Illinois Forestry Development Council

Critical Issues Facing Illinois Forests and Forestry

Critical Issue: The Need to Address the Decline of Tree Species Diversity within Illinois Forests (in Particular, the Lack of Oak Regeneration)

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Mature oak tree crowded by younger sugar maples

-Photo courtesy Illinois Natural History Survey

Why is it Important to Address Tree Species Diversity? Historically, the Illinois landscape was a vibrant quilt of prairie patches intermingled with savanna, woodland and forest. Relatively open forests were dominated by mixed stands of oak (*Quercus* species), hickory (*Carya* species), and other hardwood trees. Plant and animal life in Illinois forests adapted over time to local environmental conditions created by the large, light-filtering trees of the forest canopy. Forest organisms became at least partially dependent upon trees for everything from balancing soil nutrients to shelter. In particular, the fruits and nuts produced by trees were used by many forest wildlife species as their primary source of food.

The near-demise of the American chestnut (*Castanea dentata*) and the decline of the American elm (*Ulmus americana*) due to introduced diseases in the twentieth century underscore the importance of retaining the oak component of Illinois forests. The loss of acorns from the menu could initiate a cascading series of negative effects on the health of the interrelated forest community.

An observed downward trend in Illinois tree species diversity is of concern to foresters and other scientists, therefore, because of a potential parallel decrease in diversity of all forest organisms that are dependent upon trees. Maintaining a mix of tree species that approximates the composition and structure of Illinois woodlands and forests prior to European settlement is one strategy to address this problem.

Why has Diversity Declined? The biological diversity of Illinois forests has declined due to a variety of factors, including those of a human nature. Native Illinoisans and settlers alike manipulated the landscape to meet their needs. Land-use histories and ecological studies agree that native peoples burned to create openings and drive game. As land was cleared for agriculture and settlement over subsequent generations, the practices of cutting, grazing, burning, and planting consumed yet also regenerated many forest acres.

Changing land-use practices in the modern 'post-Smokey Bear' period of fire suppression are now credited with promoting the growth of closed-canopy, more densely packed and shaded woodlands and forests. These undisturbed conditions favor fast-growing, shade-tolerant tree species, such as maples

(*Acer* species), which are able to grow more quickly than oaks and eventually overtake and crowd dominant trees of the forest canopy.

What is the Current Status of Oaks in Illinois? At present, Nuttall's Oak (*Quercus texana*) is listed as an Illinois state endangered species, while the Willow and Rock Chestnut oaks (*Quercus phellos* and *Quercus montana)* are state threatened. The oak component in Illinois forests has been reduced by 14% since 1962, and this reduction will continue if oaks remain underrepresented in the younger age classes. In other words, many Illinois woodlands and forests do not support sufficient younger oaks to replace older trees as they die off. Oak seedlings and saplings appear to be least successful on moist sites where shade tolerant maples and American beech (*Fagus grandifolia*) trees have become established. High deer and squirrel populations can also play a role in the number of acorns that survive to germinate. The Illinois Natural History Survey estimates that at current rates of oak regeneration, their reign as the dominant species in the Illinois forest canopy could come to an end within the next 50 years.

What are Some Possible Solutions? One of the most promising ways identified to increase forest biological diversity, not only of tree species but also of ground-cover vegetation, is to re-introduce disturbances such as fire into the system. Forests dominated by oak appear stable in the presence of natural fire conditions. Beech and maples are less tolerant of fire, and fire also helps restore openness in savanna and woodland habitats. In addition, mechanical techniques to bury acorns and thinning vegetation to remove less desirable species can also give oaks a competitive advantage.

Educational programs on the role of fire in Illinois forest ecosystems targeted for private forest landowners need to be developed. In addition to state-provided technical assistance, liability ramifications for prescribed burning operations need to be defined.

Additional Reading

Fralish, J.S. (1997). Community succession, diversity, and disturbance in the central hardwood forest. In M.W. Schwartz (Ed.), *Conservation in Highly Fragmented Landscapes* (pp. 234-266). New York: Chapman and Hall.

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Lhotka, J.M. & Zaczek, J.J. (2003). Effects of scarification disturbance on the seedling and midstory layer in a successional mixed-oak forest. *Northern Journal of Applied Forestry*, 20(2), 85-91.

Ruffner, C.M. & Groninger, J.W. (2004). Oak ecosystem restoration and maintenance in southern Illinois. In M.A. Spetich (Ed.), *Upland Oak Ecology Symposium: History, Current Conditions, and Sustainability, Gen. Tech. Rept. SRS-73* (pp. 177-181). Asheville, NC: USDA Forest Service.

"Forestry professionals agree that the lack of oak regeneration is a serious issue in the Midwest. There is a need for more research and education dealing with this subject."

- Illinois citizen comment

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