

RESTORING FIRE TO RED AND WHITE PINE-DOMINATED ECOSYSTEMS IN THE LAKE STATES: HISTORY AND ECOLOGICAL RESPONSES

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ABSTRACT

The history of wildland fire in the northern Lake States is both contrasting and extreme. Before European settlement, fire—ignited naturally or by Native Americans—was a common occurrence in ecosystems dominated by red (*Pinus resinosa*) and white (*P. strobus*) pine, with fire frequencies often <20 years. The nearly complete logging of the pine resource in the late nineteenth and early twentieth centuries, accompanied by catastrophic wildfires, set in motion an extremely aggressive program of fire prevention and suppression, both in terms of mind set and implementation. It is against this historic backdrop that prescribed fires are slowly beginning to reappear in the largely second-growth pine woods of Michigan, Wisconsin, and Minnesota.

Before fire is widely restored to Lake States pine ecosystems, its effects must be understood. I have examined responses of flora and fauna to prescribed low-intensity surface fires in mature red and white pine plantations. If excessive (>70%) crown scorch is avoided, both pine species are little affected by these fires. Responses of woody and herbaceous understory vegetation to repeated burning have been quantified in a red pine plantation in northern Michigan and a mixed red and white pine plantation in southern Michigan. In general, burning has had little influence on understory species richness, but shifts in structure, composition, and dominance have occurred. A substantial increase in carabid beetle activity following burning also has been documented. Currently the dynamics of fine roots, which are especially vulnerable to a deep-burning surface fire, are being examined.

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FIRE AS A SILVICULTURAL TOOL TO IMPROVE SOUTHERN APPALACHIAN PINE-HARDWOOD STANDS

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ABSTRACT

Historically, fire was an integral part of the disturbance regime of southern Appalachian forests and defined their natural structure and composition. In particular, mixed pine-hardwood forest types occupying dry ridge sites (primarily composed of *Pinus rigida* and *Quercus prinus* in the overstory and *Kalmia latifolia* in the understory) are thought to be highly dependent on high-intensity fires for their maintenance. Fire suppression and the limited occurrence of intense natural fires in xeric pine-hardwood forests have promoted the dominance of hardwoods, and the pine component has been in a state of decline for about 2 decades. We have initiated research on the use of prescribed “stand-replacement” fires to restore degraded pine-hardwood stands. In this application, the objective of the fire is to produce a high-intensity fire, a simulated wildfire, sufficient to produce seedbed conditions for pine seed germination and reduce *Kalmia latifolia* vigor to allow for seedling establishment. This approach has only recently been applied in the southern Appalachians, and very little is known about ecosystem responses to this prescription.

In April 1995, the U.S. Department of Agriculture, Forest Service conducted a prescribed burn along a south-facing slope of a southern Appalachian watershed, Nantahala National Forest, in western North Carolina. Fire had been excluded for >70 years, and the purpose of the burn was to create a mosaic of fire intensities to restore a degraded pine-hardwood community and to stimulate forage production and promote oak regeneration along a hillslope gradient. Our preliminary results indicate that the prescribed fire increased pine regeneration and created a mix of species comparable to wildfire-derived communities. This paper will discuss the advantages, disadvantages, and unknowns associated with this treatment.

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