

**PINE FLATWOODS FOREVER II: LANDSCAPE-SCALE RESTORATION**

**Project Summary**

High-priority pine-oak flatwoods, woodland, savanna, and associated saline barrens/glades will be restored at Pine City and Warren Prairie natural areas through mechanical (forestry mulcher/grinder) and chemical (herbicide) reduction of woody vegetation and prescribed fire. These restoration actions will create additional high-quality habitat, build upon past and current restoration projects, provide connectivity to previously restored high-quality habitat, and revitalize a large landscape of priority habitat, thereby addressing one conservation action funding priority and benefiting at least 10 species of greatest conservation need (SGCN).

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*Pine flatwoods pre- (above) and immediately post-restoration (below) using a grinder*

**SWG Funding Requested: \$51,875 (50%)**

Amount and Source of Matching Funds: \$51,875 (50%) will be provided from the Arkansas Natural Heritage Commission and The Nature Conservancy

Total Project Costs: \$103,750

**NEED:** The Arkansas Natural Heritage Commission (ANHC) and The Nature Conservancy (TNC) previously identified pine-oak flatwoods as one of Arkansas’s most endangered forested ecosystems; they now partner to protect and restore them. Flatwoods have faced dramatic changes in the Mississippi Alluvial Plain (MAP) and South Central Plains (SCP) ecoregions. Much of the MAP has been converted to agricultural land, degrading most of the natural vegetation including the unique pine flatwoods of Monroe County. Similarly, large-scale conversion of flatwoods and pine-oak forests to pine plantations occurred in the SCP. Major threats to this plant community include conversion to agricultural land and plantations, altered fire regimes, invasive plant species, feral hogs, and habitat fragmentation through development.

Warren Prairie Natural Area (WPNA; 5,597 acres) supports a mosaic of important habitats—West Gulf Coastal Plain Pine-Hardwood Flatwoods, West Gulf Coastal Plain Pine-Hardwood Forest/Woodland, and West Gulf Coastal Plain Wet Hardwood Flatwoods—that support at least 28 animal SGCN. The National Audubon Society recognizes WPNA as a globally Important Bird Area (IBA) because of its sizeable winter population of Henslow’s sparrow, the largest known wintering site in Arkansas. An IBA is a significant site that provides essential habitat for one or more breeding, wintering, and/or migrating species of bird; global sites are the highest priority for conservation actions. The natural area also supports northern bobwhite and American woodcock, as well as monarch and Diana fritillary butterflies. A small population (~25 individuals) of red-cockaded woodpeckers (RCW) has been established at WPNA as part of a repatriation program, and the proposed project will help meet the ultimate goal of a self-sustaining population of 30 or more breeding groups.

Extensive stands of open pine habitat (same habitat descriptions as WPNA despite being in a different ecoregion) occur at Pine City Natural Area (PCNA; 1,043 acres), which are among the last remaining high-quality natural stands of this type. PCNA lies within a region of about 500 square miles, primarily in Monroe County, that was the only substantial area of the MAP where loblolly pine stands were characteristic at the time of European settlement. The pines are all loblolly and are an isolated population within the MAP; as a result, they have become genetically distinct from other loblolly pine and support the same suite of SGCN listed above, including the only known RCW population throughout the MAP. The project in this proposal will build on the success of State Wildlife Grants T27-11, T38-01, T-46, and AR-T-F16AF01238 by restoring additional habitat needed to support sustainable populations of the many SGCN at PCNA and WPNA dependent on open woodland and savanna.

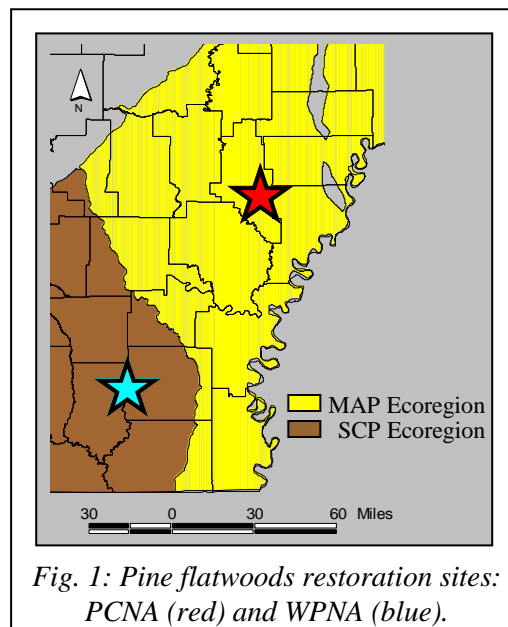
Government Land Office survey notes and aerial photography indicate that the historical flatwoods, savanna, and barrens/glades were much more open than they are today at PCNA and WPNA, emphasizing the need for fire—the most important ecological process maintaining the distribution, composition, and diversity of this system. Decades of fire suppression prior to state ownership at both sites altered species composition and structure, resulting in densification to forested stands. Additionally, much of these two sites was managed for pine production prior to protection and converted from an open to a closed canopy structure. Thus, restoration of pine and pine-oak flatwoods structure and re-establishment of fire are needed if SGCN preferring this habitat are to increase or even persist. This project will create additional high-quality habitat and increase the scale of managed land, thereby providing a larger landscape for SGCN.

