

RESTORING THE INTERIOR OZARK HIGHLANDS



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The Forest Service's Big Piney Ranger District on the Ozark-St. Francis National Forest, Hector, AR—in concert with multiple partners—is implementing a landscape-scale, long-term project to restore and maintain the forest's fire-dependent woodland ecosystems within the Ozark Highlands.

Prescribed fire, thinning treatments, commercial timber sales, and stewardship contract sales are all included in this large-scale, ambitious undertaking, known as the Bayou Woodland Ecosystem Restoration Project.

The project's overall intent is to return this area back to the landscape condition that greeted the first European settlers here—as documented in the government land office survey records for 10 years beginning in 1830.

For the project's initial phase, six ecosystem restoration areas were identified. These restoration areas represent all of the “land type associations” from the National Forest Ecological Classification System. Each is comprised of 3 to 6 landscape-scale prescribed fire units, for a combined total of 60,000 acres (24,281 ha).

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Fire and the Ozark Highlands

Fire—throughout history—has played a significant role in shaping plant and animal communities within the Ozark Highlands.

Several thousand years prior to European settlement, American Indian ecosystem management practices included setting frequent woodland fires for a variety of purposes. During the 1800s, the first European settlers continued this process—maintaining open,

park-like, oak–hickory and pine woodlands with a rich mix of wildflowers and grasses.

Then, about 80 to 100 years ago, these woodlands were heavily cut. The historic fire regime was drastically altered. Next, long-term fire suppression changed these open woodlands from once having approximately 45 to 76 trees per acre, to today's dense forests with 300 to 1,000 trees per acre.

Collaborative landscape-scale monitoring and adaptive management protocols have been developed for this project.

In 2004, 30,000 acres (12,141 ha) were burned; in 2005, an additional 22,000 acres (8,903 ha) were burned. Forest health and other noncommercial forest thinning treatments totaled 2,500 acres (1,112 ha) in 2004, and 2,000 acres (809 ha) in 2005. Commercial timber sales and stewardship contract sales treated about 6,000 acres (2,428 ha) in 2004 and 2005.

By this combination of both prescribed fire and thinning treatments, landscapes are beginning to change from Fire Regime Condition Class 3*—representing a high

departure from the historic fire regime—to Fire Regime Condition Class 1—representing a low departure from the historic fire regime.

Adaptive Management

Collaborative landscape-scale monitoring and adaptive management protocols have also been developed for this project. A comprehensive monitoring program is documenting ecosystem response to prescribed fire and timber cutting treatments.

Monitoring at 96 permanent plots quantifies treatment effects on:

- The overstory,
- The understory and herbaceous plant community,

* Fire Regime Condition Class (FRCC) is an interagency, standardized tool for determining the degree of departure from reference condition vegetation, fuels, and disturbance regimes. Assessing FRCC can help guide management objectives and set priorities for treatments.



A restored post oak–white oak woodland on a south-facing slope in the Ozark National Forest. The diverse herbaceous understory developed from onsite plants and seed in the seed bank. Overstory thinning and prescribed fire produced these results.

- Fuel loads, and
- Soils.

To date, monitoring results reveal both a 40-percent increase in herbaceous species and an 11-percent increase in herbaceous plant coverage after one to two prescribed fires. The number of shrub stems per acre has decreased by 75 percent in the burned areas.

Additional detailed monitoring data have been provided via three different research projects conducted in cooperation with Arkansas Tech University and the University of Arkansas at Monticello. Two of these studies have documented the effects of oak woodland restoration on the small mammal and bird communities. The third partner-based project has documented the effects of prescribed fire on oak sprouting ecology.

In addition, to ascertain the best program for future use on the Ozark National Forest, fuel load

data from the monitoring plots are currently being analyzed in three software programs:

A comprehensive monitoring program is documenting ecosystem response to prescribed fire and timber cutting treatments.

- FIREMON,
- Fuels Management Analyst, and
- FSveg Fuels Module.

Why Restore This Forest?

While oak trees do not survive or reproduce well in shade, many other trees such as red maple, ash, elm, and black gum thrive in shade. While these tree species are part of the area’s historical plant community, under the historic fire regime, they occurred in far fewer numbers than today. Decades of fire suppression have allowed the forest to

<i>Summary of Herbs, Shrubs, and Trees</i>		
<i>Plants</i>	<i>Treated Plots (1 or 2 burns)</i>	<i>Untreated Plots (no burns)</i>
Herbs		
Avg. # species/plot	7	5
Total number of species	72	63
Average % cover/plot	40	36
Shrubs		
Avg. # species/plot	4	11
Total # species	10	24
Average % cover/plot	9	18
Stems/acre	372	1,515
Trees		
Avg. # species/plot	25	36
Total # species	17	26
Stems/acre	328	470
Basal area	105	111

Quantifying the effectiveness of woodland restoration treatments is an integral component of this multipartner monitoring project. Monitoring data is essential for measuring progress, employing adaptive management techniques, and communicating success.

become much more dense—with a closed canopy.

