MIXED-SEVERITY WILDFIRE PROMOTES OAK SAPLING RECRUITMENT AND UNDERSTORY SPECIES RICHNESS ON THE CUMBERLAND PLATEAU, KENTUCKY

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Abstract—Wildland fires of natural and anthropogenic origin were once more prevalent in the oak-dominated forests of the Southern Appalachian Region than they are today. In the absence of periodic fire, forest structure and species composition have shifted within many Appalachian forests. In response, forest managers have used prescribed fire to create diversified habitats, restore open stand structure, and enhance the recruitment of desired species, with varied success. As an indirect and unplanned "management tool", mixed-severity wildfire remains largely unstudied, yet may effectively promote targeted species and structural changes in forests. A wildfire within an upland-oak forest in eastern Kentucky provided a rare chance to assess forest recovery across a gradient of fire severity. Nearly 6 years following the wildfire, we found greater net recruitment of oak and pine saplings (2-10 cm diameter at breast height) on moderate and high fire severity sites compared to low severity sites; recruitment of mesophytic competitor species was unaffected by fire severity. Additionally, we found that both relative stem density of oak saplings and species richness of non-woody understory species were positively associated with fire severity. Though not desirable due to complications for control, human safety, and property protection, this wildfire study illustrated the ecologically beneficial effects of mixed-severity fire, inadvertently accomplishing management objectives focused on creating a mosaic of habitats with varied openness and species diversity, and promoting the recruitment of desired tree species, elusive outcomes using prescribed fire alone.

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