

RESTORATION OF MIXED-OAK FORESTS IN SOUTHERN OHIO WITH PRESCRIBED FIRE

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ABSTRACT

Fire plays an important role in the ecology of oak forests, particularly in promoting oak dominance in regeneration layers. Since fire suppression began in the 1940's, the advanced regeneration layer in southern Ohio mixed-oak forests has been succeeding to more shade-tolerant species, such as red maple (*Acer rubrum*), sugar maple (*A. saccharum*), and black tupelo (*Nyssa sylvatica*). Structure is becoming more dense, altering the light and microclimate regimes of the forest floor. In 1994, an experiment was initiated to study the effects of ground fires at varying frequencies on 4 sites encompassing >400 hectares of mature mixed-oak forests in southern Ohio. The objective of the project is to provide information about fire effects on ecosystem processes and plant and animal communities, including soil nutrient cycling, understory light regimes, understory plant communities, tree regeneration, overstory growth and mortality, bird density and nesting success, and invertebrate populations. A GIS-derived integrated moisture index (IMI), based on topography and soils, was used to stratify the study landscape into dry, intermediate, and mesic areas. Prefire soil and vegetation patterns were strongly correlated to the IMI. Following the first-year fires, leaf litter was reduced 50%, nitrification and N mineralization rates decreased, light levels were unchanged, understory vascular plant diversity was unchanged, tree sapling top-kill was higher for shade-tolerant species on dry plots, and overstory mortality was minimal. Densities of several ground-nesting bird species were reduced, but densities of midstory-, canopy-, and cavity-nesting bird species were unaffected by fire.

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