

VEGETATION RESPONSE TO PRESCRIBED FIRE ACROSS A MOISTURE/PRODUCTIVITY GRADIENT IN THE SOUTHERN APPALACHIANS

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We examined the effects of single, dormant-season fires on overstory, midstory, and ground flora species diversity and composition, overstory mortality, and tree seedling regeneration the first and second years following prescribed burns in eastern Tennessee, northern Georgia, and western North Carolina. We evaluated the effects of burning along a moisture/productivity gradient that ranged from dry, pine-hardwood to mesic, mixed-hardwood ecosystems. All treated sites were burned in spring before leaf-out (March-April), and adjacent sites were designated as controls. Within each site, vegetation plots were measured in layers: the overstory layer (trees ≥ 5.0 cm d.b.h.); the midstory layer (woody stems < 5.0 cm d.b.h. and ≥ 0.5 m height); and the ground flora layer (woody stems < 0.5 m height and all herbaceous species). Permanent plots were sampled before the prescribed burns and the first and second growing seasons after the burns. As a result of the fires, overstory mortality occurred primarily in the small size-class hardwoods and ranged from 23 percent in the dry, pine-hardwoods forest to < 2 percent in the mesic, mixed-hardwoods forest. In the midstory, fire reduced the basal area of woody species but prolific sprouting from hardwoods resulted in higher density of fire-sensitive hardwoods such as red maple (*Acer rubrum* L.), sourwood (*Oxydendrum arboreum* (L.) DC.), and blackgum (*Nyssa sylvatica* Marshall). On the dry sites, blueberries (*Vaccinium* spp.), huckleberry (*Gaylussacia ursina* (M.A. Curtis) T & G), and mountain laurel (*Kalmia latifolia* L.) increased in density. White pine (*Pinus strobus* L.) decreased in density by 20 to 50 percent and its basal area was reduced by 50 percent after burning. On the most mesic site, midstory density and basal area were not significantly changed after burning. We found no significant change in ground-flora percent cover or diversity after prescribed on mesic sites. We hypothesized that the ground flora was not significantly affected by these low- to moderate-intensity fires because the burns occurred in the spring before the emergence of herbaceous species, and the low soil depth of heat penetration (< 2.0 cm at 59°C) did not result in damage to below-ground rhizomes or buried seeds.

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