

Implementing State Wildlife Action Plan Prairie Restoration Strategies in the Ozark Highland Ecoregion to Benefit Avian and mammal Species of Concern.

Project summary: The Ozark Highland Ecoregion historically possessed one of the most diverse segments of native tall grass prairie habitat in Arkansas. Due to its agricultural productivity this prairie habitat was converted to crop and pasture land, which diminished botanical biodiversity beyond the ecosystems ability to recover native prairie species. Project partners propose to restore 400 acres of Ozark Highland Ecoregion tall grass prairie and thereby promote recovery of imperiled grassland birds and mammals listed as species of Concern in the AWAP.

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Total amount of project cost: \$500,000

Total amount of SWG money requested: \$200,000

Amount and source of matching funds or in-kind: Project partners described above will contribute \$275,000 in matching funds and \$25,000 of in-kind services, for a total match of \$300,000.

1.0 Proposal Abstract: Project partners plan to restore 200 acres of native tall grass prairie habitat in Richland Valley, (which contains 2,800 acres recently purchased by AGFC) and 200 acres at a site know as Lane Bend, which borders Buffalo National River, for a total restoration effort involving 400 acres. Both restoration sites are located within the Ozark Highlands Ecoregion. The Arkansas Wildlife Action Plan lists the Ozark Highlands as the ecoregion containing the largest number of species of greatest conservation need. The AWAP describes the Ozark Highland Ecoregion as an area comprised of “open oak savanna and woodlands on acidic uplands, with significant tallgrass prairie inclusions.” Historically this ecoregion possessed some of the most biologically diverse grass and forb prairie species in the state, prior to European settlement. The intentional exclusion of fire and conversion to row crop agriculture decimated Ozark Highland tallgrass prairies, virtually eliminating prairie habitat (and a myriad of grassland dependent birds and mammals) by the mid 1800’s. Today, prairie habitat is found in degraded, relict patches characterized by the graminoids *Schizachyrium scoparium* (little bluestem), *Andropogon gerardii* (big bluestem), *Sorghastrum nutans* (Indian grass) and forbs including *Echinacea* spp. (coneflowers), *Silphium* spp. (rosinweeds), *Helianthus* spp. (sunflowers), and *Symphotrichum* spp. (asters). These patches are typically small and harbor a much reduced vascular plant diversity compared to the intact prairie habitat that existed prior to European settlement (Chester et. al. 1997). This restoration project will create 400 acres of native tall grass prairie habitat in two relict habitats by eliminating exotic species and planting 39 native grass and forb species characteristic of Ozark Highland prairies. All plant material used in this restoration project will originate from native progeny collected from the Ozark Highland Ecoregion and nearby counties.

2.0 Funding Priority Addressed By this Proposal: 1. Restore prairies and native grasslands, for grassland bird habitat 2. Restore native warm season grasses and forbs for the protection of the Plains Harvest Mouse, 3. Restore fire to fire-suppressed habitats to benefit Species of Greatest Conservation Need.

This prairie restoration project distinctively complies with the Arkansas Wildlife Action Plan, which lists habitat restoration/improvement as the highest needed conservation action for the Ozark Highland Ecoregion. The AWAC identifies prairie restoration as a conservation action that would benefit 18 imperiled bird species and 8 small mammals listed within the AWAP as species of greatest conservation need in the Ozark Highlands Ecoregion. Imperiled bird species that would benefit include: Bachman’s sparrow, Henslow’s sparrow, loggerhead shrike, northern harrier, willow flycatcher, Bewick’s wren, sedge wren, barn owl, Bell’s vireo, grasshopper sparrow, short-eared owl, LeConte’s sparrow, lark sparrow, smith’s longspur, buff-breasted sandpiper, painted bunting, northern bobwhite and upland sandpiper. Imperiled mammals that would benefit from this prairie restoration include: eastern small footed bat, Ozark pocket gopher, desert shrew, plains harvest mouse, long tailed weasel, southeastern shrew, black tailed jackrabbit, eastern spotted skunk and American badger.

3.0 Ecoregion where Project Will Be Conducted: The proposed native prairie restoration project will be conducted in the Ozark Highlands Ecoregion, specifically within the newly acquired AGFC property in Richland Valley and the Lane Bend property within BNR.

4.0 Restoration Methods: Active restoration is needed to restore Ozark Highland prairie, but management actions must be thoughtfully implemented to achieve the ecological goals of species diversity, community functionality, historic authenticity, and rare plant conservation while minimizing costs and unintended impacts. In previous restorations, Ozark Ecological Restoration Co. and Buffalo National River have worked with Sharp Brothers Seed Company to collect and

plant prairie grasses and forbs on over 70 acres. The experience of the partners, in conjunction with information gathered from previous plantings, will help ensure successful restoration efforts.