It is under this closed canopy that these four aforementioned tree species dominate the understory and midstory. Without the reintroduction of fire, they are destined to become the overstory.

Drought and native insects—such as the red oak borer—have historically helped to produce and maintain fire-dependent oak and pine woodlands.

In dense forests, competition among plants for resources—including water, nutrients, and sunlight—is fierce. This competition has produced more than 300,000 acres (121,407 ha) of stressed, unhealthy, and dying trees in the Ozark National Forest. This widespread condition has put the forest at greater vulnerability to insect attack, drought, and premature death. These natural agents of change have an even more severe affect in dense forest.

Restoring the forest structure and implementing prescribed fire will therefore allow for a more open canopy, thereby creating conditions favorable to oak and pine recruitment, as well as an abundant and diverse herbaceous plant understory. This, in turn, will subsequently attract wildlife such as deer, elk, and turkey.

This widespread condition has put the forest at greater vulnerability to insect attack, drought, and premature death.

Big Piney Ranger District Bayou Woodland Ecosystem Restoration Project Fire Learning Network

Collaborative Landscape Goal Statement

- Landscape ecosystem components and processes are maintained within the historic range of variation by periodic fire use and ecologically-based resource management.
- Landscapes are in Fire Regime Condition Class 1, providing healthy watersheds and safety for “communities at risk.”
- Ecosystems within the historic range of variation achieve biodiversity goals and provide multiple recreational opportunities.
- Promote and facilitate ecosystem restoration at other sites and develop public support with continuing partnership involvement.

The changes in structure and species composition that occurred here during the last century not only had negative consequences on the forest ecosystem, but also had a negative impact on the surrounding communities and their dependence on forest resources.

Furthermore, the increased fuel from the dense forest and dead trees poses a significant wildfire risk and threat to human life and private property within, and surrounding, the Ozark-St Francis National Forest. The potential for high-intensity wildfire also



A comprehensive monitoring program is an integral part of the Bayou Woodland Ecosystem Restoration Project. Changes in the plant community that have resulted from recent thinning and burning treatments are tracked in 96 permanent plots.

threatens municipal water sources, thereby affecting even broader populations.

Partnerships for Change

Collaborative partnerships based on a shared vision and common goals are vital to the success of the Big Piney Ranger District's Bayou Woodland Ecosystem Restoration Project.

The Arkansas Chapter of The Nature Conservancy was the primary partner that developed and institutionalized the landscape-scale monitoring and adaptive management plan to track plant community changes for achieving the desired ecological conditions on the ground. This monitoring program includes clear, measurable objectives and detailed descriptions of data collection methods that the project team has successfully implemented.

In addition to supporting on-the-ground efforts, The Nature Conservancy staff is also responsible for leading the South-Central Fire Learning Network, which provides a forum for developing:

- Scientific peer review of projects,
- Multilevel education and outreach campaign methods, and
- Long-term implementation plans.

In addition, the district's long-term participation in the Fire Learning

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Big Piney Ranger District Bayou Woodland Ecosystem Restoration Project

Collaborative Partnership List

Oak Ecosystem Team
Arkansas Chapter of The Nature Conservancy
Arkansas Game and Fish Commission
Arkansas Natural Heritage Commission
Arkansas Audubon Society
Arkansas Forestry Commission
National Wild Turkey Federation
Quail Unlimited
Southwest Fire Use Training Academy
Caddo Nation of Oklahoma
National Park Service, Buffalo National River
Forest Service, Southern Research Station
U.S. Fish and Wildlife Service, Arkansas Field Office
Arkansas Tech University

Network (http://tncfire.org/training_usfln.htm) has been a productive venue for partnership development. This particular affiliation has established a best science-based project and helped accelerate various on-the-ground treatments.

The Bayou project served as the field trip site for the third national Fire Learning Network meeting

(see http://tncfire.org/documents/USfln/USFLN3_summary.pdf).

To date, the project's other partners have included both State and Federal agencies, private organizations, and community groups who are actively participating in the project and bringing tangible, on-the-ground expertise to the success of this ongoing ecosystem restoration work. ■