



## Research Brief for Resource Managers

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### Influence of fire history on oak savanna stands

*Cody D. Considine, John W. Groninger, Charles M. Ruffner, Matthew D. Therrell, Sara G. Baer. 2013. Fire history and stand structure of high quality Black Oak (Quercus velutina) sand stands. Natural Areas Journal 33:10-20.*

Understanding the historical role of fire in shaping high quality habitat can be used to inform management decisions for restoration and conservation. This study focused on how fire can influence the stand structure “high quality” oak savanna communities. **The goals were to evaluate stand structure, reconstruct fire histories, and see if there was a relationship between the two.**

Four sites in Kankakee County, Illinois were surveyed. These stands were considered to be ‘high quality’ due to their lack of invasive species and the presence of rare plant and animal species. In 2007, stand structure surveys were conducted, and cores taken from canopy trees to determine age. Fire histories were reconstructed using cross sections of trees from each site, where fire scars were identified to year and season.

The fire record, 1930-2007, showed that all four stands had been repeatedly burned. **The range of fire return intervals was 1-10 years, with the average fire return interval being approximately 2 years.** The majority of fires (54%) occurred in the dormant season, suggesting some fires were set by humans during this period.

All sites had similar species composition, where black oak was the dominant canopy. Of the four stands, one was considered even aged, two sites

#### Management Implications

- Including punctuated longer fire free intervals in management plans can allow for recruitment in frequently burned sites
- Combining prescribed fire with other disturbances (grazing, single tree harvest) can be used as part of land management plans in oak savannas to achieve uneven age structure on restoration sites
- Restoration plans should incorporate strategies for removing woody and herbaceous invasive species prior to implementing fire free intervals that allow for oak regeneration

had evidence of distinct cohorts, and one site was uneven aged. The observed differences in stand structure appear to be influenced in part by fire history. **Short fire return intervals were associated with low tree density, low overall stem density, low basal area, and larger and older trees.** For example, the site burned most often lacked recruits in the mid and understory. These open high quality sites with a history of frequent fire are in contrast to most of the region where fire has been excluded and savannas transition to closed canopy hardwood forests.

While this study focused on fire histories, the authors point out that the fire histories do not fully explain the current stand structure. **Disturbances such as drought, grazing, and tree harvesting can alter stand structure both indirectly through altering fire behavior and directly by removing trees and creating gaps.** Within the

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four study sites, distinct cohorts were associated with longer fire free periods, and the site with uneven age structure was the only one with evidence of firewood harvesting. The authors suggest that **managing with disturbances in addition to prescribed fire may be necessary** to restore and maintain high quality oak savanna stands.



Top row: Photos from research sites  
Bottom row: Photos of cross sections with fire scars  
All photos taken by Cody Considine