



Research Brief for Resource Managers

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Do open grown oaks indicate former savanna sites?

Karnitz, Holly, and Heidi Asbjornsen. 2006. Composition and age structure of a degraded tallgrass oak savanna in central Iowa. Natural Areas Journal 26:179-186.

Oak savanna ecosystems, which were once common on the landscape in the upper Midwest, are now rare. Much of this habitat loss has been the result of conversion of the landscape for agriculture and development, but historical records also indicate that these open oak systems have transitioned to oak-hickory forest.

There are currently observations that the oak species in these systems have limited regeneration and many agencies are trying to identify where oak savannas were historically located and to initiate restoration activities.

One method for identifying former oak savannas is identifying open grown oaks. However, some of these large, open-grown trees have established post-settlement. Further complicating the ability to identify former oak savannas is the lack of historical records at some sites, making human impacts of logging, farming, grazing, etc. unknown.

Authors of this study hypothesized that tree recruitment would be related to site history, and that the open-grown oaks which would be seen as indicators of savanna habitat may have established post-settlement.

This study was conducted at Saylorville Lake, in central Iowa. The site has open-grown oaks, which would indicate savanna characteristics, and

Management Implications

- Multiple sources of information are needed to determine the location of former oak savannas in addition to open-grown oaks
- Sites that historically were not savanna, but currently support savanna species may still be valuable for restoration

a history of settlement and human impacts including farming and grazing. In 1958 the land was purchased as part of flood mitigation project and all agricultural and land management activity ceased.

In 2002, surveys of overstory trees, understory trees, saplings, and seedlings were conducted. These data were used to evaluate species composition and recruitment patterns, and to calculate values of dominance, frequency, density, and relative importance. In addition to the tree surveys, researchers took cores from large trees and obtained cross sections from trees being removed as part of a thinning project to determine the age of individual trees.

At this site, white oak was the dominant species (based on DBH) but had the lowest importance value, attributable to the low frequency and density of white oaks. A white oak was the oldest tree identified in the survey, being 145 years old, which was established post-settlement.

The three tree species with the highest importance values were American elm, ironwood, and shagbark hickory. Of the eight most dominant species included in the analysis, the oak species included had 3 of the 4 lowest importance values. These low importance values were attributable to low density and frequency of oaks.

Seedling and sapling counts were dominated by shade tolerant species. Seedling density was greatest for green ash (~15,000 stems/ha), and white oak had the greatest seedling density of the three oak species (~8,000 stems/ha). The greatest sapling densities (~100 stems/ha) were recorded for ironwood and grey dogwood. In contrast, the sapling density for all oaks was less than 10 stems/ha. This decline in oaks from seedling to sapling stage indicates conditions which are not favorable to oak recruitment.

The authors point out that this study was conducted at a single site and recognize there are limitations to the application to other sites. However, because Saylorville Lake had the “classic appearance of many former savanna sites after several decades without natural disturbances, such as fire” the findings are likely to apply to other sites in the Midwestern United States.

Most notable may be that the open-grown oaks on this site were established post-settlement. The open-grown characteristics likely developed as the result of a savanna-like landscape being maintained through grazing and possibly periodic fire. When farming and grazing activities ceased in 1958 there was an opportunity for more trees to establish and an increase in those that are shade-tolerant. While the history of oak sites across the Midwest varies, this shift from agriculture to no active management may be a model for other sites in the Midwest.

Although the oldest trees did not provide conclusive evidence of pre-settlement trees, written records indicate the site was a savanna. Identifying open grown oak and evaluating written historical documents could be best way to determine if sites were in fact historically savanna. There is also potential that sites which may not have been savanna pre-settlement would have open-grown oak and other indicators that would make them viable sites for savanna restoration.