The most diverse individual prairie remnants typically contain between 120 and 180 species of grass and forb (Chester et al. 1997). While this level of diversity is impossible to attain in the early stages of a restoration, it is important to include as many species as possible in the initial planting and to follow with enrichment plantings as the site matures. Thirty-nine prairie species will be planted the first growing seasons as seed, with additional species planted the second year as plugs. Appendix A identifies the species that will be planted.

Site diversity can be jeopardized even if a multitude of species are included in the initial restoration planting. The largest management concern about previous prairie restorations in the Ozarks is the dominance of a few grass species at the exclusion of forb species. Common prairie grasses like *Sorghastrum nutans* (Indian grass), *Andropogon gerardii* (Big bluestem), *Panicum virgatum* (Switchgrass), and *Schizachyrium scoparium* (Little bluestem) can easily monopolize a site if planted at high rates. For this prairie restoration project we plan to plant grass species at the rate of 3 lb/ac to reduce potential for grass dominance. Because of the inherent difficulty in establishing some species by seed, plugs will be planted to restore rare and difficult to establish species. In the greenhouse conditions can be rigidly controlled throughout the growing process, thereby maximizing the number of mature plants resulting from a given seed lot. Though cost per plant is higher with plugs it can be justified by increased establishment success (compared to seeding).

Invasive exotic species found in the Richland Valley and Lane Bend restoration sites include *Lespedeza cuneata* (Chinese lespedeza), *Sorghum halepense* (Johnson grass), *Festuca arundinacea* (Tall fescue), *Setaria* spp. (Foxtail), *Melilotus* spp. (Sweet clovers). Consequently, weed control and site preparation for this project are critical. The schedule for site preparation begins with site clearing in autumn and establishment of a winter cover crop. The following spring the cover crop is killed with a herbicide application. Next, a pre-emergent herbicide is applied followed by post-emergent herbicide treatments as needed. This intensive site preparation helps assure a weed free site, maintained with a minimum of spot spraying.

Seed purchased for this restoration project will ultimately originate from multiple wild populations of grasses and forbs collected in the Ozark Highlands Ecoregion. These criteria will help ensure seed are both genetically diverse and adapted to local conditions. The resulting intra-specific genetic diversity derived from local genotypes will increase resilience to environmental variability, reduce inbreeding depression, and provide a basis for future adaptations (Falk et. al 2001). Utilization of locally adapted populations of a particular species can enhance the functionality (e.g. survival and reproduction) of a restored community. Local ecotypes of the same species are physiologically adapted to the wetter summers and milder winters of the Ozark Highlands, unlike the upper Midwestern ecotypes of wide ranging species (*Andropogon gerardii* and *Schizachyrium scoparium*) that are widely available in the marketplace. Seed for the restoration will be purchased on a pure live seed (PLS) basis only. The seed supplier will be required to document the accuracy of the PLS estimate by citing that a reputable, objective testing facility has performed the viability and purity analysis. Appendix B lists the herbicides used to control exotic invasive plants, planting times and methods.

5.0 Measurable products and outcomes: This restoration project will create 400 acres of native tall grass prairie habitat in two relict habitats (Richland Valley 200 acres and Lane Bend 200 acres) by eliminating exotic species and planting 39 native grass and forb species characteristic of Ozark Highland prairies. This prairie restoration will benefit the recovery of 18

bird species and 8 mammals identified as imperiled species and listed in the AWAC as species of greatest conservation need. Once restored these prairie habitats will be utilized to educate local landowners about how to restore and manage native prairies on private lands.

6.0 Utilization of Existing Resources: The Searcy County Quail Unlimited Chapter has made a commitment to provide volunteer labor to assist with removal of old pasture fences at the Lane Bend site and will help with exotic plant control, planting seed and plugs of forb species. Quail Unlimited will also provide a tractor for the project that will be used to pull a drill to plant native grass seed. The Rocky Mountain Elk Foundation (RMEF) has made a cash pledge of \$65,000 for the project. Additionally, RMEF volunteers from across the state will assist with collection of native seed from remnant prairie sites within the Ozark Highland Ecoregion and hand plant prairie species that are only available in small quantities. The Searcy County Soil and Water Conservation District has agreed to provide a seed drill to plant the grass and forb seed mix. The Arkansas Game and Fish Commission will provide a seed drill, provided 8.2 million dollars to acquire the Richland Valley property, and has agreed to provide a cash match of \$205,000 that will be used to purchase seed, equipment and herbicide. The National Wild Turkey Federation (NWTF) has agreed to contribute \$5,000 for this restoration project and NWTF volunteers will assist with removal of fencing at the Lane Bend site and control of exotic weeds at the Richland Valley restoration site. Ozark Ecological Restoration Project Manager Joe Woolbright (who also manages the Baker Prairie in Harrison, AR.) will volunteer time as a consultant to assist with planting seed and plugs, treat exotic plants and inventory the two sites for extant prairie remnant plants and map these areas so they are not disturbed during the restoration process. Buffalo National River will provide three employees to assist with seed planting, collecting, ordering native seed, logistical coordination, applying herbicide and attenuating erosion at the Lane Bend site. BNR will also provide a disk, tractor and herbicide spray rig for the project.