**FUNDING PRIORITIES:** This project addresses one 2017 Arkansas Wildlife Action Plan funding priority: Woodlands (to include sandhills, oak woodlands, and pine-oak flatwoods), Savannas, and Glades and Barrens – habitat management to maintain or increase habitat quality or increase patch size, including forest management for SGCN.

**PURPOSE AND OBJECTIVES:** The purpose of this project is to restore and improve quality of pine-oak flatwoods, woodland, savanna, and associated saline barrens/glades by reducing woody encroachment and invasive plant species on 500–700 acres at PCNA and WPNA. Project completion will take two years; objectives are:

1. Restore habitat structure (50–70 ft<sup>2</sup>/acre BA) and species composition by reducing shrub and midstory cover by 40–60% on 120–200 acres at PCNA and WPNA.
2. Restore suppressed ecological processes, namely fire, to increase the amount and quality of native grassland habitat on 500–700 acres at PCNA and WPNA.
3. Measure progress toward desired ecological conditions by monitoring habitat response and response of species of greatest conservation need at PCNA and WPNA.

**LOCATION OF WORK:** Restoration activities will be conducted at PCNA (Monroe Co.) and WPNA (Bradley and Drew Co.) in two ecoregions: the Mississippi Alluvial Plain and the South Central Plains (Figure 1). This project will restore habitat of the West Gulf Coastal Plain Pine-Hardwood Flatwoods, West Gulf Coastal Plain Pine-Hardwood Forest/Woodland, and West Gulf Coastal Plain Wet Hardwood Flatwoods.



*Fig. 1: Pine flatwoods restoration sites: PCNA (red) and WPNA (blue).*

**APPROACH:** Objective 1 will be addressed during the first year of the project period. A forestry mulcher (i.e., grinder) that can chip trees up to 20” DBH will be used to remove shrubs, saplings, and canopy trees. Work will be done during dry soil conditions and in a manner to minimize soil disturbance and damage to tree roots. Work at PCNA includes over- and mid-story manipulation because of the difficulty in harvesting trees at this site without causing major soil disturbance. At WPNA, a grinder will be used to restore and manage the mid-story in areas where the canopy has been thinned by timber harvesting. Herbicide (hack and squirt and foliar spray) will be used on less-degraded areas immediately adjacent to the portion that will be treated with the forestry mulcher to expand the scale of restored areas. Herbicide will target invasive plants and shrub and midstory hardwoods (particularly sweetgum). Areas to be restored include degraded habitat adjacent to existing high-quality managed habitat.

Monitoring results from small test plots treated by a grinder at PCNA and WPNA (2008–2010) show that soil was significantly less compacted and displaced (no rutting) than in timber harvests. In addition, treated stands are ready to be burned following the first growing season since slash is not created; slash from timber harvests takes several years to “melt down” before a burn can be executed safely.

Objective 2 will be addressed during the first or second year of the project period. Prescribed fire by the ANHC and TNC will help maintain appropriate habitat structure, favor native warm-season grasses and forbs, and invigorate the herbaceous layer. Established burn units that encompass the treatment areas will be used. This will increase the size and connectedness of the pine flatwoods woodland, savanna, and saline barrens/glade system and maintain existing adjacent high-quality habitat.

Objective 3 will be addressed by ANHC staff conducting pre- and post-treatment surveys over the two-year period. Surveys for birds will be conducted using a combination of point counts and general area searches; also, butterflies surveyed and tree basal area measured.

**EXPECTED RESULTS AND BENEFITS:** Restoring degraded pine-oak flatwoods, woodland, savanna, and associated saline barrens/glades at PCNA and WPNA will (1) create additional high-quality habitat for woodland and grassland bird SGCN, (2) increase the abundance of nectar-producing flowering plants and host plants for pollinators, (3) help restore an ecological fire regime that is necessary to maintain this system, (4) provide connectivity by restoring degraded habitat adjacent to existing high-quality habitat, and (5) increase the scale of managed land, providing a large landscape to benefit animal SGCN.

