carolina Wren, Red-shouldered Hawk, Swainson's Hawk, Red-bellied Woodpecker, and Indigo Bunting.

#### **D. What measurable products or outcomes will result from your project?**

1. Our project will increase the quality and size of prairie and woodland habitats that represent the last remnant of a 2,500 acre prairie that once occupied the Conway area. We will increase the acreage of native grasslands by restoring a degraded prairie, improving a good-quality prairie, and opening an oak woodland, thus allowing a grassland cover to connect the two prairies.

2. Document the responses of two of the most difficult woodland exotic invaders in Arkansas, privet and Japanese Honeysuckle to our restoration. Specifically we will document the relative importance of seed invasion versus vegetative regrowth from small unnoticed remnants.

3. We expect that, given appropriate habitat, bird species (**SGCN**—listed above in bold) may become established. Abundant hands-on monitoring and other research opportunities for students and

community citizen-scientists will exist during the transition from degraded to restored prairie and oak woodland due to the anticipated change in bird species composition. Furthermore, because birds can and do quickly occupy appropriate habitat when it becomes available, the phenomenon of new bird species responding to our manipulations will send a positive message to students (high school and college) as well as to the community, that restoration ecology is a science that works and produces desired results that can be observed and appreciated within several years.

4. We will increase public awareness of the importance of fire and open habitats in Arkansas and involve citizen-scientists in all stages of the restoration. As a university with the education of our students and public outreach as goals, we are in a unique position to involve citizen-scientists in this project. We will work with students enrolled in our courses as well as volunteer student groups such as the Biology Club and the Environmental Alliance. In addition, UCA is already actively involved in providing guided public ecology tours at the Jewel Moore Nature Reserve, and the activities proposed here would be highlighted.

**E. To what extent will your proposed project be able to take advantage of existing resources (e.g., funding, teams, conservation areas, partnerships)?**

The proposed project will take advantage of the 20 year investment by the UCA Biology Department in maintaining the 4 acre good quality prairie, as well as the more recent investment (\$80,000) by the University of Central Arkansas to remove some woody vegetation and add a perimeter system of nature trails with signs that inform the public about the prairie and its restoration. Our proposal requires a major labor investment to remove woody vegetation; we have the volunteer base already established to assist and work with the professional labor we are requesting here (i.e., hauling away privet and other woody vegetation that is cut by professionals).

**F. How do you foresee handling longterm maintenance for your project?**

The University of Central Arkansas and the Biology Department have been involved in long-term maintenance of the 4 acre good quality reserve, and will continue that role for the restored 8 acre prairie and the 8 acre woodland. Funding and support from the UCA Physical Plant and the Biology Department will be available for long term maintenance.

**What is the proposed total budget of your project?**

<b>Item</b>	<b>State Wildlife Grant</b>	<b>UCA in-kind Match</b>
<u>Salaries and Benefits</u>		
Larson Summer (2009-10-1mo)		5,000
MacDonald Summer (2009-10-1mo)		5,000
Fringe @ 30%		3,000
Graduate Student	3,000	
<u>Operating Expenses</u>		
Woody vegetation removal	12,000	10,000 (UCA Physical Plant)
Herbicides	500	
Prescribed Burns	2,000	
<u>Capital Expenses</u>		
<b>Direct Cost Total</b>	17,500	
<b>UCA Overhead @ 10%</b>	1,750	
<b>Total by Institution</b>	<b>\$19,250</b>	<b>\$23,000</b>

**Total Project Budget: \$42,250**

## Qualifications of Individuals and Organizations:

**Katherine Larson** is conducting research on Japanese Honeysuckle and its native congener, Coral Honeysuckle, and is knowledgeable about what make Japanese Honeysuckle grow so fast—she is now ready to learn how to halt its encroachment in Arkansas woodlands. She and her students have been conducting prescribed burns and monitored responses of woody invaders to different herbicide treatments on the 4 acre Jewell Moore Nature Reserve prairie since 2000. She teaches General Ecology, Advanced Ecology, and Principles of Biology.

### Selected Publications:

- Fowler, S., and K. C. Larson. (2004) Seedling establishment of *Lonicera japonica* in natural areas. *Natural Areas Journal* 24:49-53.
- Larson, K. C., Fowler, S., and J. Walker. 2002. Lack of pollination of the alien *Lonicera japonica* limits seed set in Arkansas. *American Midland Naturalist* 148:54-60.
- Larson, K. 2000. A comparison of the circumnutation behavior of orthotropic and plagiotropic shoots of an introduced vine and its native congener. *American Journal of Botany* 87:533-538.
- Schweitzer, J. and K. Larson. 1999. Resource allocation of congeneric species of *Lonicera* in two growth habitats: implications for plasticity and invasibility. *J. Torrey Bot. Soc.* 126:15-23.

### Selected Grants:

2004. Impact of fire and pollination on growth and invasiveness of Japanese Honeysuckle. University Research Council, \$3250.00
2001. Contrasting mobility and invasiveness in an exotic woody vine and its native congeners. USDA, \$74,500.

### Selected Presentations:

- Impact of fire on the colonization of supports in a native and exotic honeysuckle vine. Ecological Society Annual Meeting, San Jose, CA August 2007
- The movement of vines and their invasive nature. Ecological Society Annual Meeting, Portland, OR, August 2004

**M. Victoria McDonald** conducts research on bird behavior, bird monitoring techniques, and the conservation of migrant birds. She has applied experience in a wide range of bird censusing research as well as 19 years experience teaching field personnel bird census methodologies. Recently she has been conducting summer and winter bird censusing and habitat evaluation as a contracted professional for several Army National Guard bases in Missouri.

 an associate professor at the University of Central Arkansas

### Selected Publications:

- McDonald, V., J. A. Jackson, and W. E. Davis, Jr. 2007. The role of bird banding in behavioral research. *In* J. A. Jackson, W. E. Davis, Jr., and J. Tautin, eds., *Celebrating of One Hundred Years of Bird Banding in North America*. Nuttall Ornithological Club, Cambridge.
- McShea, W. J., M. V. McDonald, E. S. Morton, R. Meier, and J. H. Rappole. 1995. Long-term trends in habitat selection by Kentucky Warblers. *Auk* 112:375-381.
- Mabey, S. E., and M. V. McDonald. 1995. Kentucky Warbler. *In*: *Virginia Breeding Bird Atlas Species Accounts*.

### Selected Presentations:

- Kentucky Warbler habitat in Arkansas and Virginia compared. Southeast Partners in Flight Annual Meeting, 16-19 Feb 2005, McAllen, Texas.
- Warbler habitat degradation accelerated by invasive plants. IV North American Ornithological Conference, 03-07 Oct 2006, Vera Cruz, Mexico.

**Faulkner County Forestry Commission** conducts prescribed burns and other forestry management within Faulkner County. Scott Youngblood, district forester, has examined the oak woodland at Jewell Moore Nature Reserve and has agreed to lead the prescribed burns.

Figure 1. Map of the Jewel Moore Nature Reserve on the SW corner of the University of Central Arkansas campus. The historical extent of the original prairie at Conway extended to the north and east and was 2,500 acres occupying most of the area where Conway now sits. Only 4 acres along the western edge of the degraded, but restorable prairie is proposed to be restored in this proposal. This map was prepared by Theo Witsell, Arkansas Natural Heritage Commission, 2 Feb 2007.