7.0 Long Term Maintenance: The ability to conduct prescribed burns is integral to maintaining prairie habitat. BNR and AGFC possess a crew of highly qualified fire specialist who will cooperatively apply prescribed fire to the prairie restoration sites at least once every three years. BNR and University of Arkansas botanists will monitor the prairie restoration annually to determine botanical species richness and abundance, and evaluate the populations of invasive exotic plant invaders and woody species. If the monitoring data reveal an increasing population of exotic and woody plant species, BNR staff will treat the prairies with appropriate herbicides and fire return intervals may be adjusted to control exotics and promote prairie species.

8.0 Budget over 24 Months

Item	AGFC Match	RMEF Match	NWTF Match	OER Match	Wildlife Action Plan \$\$\$	Total
Salary	\$50,000			\$10,000		\$60,000
Prairie Seed	\$120,000	\$65,000	\$5,000		\$185,000	\$375,000
Herbicide	\$50,000					\$50,000
Equipment					\$10,000	\$10,000
Fuel					\$5,000	\$5,000
Total	\$220,000	\$65,000	\$5,000	\$10,000	\$200,000	\$500,000

Appendix A

The species listed below will be installed in the Lane Bend and Richland Valley restored prairie sites in the first year of the project. These species have been chosen because they occupy prairie habitat and seed can be easily obtained from Ozark Highland genotypes. In the future, other species that historically occurred in prairie will be added to the restoration sites as plugs grown from local genotype seed in a greenhouse facility

<u>Forbs</u>			<u>Grasses</u>		
<u>Species</u>	<u>Seeding Rate</u>	<u>Plugs</u>	<u>Species</u>	<u>Seeding Rate</u>	<u>Plugs</u>
	(oz. PLS/ac)			(lbs. PLS/ac)	
<i>Asclepias syriaca</i>		Y	<i>Andropogon gerardii</i>	1.00	-
<i>Asclepias tuberosa</i>	1	Y	<i>Sorghastrum nutans</i>	0.75	-
<i>Coreopsis tripteris</i>	5		<i>Scizachyrium scoparium</i>	1.50	-
<i>Desmanthus illinoensis</i>	7		<i>Panicum virgatum</i>	0.25	-
<i>Echinacea pallida</i>		Y	<i>Sporobolus asper</i>	0.25	-
<i>Echinacea purpurea</i>		Y	<i>Tridens flava</i>	0.25	-
<i>Eryngium yuccifolium</i>	8	Y			
<i>Helianthus eggertii</i>	Trace	Y			
<i>Helianthus hirsutus</i>		Y			
<i>Heliopsis helianthoides</i>	5				
<i>Lespedeza capitata</i>	7	Y			
<i>Liatris aspera</i>		Y			
<i>Liatris spicata</i>		Y			
<i>Liatris squarrosa</i>	2				
<i>Lobelia puberula</i>		Y			
<i>Manfreda virginica</i>	5	Y			
<i>Monarda fistuosa</i>	2				
<i>Oligoneuron rigidum</i>	3	Y			
<i>Parthenium integrifolium</i>	6				
<i>Physostegia virginiana</i>		Y			
<i>Ratibida pinnata</i>	8				
<i>Rudbeckia fulgida</i>	5				
<i>Rudbeckia hirta</i>	4				
<i>Scutellaria incana</i>		Y			
<i>Silene regia</i>	Trace	Y			
<i>Silphium integrifolium</i>		Y			
<i>Silphium pinnatifidum</i>	7	Y			
<i>Silphium terebinthinaceum</i>		Y			
<i>Silphium trifoliatum</i>	7				
<i>Symphyotrichum novae-angliae</i>	3	Y			
<i>Symphyotrichum pratense</i>		Y			
<i>Verbesina virginica</i>	6				
<i>Veronicastrum virginicum</i>	Trace				

Appendix B. Weed control and planting schedule for prairie restoration

Treatment	Herbicide
1) Spring herbicide application to kill cover crop	Roundup and/or Crossbow
2) Pre-grass emergent herbicide application to kill weed seed	Roundup, Plateau and/or Crossbow
DRILL NATIVE GRASSES (LATE SPRING)	
3) Post-emergent herbicide applications (2)	Plateau or Select
4) Mow (2 or more cuttings as needed) to prevent seed set of annual weeds	NA
DRILL NATIVE FORBS (FALL)	