Background:

Lightning-induced fires have shaped the development of hardwood vegetation communities in the Mid-South for millions of years. The arrival of humans to the region some 10,000 years ago dramatically increased the frequency of fire on the landscape. Fire was used to keep the forests more open and provide high quality habitat for vast herds of elk and buffalo. As a result of these high natural and anthropogenic fire frequencies, open fire-maintained ecosystems like oak woodlands and savannas dominated the transitional zone between the prairies of the west and the deciduous forests of the east. These ecosystems were characterized by widely spaced overstory that allowed for the development of a rich and diverse ground layer of grasses, forbs, and legumes and supported an equally diverse avian community. Oak savannas and woodlands once encompassed >11 million hectares of the Midwestern U.S. Today these open grassy woodlands are largely gone from the Mid-South and are rare across the continent. In fact, oak savannas and woodlands are among the most imperiled ecosystems in North America, and have been reduced to less than 1% of their original extent. Most were cleared for cropland, converted to pasture, or succeeded into closed-canopy forests as a result of fire suppression. Consequently, associated early successional vegetation and avian communities have also drastically declined. Declines in grassland, savannah, woodland, and scrub/shrub bird species over the past 35 years has been attributed to changes in vegetation
structure resulting from succession of these habitat types into closed-canopy forests. It is this significant loss of biodiversity that supports a critical need for the restoration of these highly imperiled ecosystems.

Despite this critical need, research evaluating potential restoration management techniques is limited, especially within our region of the Mid-South. Prescribed fire, mechanical thinning, and the use of forestry herbicides to control persistent woody invasion have all shown potential for restoration. However, few studies have evaluated combinations of these techniques. Many investigators have concluded that fire alone may not be sufficient to restore oak savannahs and woodland ecosystems, and the addition of mechanical and chemical methods may reduce the restoration timeframe from decades to years. While some research has incorporated multiple techniques, it has been conducted in partially degraded wooded grasslands where succession has not advanced to the point of closed canopy forests. Furthermore, research focused on wooded grassland restoration has not adequately addressed changes to avian and vegetation communities when multiple techniques are used.

The Project:

A multi-state project has been initiated to document restoration benefits in terms of forest health, wildfire risk reduction, oak regeneration, native grasslands restoration, rare plant
conservation, songbird conservation, and native community conservation. We also seek to identify the most cost-effective and efficient ways to successfully restore oak savannah and woodland ecosystems. Study sites include Catoosa Wildlife Management Area near Crossville, TN, Land Between the Lakes National Recreational Area near Golden Pond, KY, Daniel Boone National Forest near Whitley City, KY, Edge of Appalachia Preserve near Union City, OH, and Green River Game Lands near Hendersonville, NC.

At each site, replicates of the experiment will be installed with six treatments in a complete randomized block design. The treatments will be: control (no canopy removal, no prescribed fire), light canopy removal-dormant season burning, light canopy removal-growing season burning, heavy canopy removal-dormant season burning, heavy canopy removal-growing season burning, and no canopy removal-growing season burning. An imbedded study using herbicide application to control woody invasion will also be installed at each site. Herbaceous plant, woody plant, and avian community response will be intensely monitored together with fuel loading and fire behavior characteristics.

Conclusion:

The decline and degradation of oak savannahs and woodlands throughout the Mid-South underscores the need to develop management techniques capable of their efficient and accurate
restoration. Evaluation of these techniques with regard to community monitoring and the documentation of costs will allow for the identification of the most efficient strategies for restoration of healthy and sustainable oak savannas and woodlands. Healthy oak ecosystems, which included oak savannas and woodlands, are a rich and beautiful part of the natural history of this region. The Cooperative Oak Ecosystem Restoration Project gives us an opportunity to ensure that this legacy is passed on and remains sustainable. This research provides an excellent opportunity to strengthen the scope of existing research and provide the scientific foundations essential to making such a vision for stewardship more than a plan, more than an idea – a reality.

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