

THE EFFECTS OF STAND-REPLACING FIRES ON *PINUS RIGIDA* COMMUNITIES IN THE SOUTHERN APPALACHIANS

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ABSTRACT

In the southern Appalachians, xeric sites have historically been occupied by mixed pine-hardwood ecosystems perpetuated by periodic fires. Without fire, pines are eventually replaced by hardwoods. Mountain laurel (*Kalmia latifolia*) has also increased in the absence of fire, further inhibiting pine regeneration. In April 1995, the U.S. Forest Service conducted a high-intensity prescribed burn within declining *Pinus rigida* (pitch pine) stands in the Nantahala National Forest from which fire had been excluded for >70 years. We made pre- and postburn measurements to determine the effects of the fire on the mortality and regeneration of overstory, understory, and herbaceous vegetation.

Following the burn, overstory basal area (BA) decreased by 20%. The BA of all species was similarly affected, but *Quercus* spp. stems decreased by 47%. Understory BA decreased by 66% after burning, and understory stems decreased by 87%. *Kalmia latifolia* biomass at the end of the growing season was only 30% of preburn biomass, but the effects were spatially variable. After one growing season, total understory stem density had increased to approximately half of its preburn value. Understory *Sassafras albidum* (sassafras) and *Quercus* spp. showed the most favorable first year response to fire, increasing to near preburn densities. Conversely, *Acer rubrum* (red maple), one of the most abundant preburn understory species, declined by 90%. Total seedling density declined immediately after fire, but *Pinus rigida* seedlings increased by 400% to 5500 per hectare. By the end of the first growing season, total seedling density had surpassed its preburn level. High-intensity prescribed fires may help to regenerate declining pine stands in the southern Appalachians, but need to occur early during stand development to ensure adequate pine regeneration.

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