Prescribed burning alone will take decades to reach ecological goals due to decades of fire suppression. Mechanical treatment of priority stands coupled with targeted herbicide and the reintroduction of fire will restore community structure; reduce abundance of invasive plant species; favor native warm-season grasses and forbs; increase the size and connectedness of pine flatwoods, woodland, savanna, and barrens/glades; and stimulate the herbaceous layer.

*Table 1: Arkansas Wildlife Action Plan SGCN which will benefit from this project (10). All species have been documented at WPNA and/or PCNA.*

|                   |                         |
|-------------------|-------------------------|
| American woodcock | Le Conte's sparrow      |
| Bachman's sparrow | Monarch                 |
| Diana fritillary  | Northern bobwhite       |
| Georgia satyr     | Red-cockaded woodpecker |
| Henslow's sparrow | Sedge wren              |

This project will benefit 10 SGCN known from PCNA and WPNA (Table 1). Open and frequently burned pine-oak flatwoods, savanna, and barrens/glades will improve habitat for wild turkey, northern bobwhite, white-tailed deer, and non-game birds such as Bachman's and Henslow's sparrows, sedge wren, and RCW. In addition, this woodland restoration, which we will maintain in future years, will provide quality habitat for the Diana fritillary, Georgia satyr, and monarch for nectaring and egg-laying.

The ANHC has observed recent success stories using these management techniques. Benefits from past restoration projects at these two natural areas have been documented for the Diana fritillary, Henslow's sparrow, and RCW. We therefore expect the proposed management techniques will provide the connectivity and landscape scale for SGCN at PCNA and WPNA to increase their population levels and their likelihood of persistence.

**BUDGET:** The estimated total cost of this project is \$103,750, and we are providing match above the required minimum level. The federal share is \$51,875 (50%), and the total match is \$51,875 (50%). The ANHC and TNC will provide non-federal match for restoration activities.

| Category           | Total            | Match - ANHC     | Match - TNC     | Grant            |
|--------------------|------------------|------------------|-----------------|------------------|
| Salary / Benefits  | \$ 7,050         | \$ 2,500         | \$ 1,000        | \$ 3,550         |
| Contract Services  | 95,000           | 48,375           | 0               | 46,625           |
| Travel             | 1,700            | 0                | 0               | 1,700            |
| <b>Grand Total</b> | <b>\$103,750</b> | <b>\$ 50,875</b> | <b>\$ 1,000</b> | <b>\$ 51,875</b> |

## **ORGANIZATION AND STAFF QUALIFICATIONS**

The Arkansas Natural Heritage Commission (ANHC) is charged with the responsibility of establishing and maintaining a System of Natural Areas. Natural areas are those lands specifically managed to preserve, and sometimes restore, natural communities that are now rare across the state. The ANHC has placed a high priority on lands at Pine City and Warren Prairie natural areas. The ANHC and The Nature Conservancy (TNC) have worked closely for more than a decade to protect, monitor, and restore pine-oak flatwoods. They have proven success in restoring and protecting areas at both sites through prescribed burning and timber thinning.

TNC has worked with the pine-oak flatwoods and associated plant communities for approximately 20 years and has developed a broad understanding of this at-risk ecosystem through scientific observation and the use of adaptive management in the implementation of restoration techniques. TNC also maintains a science and conservation staff that is trained in planning and implementing prescribed fires compliant with the National Wildfire Coordination Group standards. In addition to burning expertise, TNC employs a Director of Conservation Forestry that is responsible for planning and oversight of forestry-related projects.

Project Leader: Bill Holimon is an Ornithologist and is Chief of Research for the Arkansas Natural Heritage Commission. Bill received a B.S. in biology from the University of Arkansas at Little Rock and an M.S. in biology from New Mexico State University. Bill previously worked for The Nature Conservancy in Texas on conservation of two federally listed endangered bird species, the golden-cheeked warbler (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*). In addition, he has conducted extensive work on various taxa of red crossbills (*Loxia curvirostra*) throughout North America. Bill is a native Arkansan who has published scientific papers on rare birds of Arkansas.

Douglas Zollner is the Director of Conservation Science for The Nature Conservancy, Arkansas Field Office. He has been working with the Conservancy for 20 years. Zollner also serves as the Conservancy's National Fire Restoration Coordinator, coordinating Conservancy efforts to reduce the threat of altered fire regimes to biodiversity across ownerships at landscapes in the U.S. and Mexico. Zollner has over 30 years of working experience with ecological assessments and conservation planning, woodland and watershed restoration, fire ecology, ecological modeling, and developing and implementing measures of conservation success in an adaptive management context. He received a B.S. from the University of Arizona in Watershed Management and an M.S. from Texas Tech University in the Ecology of Arid Lands.